McKinsey Global Institute

From poverty to empowerment

Raising the bar for sustainable and inclusive growth

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September 2023

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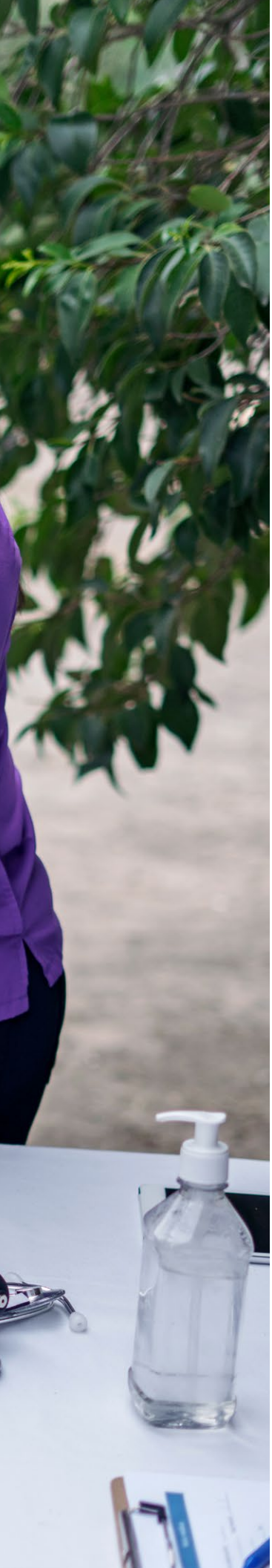


Key findings

— **This research considers growth, inclusion, and sustainability as parts of a connected system.** It assesses the extent to which accelerated growth can further the two defining societal aspirations of our time: raising minimum living standards and limiting global warming. It also frames the choices countries face in a decisive decade that will determine the state of the world in 2050.

— **Beyond ending poverty, the next challenge is progressing toward economic empowerment,** which enables people to realize more of their potential. Economic growth has fueled tremendous poverty reduction in the past half century. Many have argued that the $2.15 per day extreme poverty line needs a complementary benchmark to gauge progress beyond that point. We frame this higher bar as the empowerment line, the level at which people can afford to meet essential needs such as nutrition, housing, healthcare, and education; they also gain a modest sense of security and have reduced risk of slipping back into poverty. Empowerment starts at $12 per day in purchasing power parity terms globally, with regional variations to account for different norms and costs. As of 2020, some 730 million people lived in extreme poverty, while 4.7 billion were below the empowerment line.

— **The pursuit of economic empowerment must be viewed in conjunction with global net-zero commitments.** Addressing the causes of climate change is a pressing economic and social challenge—and at today's emissions levels, the carbon budget to limit warming to 1.5°C is trending toward being exhausted by 2030. Achieving net-zero emissions, as many countries have pledged to do, would require a major increase in investment and in the capacity of energy and resource systems.

— **The dual goals pose tensions that need to be managed.** Rapid improvement in living standards could raise demand for energy- and emissions-intensive products and services (although historical patterns could change if new consumers shift behaviors). A disorderly net-zero transition could increase energy and other costs for consumers and cause labor market frictions, creating a disproportionate burden for low-income households; if people feel it is crowding prospects for their lives to improve, support could waver. At the same time, not acting to curb temperature rise could harm economies, and the poorest populations are most heavily exposed to physical risks.

— **The combined empowerment and net-zero investment gaps amount to an enormous 8 percent of global GDP annually over the decade.** We quantify the cumulative spending boost that would close both gaps by 2030. Lifting everyone above the empowerment threshold implies that the people currently below it would need 40 percent more spending power on average by 2030 (even more in sub-Saharan Africa and India). To get on a net-zero trajectory, the world would need to muster an additional $41 trillion in low-emissions investment (above continued 2020 spending levels, cumulatively through 2030). These are shifts in income, consumption, and investment of an unprecedented magnitude.

— **Businesses and the market economy can generate half the combined resources through growth and innovation.** This involves not only maintaining baseline growth but also boosting productivity even further through investment in technology, new businesses, and human capital. Accelerated growth and better-paying jobs could close almost two-thirds of the global empowerment gap. On the climate transition, even with current policies, we see potential for almost $10 trillion of low-emissions alternatives to become viable for private

actors, especially in power and mobility. All told, growth and innovation, even without policy changes, could unlock just over a third of the step-up needed in net-zero spending.

— **Beyond what market forces can address under current policies, substantial gaps remain—and so do hard choices about whether and how to fill them.** Growth and innovation alone could generate progress that would be historic in and of itself. Yet closing both gaps in full would take even more than what they can deliver without new policies and incentives. We estimate the unfilled economic gap at 4 percent of GDP per year globally, or $40 trillion, cumulatively through the decade. Developing countries account for nearly two-thirds of this.

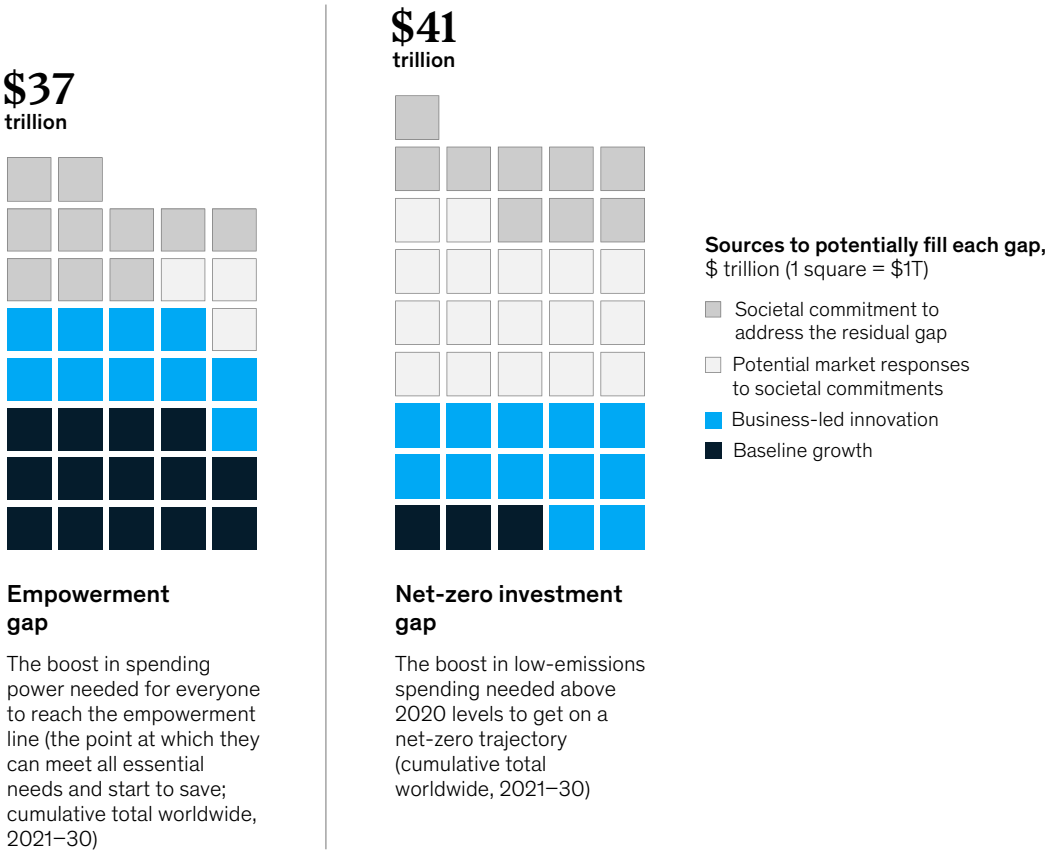
— **Additional societal commitments could accelerate progress but come with their own risks.** Combined public and private action could deliver housing, healthcare, education, and food that is more affordable and leads to better outcomes, potentially unlocking $3 trillion of benefits to those below the empowerment line. Public finance support could change the risk and cost profiles of net-zero investments, unlocking a further $17 trillion from private actors over the decade. However, such extensive commitments could distort the baseline economy. In a scenario where high-income economies choose to shoulder both gaps for the world, it would amount to 3.5 percent of their own GDP annually; the global financial system would need to accommodate higher cross-border flows.

— **Empowering large populations while getting on a net-zero trajectory would take a global push for growth, innovation, and collaboration. Growth boosts economic empowerment and creates the financing capacity for net zero.** The upside is compelling: some 2.1 billion people could move above the empowerment line and 600 million people out of poverty, taking significant steps on their journey toward full economic empowerment. Yet addressing residual gaps would take bolder innovation in finance, technology, industry, and policy. The possibilities include creating new multilateral financing vehicles; integrating low-income countries into global trade in a way that lifts local communities and small businesses; developing sustainable cities with affordable housing; and designing effective carbon markets. Private actors, governments, and nonprofits would need to combine their capabilities and expertise—and think without limits about how they can contribute to meeting this moment.

Exhibit

What would it take for the world to raise everyone to minimum living standards while also getting on a net-zero pathway by 2030?

Growth and innovation can deliver half the combined gap; additional societal commitments could fill the rest in tandem with market responses.



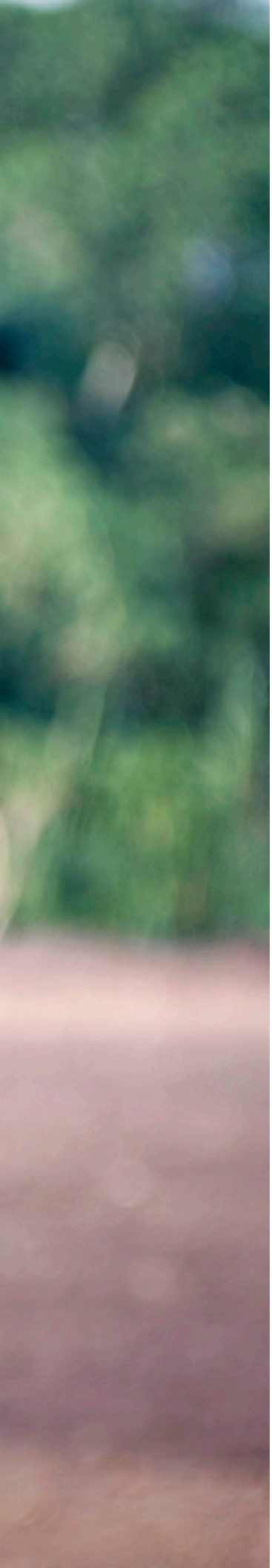
Empowerment gap

The boost in spending power needed for everyone to reach the empowerment line (the point at which they can meet all essential needs and start to save; cumulative total worldwide, 2021–30)

Net-zero investment gap

The boost in low-emissions spending needed above 2020 levels to get on a net-zero trajectory (cumulative total worldwide, 2021–30)

Source: McKinsey Global Institute analysis



Executive summary

Growth, inclusion, and sustainability are connected, often complementing one another but sometimes pulling in different directions.[1] This research explores how growth can contribute to higher living standards and a greener world, building on the tremendous progress of the past half century. Specifically, it looks at the economics of addressing both poverty and climate change in a decisive way—as well as the trade-offs involved.

We focus on established global aspirations without imposing constraints on the ambitions. On the sustainability side, the Paris Agreement laid out a framework to limit temperature rise to well below 2.0°C (and preferably to 1.5°C) relative to preindustrial levels. In response, many countries have committed to **reaching net-zero emissions**. On inclusion, while the world has made historic strides against extreme poverty, development experts and economists have discussed setting a higher bar for living standards. The UN Sustainable Development Goals (SDGs) propose achieving adequate nutrition, health, education, clean water, energy, and living conditions for all. The concept of **economic empowerment** used in this research captures these aspirations. For each country, we estimate the point at which individuals can meet their essential needs and begin to have some security. This does not undermine the goal of eliminating extreme poverty; it explores how to move further toward a world in which people realize more of their own potential.

The actions taken (or not) in this decade will determine what kind of world the next generation will inherit. This research therefore considers how much progress could be feasible by 2030.[2] The time frame is intentional. At today's level of emissions, the world's carbon budget for holding to a 1.5°C path is expected to run out around the end of the decade. In addition, 2030 is the target for the SDGs. Without faster progress on empowerment, the next generation could enter adulthood ill-equipped for the jobs of the future, putting many at risk of falling further behind.

Since these are urgent, simultaneous challenges, we bring them together to offer a more holistic view, considering the interactions between growth, economic inclusion, and the net-zero transition (Exhibit E1). Productivity-driven growth lifts incomes and raises living standards while unlocking the financing capacity needed for a low-emissions future. Meanwhile, innovation that goes hand in hand with growth can bring down the costs of low-emissions technologies. This could lower the spending needed for the transition and reduce the risk of households facing higher costs as a result.

Yet tensions exist in the system. Global economic empowerment implies billions of people with growing demand for energy, while a disorderly net-zero transition could create challenges of affordability. Some may view investment in the transition as a project that crowds out prospects for their lives to improve—but since the poorest populations are most exposed to the physical risks of climate change, reducing those risks is part of ensuring general well-being.

This research **sizes the empowerment and net-zero gaps and explores scenarios of how they could theoretically be closed**. The empowerment gap is the cumulative boost in consumption needed to meet everyone's essential needs by 2030, while the net-zero investment gap is the cumulative spending on low-emissions technologies needed over the decade, above what is

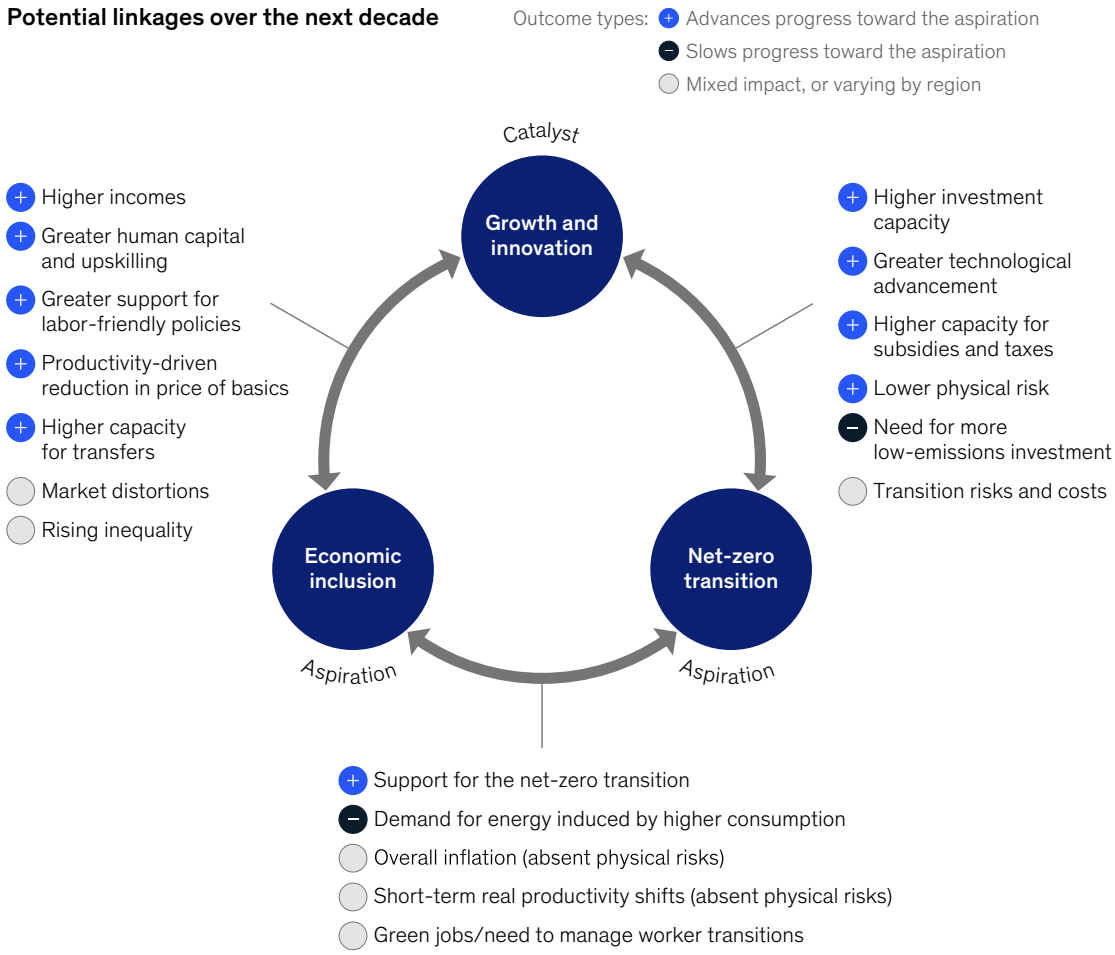
[1] While inclusion intersects with issues of race and gender, this report focuses on economic inclusion for the population as a whole. MGI and McKinsey have a large body of research examining inclusion from racial and gender perspectives. Similarly, while sustainability encompasses many priorities, this research focuses specifically on the net-zero transition.

[2] We use a 2020 starting point to give a clear decade-long view of potential progress. Scenarios from the Network for Greening the Financial System (NGFS), the basis for our sustainability analysis, use 2020 as their starting point. Based on investment in low-emissions assets and increases in empowerment in 2021 and 2022, the scale of spending needed this decade has not dramatically shifted.

Exhibit E1

Growth and innovation are essential to making progress toward bold goals.

Potential linkages over the next decade



Note: In this analysis, we directly quantify the impact of growth on economic inclusion and the net zero-transition. We do not model second- and third-order effects (eg, economic inclusion's subsequent impact on GDP growth).
Source: McKinsey Global Institute analysis

happening at present. Since neither could be addressed instantaneously, we assume steadily upward progress over the decade. This hypothetical would require the equivalent of **8 percent of global GDP annually**, with significant variations by region.

This is obviously a massive sum, and its scale leads us to explore **how much market forces could deliver**. We find that accelerated growth and business innovation could take the world halfway to closing the combined gaps. Companies can make major contributions and benefit from new opportunities, even under current policy frameworks.

Beyond this point, the remaining economic gaps leave societies with choices about whether to address both challenges in full, in part, or not at all. Countries might prioritize one of these transformations over the other, or leave both unaddressed beyond what market forces can do. They might also attempt to make partial progress on both fronts. Closing the gaps would require protecting

baseline growth against headwinds, boosting productivity and innovation to maximum levels, and potentially making societal commitments equivalent to 2 percent of global GDP, as an annual average, over the decade ($20 trillion cumulatively). Importantly, societal commitments would activate more innovation and investment by private actors. But actions on this scale would also take economies into uncharted territory, demanding more attention to maintaining economic growth and stability.

Societies are already spending on the twin priorities. In 2020, some 90 percent of the $1.4 trillion of global net-zero spending was either made by the public sector or subsidized in some way. About 20 percent of the consumption of people below the empowerment line was supported by public and social spending on in-kind transfers in 2020, by our estimates.

Are there further opportunities to close gaps without risking growth? All economies have constraints on fiscal resources. They would need to weigh those constraints against the implications of leaving urgent needs unaddressed—and against the potential longer-term payoff of an economically empowered population and a stable climate. Our research aims to provide ambition, provocation, and a fact base to inform these debates.

Economic empowerment raises living standards

More than a billion people have exited extreme poverty in recent decades. Yet large populations above this line lack adequate healthcare, quality education for their children, or decent housing. The SDGs incorporate higher aspirations, while the UN Development Programme calls to "expand the sense of possibility in people's lives."[3] When people have health, education, and stability, they are equipped to improve their own circumstances.

$2.15

extreme poverty line

$12

global floor of the empowerment line

Continuing to raise the bar everywhere in the world

The World Bank's extreme poverty line was recently updated from $1.90 to $2.15 per person per day (in purchasing power parity, or PPP, terms).[4] But as more people exceed it, the world needs a complementary benchmark to track progress toward a higher living standard.

The concept of economic empowerment described in this research ensures that everyone has the means to access the full range of basics (Exhibit E2). Empowerment still implies living in frugal circumstances. But people can begin to build a modest buffer for weathering emergencies and can invest in themselves to become more productive.[5]

When people rise meaningfully above poverty, many outcomes improve, including childhood mortality, life expectancy, years of schooling, and digital and financial inclusion. Life satisfaction increases when people shed the stress of not being able to make ends meet and can fulfill more of their material desires.[6]

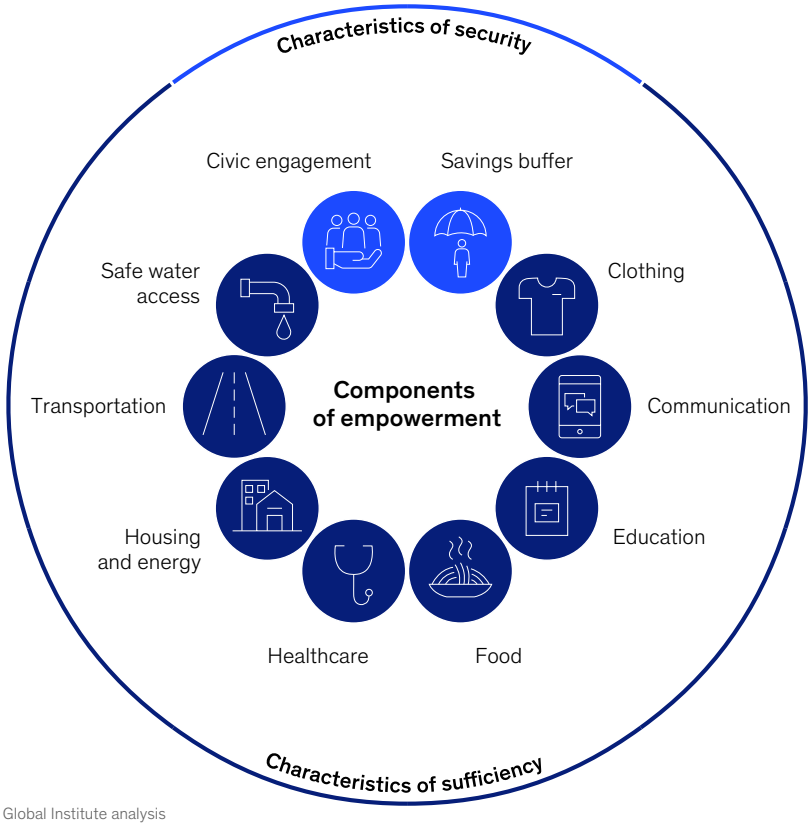
How we quantify the higher bar

We start with consumption of $12 per person per day in PPP terms as a global floor, in line with other research (see Box E1, "Measuring economic inclusion"). For countries at higher income levels,

[3] *Human development report 2021–22: Uncertain times, unsettled lives: Shaping our future in a transforming world*, UN Development Programme, September 2022.
[4] This 2022 update in the global poverty line also involved changing from 2011 PPP terms to 2017 PPP terms.
[5] This concept is rooted in earlier MGI research that quantified the cost of a basket of essential goods and services for households in India. See *From poverty to empowerment: India's imperative for jobs, growth, and effective basic services*, McKinsey Global Institute, February 2014.
[6] Daniel Kahneman and Angus Deaton, "High income improves evaluation of life but not emotional well-being," *Proceedings of the National Academy of Sciences*, volume 107, issue 38, September 2010. Andrew T. Jebb et al., "Happiness, income satiation and turning points around the world," *Nature Human Behaviour*, volume 2, 2018, found a similar relationship between life satisfaction and prosperity globally.

Exhibit E2

The empowerment line is the point at which individuals can meet their essential needs and begin to achieve security.



Source: McKinsey Global Institute analysis

we raise the line to account for local norms and the costs of food, housing and energy, safe water access, transportation, healthcare, education, clothing, and communication, using WageIndicator data as of 2022 and 2023. Purchasing power is consistently set to obtain that basket of goods plus a small margin for social activities and savings.[7] The housing may be a modest apartment; the transportation could be a transit pass, a used car, or perhaps a motorbike in some contexts.

We then convert from PPP terms to 2020 US dollars. Expressed that way, the empowerment threshold ranges between $3 and $50 per capita per day across the countries in our data set.[8] To give some examples, the line is about $3 per capita in Afghanistan and Sudan; $4 to $5 in India, Indonesia, and Nigeria; $8 to $11 in China, Mexico, South Africa, and Thailand; $15 to $45 in Australia, Denmark, Italy, Japan, and Poland; and $50 in the United States. Establishing each country's threshold makes it possible to size its empowerment gap—the share of the population that falls short of sufficiency as well as the dollar amount that would bridge this gap.

[7] We note that having one empowerment threshold for a given country does not reflect how housing and other costs vary from region to region within the country; it costs more to live an empowered life in an expensive major city than in a poorer rural area.
[8] Iceland and Switzerland are outliers on the upper end of the empowerment line range and above $50.

Box E1

Measuring economic inclusion

It's been said that you can't improve what you can't measure. In the case of poverty, the challenge is not a lack of metrics but rather a proliferation of them.[1] Starting with the holistic SDGs, economic inclusion can be framed as moving everyone toward health and well-being, education, affordable essentials, and sustainable communities.

Poverty can be more specifically expressed in monetary or nonmonetary terms.[2] It is often calculated monetarily by looking at income or consumption, using both absolute and relative terms or a hybrid of the two (exhibit). The World Bank, for example, sets its global extreme poverty line at $2.15 per person per day in 2017 purchasing power parity terms. This is the median of national poverty lines in more than two dozen of the world's poorest countries.[3] To account for higher living standards as countries move up the development curve, the World Bank introduced poverty lines specific to lower-middle- and upper-middle-income economies.[4]

Another approach uses the extreme poverty threshold as a floor, combined with lines that rise with countries' income levels.[5] Others have proposed an entirely relative line based on median income or consumption.[6]

Another set of literature uses the aspiration for everyone globally to reach a higher living standard. Development economist Lant Pritchett, for example, proposes using the high-income poverty threshold universally, arguing that there is basic unfairness in setting a line with lower living standards in developing countries.[7] The lower bound of a high-income poverty threshold has inspired definitions of a global middle class, a topic of debate. Abhijit Banerjee and Esther Duflo have explored the consumption patterns that point to someone exiting poverty and entering the global middle class.[8]

The concept of economic empowerment in this research defines a minimum acceptable standard of living as having the means to afford nutrition, education, healthcare, housing, water and sanitation, and energy. Many of these aspirations are embodied in the SDGs; they are essential to enabling people to realize more of their potential. Empowerment starts with an absolute floor that lifts people past the point at which they are no longer at extreme risk of falling back into poverty.[9] Research from Brookings economist Homi Kharas (cofounder of World Data Lab, one of the main sources of data for this analysis) suggests that this level is $12 per person per day in PPP terms.[10]

Since we aim to use a common definition of basic needs and security worldwide, why not an absolute PPP threshold? First, the data set from the WageIndicator Foundation that we use for setting thresholds above the global floor prices a consistent basket of essential goods and services, not the economy-wide basket used in PPP measures.[11] Second, some costs vary due to differing norms for the type or amount of a good or service related to empowerment (for example, the type of transportation required to secure a job or the minimum quantity of healthcare available to consumers). Our approach therefore gradually scales up empowerment lines for countries with progressively higher levels of income.[12]

Our approach is consistent with economist Martin Ravallion's view: "Any absolute line you choose will not adjust over time or across countries for differences in the costs of avoiding social exclusion and relative deprivation. . . . Where and when you live matters as to whether you should be considered poor at any given level of real consumption."[13] Nobel laureate Amartya

1 Anthony B. Atkinson, *Measuring poverty around the world*, Princeton University Press, 2019.
2 Nonmonetary approaches include the Multidimensional Poverty Index developed by Sabina Alkire and James Foster, and the UN Development Programme's Human Development Index. See *Global multidimensional poverty index 2023*, Oxford Poverty & Human Development Initiative and UNDP, 2023.
3 Updated from $1.90 in 2011 PPP. See Dean Jolliffe et al., *Assessing the impact of the 2017 PPPs on the international poverty line and global poverty*, World Bank policy research working paper number 9941, February 2022.
4 R. Andres Castaneda Aguilar et al., "September 2022 global poverty update from the World Bank: 2017 PPPs and new data for India," World Bank Data Blog, September 14, 2022.
5 See, for example, Martin Ravallion and Shaohua Chen, "A proposal for truly global poverty measures," *Global Policy*, volume 4, issue 3, September 2013.
6 Christopher Garroway and Juan R. de Laiglesia, *On the relevance of relative poverty for developing countries*, OECD Development Centre, working paper number 314, September 2012.
7 Lant Pritchett, "Monitoring progress on poverty: The case for a high global poverty line," in *Eradicating global poverty: A noble goal, but how do we measure it?* Emma Samman, ed., Overseas Development Institute working paper, 2013.
8 Abhijit V. Banerjee and Esther Duflo, "What is middle class about the middle classes around the world?" *Journal of Economic Perspectives*, volume 22, number 2, spring 2008; and William Easterly, "The middle class consensus and economic development," *Journal of Economic Growth*, volume 6, 2001.
9 *Latin American economic outlook 2019: Development in transition*, OECD, Economic Commission for Latin America and the Caribbean, CAF Development Bank of Latin America, and the European Union, 2019. Middle-class households have also been defined as "comfortably clear of the risk of poverty" in Anthony B. Atkinson and Andrea Brandolini, "On the identification of the middle class," in *Income inequality: Economic disparities and the middle class in affluent countries*, Janet C. Gornick and Markus Jantti, eds., Stanford University Press, 2013.
10 Homi Kharas, *The emerging middle class in developing countries*, OECD Development Centre, working paper number 285, January 2010, defines the global middle-class line as $10 in 2005 PPP, since raised to $12 in 2017 PPP. Also using this general level are Surjit Singh Bhalla, *Second among equals: The middle-class kingdoms of India and China*, 2007; Nancy Birdsall, Nora Lustig, and Christian Meyer, *The strugglers: The new poor in Latin America?* Center for Global Development working paper number 337, 2013; and Rakesh Kochhar, "The pandemic stalls growth in the global middle class, pushes poverty up sharply," Pew Research Center, March 2021. See also worlddata.io.
11 This data set compiles costs of essential goods (rather than the whole economy, which PPP indices measure). See Martin Guzi et al., *Living wages and income worldwide*, WageIndicator Foundation, 2023, and wageindicator.org.
12 The combination of a floor with a gradual scaling-up approach is used by Dean Jolliffe and Espen Beer Prydz, "Societal poverty: A relative and relevant measure," *World Bank Economic Review*, volume 35, issue 1, February 2021.

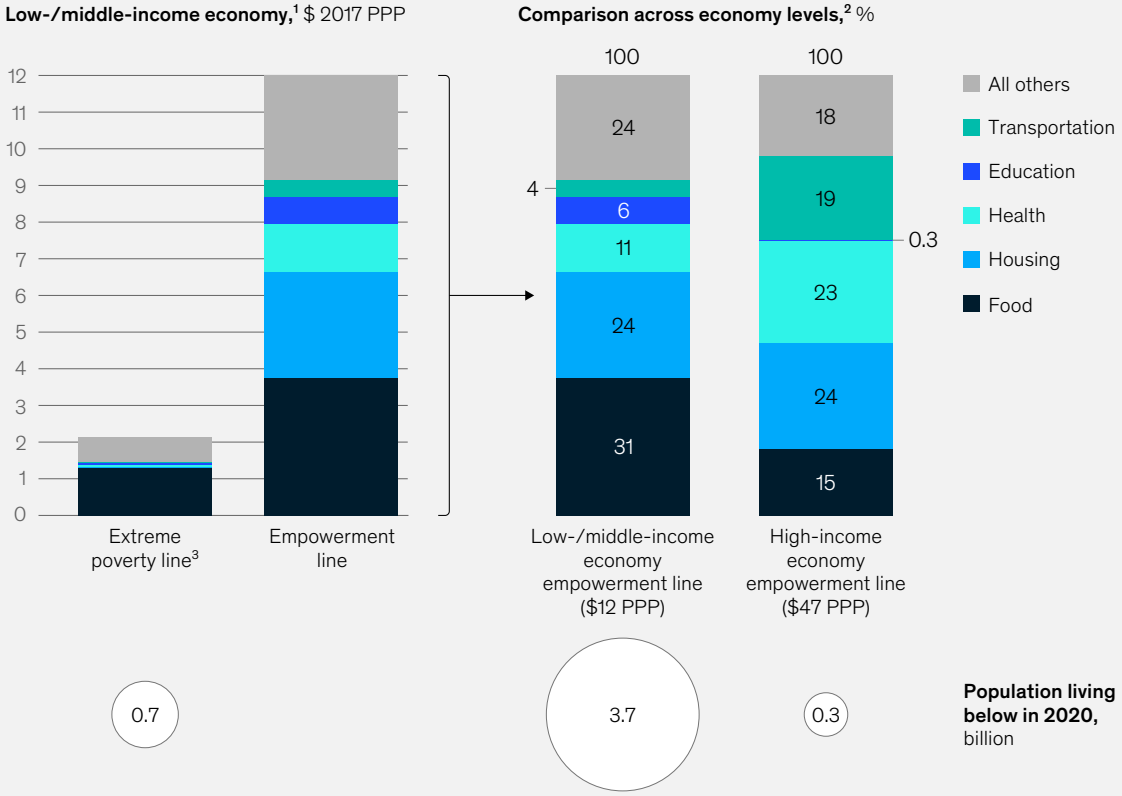
Box E1
(continued)

Measuring economic inclusion

Exhibit

The means required to achieve sufficiency in basic needs vary by stage of development.

Illustrative examples of daily spending patterns



[1]The extreme poverty spending distribution is based on India's first decile of household expenditure in the 2011–12 National Sample Survey of Household Consumer Expenditure. The empowerment distribution is based on spending required to meet basic needs, derived from WageIndicator Foundation data for India. The empowerment line of $12 in 2017 PPP terms is our global floor. It is informed by academic literature, including Kharas (2010) and Bhalla (2007), establishing the global middle-class threshold as $10 in 2005 PPP (since raised to $12 in 2017 PPP).
[2]The empowerment line and distribution are based on spending required to meet basic needs, derived from WageIndicator Foundation data from 2022 and 2023 for the United States.
[3]Based on the World Bank's definition of extreme poverty, which is $2.15 per person per day in 2017 PPP terms.
Source: World Data Lab; WageIndicator Foundation; World Bank; Ministry of Statistics and Programme Implementation (India); McKinsey Global Institute analysis

Sen also notes that what is needed for daily life may differ across societies.[14]

Empowerment is related to the "living wage" concept that has gained traction for employers and workers to evaluate wages against living costs. It has been broadly defined as the amount individuals need to earn to cover their basic household expenses plus taxes.[15] The empowerment line is a consumption-based counterpart that complements this income-based metric.

In both high- and low-income countries, we view empowerment as the point at which people can begin to invest in themselves and have a fuller range of choices about shaping their lives. This echoes Sen's assertions that income alone does not reflect well-being. Economic empowerment conveys the ability to participate in society, the freedom to enjoy life, and individual agency.

Finally, economic inclusion raises the larger topics of inequality and redistribution.

In this research, we determine what it would take to lift the poorest population segments, a goal that has widespread support. We explicitly do not model redistribution from the wealthiest segments as the means to achieve this. We also recognize that poverty intersects with issues of race and gender, but this analysis does not incorporate demographics.

[13] Martin Ravallion, "Two goals for fighting poverty," in *Eradicating global poverty: A noble goal, but how do we measure it?* Emma Samman, ed., Overseas Development Institute working paper, 2013.
[14] Amartya Sen, *Development as freedom*, Oxford University Press, 1999.
[15] See, for example, Amy K. Glasmeier, Living Wage Calculator, livingwage.mit.edu.

Because we use a consumption-based metric, taxes and direct transfers are already taken into account. Cost-of-living thresholds are then adjusted for the estimated in-kind transfers provided in each country. Universal healthcare, for example, lowers out-of-pocket healthcare costs for individuals. We note, however, the challenges of accurately tracking how public services reach the targeted recipients. Indeed, one way for countries to advance empowerment is through logistical and operational improvements to ensure that social benefit programs can be accessed by their intended beneficiaries.

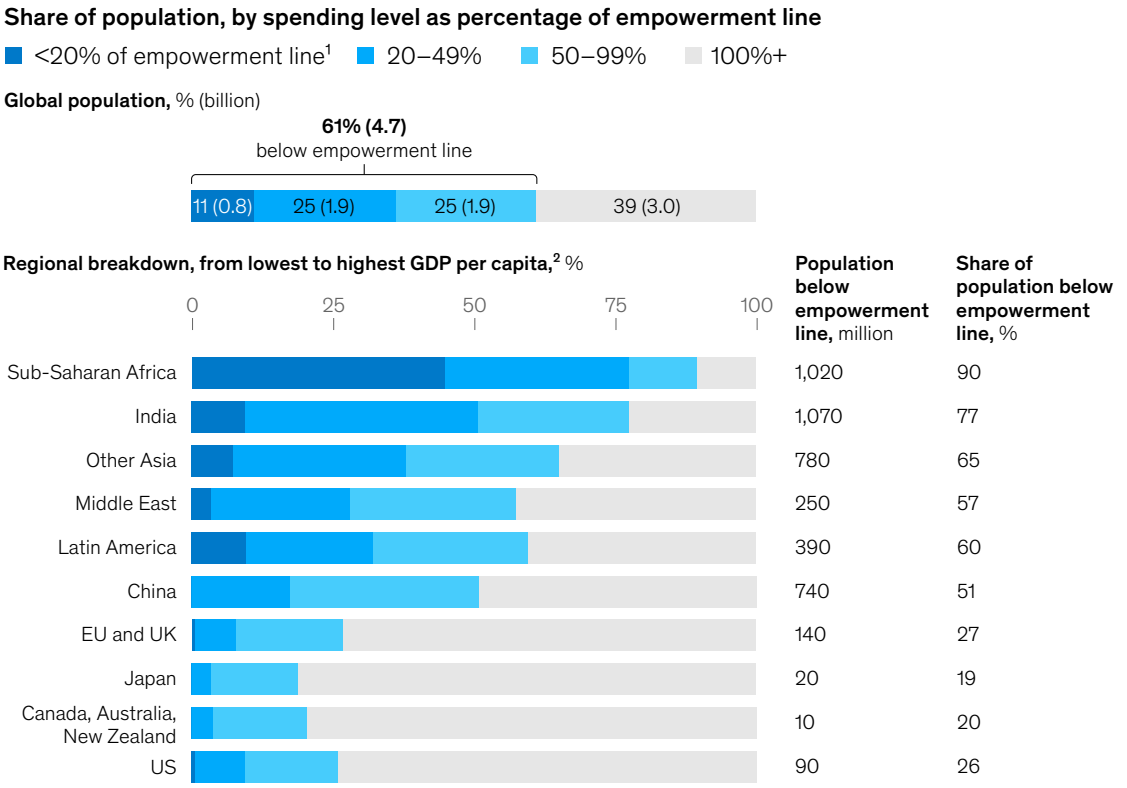
Finally, we note that empowerment is a per-person metric. Families that combine their resources would have better prospects for meeting their basic needs than individuals below this line living alone.

Who is not fully economically empowered?

About 4.7 billion people worldwide (approximately 60 percent of the global population) are not yet fully economically empowered by this benchmark (Exhibit E3).[9] Some 4.4 billion of them live in

Exhibit E3

Worldwide, 4.7 billion people live below the empowerment line, with poverty levels that vary across regions.



[1]A spending level threshold just above the international poverty line for countries where the empowerment line is the global floor of $12 PPP. Based on 2020 population figures.
[2]Geographies represent 95% of global GDP.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; McKinsey Global Institute analysis

[9] For both empowerment and sustainability analyses, we use regional groupings that follow NGFS conventions.

For many people below the empowerment line, especially in the world's major cities, the high cost of housing eats into other priorities.

low- and middle-income countries; nearly half are in sub-Saharan Africa and India. Some may live in rural villages far from the nearest medical clinic; others are in crowded urban tenements.

Yet more than 300 million people in high-income countries also fall into this category, including just over a quarter of the population in the United States and in the European Union and United Kingdom. While even high-income countries have some degree of homelessness and deprivation, most of the population below the empowerment line in these regions does not experience such severe poverty. Yet some of their essential needs are not sufficiently met. In many cases, the high cost of housing eats into other priorities. People may not be able to invest in better education or training for themselves or their children. Closer to the threshold, a person may rent a basic apartment with a decently equipped kitchen; he may even own a TV, a mobile phone, or a used car. But living paycheck to paycheck means there is little savings to handle emergencies, move, or retire comfortably. Someone whose family members have disabilities may have limited prospects for employment without caregiving support, for example.

The family of four squeezed into a small studio apartment in Los Angeles is not fully empowered. Neither is the street vendor in Lima nor the subsistence farmer in Laos.

The magnitude of lifting everyone to empowerment

Our analysis assumes that people below the line gain a bit more spending power each year through 2030. Because we adopt a common time frame for the world, this ramp-up to full empowerment would be steeper for the poorest deciles and more gradual for deciles closer to the line.

Using these parameters, achieving universal empowerment by 2030 would involve boosting the *cumulative* consumption of 4.7 billion people worldwide over the decade by just over $37 trillion (the empowerment gap). This boost is equivalent to 40 percent of this cohort's continued spending at 2020 levels.[10] We note that the gap is the product of how the threshold and the timeline are set. Lowering the threshold or allowing this trajectory to play out over a longer time frame would produce different results.

Making progress toward closing the empowerment gap matters. For billions of people, achieving minimum living standards is *the* foremost existential issue. Their hopes involve getting out of unsustainably high debt, securing healthcare for their children, or moving in search of a better job. Leaving so many people in vulnerable circumstances imposes limits on growth and risks destabilizing societies.

[10] The empowerment gap refers exclusively to the boost in spending power over 2020 levels. The current consumption of people below empowerment thresholds would amount to some $94 trillion over ten years, if extended at current levels.

Empowerment could yield long-term benefits—and not only for the individuals whose lives improve. It would eventually create a virtuous cycle. Many more people would have the skills and agency to participate in a knowledge-intensive and digital economy. They would also become consumers, fueling future growth.

The net-zero investment gap is the incremental low-emissions spending needed by 2030 to change the climate trajectory

Alongside the aspiration to raise living standards, countries and companies worldwide have committed to reducing emissions to net zero, aiming to limit global warming to 1.5°C relative to preindustrial levels in the current century. This research builds on scenarios from the Network for Greening the Financial System to quantify the low-emissions spending needed to get on this pathway by 2030 (see Box E2, "Measuring the net-zero investment need"). Across seven sectors globally, our analysis finds the biggest needs in power and mobility (Exhibit E4).

This research looks at scenarios of baseline economic growth (2.7 percent globally) and accelerated growth (3.4 percent globally).[11] Given the critical importance of growth to economic

[11] Baseline growth relies on projections from Oxford Economics (aggregating different growth rates across countries). Accelerated growth is an adjusted scenario in which productivity gains add another 0.7 percentage point.

Box E2

Measuring the net-zero investment need

We build on scenarios from the Network for Greening the Financial System (NGFS), adjusting for baseline and accelerated growth. NGFS scenarios are frequently used in risk analysis, provide regional granularity, and include a holistic view of emissions. This analysis is performed for approximately 50 key low-emissions technologies and 12 regions, addressing 85 percent of global greenhouse gas emissions. In some cases, NGFS variables were downscaled for more granular quantification. Our "investment" need includes both capital investment and consumer spending on items such as electric vehicles. We include only low-emissions investments such as solar and wind power, while excluding high-emissions investments in areas such as fossil fuels.

We build on the NGFS Net Zero 2050 scenario (with warming of 1.5°C by 2100) to estimate the incremental low-emissions investment that would be needed (the net-zero investment gap). The NGFS Current Policies scenario enables us to estimate how much spending is likely under current policy frameworks (with warming of about 3.0°C by 2100). Other "current policy" scenarios may produce slightly different warming outcomes, though all would find a gap with a net-zero trajectory.

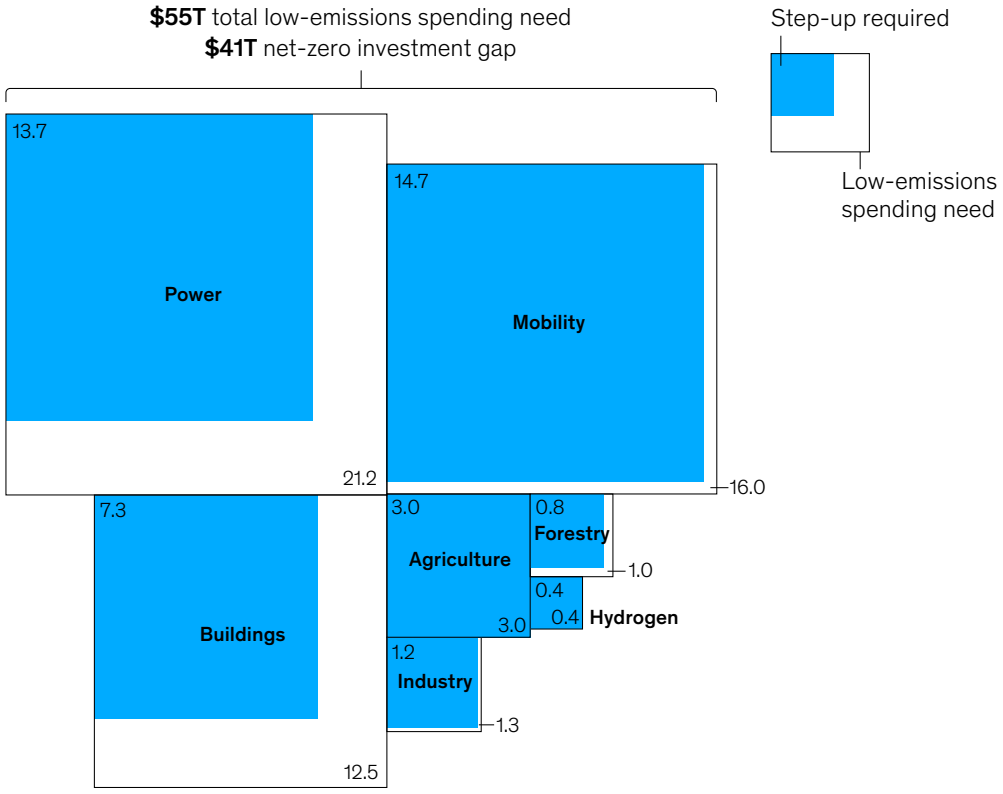
We also employ the McKinsey Transition Finance Model to answer the question of who pays. First we determine, for each lever and region combination, the share of grant and concessional spending required to make low-emissions technologies cost competitive with high-emissions alternatives based on their total cost of ownership, and to compensate consumers and companies for the technological and market risks associated with them. We rely on this modeling even for 2020, due to limited data on present-day subsidies; however, where available, we have triangulated our results with actual data. The rest of the spending need is then split between private actors (corporations and consumers) and public actors (governments, state-owned enterprises, multilaterals, and philanthropies) based on historical patterns and expert input. We acknowledge the many uncertainties in both this allocation and the size of the investment gap.[1]

[1] See *The net-zero transition: What it would cost, what it could bring*, McKinsey Global Institute, January 2022.

Exhibit E4

The net-zero investment need in this decade differs across seven major energy and land-use sectors.

Global low-emissions spending need and net-zero investment gap,[1] 2021–30, $ trillion



[1]Includes investment in assets with low-emissions footprints (not all necessarily carbon neutral) and in enabling infrastructure. Hydrogen includes low-emissions hydrogen production using biomass or electricity, as well as CCS-equipped production from fossil fuels. Forestry includes afforestation and avoided deforestation. Industry includes biofuel production, steel production with electric furnaces using scrap or hydrogen-fueled DRI, CCS-equipped steel production, and cement production using CCS-equipped or biomass-fueled kilns. Agriculture includes low-emissions production methods for crops and dairy and for livestock management (including use of biofertilizers, anaerobic digesters, nitrogen inhibitors, and feed additives). Buildings includes heating equipment for buildings run on electricity or biomass, district heating exchangers and connections, cooking technology not relying on fossil fuels, and building insulation. Mobility includes zero-emissions cars, buses, and commercial vehicles, as well as enabling infrastructure. Power includes electricity generation using wind, solar, hydro, nuclear, and geothermal power, generation relying on biomass and gas with CCS, electricity transmission and distribution, storage infrastructure, and heat production from low-emissions sources such as biomass.
Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

inclusion, we use the higher assumption for net zero, a scenario that could add an estimated 3 gigatons (Gt) of energy-related CO_2 emissions in 2030 if historical relations of growth and emissions hold. This means that low-emissions spending would correspondingly need to scale up almost $5 trillion globally beyond what would be needed in a baseline scenario. In this high-growth world, getting on track for net zero would take cumulative investment and spending of $55 trillion on low-emissions assets over the decade—a step-up of $41 trillion as compared with

simply extending 2020 levels. We refer to this step-up as the net-zero investment gap.[12] At the same time, higher growth would expand the world's financing capacity.

It is important to note that this $41 trillion figure does not reflect the world's full energy and land-use investment; it excludes spending on high-emissions assets. Some high-emissions spending would continue, particularly in developing economies that are still expanding energy access, but overall global levels would fall. Some of the step-up in low-emissions spending could be captured as capital is reallocated away from high-emissions assets, provided that low-emissions alternatives become viable and cost competitive.

Our analysis assumes that providing incentives for low-emissions spending through subsidies would produce the same outcome as discouraging high-emissions spending through taxes. In practice, however, more policy mechanisms are needed to limit high-emissions spending. Some scholars have pointed to carbon taxes and subsidies as complements rather than a binary choice, especially at early stages of the net-zero transition.[13]

Empowerment and the net-zero transition affect each other—and some tensions would need to be managed

As people move toward empowerment, their consumption rises. As mentioned earlier, our analysis builds in the assumption that higher economic growth increases the net-zero financing need, relying on the historical relationship of growth to the production and consumption of energy- and emissions-intensive products. Going further to achieve full empowerment by 2030 could push these needs—and therefore emissions—even higher than what is accounted for in this adjustment.

Using data from India, South Africa, the United Kingdom, and the United States, we estimate that moving everyone to the empowerment line could raise demand for energy-intensive products and services, and in turn emissions, by as much as an additional 15 percent above the effects of accelerated growth alone.[14] However, significant uncertainties surround the effects of growth and empowerment on emissions. Historical patterns could change, for example, if consumers shift behaviors.

Just as empowerment affects the net-zero transition, the reverse is also true. If interventions such as carbon taxes increase the costs of energy and other goods for consumers, they could create a disproportionate burden for people below the empowerment line.[15] Actions such as recycling carbon tax revenue into transfers or subsidies could protect low-income households and provide economic development for distressed communities.[16]

[12] These figures differ from those in our 2022 report *The net-zero transition: What it would cost, what it could bring*. Here we focus only on low-emissions spending rather than total high- and low-emissions spending, and we use a 2030 rather than a 2050 time frame. This research also includes updated data and refined assumptions.

[13] For example, see Daron Acemoglu et al., "The environmental and directed technical change," *American Economic Review*, volume 102, number 1, February 2012.

[14] Data on household energy expenditures from the UK Office for National Statistics, US Consumer Expenditure Survey, Statistics South Africa, and India 68th Round of National Sample Survey. Energy expenditures are uplifted for each decile under the empowerment line, then used to estimate the relative increase in emissions per capita for each country (based on World Bank CO_2 energy-related emissions data for each country's direct emissions). Does not include non-energy and non-CO_2 emissions, which could change the estimate.

[15] Energy prices could rise in the near term, for example, if carbon prices are imposed before low-emissions energy sources are widely available and cost competitive. But they could also decline over the longer term (for example, due to the lower operating costs of renewable energy sources and through energy efficiency).

[16] See, for example, Jonathan L. Ramseur and Jane A. Leggett, *Attaching a price to greenhouse gas emissions with a carbon tax or emissions fee: Considerations and potential impacts*, US Congressional Research Service, 2019; Frederick van der Ploeg and Maria Chiara Paoli, "Recycling revenue to improve political feasibility of carbon pricing in the UK," VoxEU, October 2021; and Baoping Shang, *The poverty and distributional impacts of carbon pricing: Channels and policy implications*, IMF working paper, 2021.

The net-zero transition could produce a surge of jobs in construction, certain types of manufacturing, and operations. Previous MGI research found that job gains could slightly outweigh job losses globally.[17] However, the small net impact disguises the possibility of substantial churn as jobs are redistributed across industries and regions. In addition, the jobs being added may require different skills.

These potential impacts on households and labor markets make it crucial to manage the transition effectively and support consumers and workers in the most affected regions and sectors.

The two aspirations also have complementary aspects. *Not* acting to curb temperature rise could harm growth—and empowerment—substantially through effects such as impairing the ability to work outdoors, agricultural losses, and damage to capital stock. Lower-income people would become even more exposed to hazards if climate change is not convincingly addressed. And research has shown that as households become more empowered, they are more likely to be aware of the risks of climate change and, in turn, lend support to net-zero policies.[18]

The gaps vary widely across regions

The empowerment and net-zero investment gaps vary in magnitude across different parts of the world, not only in absolute dollar terms but also relative to GDP.

In the timeline we have set to 2030, the global empowerment gap would be equivalent to about 4 percent of world GDP on average annually. However, it is only 1 percent of annual GDP in high-income regions, including Australia, Canada, the European Union and the United Kingdom, Japan, New Zealand, and the United States (Exhibit E5).

In developing regions, the starting point is harder. The total empowerment gap is the equivalent of 4 percent of GDP on average annually in the Middle East, 6 percent in Asia (not including China, India, or Japan), 7 percent in Latin America, 13 percent in India, and a daunting 45 percent in sub-Saharan Africa.

The net-zero investment gap is also equivalent to about 4 percent of global GDP each year. It ranges from about 2 percent of GDP in Japan to 14 percent on average annually in India (Exhibit E6).

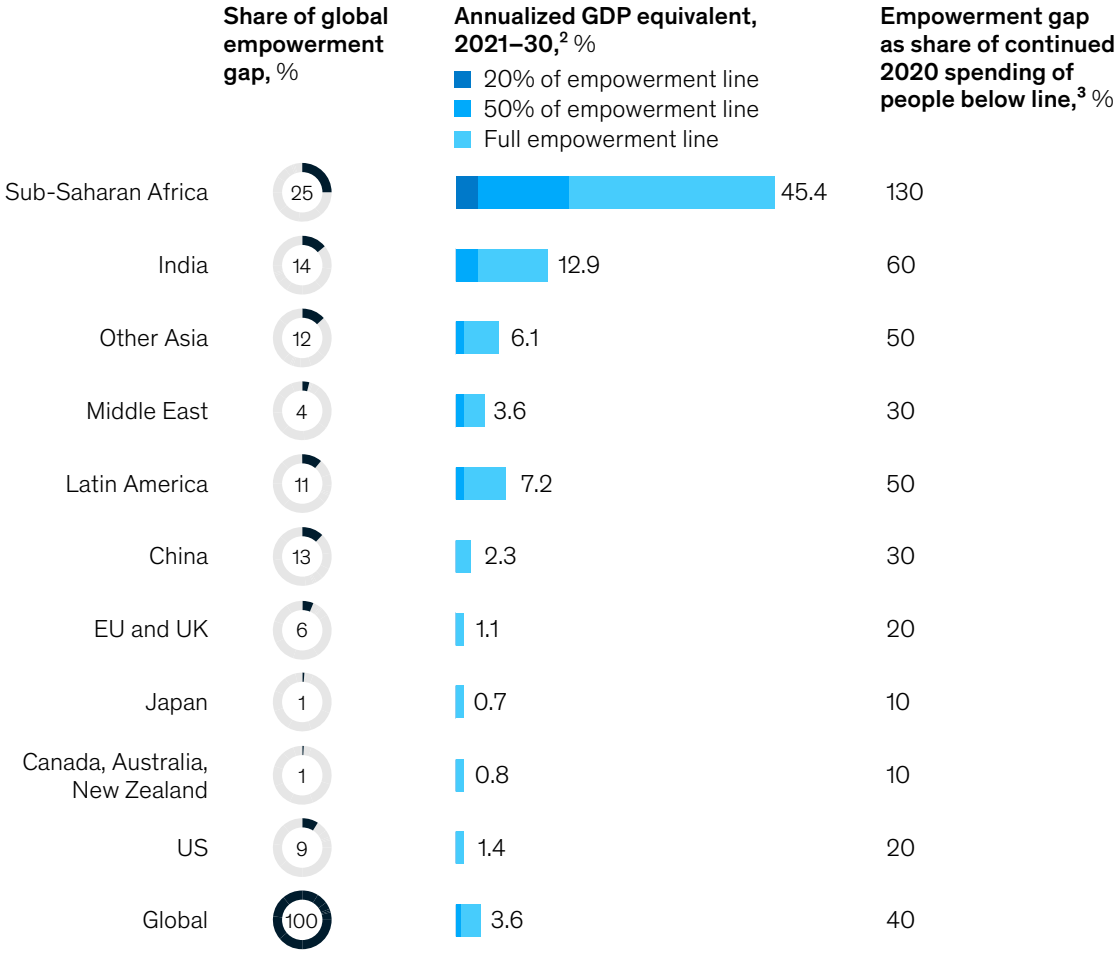
High-income regions have an annual net-zero investment gap on the order of about 3 percent of annual GDP on average, about four to five times higher than their 2020 levels of investment. Most developing regions have a larger net-zero investment gap relative to GDP. They face the twin challenges of replacing fossil fuel generation while substantially broadening energy access and meeting the energy needs of growing economies—and doing so in a low-emissions way.[19]

[17] *The net-zero transition: What it would cost, what it could bring*, McKinsey Global Institute, January 2022. See also *World Employment and Social Outlook 2018: Greening with jobs*, International Labour Organization, 2018.
[18] Higher-income households are more likely to buy products with sustainability-related claims; see "Consumers care about sustainability—and back it up with their wallets," McKinsey & Company, February 2023.
[19] NGFS scenarios account for differences in likely emissions reduction trajectories across developed and developing economies. Developed countries typically reach net zero earlier than developing countries.

Exhibit E5

Lower-income regions generally have larger shares of the $37 trillion empowerment gap.

Empowerment gaps by region, from lowest to highest GDP per capita[1]

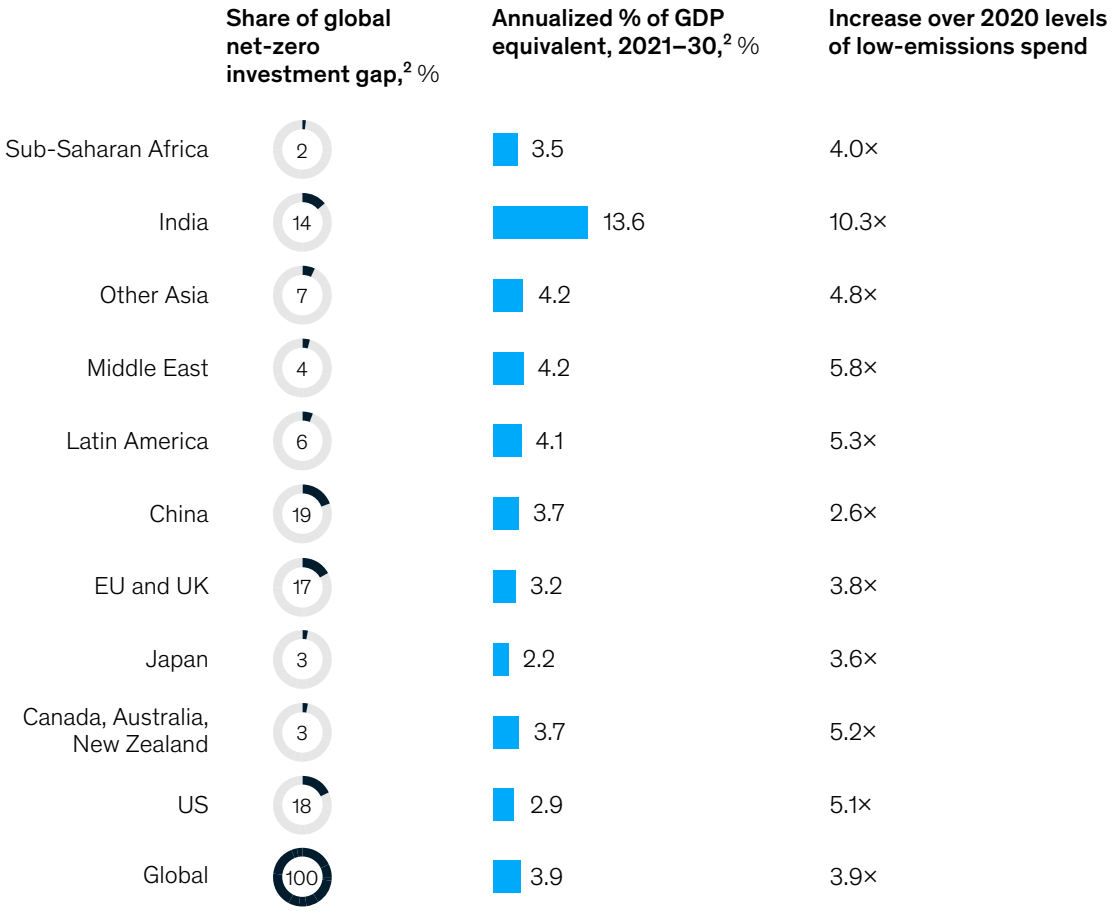


[1]Regions listed represent 95% of global GDP.
[2]In a high-growth scenario (3.4% global growth annually, 2021–30).
[3]Reflects target spending for populations below the empowerment line, 2021–30 divided by a continuation of their 2020 spending and in-kind transfers. Figure based on a linear ramp-up of spending each year, 2021–30, with full empowerment reached in 2030. The global step-up from 2020 to full empowerment in 2030 is ~80%.
Note: This is not a projection or prediction but rather a scenario analyzing how specific empowerment goals could be financed. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per person per day, based on academic research.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; McKinsey Global Institute analysis

Exhibit E6

Each region has a unique share of the $41 trillion net-zero investment gap.

Net-zero investment gaps by region, from lowest to highest GDP per capita[1]



[1]Regions listed represent 95% of global GDP.
[2]This reflects a high-growth scenario (3.4% annual global growth, 2021–30). In a baseline scenario of 2.7% global growth, the net-zero investment gap would be $37 trillion (cumulative, 2021–30).
Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the NGFS Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

Growth and business-led innovation could be the biggest drivers of economic empowerment

How could populations below the empowerment line gain more spending power? Our scenario starts with growth. By our estimates, aggregate baseline growth of 2.7 percent per year globally could generate enough income to give our target population the ability to meet some $14 trillion

more of their needs over ten years.[20] This could help lift 830 million people into empowerment by 2030 and bring some 160 million people out of poverty, reducing the share of the global population in poverty from 11 to 8 percent.[21]

On top of this, businesses can improve productivity to accelerate global growth. Farm and non-farm sectors have the potential to raise productivity, in aggregate, by at least 0.5 to 1.0 percent each year across regions, as outlined in many prior MGI research efforts.[22] This is not only about cost-saving efficiencies; it is also about innovation and new business creation, new types of work, and products and services that address new markets. If global growth could reach 3.4 percent annually by harnessing such opportunities, more resources would also become available for public goods and social spending.

Increasing investment and technology adoption will be key to these efforts. This creates the challenge—and the opportunity—to upskill workers to use those technologies and make successful job transitions into more productive sectors and better-paying occupations. Previous MGI research has explored the scale of the skill shifts and occupational transitions that will likely be needed in the years ahead.[23] Our analysis here suggests that roughly 10 percent of lower- and mid-skill workers could see their wages rise if they are equipped to take on higher-skill jobs by 2030 in response to technology, sector-specific growth opportunities, and other trends.

Businesses have a critical role here. About half of workers' lifetime earnings is due to skill building through work experience and learning on the job; this dynamic is especially important for those without educational credentials who start out in low-wage work.[24] Businesses can become more productive by accelerating this process: during the pandemic, for example, US workers moved into different occupations, including better-paying ones, at a rate 50 percent higher than in the past.[25] But upskilling does not happen without intentional effort. It will be a heavy lift for businesses to improve this dynamic, especially where the process involves bringing people from subsistence farming into more productive work.

All told, higher growth combined with creating and filling more productive jobs could close an additional $10 trillion of the global empowerment gap beyond what baseline growth can deliver, by our estimates. This includes the impact of social and public transfers rising in line with higher growth. This could raise living standards and transform lives on a massive scale, lifting 2.1 billion people into empowerment and 600 million more out of poverty. In this scenario, the share of the global population below the empowerment line drops from 60 percent to 30 percent and the share in poverty shrinks to 3 percent over the decade.

Lower-income countries would take longer to achieve full empowerment. But accelerated economic growth could eliminate the most severe forms of poverty in much of the world by 2030 (although we note the unique difficulties in places where conflicts are ongoing, among other deep-rooted structural issues).

[20] The lift required for global empowerment is based on 2020 empowerment thresholds. We do not adjust annually, although the line may in fact rise due to increasing per capita income, changes in input costs, and other factors. Conversely, we also do not model the potential positive GDP implications of having many more empowered and productive workers.
[21] We use 20 percent of the empowerment line as a proxy for poverty. For countries at the floor of $12 PPP per day, this is slightly higher than the World Bank's $2.15 line.
[22] Recent research includes *The future of wealth and growth hangs in the balance* (May 2023) and *Rekindling US productivity for a new era* (February 2023).
[23] See, for example, *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, November 2017.
[24] *Human capital at work: The value of experience*, McKinsey Global Institute, June 2022.
[25] *Generative AI and the future of work in America*, McKinsey Global Institute, July 2023.

The toughest challenge is in sub-Saharan Africa. If economic growth remains at the baseline, the absolute numbers of those experiencing the most extreme deprivation might actually tick up as the population rises. But accelerated productivity-driven growth could cut that population in half, which translates to 250 million people exiting poverty. The gap remaining to fully erase poverty in this scenario amounts to $120 billion over a decade, equivalent to about 5 percent of total public spending in these countries, projected at historical rates. At the same time, living standards would continue to improve for the rest of the population. In a high-growth scenario, the population above 50 percent of the empowerment standard would rise from 260 million in 2020 to 550 million in 2030. Transforming so many lives would expand the continent's possibilities (see Box E3, "The empowerment opportunity for Africa").

Some $15 trillion of new low-emissions spending could be unlocked this decade through growth and innovation

How much low-emissions spending can be spurred by growth and innovation? And what role will private actors play? This depends on whether each low-emissions investment opportunity is "in the money"—that is, competitive in total cost of ownership relative to traditional alternatives. We have analyzed these by technology, sector, and region.

Only about 10 percent of the $1.4 trillion low-emissions investment in 2020 was fully private. Our model starts by assuming these levels continue over the decade. This would mean an additional $14 trillion coming on stream by 2030.[26]

On top of that, an additional $15 trillion in investment could occur, even without changes to the policy frameworks that existed in 2020.[27] Of this, $3 trillion could come from current investment simply rising in line with baseline growth (assuming that spending levels stay consistent as a share of GDP). The remaining $12 trillion could occur with accelerated economic growth and, more importantly, with technological advances on the horizon making low-emissions alternatives more cost competitive.

While some of this $15 trillion step-up would continue to be financed or subsidized by public budgets, the majority could consist of "in the money" spending by the private sector. Combined with continued spending at 2020 levels, some $10 trillion in low-emissions spending could become viable for private actors by 2030.

Where exactly are these "in the money" opportunities? The power and mobility sectors in China, Europe, India, and the United States collectively make up about 70 percent of this category—and these are precisely the areas with the biggest needs for investment. Action is already building in these areas. With new supply chains turning out batteries and a wider array of models hitting the market, electric vehicles are poised to become more affordable. Meanwhile, technology advances and continued cost reductions could create almost $700 billion of new viable investment opportunities across solar and wind generation in these regions.

[26] Our breakdown of spending across public and private actors is based on a granular bottom-up modeled assessment across technologies and regions. For the public sector, we include grants and concessional financing and direct public spending. We have triangulated our results from 2020 with external estimates and find them broadly in line. Any discrepancies are likely due to differences in how subsidies are accounted for.

[27] This includes, for example, carbon taxes in place as of 2020 in the EU.

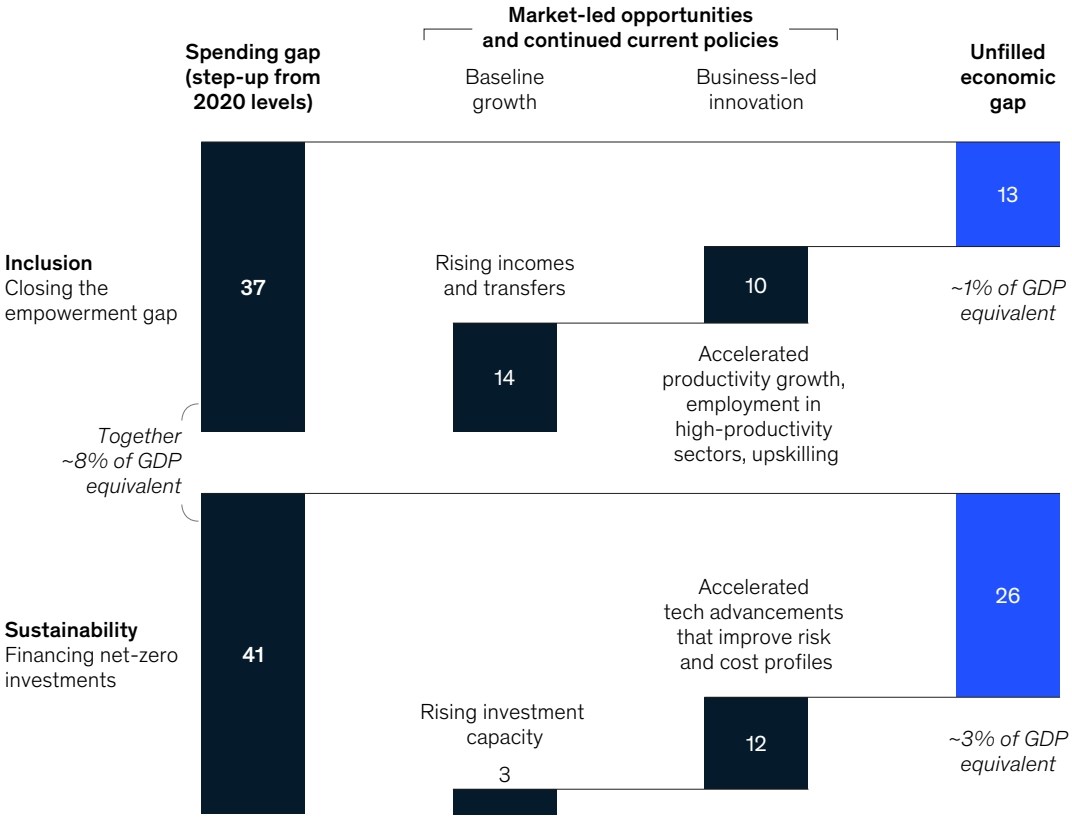
The extent to which growth, innovation, and continued current policies could close the combined gaps varies by region

Market forces—the combination of higher productivity-driven growth, business innovation, and technology advances—plus the continuation of current policies and public commitments could move the world much further on both fronts. At the global level, these forces could close roughly half of the combined empowerment and net-zero investment gaps (Exhibit E7). By our estimates,

Exhibit E7

Market-led opportunities and continued current policies could potentially get the world halfway toward the combined goals.

Avenues for filling each gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific empowerment levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For net-zero investments, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending. Assumptions about policies and current commitments are as of 2021, reflecting the NGFS scenario.
[1]2020 $.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

just under one extra percentage point of growth reduces the unfilled empowerment gap by more than one percentage point of GDP.[28]

But growth and business-led innovation have uneven potential across countries (Exhibit E8).

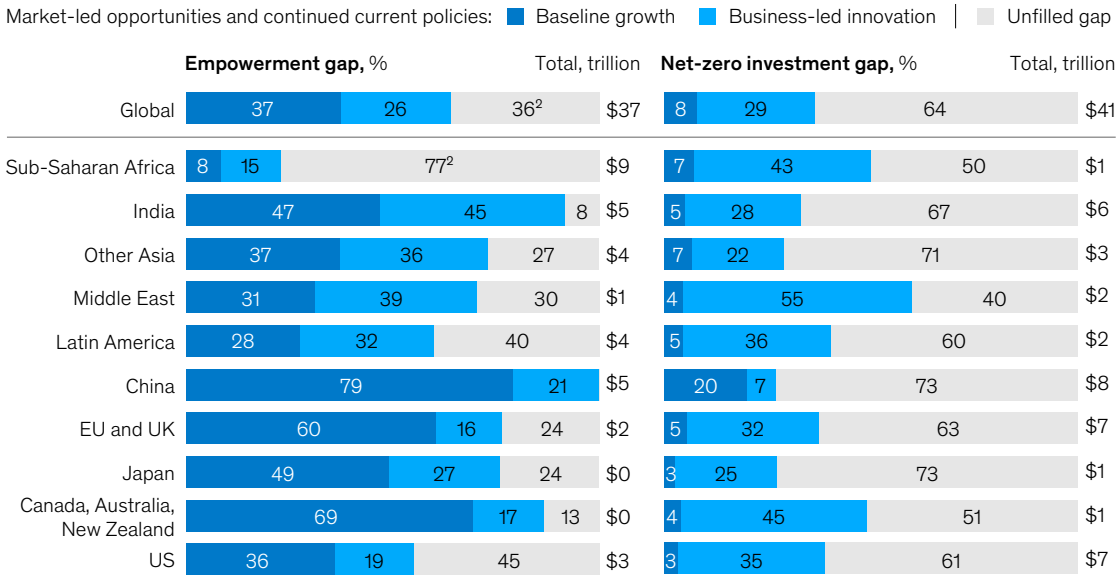
By 2030, these two forces could fill roughly 55 to 85 percent of the empowerment gap in high-income regions. Across the rest of the world, the picture varies widely. The greatest potential lift could occur in India and China. Accelerated growth and business innovation could erase more than 90 percent of the empowerment gaps in both countries, lifting about 700 million people in India and over 730 million in China above the threshold by 2030. But these two forces may have lower impact by 2030 in many other developing countries.

For net zero, the potential impact of growth is less, as discussed previously. Growth and business-led innovation plus continued current policies could together fill about 30 to 60 percent of the gap, with economies in Asia (apart from India) at the lower end.

Exhibit E8

The portion of the economic gaps that can be filled by growth and business-led innovation varies by region.

Potential of each avenue to fill gaps by region, from lowest to highest GDP per capita[1]



[1]Regions listed represent 95% of global GDP.
[2]Getting the full population to 50% of the empowerment line would decrease the unfilled gap to 23% globally and to 56% for sub-Saharan Africa specifically.
Note: Numbers may not sum to 100% due to rounding. This is not a projection or prediction but rather a scenario analyzing how specific empowerment spending levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For sustainability, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

[28] While economic growth increases the low-emissions spending need to reach a net-zero trajectory, the unfilled gap remains largely constant as a share of GDP.

The residual gaps raise fundamental questions

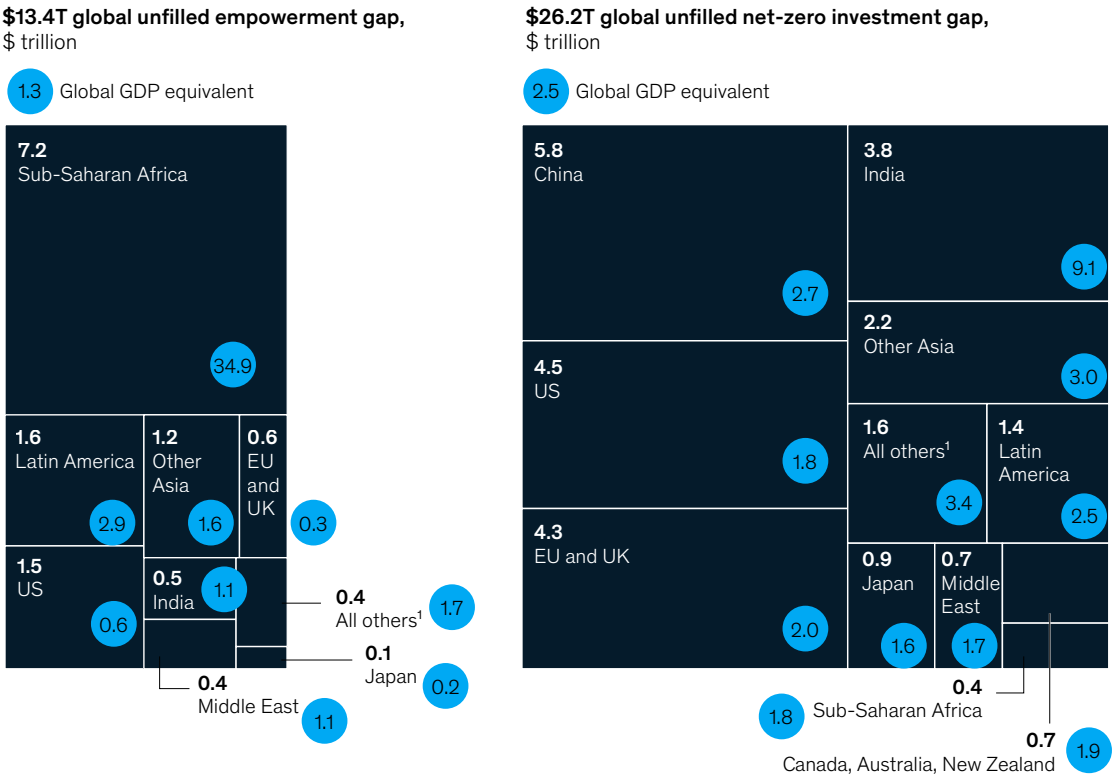
After accounting for growth, business innovation, and continued current policies, the unfilled gaps amount to $40 trillion across both empowerment and net zero. This is the global total, cumulative through the decade, with roughly $13 trillion on the empowerment side and $26 trillion for net-zero investments through 2030. Each country and region has a unique share of this residual gap, depending on its current development challenges, its growth prospects, and how carbon-intensive its economy currently is (Exhibit E9). Developing countries account for nearly two-thirds of the residual gap globally.

Exhibit E9

Sub-Saharan Africa has the highest unfilled economic gap, followed by the United States and China.

Regional breakdown of unfilled empowerment and net-zero economic gaps, cumulative, 2021–30

XX GDP equivalent for each region, annual average 2021–30, %



[1]Includes Canada, Australia, and New Zealand.
Note: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific empowerment spending levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For sustainability, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending. Figures in 2020 US dollars.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

Different outcomes are possible depending on the extent of growth, innovation, and public-private action

The choices societies make about prioritizing these aspirations and putting resources into them can produce a broad range of outcomes.

If economic growth stays at the baseline, but innovation does not bring down the cost of low-emissions technologies as much as expected and no additional commitments are made, some 830 million people would cross the empowerment line by 2030. But some 3.9 billion would remain below it, and the world would be on a trajectory for over 3.0°C of warming in 2100.[29]

[29] Drawing on expected warming under the NGFS Current Policies scenario as of 2100.

Box E3

The empowerment opportunity for Africa

This report builds on NGFS scenarios for its net-zero analyses. We therefore use NGFS regional groupings for our economic empowerment analysis to make the two goals more comparable. Yet the African continent is bigger and more diverse than the focus on sub-Saharan countries implies.

Looking at the entirety of Africa adds in other major economies, including Algeria, Egypt, and Morocco. While 90 percent of the population in sub-Saharan Africa alone is below the empowerment line, that share shrinks to 85 percent for the entire continent. Africa's gap to reach full empowerment is equivalent to 33 percent of GDP, down from 45 percent of regional GDP for sub-Saharan Africa alone.

Yet economic empowerment is not a binary condition, and what matters is progress along the continuum. Some 70 percent of the entire continent's population was below 50 percent of full empowerment in 2020. Getting them above this intermediate benchmark would be a major stride in development. This would require a boost in spending power equivalent to 11 percent of GDP, roughly in line with India's full empowerment gap—and significant progress is achievable through faster growth and business-led innovation.

Just as the story changes while zooming out to the full continent, it also becomes more nuanced when zooming in to individual countries. Beneath the regional aggregates are some economies that have stronger recent growth momentum and others with large populations closer to full empowerment. In Algeria, Botswana, Egypt, and Morocco, for example, market-led opportunities could close at least 70 percent of the full empowerment gaps—and get the entirety of these countries' populations above the 50 percent benchmark. Meanwhile, countries such as Benin, Cote d'Ivoire, Ghana, Kenya, Senegal, and Tanzania could rely on market forces to get more than half of their populations to 50 percent of full empowerment.

In our scenario of accelerated growth, some 770 million people across the continent could be above 50 percent of the empowerment line by 2030—almost doubling the number in 2020 (exhibit). At the same time, the number of people living in extreme poverty would drop by just under 270 million over the decade. As noted in recent MGI research, African economies can accelerate these outcomes through digitization, talent development, regional collaboration, and industry champions.[1] These strategies could attract more international investment, creating self-sustaining momentum that transforms millions of lives.

[1] *Reimagining economic growth in Africa: Turning diversity into opportunity*, McKinsey Global Institute, June 2023.

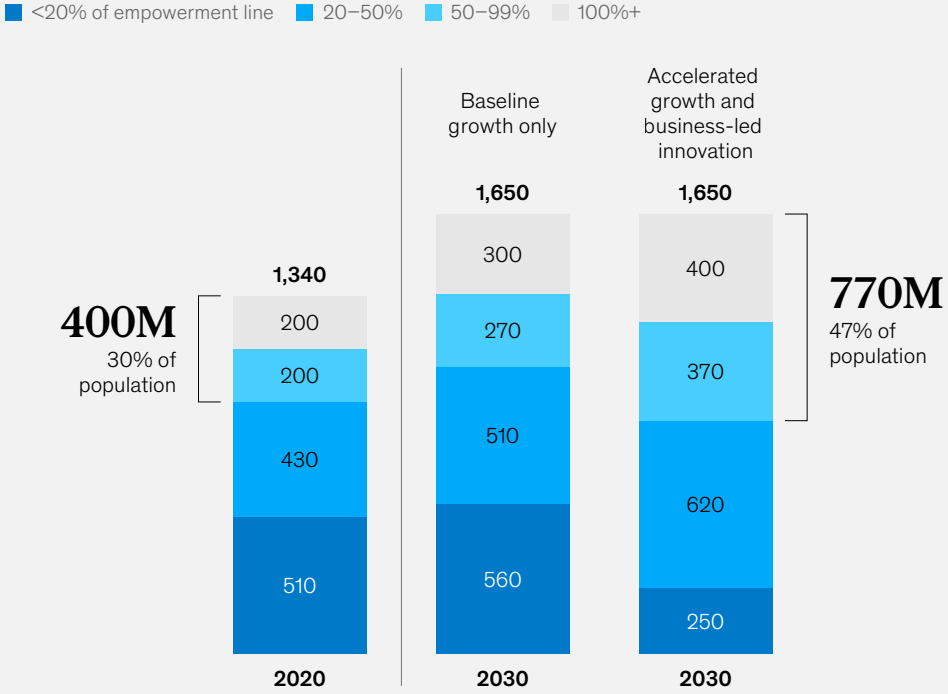
Box E3
(continued)

The empowerment opportunity for Africa

Exhibit

In Africa, growth and innovation could reduce poverty and lift almost another 400 million above 50 percent of the empowerment line.

Africa's population, by spending level as a percentage of empowerment line, million



Source: World Data Lab; WageIndicator Foundation; World Bank; Oxford Economics; McKinsey Global Institute analysis

Exhibit E10 shows the degrees of progress that could be achieved in line with higher growth, innovation, and commitments. While these are global results, the trade-offs differ across countries and regions.

— **Innovation-led accelerated growth.** Countries could choose to rely solely on maximizing what market forces can do. With higher economic growth and innovation delivering the anticipated productivity improvements and reductions in the price of low-emissions technologies, 2.1 billion people could move above the empowerment threshold, but the world would be on a 3.0°C warming path. This would produce much more progress, especially on the empowerment side, than the current trajectory, although it would be far from closing the gaps.

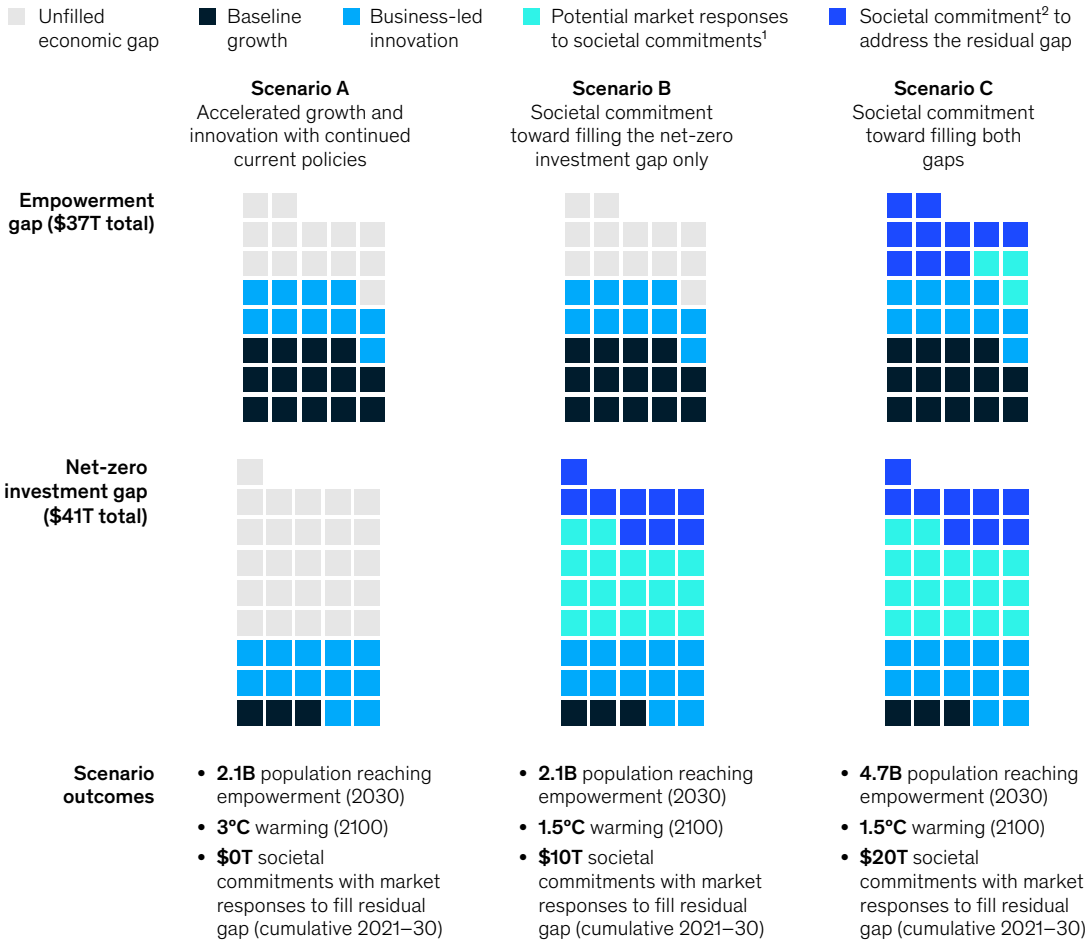
— **Commitment to partially address either gap.** Assuming high growth and innovation, societies could choose to address one of the residual gaps, leaving the other to be addressed by market forces alone. The exhibit illustrates societies choosing to tackle net zero completely but not empowerment. The choice is not binary, of course. Many combinations could yield partial progress on both challenges in tandem.

— **Commitment to fully close both gaps.** In this scenario, the global population would be fully empowered with a higher standard of living, and the world would be on track to achieve net zero by mid-century, hopefully limiting warming to 1.5°C by 2100. This would take a best-

Exhibit E10

Scenarios show a range of outcomes that depend on commitments to go beyond what growth and innovation can do.

Gaps by scenario, $ trillion (1 square = $1T)



[1]These include providing more affordable essentials, labor-friendly work arrangements, crowded-in capital, and faster learning rates (decreasing unit capex for low-emissions technologies, which occurs through R&D expenditure, learning by doing, and broader economies of scale).
[2]Societal commitment to address the residual gaps can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
Note: These are not projections or predictions but rather scenarios analyzing how specific empowerment spending levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For net-zero investments, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

case scenario of global growth and innovation along with commitments that wholly—and effectively—address the combined $40 trillion residual gap over the decade.

The important assumption in the final two scenarios is that public commitments on such a scale would spur additional private activity and investment. However, it is possible that such extensive commitments could distort the baseline economy.

These scenarios lead us to three questions about how additional commitments could theoretically close the last-mile gaps as well as the implications for countries that lack the economic resources.

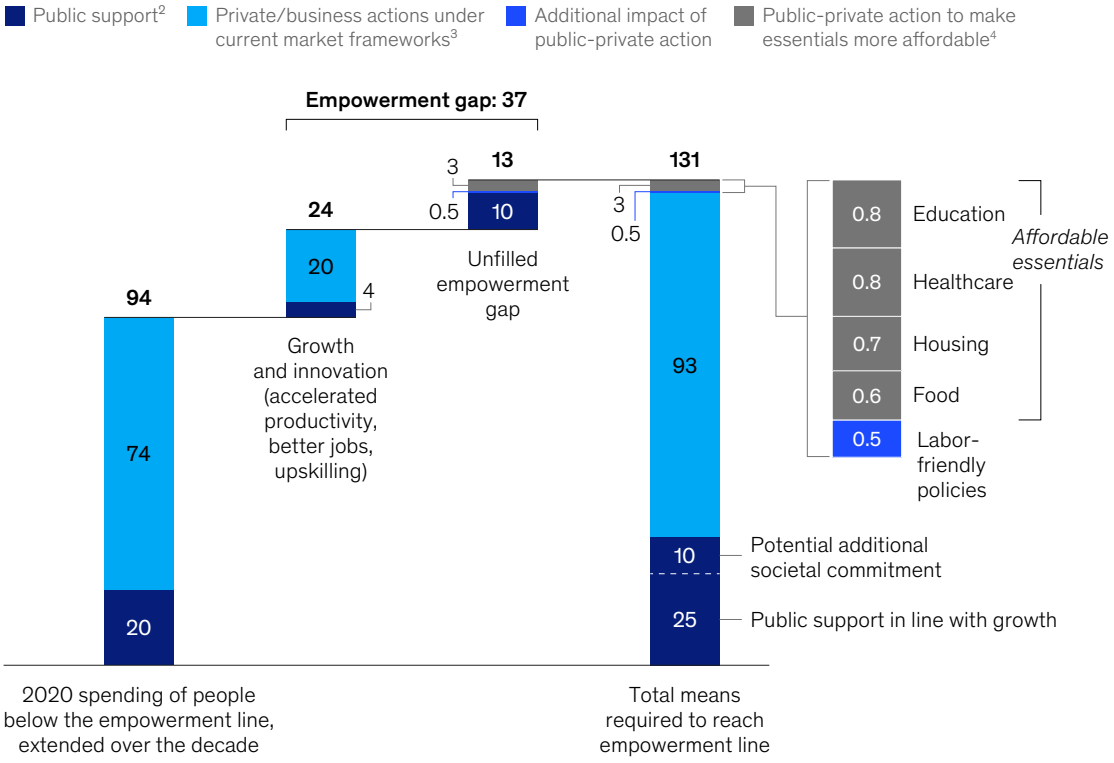
Question 1: How could societies get closer to full empowerment beyond what current market forces can do?

The options for closing the residual $13 trillion economic gap for universal empowerment involve delivering essential goods and services more affordably and effectively, improving work arrangements and pay, and injecting more direct support. As a thought experiment, we quantify some of these avenues, cautioning that the effects of intervention on this scale are not known (Exhibit E11).

Exhibit E11

To address residual empowerment gaps, societies could increase their commitments and make essentials more affordable.

Scenario for potentially closing the empowerment gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific empowerment spending levels could occur.
[1]2020 $.
[2]Additional societal commitment can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
[3]Economically viable under current policies.
[4]Based on matching productivity benchmarks.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

First, beyond incomes, one of the biggest factors determining empowerment is the price of essential goods and services. Multiple efficiencies could bring down these costs. Benchmarking against the productivity gains and outcome improvements that some countries have achieved in past decades, we estimate the potential to improve capacity and productivity in housing, healthcare, education, and nutrition. If these are passed on to consumers, they could yield some $3 trillion of benefits to those below the empowerment line (cumulatively through 2030). In effect, this would lower the empowerment threshold. In places where the public sector provides essential services, looking for operational efficiencies and raising the bar for quality can ensure that public funds are well spent. Beyond the financial savings, these could yield immense benefits in terms of well-being and human potential.

For instance, we estimate that improved construction productivity could lower housing expenditures by 11 percent globally if all countries emulated their best-performing peers and these gains reached consumers. Health outcomes (expressed in healthy life expectancies) could improve by 36 percent globally, even keeping current levels of healthcare spending constant, if each country matched its best-performing peer over the next decade. Globally, we find an opportunity to improve learning outcomes (expressed as both years of schooling and test performance) by 42 percent, with the greatest potential gains in low- and middle-income countries.

Policies and incentives could spur more business attention and innovation in the affordable segments of the housing, healthcare, food, and education markets. In housing, for example, local governments can change regulations related to land use, density, and permitting to lower costs for private developers. They can also require a percentage of affordable units in larger multifamily projects or offer concessional finance to buyers and developers of affordable housing.

On a different front, more labor-friendly policies and business decisions to offer higher wages or benefits could address labor's declining share of national incomes, particularly in high-income economies. This could occur alongside structural factors we have accounted for as part of economic growth, such as changing employment mixes.

For the remaining unfilled $10 trillion global gap, one option could be well-administered transfers to households. While better-paying jobs are the biggest driver of higher living standards, transfers can be targeted to those who do not benefit from these opportunities, especially the very poorest, those living in remote communities, children, the elderly, and people unable to work. In many places, there is room to make subsidy programs more transparent. Digital tools can spot leakages while streamlining eligibility processes and delivering benefits more efficiently. In addition, governments, philanthropies, social investors, development finance institutions, and multilateral agencies could consider increased direct funding for affordable housing, health, and quality education.

A $10 trillion incremental commitment to achieve full empowerment would be equivalent to about 3 percent of total global government budgets over the decade (assuming both accelerated growth and government spending held constant at its current share of GDP). But the regional differences are stark. The amount needed to close the gap in the United States, for example, equals about 1 percent of government spending, while in sub-Saharan Africa, it would take 1.3 *times* the region's government spending. Even if the region's gap could be closed through international transfers, uncertainties remain about the potential size and duration of such aid. Large capital flows could affect prices, labor markets, savings, and ultimately growth.

Question 2: What would it take to get on a true net-zero trajectory beyond what current market forces can do?

After accounting for market forces, technological advances, and the continuation of current policies, the residual unfilled net-zero investment gap is $26 trillion, cumulative through the decade. This is equivalent to 3 percent of global GDP annually.

Fully addressing this unfilled economic gap would require a combined public–private effort. Higher public commitments could activate even more private capital and create even faster learning effects (that is, the lowering of costs as technologies mature and are deployed widely). For example, the vast majority of wind and solar will come on stream only if there is sufficient investment in transmission and distribution, which is largely a public-sector effort today in many parts of the world. All of this rests on the unproven assumption that these shifts do not damage the base economy.

We present a scenario illustrating how such commitments could play out if countries choose to make them. Beyond the levels of public funding suggested by growth and the continuation of current policies, we estimate that an injection of just under $10 trillion in public funding could potentially unlock almost $17 trillion in additional positive impact collectively to 2030. Public support could take the form of concessional finance (that is, lending below market rates), subsidies, and projects undertaken by state-owned enterprises and development finance institutions.

One-quarter of the total $55 trillion needed through 2030 could be private in-the-money spending (plus avoided spending), up from 10 percent in 2020. All told, some $31 trillion could potentially come from private actors (Exhibit E12), including what is expected to become cost competitive as well as what could be unlocked through additional policies and public finance. Public support alone makes up some 36 percent of the total in this scenario, down from half in 2020.

About 70 percent of crowded-in private spending could occur in the building and mobility sectors, based on our bottom-up modeling. Public support would be critical for building decarbonization, since heat pumps, a key technology, are not yet cost competitive relative to gas boilers. Similarly, there are significant opportunities in mobility, but public-sector support may still be needed, especially for heavy-duty electric vehicles, which are expected to take longer than battery electric passenger vehicles (BEVs) to become cost competitive.[30]

Such levels of public and private action could also yield up to $4 trillion in avoided investment, thanks to additional R&D, economies of scale, and learning by doing.

As with the empowerment gap, the $10 trillion of public commitment to be on track for net zero represents about 3 percent of total global government budgets over the decade (assuming both accelerated growth and government spending remain constant as a share of GDP). This ranges from less than 1 percent of current government budgets in the European Union and United Kingdom to 14 percent in India. The consequences of scaling up public commitments and international capital flows to this extent would be uncharted territory.

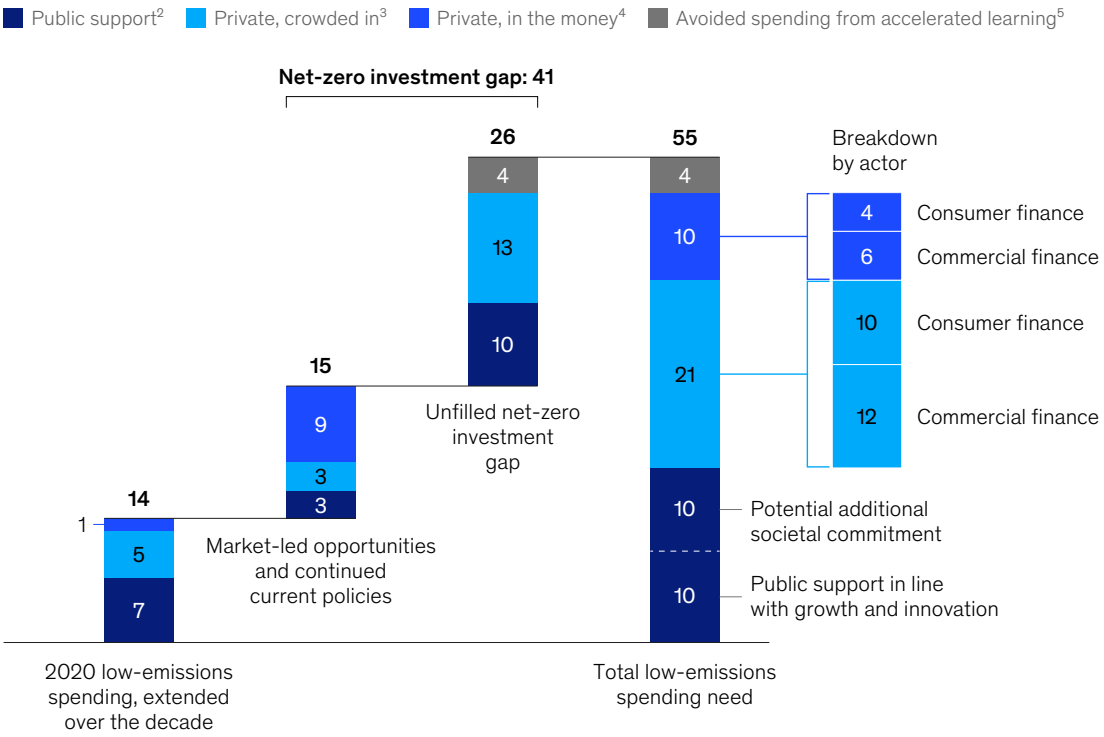
Even if the residual gap for net zero is not fully addressed, pursuing everything that market forces can do would already be a tremendous ramp-up in spending and progress. At this scale, and with this additional momentum, the environment becomes more fertile for breakthroughs

[30] "Preparing the world for zero-emission trucks," McKinsey & Company, November 2022.

Exhibit E12

Fully closing the net-zero investment gap relies on the assumption that higher public commitments can activate more private capital.

Scenario for potentially closing the net-zero investment gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. This analysis covers sectors accounting for 85% of global emissions.
[1]2020 $.
[2]Additional societal commitment can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities; when provided by state-owned enterprises and development finance institutions, could be at market rates.
[3]Crowding in is a phenomenon that occurs when higher public commitments lead to increased private investment (for example, through subsidies or guarantees).
[4]A low-emissions technology is "in the money" if it is cost-competitive with its high-emissions alternative (that is, its total cost of ownership is lower).
[5]Learning rates refer to the annual rate of decrease in unit capex for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

and societal shifts that we cannot foresee today. This argues for a continued focus on growth and innovation.

Question 3: Will societies have the capacity and willingness for higher public and private commitments?

If governments choose to address some or all of the residual gaps, they could explore making their spending more efficient, reallocating existing spending, issuing new debt, or raising taxes. Capital could also come from philanthropies, multilateral agencies, or social investors.

Carbon pricing can play a role in spurring the switch from away from high-carbon assets. We model how the need for public support to achieve both empowerment and net zero would change

if carbon taxes, rather than subsidies, were the primary vehicle to shift incentives toward low-emissions spending.[31] We found that they reduce the need for additional public support to reach net zero by 0.4 percentage point of GDP. At the same time, the residual empowerment gap would rise by 0.2 percentage point of GDP (on average annually) unless this effect is mitigated by revenue recycling.[32]

Most high-income countries theoretically have the resources to make higher commitments if they choose to, although how much debt countries can carry is the subject of ongoing debate.[33] Yet the choice to aim for full empowerment, net zero, or both would involve difficult trade-offs with other national priorities.

Achieving full empowerment and a net-zero trajectory in the current decade appears more challenging for lower- and middle-income countries. Allocating large amounts to the net-zero transition could eat into existing social welfare programs, potentially worsening the empowerment gap. India's need for incremental public support to get on a net-zero pathway is more than 50 percent higher than the share of GDP that currently goes to social protection spending, for example. Debt, too, is problematic for the developing world: the IMF estimates that 60 percent of low-income countries are already in debt distress or approaching it.[34]

Yet sustainability and inclusion are global projects, with ramifications that do not stop at national borders. For context, if high-income countries were to take on the combined residual gaps in the entire world, it would require an amount equivalent to about 3.5 percent of their GDP on an average annual basis (up from less than 1 percent of GDP to bridge only their own residual gaps). Even if high-income societies were willing to bear that cost, the world would need a mix of mechanisms for cross-border flows that could include international aid, cross-border debt, assistance from multilateral institutions, and debt relief (including creative debt-for-nature or debt-for-climate swaps). New financial vehicles might need to be designed.

We are reaching a fork in the road

We undertook this exercise to show what is theoretically possible and inform the debate. Regardless of whether countries decide to increase public commitments, this research leads to two important takeaways.

The importance of productivity-driven growth cannot be overstated

Faster growth propels inclusion. Almost 40 percent of the empowerment gap can be closed by baseline growth—and, as noted earlier, just under one extra percentage point of growth reduces the unfilled empowerment gap by more than one percentage point of GDP.

Additionally, growth can give governments more fiscal flexibility. The incremental GDP growth from higher productivity would allow for more than $30 trillion in additional public debt to be incurred globally without raising the 2020 global public debt–to-GDP ratio. At a global level,

[31] We use carbon prices estimated by NGFS that range from about $78 per ton of emissions in emerging economies like India to about $300 in the United States.

[32] Based on changes in private consumption seen in the National Institute of Economic and Social Research's NiGEM model when shifting from a no-transition, no-physical-risk baseline to a net-zero scenario, looking forward to 2030. NiGEM incorporates NGFS carbon prices as taxes, as well as NGFS energy prices.

[33] See, for example, Christina D. Romer and David H. Romer, *Fiscal space and the aftermath of financial crises: How it matters and why*, Brookings Papers on Economic Activity, Spring 2019; and Oliver Blanchard, "Public debt and low interest rates," *American Economic Review*, volume 109, number 4, April 2019.

[34] "Debt dynamics," in *Crisis upon crisis: IMF annual report 2022*, International Monetary Fund, September 2022. See also *The human cost of inaction: Poverty, social protection and debt servicing, 2020–2023*, UNDO Global Policy Network Brief, July 2023.

Higher growth and innovation could bring 600 million more people out of poverty, taking steps on a longer journey toward empowerment.

and specifically for high-income regions, this additional debt capacity exceeds the incremental public support needed to fill the empowerment and net-zero investment gaps. It is a question of whether or not those countries choose to assume that kind of debt, and where to allocate it.

Visionary agendas are more likely to be pursued when the pie is growing and put aside when it is shrinking.[35] While growth can't overcome every structural challenge, it can create space for new solutions to take root. Although growth in its current form has increased both emissions and inequality in the past, businesses, institutions, and governments can address these externalities more directly.

For developing economies, the prospects for more people to exit poverty are inextricably linked to their ability to grow. These countries would need to double down on productivity, skill development, and technological leapfrogging.[36] They may also need institutional reforms, from clearer legal frameworks for property rights to stronger oversight that prevents leakages of public spending.[37] New collaborations may be needed to integrate low-income countries more fully into global flows of trade, finance, technology, and knowledge.

The upside is compelling: higher growth and innovation could lead to some 600 million people moving out of poverty, taking significant steps on their journey toward full economic empowerment. Even in the absence of greater commitments and international transfers, growth and the actions of businesses can unlock real progress that changes lives.

Innovation at scale is critical

Relentlessly focusing on technology development is one of the keys to getting to net zero and lowering the price tag associated with doing so. The significant recent drops in the costs of wind and solar power offer reason for hope. R&D, learning by doing, and scaling up eventually drive costs down. The faster this happens, the lower the risk of households facing higher energy costs.

On the inclusion side, innovation and technology adoption generate demand for higher skills and better jobs. Innovation is also needed to tap efficiency-boosting opportunities and bring down the costs (and prices) of basic needs, from housing and food to education and healthcare.

Innovation is also needed in a broader sense. Lifting minimum living standards and containing climate change would involve sweeping transformations, requiring bold approaches in policy, finance, technology, and industry. The possibilities could include creating new multilateral financing vehicles; integrating low-income countries into global flows of capital and trade in a way that lifts local communities and small businesses; developing sustainable cities with

[35] Benjamin M. Friedman, *The moral consequences of economic growth*, Knopf, 2005.
[36] See, for example, *Reimagining growth in Africa: Turning diversity into opportunity*, McKinsey Global Institute, June 2023.
[37] *Realizing property rights*, Hernando de Soto and Francis Cheneval, eds., Frank/Wynkin de Worde, 2006.

affordable housing; strengthening education and healthcare systems worldwide; and designing effective carbon markets, including incentives for countries to preserve biodiversity and critical carbon sinks.

Progress toward empowerment and net zero would depend on private actors, governments, and NGOs and nonprofits combining their capabilities and expertise—and thinking without limits about how they can contribute to meeting this moment. Regardless of whether countries fully close the gaps, they have real opportunities to build a more stable, prosperous future.

We recognize the scope of these challenges as well as the political realities and the gravitational pull of the status quo. Financing is only one aspect of what would need to be done; achieving consensus and moving toward implementation would be incredibly complex. Countries that decide to take on these generational transformations would need an entirely different magnitude of public–private cooperation. The size of the challenge is not a reason for resignation; it is a call for everyone to roll up their sleeves on what can be done today. Every incremental step forward advances the continuum of progress.

A note on data sources

The net-zero modeling used in this research relied on several proprietary McKinsey assets, including McKinsey Net Zero Analytics, McKinsey Hydrogen Insights (data as of end 2021), the McKinsey Center for Future Mobility, and McKinsey Power Solutions.

Among the external sources of data in this report, we acknowledge the International Energy Agency (Paris). We specifically relied on three IEA sources: *Net zero by 2050*, 2021, https://www.iea.org/reports/net-zero-by-2050; *World energy outlook 2021*, https://www.iea.org/reports/world-energy-outlook-2021; and *Energy technology perspectives 2017*, https://www.iea.org/reports/energy-technology-perspectives-2017. All are license CC BY 4.0.

We note that some analysis in this research was derived from IEA material, and MGI is solely liable and responsible for it; it is not endorsed by the IEA in any manner. This holds true for all providers of the data that went into our analysis. We gratefully acknowledge their assistance and input, but the conclusions and any errors are our own.

1. Economic empowerment: Higher minimum living standards for everyone

In perhaps the biggest achievement of modern times, a billion people worldwide exited extreme poverty in the three decades preceding the pandemic—that is, their incomes surpassed the World Bank's poverty line, set at $2.15 per day.[38] While China and India account for the largest share of global poverty reduction, other developing countries such as Bangladesh, Brazil, Tanzania, and Vietnam also achieved rapid gains.[39] This progress has translated into tangible human development outcomes. Since 1990, mortality for children under age five has been reduced by almost 60 percent.[40] Most children worldwide now have access to at least primary education. In the developing world, the average years of schooling completed more than tripled between 1950 and 2010, fueling dramatic increases in literacy rates.[41]

Amid this good news, poverty has remained stubbornly hard to erase in full. As of 2020, some 730 million people were still in extreme poverty worldwide.[42] Many of them struggle to afford food and survive. Extreme poverty remains a challenge in developing countries, but even in wealthier countries, the poorest segments of the population may face homelessness, lower life expectancy, and the inability to move in search of better jobs.

The territory above the poverty line can also be a difficult place to thrive. An even bigger swath of the global population may not be formally counted as "poor" by the $2.15 metric or their own national poverty lines, but they are still unable to secure an economic foothold. They meet more of their essential needs than those in extreme poverty, but not across the board or to a sufficient

[38] The World Bank's extreme poverty line was recently updated from $1.90 to $2.15 per person per day; the update also involved changing from 2011 purchasing power parity (PPP) terms to 2017 PPP terms. *Correcting course: Poverty and shared prosperity 2022*, World Bank, 2022.

[39] See, for example, "Which countries reduced poverty rates the most?" World Bank Data Blog, November 2019; *Tanzania: Mainland poverty assessment 2019*, World Bank; Nicholas Kristof, "What can Biden's plan do for poverty? Look to Bangladesh," *New York Times*, March 10, 2021; Shimbo Pastory and Johnson Mwamasangula, "Tanzania makes progress in poverty eradication efforts," *The Citizen*, October 17, 2022; Ngo Ha Quyen, "Reducing rural poverty in Vietnam: Issues, policies, challenges," UN Expert Group Meeting on Eradicating Rural Poverty to Implement the 2030 Agenda for Sustainable Development, Addis Ababa, 2019.

[40] "Children: Improving survival and well-bring," World Health Organization, September 2020.

[41] *World development report 2018: Learning to realize education's promise*, World Bank, 2017.

[42] The World Bank estimated the extreme poverty rate in 2020 as 9.3 percent of the global population, which was approximately 730 million people; see worldbank.org/en/topic/poverty/overview.

degree. Their lives might involve making do with very little and not having buffers to weather periods of hardship. Many are one emergency away from falling back into poverty.

Development experts and economists have discussed setting a higher bar for living standards, taking this cohort's vulnerability into account. This higher bar does not undermine the goal of eliminating extreme poverty; it is a complementary benchmark that explores how to move toward a world in which people can realize more of their own potential.

For each country, we estimate the point at which a person has the means to afford the full range of simple basics plus a small measure of savings and the resources to make self-determined choices. This last point involves people having greater agency, echoing the UN Development Programme's aspiration to "expand the sense of possibility in people's lives."[43] This chapter defines the concept more fully and translates the current gap into concrete economic terms.

Our analysis uses a 2021–30 time frame. The end date of 2030 is the target year of the Sustainable Development Goals, which include eliminating poverty and improving well-being for all ages, as well as 15 other inclusion- and sustainability-connected aims. While we do not explicitly model the SDGs, they are in sync with many of the objectives in this research. We chose a 2020 starting point in part because of data availability and also to provide a clear decade-long line of sight. Our results are broadly relevant for a 10-year horizon, not just anchored to these specific dates.

Universal empowerment lifts everyone to economic sufficiency

To quantify what a higher bar for living standards could look like, we estimate an empowerment line for each country (Exhibit 1). It is a metric calibrated to ensure that everyone has the means to meet their essential needs, including food, housing and energy, safe water access, transportation, healthcare, education, clothing, and communication, with small margins for spending toward civic engagement (some minimum spending on recreation or community activities) and a savings buffer.[44] The housing is likely a modest apartment; the transportation could be a transit pass, a used car, or perhaps a motorbike if that suffices in some contexts. But everyone is lifted to minimum acceptable living standards.

Empowerment is the point at which people have the ability to start making real choices about discretionary purchases, which fuels market growth, and have the ability to invest in themselves, which builds their human capital. Beyond the economics, however, is an improved quality of life.

How we arrive at the empowerment line for different countries

We arrive at a unique empowerment threshold for each country, building on a rich body of literature on the topics of absolute and relative poverty. While the empowerment lines vary across countries, the concept remains the same: the means required to meet basic needs and have some degree of economic security. In 2020 US dollar terms, we estimate that such means range between $3 and $50 per capita per day across the countries in our data set.[45] The empowerment line is about $3 per capita in countries like Afghanistan and Sudan; $4 to $5 in

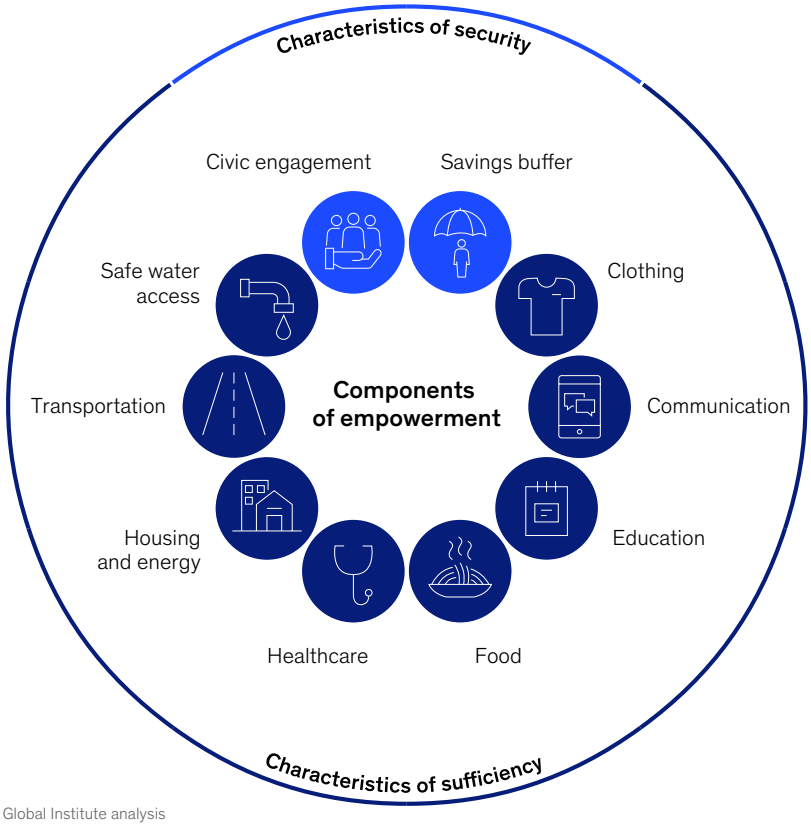
[43] *Human development report 2021–22: Uncertain times, unsettled lives: Shaping our future in a transforming world*, UN Development Programme, September 2022.

[44] This concept is rooted in earlier MGI research, which took a micro approach and quantified the cost of a basket of essential goods and services for households in India. See *From poverty to empowerment: India's imperative for jobs, growth, and effective basic services*, McKinsey Global Institute, February 2014. The data set used in this research compiles the costs of essential goods (rather than the whole economy, which PPP indices measure). See Martin Guzi et al., *Living wages and income worldwide*, WageIndicator Foundation, 2023, and wageindicator.org.

[45] Iceland and Switzerland are outliers on the upper end of the empowerment line range and above $50.

Exhibit 1

The empowerment line is the point at which individuals can meet their essential needs and begin to achieve security.



Source: McKinsey Global Institute analysis

India, Indonesia, and Nigeria; $8 to $11 in China, Mexico, South Africa, and Thailand; $15 to $45 in Australia, Denmark, Italy, Japan, and Poland; and $50 in the United States.

To arrive at these figures, we start with a global floor, the minimum level of consumption needed in the lowest-income countries. This draws on research defining the level at which a person can meet basic needs and start to achieve discretionary consumption as $12 (in purchasing power parity, or PPP, terms) per person per day in developing countries.[46] This is the point at which research suggests there is minimal risk of a person falling back into poverty.[47] (For more on the research that informed our thinking and methodology, see Box E1, "Measuring economic inclusion," in the executive summary.)

[46] Homi Kharas, *The emerging middle class in developing countries*, OECD Development Centre, working paper number 285, January 2010. Note that he defines the global middle-class line as $10 in 2005 PPP, since raised to $12 in 2017 PPP. Also using this general level are Surjit Singh Bhalla, *Second among equals: The middle-class kingdoms of India and China*, 2007; Nancy Birdsall, Nora Lustig, and Christian Meyer, *The strugglers: The new poor in Latin America?* Center for Global Development working paper 337, 2013; and Rakesh Kochhar, "The pandemic stalls growth in the global middle class, pushes poverty up sharply," Pew Research Center, March 2021. See also www.worlddata.io.

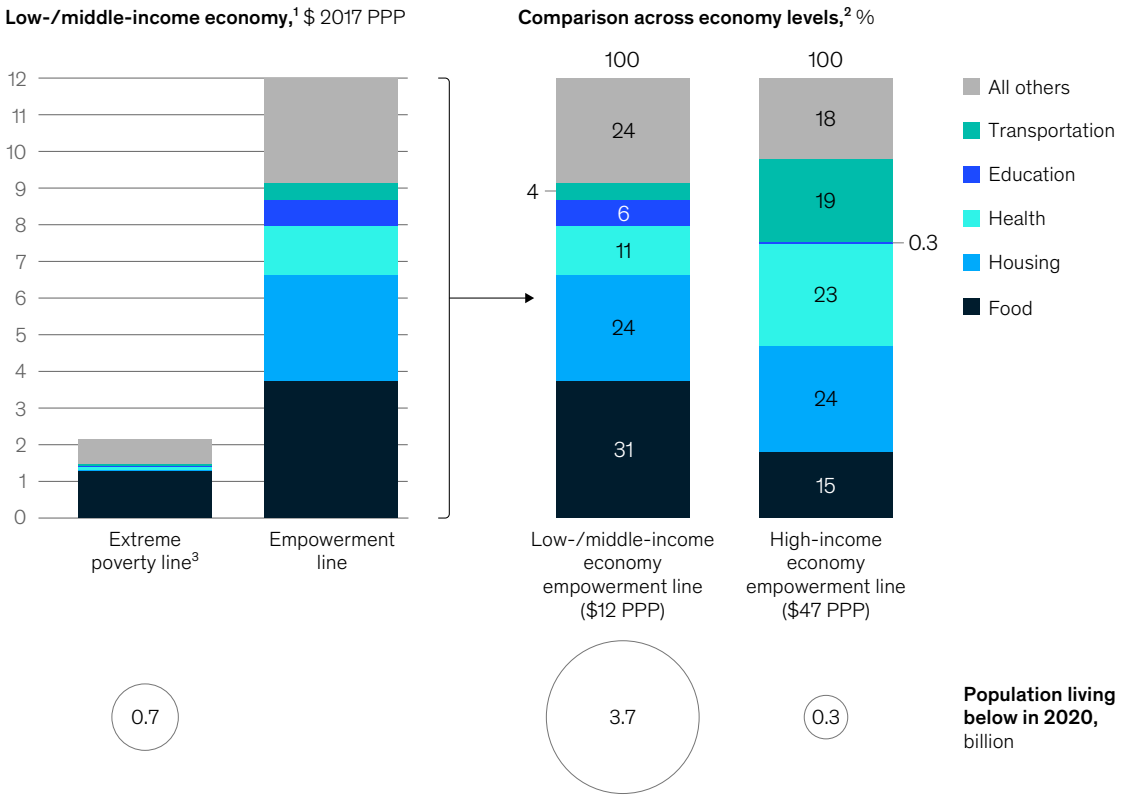
[47] *Latin American economic outlook 2019: Development in transition*, OECD, Economic Commission for Latin America and the Caribbean, CAF Development Bank of Latin America, and European Union, 2019.

Second, we raise the floor for countries at higher income levels, since some modest adjustments are needed for their residents to afford the quantity or quality of goods necessary to function (Exhibit 2). To do this, we use detailed 2022 and 2023 cost-of-living data from the WageIndicator Foundation for a basket of goods and services covering basic needs.[48] (See the technical appendix for more on methodology.) The estimates we use are nationally representative, although we acknowledge significant within-country variations.[49]

Exhibit 2

The means required to achieve sufficiency in basic needs vary by stage of development.

Illustrative examples of daily spending patterns



[1]The extreme poverty spending distribution is based on India's first decile of household expenditure in the 2011–12 National Sample Survey of Household Consumer Expenditure. The empowerment distribution is based on spending required to meet basic needs, derived from WageIndicator Foundation data for India. The empowerment line of $12 in 2017 PPP terms is our global floor. It is informed by academic literature, including Kharas (2010) and Bhalla (2007), establishing the global middle-class threshold as $10 in 2005 PPP (since raised to $12 in 2017 PPP).
[2]The empowerment line and distribution are based on spending required to meet basic needs, derived from WageIndicator Foundation data from 2022 and 2023 for the United States.
[3]Based on the World Bank's definition of extreme poverty, which is $2.15 per person per day in 2017 PPP terms.
Source: World Data Lab; WageIndicator Foundation; World Bank; Ministry of Statistics and Programme Implementation (India); McKinsey Global Institute analysis

[48]The WageIndicator Foundation is a nonprofit that collects and shares data on wages and the cost of living globally in an effort to create labor market transparency and advocate for workers earning fair wages that enable them to lead decent lives.
[49]We note that having one empowerment threshold for a given country does not reflect how housing and other costs vary from region to region within the country; it costs more to live an empowered life in an expensive major city than in a poorer rural area.

Because we use a consumption-based metric to calibrate the empowerment line for each country, we compare the threshold to the consumption distribution in each country. This already accounts for taxes and direct transfers. But in-kind transfers also affect the empowerment threshold. Universal healthcare, for example, lowers out-of-pocket healthcare costs needed for individuals, while free public K–12 schools lower out-of-pocket education costs required for families. We use International Monetary Fund (IMF) and OECD data to adjust the global empowerment line floor for the estimated in-kind transfers that each country provides. This total is prorated to the share of the population below the empowerment line and then converted to a per-person, per-day figure. For countries above the global floor, the cost-of-living data from WageIndicator Foundation also takes such transfers into account.

However, we acknowledge the lack of perfect certainty about how public services reach their targeted recipients, especially the poorest segments.[50] Indeed, one way for countries to advance empowerment is through improvements in program design and execution to ensure that social benefit programs can be accessed by their intended beneficiaries, and that such transmission is accurately measured.[51] We also note that empowerment is a per-person measure. Families that combine their resources would have better prospects for meeting their basic needs than individuals below this line living alone.

Empowerment thresholds rise along with income levels, reflecting each country's cost of living and context. Yet it is important to note that the definition of basic goods remains consistent across countries, creating a universal standard for building lives that no longer revolve around struggle and doing without. At this same time, we are able to account for relative differences in living standards and costs of living across countries of different income groups (Exhibit 3).

This approach recognizes the very real economic insecurity that persists even in most of the world's wealthy countries, along with the need to make faster progress in the developing world. At the empowerment line, everyone would have the means to afford the essentials within their own context as well as start to save for the future. For the most part, the empowerment thresholds in developing countries are above current median consumption levels; in high-income countries, they are below the median.

4.7B

people worldwide are not fully economically empowered

4.4B

are in low- and middle-income countries

In both high- and low-income countries, we view empowerment as the point at which people can begin to invest in themselves and make choices about issues such as where they live and what paths they will pursue as workers and consumers. Defining economic sufficiency as the point at which discretionary choices can be made echoes Nobel laureate Amartya Sen's assertions that income alone does not reflect well-being. Economic empowerment conveys capabilities, including the freedom to enjoy life and individual agency.[52]

What does it mean to live below the empowerment line?

As of 2020, about 4.7 billion people worldwide (approximately 60 percent of the global population) were not yet fully economically empowered. Some 4.4 billion of them lived in low- and middle-income countries, while 300 million people were in high-income countries.

[50] Stephen Kidd and Diloa Athias, *Hit and miss: An assessment of targeting effectiveness in social protection*, Development Pathways UK, 2019.

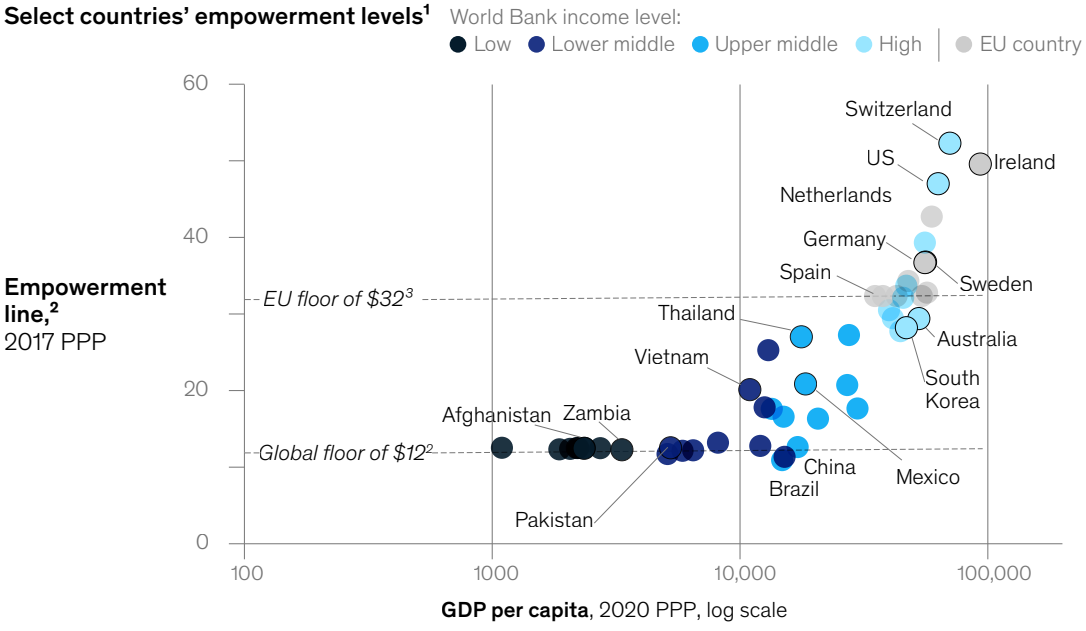
[51] See, for example, Abhijit Banerjee et al., *E-governance, accountability, and leakage in public programs: Experimental evidence from a financial management reform in India*, NBER working paper number 22803, 2016; *Social protection, food security and nutrition: An update of concepts, evidence and select practices in South Asia and beyond*, World Bank, 2022; and Marin MacLeod et al., "How to deliver cash transfer programs more effectively to hard-to-reach populations," *Stanford Social Innovation Review*, August 2021.

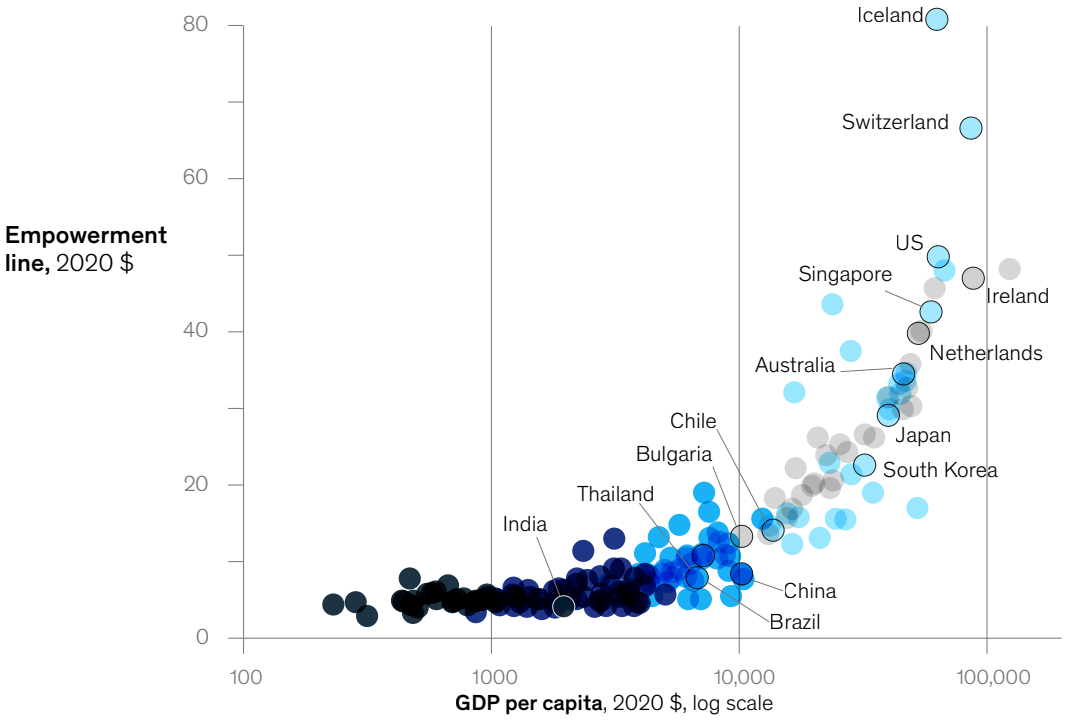
[52] Amartya Sen, *Development as freedom*, Oxford University Press, 1999; and *Human development report 2021–22: Uncertain times, unsettled lives: Shaping our future in a transforming world*, UN Development Programme, September 2022.

Exhibit 3

The empowerment line starts with a global floor, then rises across countries to reflect higher costs and different contexts.

Select countries' empowerment levels[1]





[1]Ten largest economies by 2020 GDP in each of the five categories presented.
[2]$12 in 2017 PPP terms is the global empowerment line floor. It is informed by academic literature, including Kharas (2010) and Bhalla (2007), establishing the global middle-class line as $10 in 2005 PPP (since raised to $12 in 2017 PPP). For countries at this global floor, we also deducted estimated in-kind transfers.
[3]Based on the weighted average pre-adjustment empowerment lines across EU countries. We set a higher minimum standard for the EU given its single-market nature and to harmonize the line in PPP terms within the bloc.
Note: The empowerment line is based on spending required to meet basic needs, derived from WageIndicator Foundation data from 2022 and 2023.
Source: WageIndicator Foundation; World Bank; Oxford Economics; OECD; IMF; McKinsey Global Institute analysis

Sub-Saharan Africa and India are home to more than 40 percent of the global population below the empowerment line.

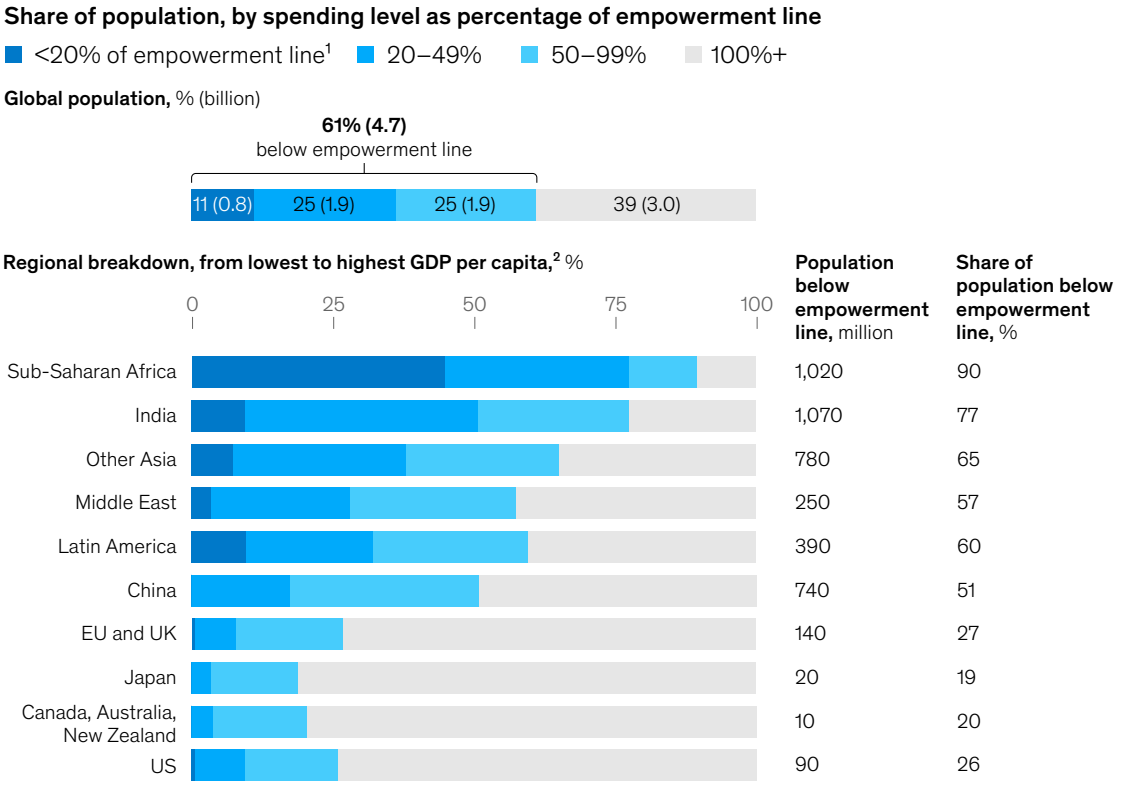
Their experience has many different faces depending on an individual's distance from that line (Exhibit 4). The poorest segments meet less than 20 percent of their essential needs. There are some 850 million such people globally (including all those in extreme poverty), with the majority in sub-Saharan Africa and India. They may be subsistence farmers and live far from the nearest medical clinic, with no digital networks and even a lack of clean drinking water. The urban poor among them may live in slums or shantytowns.

An additional 1.9 billion people globally are not in such extreme circumstances, but they lack the means to meet more than half of their basic needs. In high-income countries, they may live in rural areas with entrenched poverty and few job opportunities, or they may crowd into small apartments in unsafe urban neighborhoods, with little privacy or few quiet spots for children to study.

Yet another 1.9 billion are closer to the empowerment line and may have some of the calling cards of minimum acceptable living standards, but they remain vulnerable. They may own a TV, a basic

Exhibit 4

Worldwide, 4.7 billion people live below the empowerment line, with poverty levels that vary across regions.



[1]A spending level threshold just above the international poverty line for countries where the empowerment line is the global floor of $12 PPP. Based on 2020 population figures.
[2]Geographies represent 95% of global GDP.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; McKinsey Global Institute analysis

mobile phone, and a used car, for example, but living paycheck to paycheck demands a constant financial balancing act. This segment typically lacks savings to cushion against emergencies or build a more secure retirement. MGI's own past work showed that the lower two quintiles of the population in advanced economies struggle to achieve savings and security.[53]

Housing is a major issue for most people living below the empowerment line. They may have to accept poorly maintained housing, take on longer daily commutes, crowd too many people into small spaces, or pay rent that strains their monthly budget. Previous MGI research estimated that the global affordable housing gap affects one in three urban residents worldwide.[54] In the United States, for example, about 30 percent of households spend more than 30 percent of their income on housing; less than 40 percent of households in the lowest quintile of income earners own any equity in their home.[55]

Healthcare is another important component of empowerment; this involves both access and financial risk protection from hardship for the cost of care.[56] It takes sufficient and sustained financing, and a major focus on primary care, to keep healthcare systems equitable and resilient. But disparities in access to quality care are evident in the varying health outcomes across countries and across population segments within countries. The gap between low- and high-income countries in life expectancy is 18 years, for example.[57] In India, there is an eight-year difference in average life expectancy between the lowest and highest income quintiles.[58]

Another aspect of living below the empowerment line is inadequate access to quality education. In some parts of the world, cost of basic education remains a problem: in much of Africa, for example, the cost of school fees prevents some children from enrolling.[59] Then there is the challenge of delivering quality affordable education. Many developing countries have expanded primary and secondary schools but struggle to ensure that teachers are well trained and curricula are effective. Without improvements in access, quality, and affordability, the next generation could enter adulthood ill-equipped to participate in the modern global economy.

$37T

global empowerment gap, cumulative to 2030

Full economic empowerment, by contrast, would give people the tools they need to shape and improve circumstances for themselves and their families. That could include enrolling children in better schools, providing them with books and enrichment experiences, and creating pathways to higher education. It could also involve adults moving to places with better job opportunities or continuing their education to add skills for more fulfilling careers.

We calculate the global empowerment gap at $37 trillion, cumulative through 2030

Establishing the empowerment line makes it possible to size each country's empowerment gap—that is, the increase in spending power (in dollar terms) that would lift the entire population to

[53] *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.
[54] *Tackling the world's affordable housing challenge*, McKinsey Global Institute, October 2014.
[55] The share of income toward housing costs data is from the 2021 American Community Survey from the US Census Bureau. Home equity statistics are available in the US Census Bureau 2021 Wealth, Asset Ownership, & Debt of Households Detailed Tables.
[56] These are both planks of Sustainable Development Goal number 3. The World Health Organization estimates that 930 million people incurred health spending exceeding 10 percent of their household budget (catastrophic health spending) and 90 million people were pushed back into extreme poverty by out-of-pocket healthcare spending. See who.int/health-topics/financial-protection
[57] "Uneven access to health services drives life expectancy gaps," World Health Organization, April 2019.
[58] As of 2019, India's lowest income quintile had a life expectancy of 65.1 years on average, and the highest quintile had a life expectancy of 72.7 years. See Miqdad Asaria et al., "Socioeconomic inequality in life expectancy in India," *BMJ Global Health*, volume 4, number 3, June 2019.
[59] Leora Klapper and Mansi Vipin Panchamia, "The high price of education in Sub-Saharan Africa," World Bank blog, March 3, 2023.

If every household were fully empowered to meet all basic needs by 2030, the generation coming into adulthood by midcentury would be healthier, more educated, and equipped to realize more of their potential.

sufficiency and security. It is the cumulative step-up in spending over 2020 levels that would take everyone to the threshold in 2030, after accounting for government transfers.

The global empowerment gap is just over $37 trillion, cumulative over the decade. On an average annual basis, the gap is equivalent to about 40 percent of this population's 2020 levels of spending. Of course, the size of the gap depends on the threshold selected and the target time frame over which the higher level is achieved. Lowering the threshold or allowing this trajectory to play out over a longer time frame would produce different results.

Our analysis starts with actual spending in 2020 and assumes that people below the empowerment line gain a bit more spending power each year through 2030.[60] In 2025, for example, their spending is assumed to reach 50 percent of the empowerment line.[61] Closing this gap implies a steeper rise for the poorest segments and a more gradual one for the population starting closer to the empowerment line.

The size of the gap by region

The magnitude of the empowerment gap varies widely across regions, reflecting different starting points. In high-income regions, including the EU, Japan, and the United States, the gap is equivalent to 1 percent of GDP each year (Exhibit 5). For China, it's 2 percent of GDP, on an annual average basis to 2030.

But in many parts of the developing world, the starting point is harder, since large populations are much further away from the line. The gap is 6 percent of GDP annually in Asia (outside of China, India, and Japan), 7 percent in Latin America, 13 percent in India—and a daunting 45 percent in sub-Saharan Africa. Again, this is a product of how we have set the line. If the threshold were set 50 percent lower, India's gap would be 3 percent of GDP and sub-Saharan Africa's would be 16 percent of GDP.

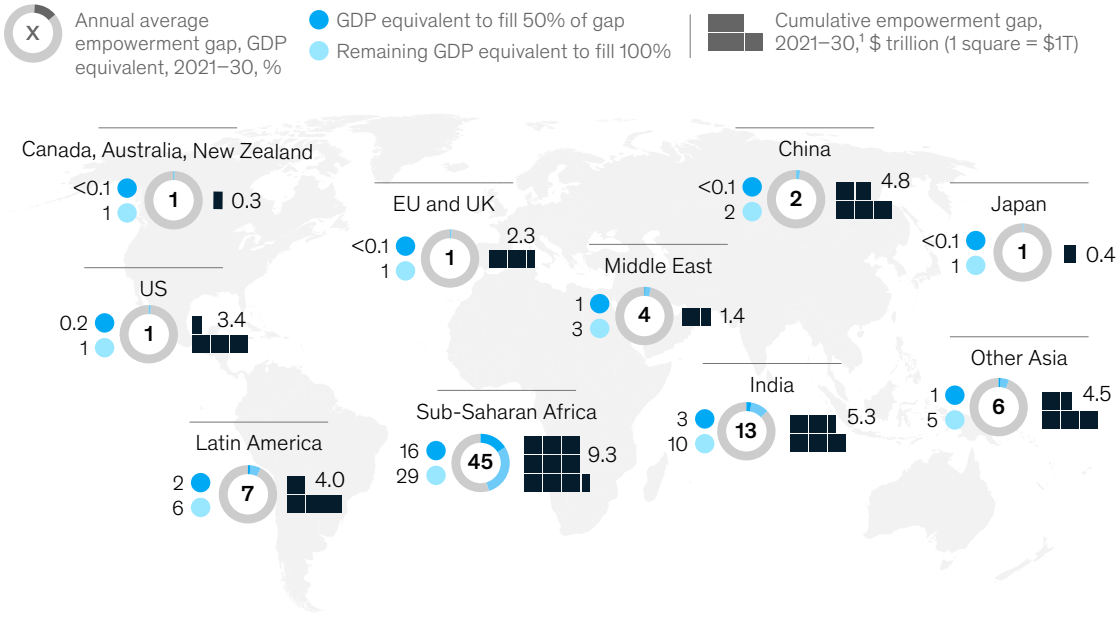
[60] All calculations are relative to the empowerment gap in 2020; we chose not to adjust this line over time with development levels. In reality, the threshold will rise as a country develops, so China and other countries could still have populations below a new and higher threshold in 2030 (although by 2020 standards, the gap will be closed). This research focuses on closing today's gaps rather than on projecting the size of future gaps.

[61] The difference between estimated annual spending per capita for people below the empowerment threshold relative to the target for that year is the annual gap. The final empowerment gap figure is the sum of the annual gaps over the next decade.

Exhibit 5

Whether measured in absolute dollar terms or relative to GDP, the empowerment gaps are largest in sub-Saharan Africa and India.

Empowerment gaps by region



Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by McKinsey & Company.
[1]2020 $.
Source: World Data Lab, WageIndicator Foundation, Oxford Economics, World Bank, IMF, OECD, McKinsey Global Institute analysis

Making progress toward empowerment is important for both individuals and societies

The empowerment gap is large, but making steady progress toward closing it matters. At a societal level, empowerment is correlated with positive human development outcomes ranging from reduced childhood mortality and longer life expectancy to additional years of schooling and expanded digital and financial inclusion. For individuals, life satisfaction improves when people can shed the stress of not being able to make ends meet and fulfill more of their material desires.[62]

If every household were fully empowered to meet its basic needs by 2030, all children could grow up healthier, more educated, and more globally connected. Importantly, they would have the tools for advancement. By 2050, the global generation coming into adulthood would be equipped to fulfill its potential. This intergenerational perspective matters, since growing up with better health and nutrition, higher-quality education, the ability to buffer shocks, and a more

[62] Daniel Kahneman and Angus Deaton, "High income improves evaluation of life but not emotional well-being," *Proceedings of the National Academy of Sciences*, volume 107, issue 38, September 2010; this research analyzed survey results in the United States and found that increases in life satisfaction rose along with income growth up to $75,000 annually. See also Andrew T. Jebb et al., "Happiness, income satiation and turning points around the world," *Nature Human Behaviour*, volume 2, 2018, for a global study that found a similar relationship between life satisfaction and prosperity.

stable environment can significantly improve an individual's opportunities for productivity and well-being over a lifetime.[63]

The aspiration to give the next generation a better starting point is urgent not only from a humanitarian perspective but also from an economic one. A large body of academic literature has established that investing in children yields enormous economic and societal benefits.[64] The world will need many more educated, empowered adults in the decades ahead to achieve broad-based prosperity. Already, as populations age in many parts of the world, labor forces are shrinking, requiring new ways to encourage participation and raise productivity. Meanwhile, the expanding knowledge economy needs workers with more technological and cognitive skills, while automation and artificial intelligence are increasingly displacing routine work. Universal empowerment would equip many more people with the skills and agency to participate in a more knowledge-intensive economy.

Inaction also poses risks to societies. The discontent associated with poverty and hunger—now potentially exacerbated by the effects of climate change—can lead to instability.[65] For billions of people, reaching empowerment is the existential issue. Since the net-zero transition requires broad public support, there is even more urgency to prioritize empowerment alongside sustainability. If people feel that investment to address the climate agenda is crowding out their prospects for a better life, popular pressure could build for countries to opt out of the effort altogether.

In our systems view of the economy, empowerment is inextricably linked to growth and sustainability—and the clock is ticking on the latter. The following chapters will define the investment and spending needed in this decade to get on a path to reach net-zero emissions, then outline how growth and other avenues for action could move the world closer to achieving both goals.

[63] See, for example, *The economic costs of childhood socio-economic disadvantage*, OECD Policy Insights, November 2022; Robert L. Wagmiller Jr., "The temporal dynamics of childhood economic deprivation and children's achievement," *Child Development Perspectives*, volume 9, number 3, September 2015; and Nadia Akseer et al., "Economic costs of childhood stunting to the private sector in low- and middle-income countries," *The Lancet*, volume 45, March 2022.

[64] See, for example, James J. Heckman and Dimitriy V. Masterov, *The productivity argument for investing in young children*, 2007; and Gary S. Becker, "Investment in human capital: A theoretical analysis," *Journal of Political Economy*, volume LXX, number 5, 1962. One federal study in the United States calculated that expanding early learning initiatives would provide societal benefits of $8.60 for every dollar spent, about half of which comes from increased earnings for children when they become adults; see *The economics of early childhood investments*, US Council of Economic Advisers, Executive Office of the President, December 2014.

[65] Per Pinstrup-Andersen and Satoru Shimokawa, "Do poverty and poor health and nutrition increase the risk of armed conflict onset?" *Food Policy*, volume 33, issue 6, December 2008; José Naranjo, "Extreme poverty and terrorist violence fuel instability in the Sahel region," *El País*, August 14, 2023; Rachel Chason, "How climate change inflames extremist insurgency in Africa," *Washington Post*, July 1, 2023; Angelique Chrisafis, "'There is no hope': Simmering anger boils over in poverty-riven French district," *The Guardian*, July 2, 2023; and Susan Rice, "The threat of global poverty," *The National Interest*, number 83, Spring 2006.

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2. The net-zero investment need

Climate change is an urgent, generational problem. And while it is not the only element of sustainability, climate science tells us that as average temperatures rise globally, acute environmental hazards such as heat waves and floods would increase in both frequency and severity in parts of the world, while chronic conditions such as heat and rising sea levels also intensify.[66] At current emissions levels, the world could deplete its "carbon budget" for limiting warming to 1.5°C relative to preindustrial levels by the end of the current decade; if CO_2 emissions exceed that envelope, warming would be pushed higher.[67]

This is a decisive decade for altering the world's path on emissions. Reaching net-zero emissions, as many countries have pledged to do, involves transforming energy and land-use systems.[68] It would change how we power, cool, and heat our homes; how we get around; how we create goods and produce our food; and how we approach many other aspects of life and work.

This research focuses on one specific element of that journey: the need for a massive infusion of capital (see Box 1, "Requirements to reach net-zero emissions," for a more detailed overview of other elements). In a scenario of accelerated economic growth (an important driver of empowerment), low-emissions investment and spending would need to total $55 trillion, cumulative over the decade—a major increase of $41 trillion relative to 2020 spending levels.[69] The incremental investment need is roughly equivalent to 4 percent of global GDP annually. It would go toward assets that deliver renewable power and other low-emissions sources of energy as well as electric vehicles, to name just

[66] *Climate change 2021: The physical science basis: Contribution of Working Group I to the Sixth Assessment Report*, Intergovernmental Panel on Climate Change (IPCC), 2021; Noah S. Diffenbaugh and Christopher B. Field, "Changes in ecologically critical terrestrial climate conditions," *Science*, volume 341, number 6145, August 2013; Seth D. Burgess, Samuel Bowring, and Shu-zhong Shen, "High-precision timeline for Earth's most severe extinction," *Proceedings of the National Academy of Sciences*, volume 111, number 9, March 2014.

[67] As of 2020, the IEA estimated about 33.9 Gt of annual CO_2 emissions from the energy system and 5–6 Gt of annual CO_2 emissions from land-use systems. In the IPCC 2021 annual report, the authors found that the residual global carbon budget to remain within 1.5°C warming with 67 percent probability was 400 Gt. Therefore, from this report's effective measurement start date of 2020, the climate budget to limit warming to 1.5°C (assuming constant emissions) would run out in roughly 10 years, or around the end of 2030.

[68] *The net-zero transition: What it would cost, what it could bring*, McKinsey Global Institute, January 2022.

[69] This includes spending for low-emissions physical assets across various forms of energy supply (for example, renewable power systems, hydrogen, and biofuel supply), energy demand (for example, for vehicles and alternate methods of steel and cement production), and various forms of land use (for example, greenhouse gas–efficient farming practices). This includes both what is typically considered investment in national accounts and, in some cases, spending on consumer durables such as personal cars. We often refer to this spending as "investment" while acknowledging that it also includes categories of consumer durables. We typically consider spending to replace physical assets at the point of emissions (for example, cars for mobility); additional spending would also occur through the value chain. To minimize double counting, we have not sized this spending. We use a 2020 starting point to give a clear decade-long line of sight and because the Network for Greening the Financial System's scenarios, which provide the basis for our analysis, include actual, historical data for energy use only up to 2020. (Based on clean energy investment in 2021 and 2022, the scale of investment still needed by 2030 has not shifted dramatically since 2020.)

a few priorities. For context, if the world continued investing in low-emissions assets at constant 2020 levels through the decade, it would get to a cumulative total of only about $14 trillion.

This research considers the emissions reduction needed in this decade to put the world on a path to global net zero by 2050, focusing on areas that account for 85 percent of all greenhouse gas emissions across countries.[70] Our analysis builds on a scenario to reach net zero and limit warming to 1.5°C from the Network for Greening the Financial System (NGFS).[71] Much more would be needed beyond 2030, but our focus is on the near-term steps over the decade that would lead to a broader net-zero trajectory.

We emphasize that our estimates are not predictions or forecasts but rather the product of scenarios, which are always subject to some uncertainty, particularly in an emerging field of research. Some of these unknown factors include the world's warming pathway; the decarbonization methods and actual activity levels within each sector; the evolution of technology costs through innovation; and the availability of input materials which could affect these costs, to name a few. All of these variables could affect the capital investment needed for the transition. Our findings are estimates meant to illustrate the magnitude of the challenge and its dimensions across sectors and geographies. See the technical appendix for a more detailed discussion of our methodology and data sources.

A net-zero trajectory requires a $41 trillion step-up in low-emissions investment, cumulative through 2030

We quantify the necessary step-up in low-emissions investment and spending above 2020 levels, cumulative through 2030, needed in a scenario that will get the world to net zero by 2050. To arrive at this figure, we have undertaken a detailed, bottom-up exercise, examining a long list of low-emissions technologies and their potential deployment across sectors and countries.[72]

We start with 2020 spending on low-emissions assets like wind and solar energy generation, electric vehicles, and heating for buildings. All of this totaled about $1.4 trillion per year, or 1.7 percent of global GDP. In 2021 and 2022, clean energy investment grew only about 15 to 30 percent above 2020 levels—well below the nearly 300 percent average annual increases

[70] Specifically, we quantify the capital expenditures needed for shifting energy use in the power, mobility, buildings, and industry systems away from fossil fuels; establishing the infrastructure required for the transition; adopting low-emissions agricultural processes; ramping up the production of low-emissions fuels, both hydrogen- and biomass-based; and increasing the volumes of carbon capture, via afforestation and the deployment of carbon capture, utilization, and storage technologies. Our investment analysis excludes some industries (e.g., aluminum, chemicals); non-road mobility (since road transportation accounts for 75 percent of the emissions in this sector); and waste and measures like circular economy. More abatement is possible in these areas.

[71] See Box E2, "Measuring the net-zero investment need," in the executive summary, for more on methodology. The Net Zero 2050 scenario from NGFS assumes that governments enact strong climate policies, technological innovation proceeds at a rapid pace, and carbon removal is widely practiced. It reaches net-zero CO_2 emissions by 2050 for the economy as a whole; this means there are some residual gross emissions in hard-to-abate sectors and regions, but they are offset by CO_2 removals. This ultimately limits warming to only 1.5 degrees Celsius by 2100. This is in line with the net-zero aspiration we frame in this paper. We adjust NGFS scenarios for baseline and accelerated growth.

[72] Our analysis divides high-emissions assets from low-emissions assets and enabling infrastructure. Low-emissions assets have a relatively low emissions footprint; the term does not always mean carbon neutral. This segmentation allows us to size the step-up needed for the specific technologies that help the world achieve net-zero emissions. In doing so, we recognize that the demarcation between high- and low-emissions levers is not always clear. Low-emissions assets and enabling infrastructure include assets for blue-hydrogen production with carbon capture and storage (CCS); low-emissions hydrogen production using electricity and biomass; biofuel production; electricity generation using wind, solar, hydro, nuclear, and geothermal power, as well as relying on biomass and gas with CCS; electricity transmission and distribution and storage infrastructure; heat production from low-emissions sources such as biomass; electric arc steel furnaces using scrap or hydrogen-fueled direct reduced iron (DRI), as well as basic oxygen furnaces with CCS; cement kilns with biomass or fossil-fuel kilns with CCS; battery electric and other low-emissions vehicles and supporting infrastructure; heating equipment for buildings run on electricity or biomass, including heat pumps; district heating exchangers and connections; cooking technology not relying on fossil fuels; building insulation; low-emissions production methods for crops, including reliance on bio-fertilizers and on anaerobic digesters; low-emissions techniques for dairy and livestock management, including use of nitrogen inhibitors and feed additives reducing cattle emissions; and afforestation.

needed to reach a net-zero pathway by 2030.[73] Therefore, the scale of investment still needed by 2030 has not shifted dramatically since 2020.

If we assume baseline global GDP growth of roughly 2.7 percent annually, spending on low-emissions assets would need to total roughly $51 trillion, cumulative over the decade. This would be a step-up of roughly $37 trillion as compared with simply extending current levels of spending over the decade. This increase is equal to 3.6 percent of global GDP on average annually to the next decade.

However, this research focuses on a scenario in which the world achieves even higher productivity-driven growth of 3.4 percent globally, a critical driver of incomes and broader prosperity. But there's a catch: higher growth means higher production, which ultimately requires greater inputs of energy and physical capital.

Accelerated economic growth increases the total net-zero investment need to about $55 trillion (Exhibit 6). On top of continuing current levels of spending, this would be a step-up of $41 trillion, cumulative through the end of the decade.[74] That is equivalent to just under 4 percent of global GDP on average each year. We refer to this incremental increase as the net-zero investment gap.

It is important to note that these figures do not reflect high-emissions investment. In the scenario modeled here, some high-emissions investment continues but at falling levels globally, while low-emissions investment needs to rise to about four times its current levels in the next decade.

In addition, our research does not explore the continued increases in low-emissions investment and spending needed after 2030. After 2030, high-emissions investment would continue decreasing in this scenario, eventually hitting a low annual average of $700 billion from 2046 to 2050. Meanwhile, low-emissions investment would continue increasing through the early 2040s, incrementally decreasing only in the final several years of the decade.

This is a decisive decade for altering the world's emissions trajectory. Getting to net zero by 2050 will involve transforming energy and land-use systems worldwide.

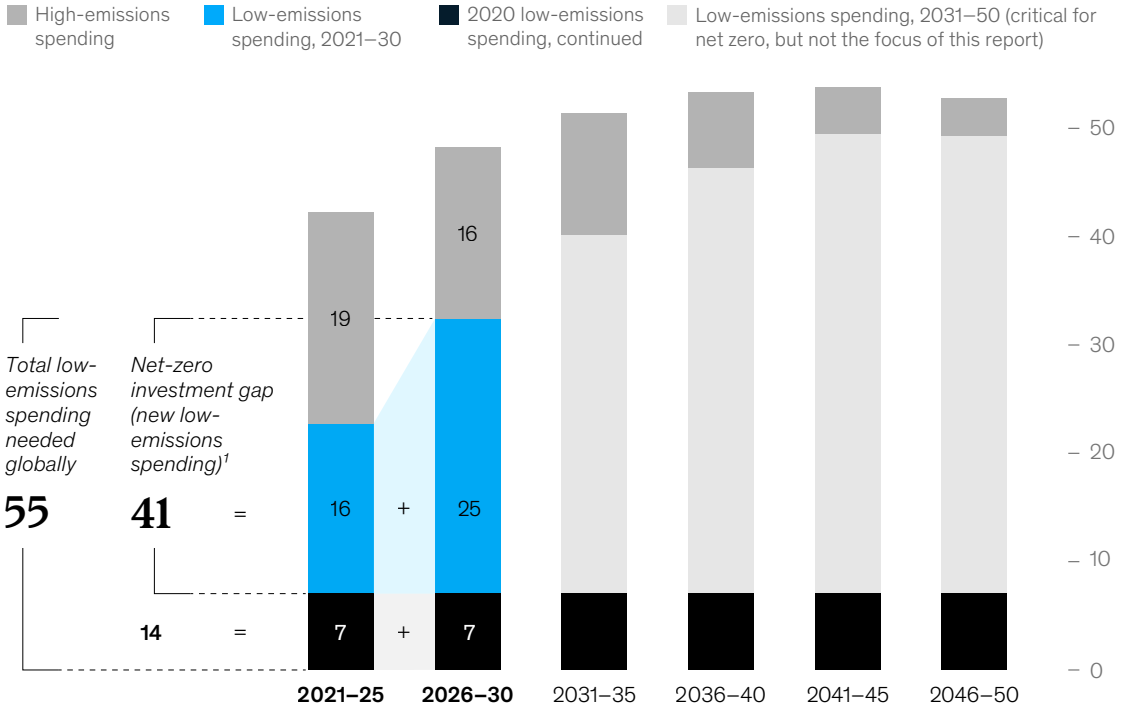
[73] *World energy investment 2023*, IEA, May 2023.

[74] These figures differ from those in our 2022 report *The net-zero transition: What it would cost, what it could bring*. This report focuses on only the low-emissions spending need rather than total spending across both high- and low-emissions, and it focuses on the period through 2030, rather than the full period through 2050. It also includes updated and refined assumptions, for example, refined views of unit capital costs and improved data for 2020 levels of spend.

Exhibit 6

We define the net-zero investment gap as the incremental low-emissions spending needed in global energy and land-use systems relative to today's levels.

Global high- and low-emissions spending needed to be on a 2050 net-zero pathway, $ trillion



[1]The incremental low-emissions spending needed through 2030 is $37T in a scenario with baseline GDP growth (2.7% global growth p.a., 2021–30) and $41T in a high-growth scenario (3.4% global growth p.a., 2021–30). All figures in 2020 dollars.
Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. They cover sectors accounting for 85% of global emissions.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

The net-zero spending need breaks down differently across sectors

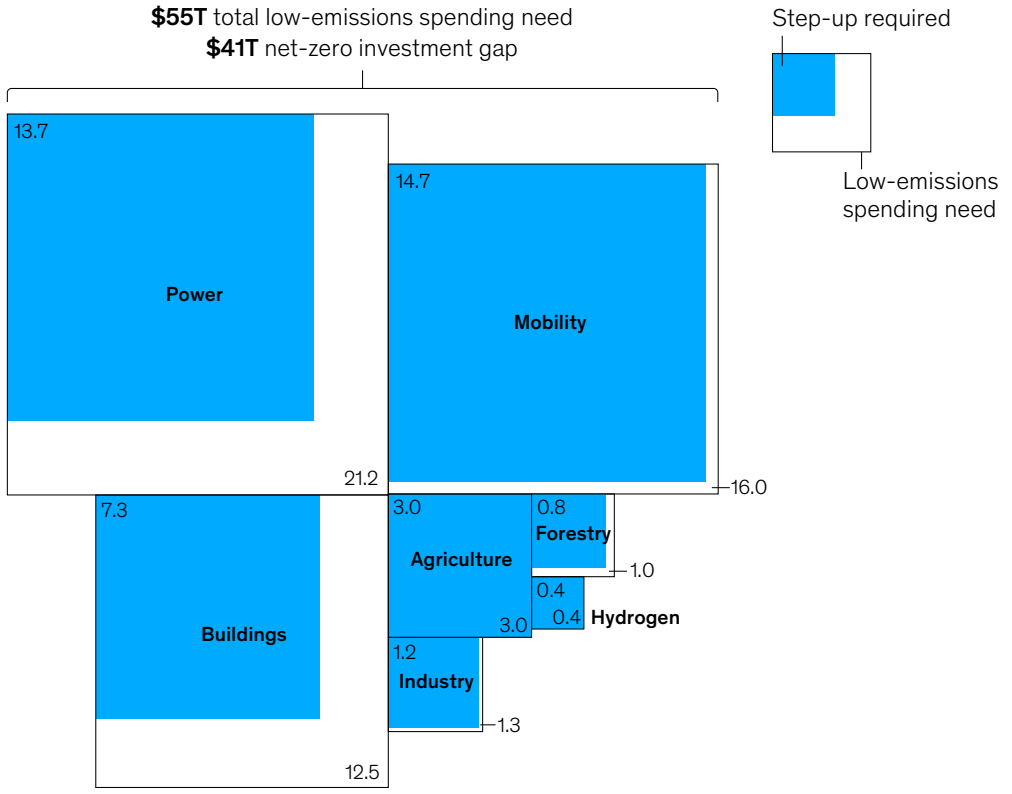
In the scenario modeled for the current decade, mobility accounts for more than one-third of the net-zero investment gap, or $14.7 trillion (Exhibit 7). Our analysis focuses only on passenger and commercial vehicles in road mobility, which produce three-quarters of mobility emissions (although addressing aviation, rail, and shipping as well could further reduce overall emissions).[75] Bringing down the emissions associated with road mobility involves shifting to electric vehicles (powered by either batteries or fuel cells) across cars, buses, and light and heavy trucks; it also involves building the charging infrastructure needed to power these vehicles. Battery electric and fuel cell electric vehicle (BEV and FCEV) cars would play a key role, with their stock increasing from around 10 million in 2020 to more than 450 million in 2030. They account for

[75]Two- and three-wheelers are excluded from this analysis because of the wide range of estimates on today's stock and penetration. Including them would create a high degree of uncertainty.

Exhibit 7

The net-zero investment need in this decade differs across seven major energy and land-use sectors.

Global low-emissions spending need and net-zero investment gap,[1] 2021–30, $ trillion



[1]Includes investment in assets with low-emissions footprints (not all necessarily carbon neutral) and in enabling infrastructure. Hydrogen includes low-emissions hydrogen production using biomass or electricity, as well as CCS-equipped production from fossil fuels. Forestry includes afforestation and avoided deforestation. Industry includes biofuel production, steel production with electric furnaces using scrap or hydrogen-fueled DRI, CCS-equipped steel production, and cement production using CCS-equipped or biomass-fueled kilns. Agriculture includes low-emissions production methods for crops and dairy and for livestock management (including use of biofertilizers, anaerobic digesters, nitrogen inhibitors, and feed additives). Buildings includes heating equipment for buildings run on electricity or biomass, district heating exchangers and connections, cooking technology not relying on fossil fuels, and building insulation. Mobility includes zero-emissions cars, buses, and commercial vehicles, as well as enabling infrastructure. Power includes electricity generation using wind, solar, hydro, nuclear, and geothermal power, generation relying on biomass and gas with CCS, electricity transmission and distribution, storage infrastructure, and heat production from low-emissions sources such as biomass.
Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

roughly three-quarters of the spending need in mobility, with all of the remainder going to low-emission commercial mobility and infrastructure build-up.

An additional third of the cumulative gap (about $14 trillion) relates to needs in the power sector.[76] Almost any decarbonization trajectory involves a massive increase in electrification, with power

[76]See, for example, Hannah Richie and Max Roser, "Emissions by sector," Our World in Data. Note that the power sector has the largest total investment need over the decade. However, it also has a higher current level of spending than mobility, which means that the gap, or necessary step-up, in mobility is larger.

Box 1

Requirements to reach net-zero emissions

To achieve net-zero emissions, previous McKinsey research identified fundamental system-level requirements that fall into the following three categories:[1]

— **Physical building blocks.** While there is a line of sight to the technologies needed to limit warming to 1.5°C above preindustrial levels, further innovation is needed to continue developing new technologies that can be deployed at scale and to reduce costs. Supply chains would need to be built out to support new technology deployment; this would require not only significant capital and the right capabilities but also extensive coordination. Necessary natural resources, including copper, nickel, rare earth metals, land, and water, would also need to be carefully managed to minimize bottlenecks and prevent price spikes and inflation.

— **Economic and societal adjustments.** An orderly transition to net zero would require significant changes to where and how capital gets allocated. Companies and countries would need to manage the demand shifts and cost changes that would stem from a wholesale revamping of energy and land-use systems. Compensating mechanisms could also be needed to address socioeconomic impacts on individuals and communities, which could be substantial.

— **Governance, institutions, and commitment.** The transition will require new governing standards, tracking and market mechanisms, and effective institutions. Securing an orderly transition will require leaders to develop coherent, reliable, and workable policies and help their organizations navigate the changes that lie ahead. The transition is also unlikely to occur without the support of citizens and consumers, and in some cases, consumers may need to fundamentally shift behaviors to reduce their own emissions.

[1] Mekala Krishnan, Tomas Nauclér, Daniel Pacthod, Dickon Pinner, Hamid Samandari, Sven Smit, and Humayun Tai, "Solving the net-zero equation: Nine requirements for a more orderly transition," McKinsey & Company, October 2021.

provided from low-emissions sources. This requires transforming generation and storage systems, as well as expanding transmission and distribution (T&D). Infrastructure (including both utility-scale storage and T&D) accounts for around 10 percent of the $41 trillion scale-up needed for a successful transition. Particularly high spending is required in emerging economies, which have to expand their power systems and ensure they can keep pace with rapid growth while undertaking the transition. China, for instance, accounts for more than a quarter of the global investment need in T&D, while India has higher needs than all of the European Union and United Kingdom. In the NGFS Net Zero by 2050 scenario, 70 percent of global electricity would be generated via renewables by 2030. Solar and wind would account for almost half of generation volumes by that date—a sharp increase from their 8 percent share in 2020.

About 20 percent of the gap would go toward equipping and retrofitting commercial and residential buildings with cleaner heating and cooking units, particularly the former. This primarily consists of spending on heat pumps in the scenario modeled here, with significant spending on retrofits and district heating as well. The stock of heat pumps would need to increase by five times in the current decade.

The four other sectors combine for less than 15 percent of the net-zero investment gap. Agriculture accounts for about 60 percent of this, with $3 trillion needed to promote wider

adoption of lower-carbon approaches to growing crops, producing dairy, and maintaining livestock.[77] The three other sectors (forestry, industry, and hydrogen) would require smaller increases. In forestry, the need is for planting and expanding forests as well as avoiding deforestation. Industry is a unique case. It has a relatively small investment need in the current decade because decarbonizing heavy industry will rely on technologies that are not expected to reach full commercial maturity until around the end of the decade; the scale of investment needed in this decade is therefore relatively low. For instance, even in 2030, only about 25 percent of cement is projected to be produced using low-emissions technologies.

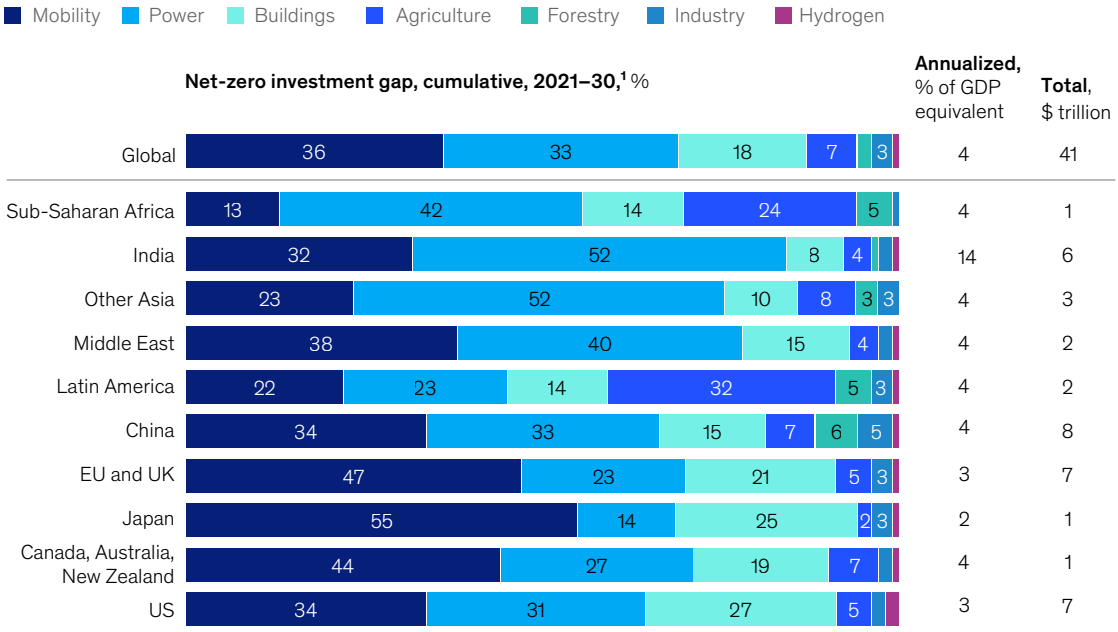
The size of the gap that would need to be bridged to get on a net-zero pathway varies by region

The sectors and systems described above have unique footprints across regions. Each region therefore has its own investment need and would allocate it differently (Exhibit 8).

Exhibit 8

The net-zero investment gap varies by sector and region, although mobility and power are large shares of the total.

Breakdown of net-zero investment gap[1] by region and sector, from lowest to highest GDP per capita



[1]In a high-growth scenario (3.4% global growth annually, 2021–30). All figures in 2020 US dollars.
Note: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. They cover sectors accounting for 85% of global emissions.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

[77] Investment needs are roughly equal between crops and livestock-related activities. Some of the methods for reducing livestock emissions include using anaerobic digestors, feed additives, and nitrogen inhibitors to reduce cattle-related emissions.

Each region's net-zero investment gap needs to be viewed not only in absolute terms but also in relative terms.

Mobility requires low-emissions investment and spending in many high-income economies. It accounts for more than 40 percent of the investment gap in Australia, Canada, Europe, and New Zealand, for example. Among other things, this reflects the large price discrepancy between zero-emissions vehicles in high-income countries versus emerging economies, as well as the larger share of car ownership.

Power is a bigger slice of the net-zero investment gap across Asia and Africa than in the rest of the world. In fact, the sector represents about 30 percent of the gap in higher-income economies on average, but 45 percent in developing countries. While most regions will need to expand their power sectors to accommodate electrification, the extent of the scale-up is larger in developing economies. According to the NGFS Net Zero scenario, higher-income regions are projected to increase electricity generation by approximately 10 percent in the current decade, compared to roughly 25 percent in developing economies. India and sub-Saharan Africa need expansions of more than 60 percent. This drives higher T&D spending in emerging economies compared to high-income ones—in the former, it represents around 15 percent of the total net-zero investment need, while in the latter it is around 10 percent. In addition, most developing economies also need to grow renewable generation fourfold, compared to a threefold increase in high-income regions.[78]

The investment required for low-emissions agriculture is higher in regions where agriculture accounts for a bigger share of GDP. The largest gap is in Latin America, which is one of the world's breadbaskets for staple crops such as grains and is also a major producer of livestock.[79] The second-highest share is needed in sub-Saharan Africa, where agriculture employs more than half of the workforce.[80]

Finally, each region's total net-zero investment gap needs to be viewed not only in absolute levels but also in relative terms. The United States, for example, would need to boost low-emissions spending by $7.4 trillion, cumulative over the decade, or 3 percent of its GDP annually in an accelerated growth scenario.

Meanwhile, India's net-zero investment gap looks smaller in absolute terms, at a total value of $5.6 trillion (nearly $2 trillion less than the United States over the decade). However, that gap represents 14 percent of the country's GDP this decade with accelerated growth, a ninefold increase from 2020 levels of low-emissions spending, which makes India the country with the steepest relative hill to climb by far. By the same token, sub-Saharan Africa is the geography with the smallest absolute gap to bridge. This is because the region has a relatively small energy-system emissions footprint today and a slower transition compared with other regions.[81]

[78] China and Latin America are an exception to this trend, as they already have a large share of renewable generation as of 2020, which reduces the need for further build-up (to 30 percent for China and 60 percent for Latin America).
[79] "Will the world's breadbaskets become less reliable?" McKinsey Global Institute, May 2020.
[80] "Employment in agriculture (% of total employment) (modeled ILO estimate)," World Bank, accessed January 2021.
[81] For instance, the NGFS shows that in 2020, energy-related CO_2 emissions in sub-Saharan Africa were about one-fifth of those in India.

But relatively low 2020 investment levels mean that it would need to muster a bigger factor increase than higher-income geographies with higher levels of current low-emissions capital expenditures, like Japan and China.

Achieving net zero by 2050 in typical transition scenarios would entail decisive action in this decade. After all, it takes time to transform energy systems—and then even more time for the benefits to manifest. Sizing and mapping the net-zero investment need leads to the next big questions: where can such large sums come from, and who could pay? The following chapter will discuss the role of growth and other avenues for action; chapter 5 will then take a step-by-step approach examining how far each of these avenues can take us toward a net-zero trajectory.

3. A systems view showing the role of growth

Sustainability, inclusion, and growth are often viewed as independent objectives. In reality, they can—and must—progress together. The economy is an interconnected system. Moving one cog makes other cogs turn, and the machine works smoothly only if all the gears pull together.

Why do we assess this system against not just one but two goals of historic magnitude, and through the lens of what is possible in this decade? Business leaders and policy makers worldwide understand the urgency of acting now to get on track for net-zero emissions by 2050. But at the same time, they are grappling with meeting society's broader expectations.

For billions of people in their roles as citizens, consumers, and workers, living standards and job opportunities are the primary concern. People need to see their own lives getting better and to feel that their children have prospects to go even further. Since broadening prosperity and tackling climate change are contemporaneous challenges, with synergies and counteractions, they need to be viewed and tackled in tandem. The net-zero transition needs broad public support and participation, which could erode if people feel that their hopes are being postponed because of it. Leaving large segments behind could also have generational consequences by limiting growth, risking social stability, and wasting human potential.

Our research applies the same urgency to both economic empowerment and net-zero investment in this decisive decade to provide a fact base for decision making. The time frame is intentional. At today's level of emissions, the world's carbon budget for holding to a 1.5°C path is trending toward running out around the end of the decade.[82] In addition, 2030 is the target for the Sustainable Development Goals.

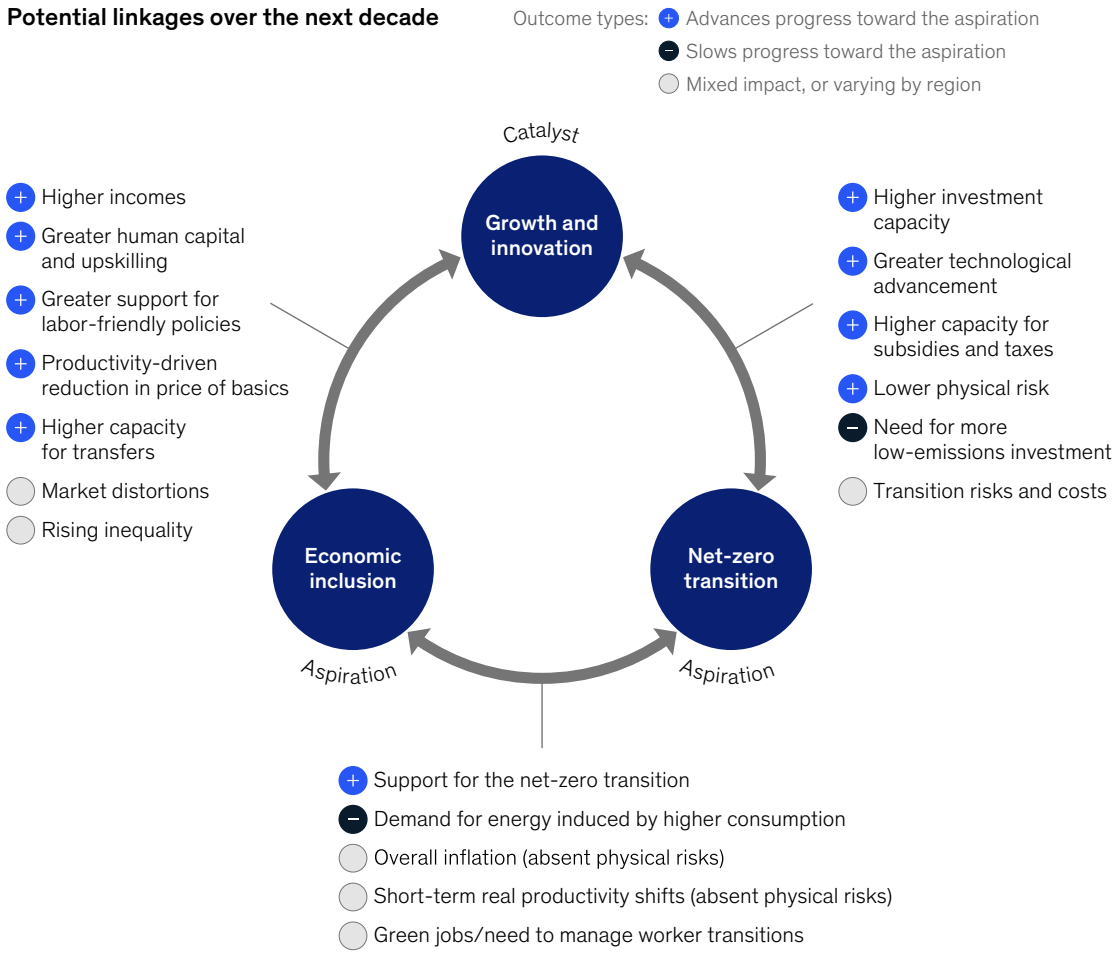
Economic growth is essential for both aspirations (Exhibit 9). Visionary goals, whether for sustainability or inclusion, are more likely to be pursued when the pie is growing and put aside when it is shrinking. Growth lifts incomes and raises living standards. It unlocks the financing capacity needed for a net-zero future. While growth can't overcome every structural challenge, it can create space for new solutions to emerge and take root.

[82] We use a 2020 starting point to give a clear decade-long view of potential progress. In addition, NGFS scenarios, the basis for our sustainability analysis, use 2020 as their starting point. Based on investment in low-emissions assets and increases in empowerment in 2021 and 2022, the scale of spending needed this decade has not dramatically shifted.

Exhibit 9

Growth and innovation are essential to making progress toward bold goals.

Potential linkages over the next decade



Note: In this analysis, we directly quantify the impact of growth on economic inclusion and the net zero-transition. We do not model second- and third-order effects (eg, economic inclusion's subsequent impact on GDP growth).
Source: McKinsey Global Institute analysis

Growth in its current form has not delivered sufficiency to everyone and has been contributing to increased emissions for decades. If these externalities were directly addressed, it could be possible to achieve a virtuous cycle (see Box 2, "To grow, or not to grow? That is the debate."). Advancing inclusion and getting to net zero would ultimately reinforce growth by reducing the physical risks and costs of climate change, strengthening societal stability, expanding economic choice, and preparing the next generation with the skills needed to be productive. The whole system would be stronger and more resilient.

This chapter introduces our frameworks, which explore the extent to which growth and innovation can close the empowerment and net-zero investment gaps (explored in turn and in more detail in chapters 4 and 5). After accounting for these forces, substantial unfilled gaps

remain; this tees up questions we return to in chapter 6. Finally, this chapter explores some of the interactions in this interconnected system, including some risks and tensions that would need to be managed.

Box 2

To grow, or not to grow? That is the debate.

Is economic growth, with its emphasis on producing and consuming ever-larger quantities of material goods, harming the planet? Or could it be part of the solution for saving it?

This debate has been ongoing for some years now, with the looming threat of climate change causing some academics to make the case for "degrowth." Among them is economic anthropologist Jason Hickel, who paints the pursuit of growth as a race to ecological disaster and does not believe that technological innovation alone can head off climate change. He also asserts that high-income countries don't need more growth in order to improve people's lives, calling for their economies to be reorganized around well-being, pulling back on excess energy and resource use.[1] The world, with its finite resources, cannot continue aiming for continuous growth, according to physicist and former US Energy Secretary Steven Chu, who argued that "you have to design an economy based on no growth or even shrinking growth."[2]

Other scholars do not go quite so far, instead making the case that slower growth is compatible with prosperity, at least for high-income economies. They envision a different model of growth that stays within environmental limits and has a stronger emphasis on shared prosperity and providing essential services.[3] Yet the global system is interconnected: consumption in high-income economies creates the markets for the export-oriented economies of Asia that have lifted so many out of poverty.[4]

Another school of thought defends economic growth. Benjamin Friedman argues that it creates increasingly "moral" societies, with rising prosperity for most, along with greater tolerance, more robust democracies, and a stronger safety net for the most disadvantaged. As long as households feel their quality of life improving over time, they are less concerned with how others are doing and more inclined to be generous to those left behind. Friedman cautions that stagnation invites a fight for scarce resources and retrenchment. In other words, growth can drive progress on inclusion, well-being, and economic mobility—provided it is broad-based.[5] Major societal endeavors, such as the push to get to net zero, are more likely to win public buy-in when the pie is expanding.

The net-zero transition depends on fueling a burst of technological innovation, which is funded by growth and fueled by the aspiration to capture even more growth in the future. Economist Alessio Terzi observes that much of the world's R&D machinery is inextricably tied to private-sector activity and the incentives that economic rewards provide. He notes that market forces have not addressed carbon emissions because they are not priced and argues that changing this can harness these forces in service of the transition. In societies where this is politically infeasible, regulation is an indirect way to increase the price of carbon. Terzi argues that growth is necessary, but so too is a reckoning with the legitimate discontents and criticisms of the anti-growth movement. Societies have to resolve the tensions between unchecked market forces, environmental sustainability, and the need for prosperity to reach those who have been left behind.[6]

1 Jason Hickel, *Less is more: How degrowth will save the world*, William Heinemann, 2020. See also Tim Jackson, *Prosperity without growth: Economics for a finite planet*, Earthscan Publications, 2009; and James D. Ward et al., "Is decoupling GDP growth from environmental impact possible?" *PLoS One*, 2016.
2 Laurie Goering, "John Kerry calls on scientists to lead fight against climate change denial," Reuters, April 27, 2021.
3 See, for example, Kate Raworth, *Doughnut economics: Seven ways to think like a 21st-century economist*, Chelsea Green Publishing, 2018; and Abhijit Banerjee and Esther Duflo, *Good economics for hard times*, PublicAffairs, 2019.
4 John Cassidy, "Can we have prosperity without growth?" *New Yorker*, February 3, 2020.
5 Benjamin M. Friedman, *The moral consequences of economic growth*, Knopf, 2005.
6 Alessio Terzi, *Growth for good: Reshaping capitalism to save humanity from climate catastrophe*, Harvard University Press, 2022.

Box 2 (continued)

To grow, or not to grow? That is the debate.

Advocates of green growth hold that it is possible to keep economies growing while advancing sustainability. Some economists have predicted that it is possible to "decouple" GDP growth and carbon emissions, a path made more promising by the steep decline in the price of renewables.[7] Indeed, some high-income economies have begun to achieve this.[8]

Our own analysis finds that growth is the most important force driving inclusion. More than 60 percent of the empowerment gap can be closed in a scenario of accelerated growth, which creates better-paying jobs that lower the public finance burden for inclusion while simultaneously creating more tax revenue that can be deployed. That extra economic growth does increase the net-zero investment need, but it also increases the financing capacity to address it. Indeed, it is hard to imagine how countries can muster the immense step-up in capital investment required for the net-zero transition in the absence of growth.

[7] See, for example, Esther Sanyé-Mengual et al., "Assessing the decoupling of economic growth from environmental impacts in the European Union: A consumption-based approach," *Journal of Cleaner Production*, volume 236, November 2019.

[8] Hannah Ritchie, "Many countries have decoupled economic growth from CO_2 emissions, even if we take offshored production into account," Our World in Data, December 2021; and Qiang Wang and Shasha Wang, "Decoupling economic growth from carbon emissions growth in the United States: The role of research and development," *Journal of Cleaner Production*, volume 234, October 2019.

We consider how much growth and innovation can deliver on both fronts

Reaching the goals outlined in chapters 1 and 2 for sustainability and inclusion involves considerable step-ups from 2020 spending levels. It would require channeling roughly 8 percent of global GDP toward these goals each year.

Where could such substantial resources come from? To answer this, we estimate the potential contributions that could originate from various sources and forces, with particular attention to how much growth and business-led innovation can deliver (Exhibit 10). The numbers attached here are the product of macroeconomic modeling combined with detailed bottom-up analysis of costs and opportunities.[83]

Growth and business-led innovation

Economic growth is an essential prerequisite if the world is to marshal resources of such magnitude. We find that growth and business-led innovation can contribute to meeting approximately half of the combined gaps. Businesses can further both goals and harness profitable opportunities as they do so.

Baseline growth

We start with a baseline scenario from Oxford Economics assuming GDP growth that averages about 2.7 percent globally on aggregate, varying by country. We then calculate how investment and spending related to empowerment and net zero would increase from actual 2020 levels in line with that growth.

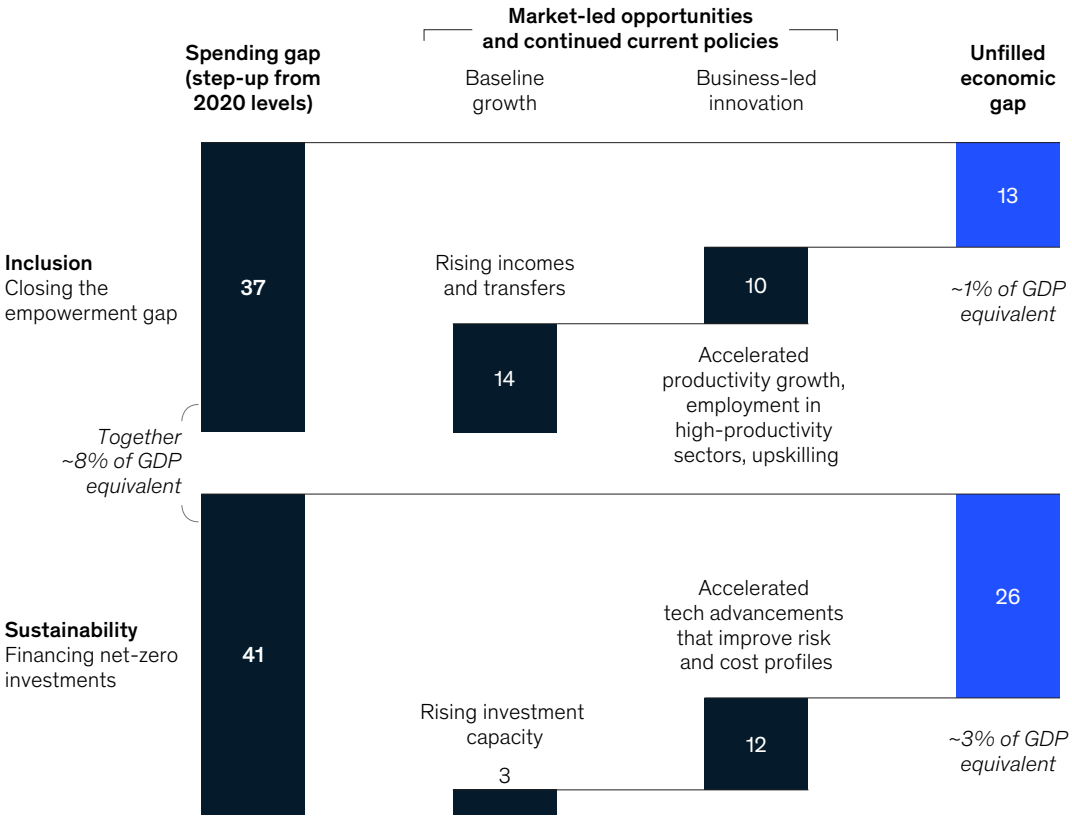
Baseline growth alone creates slow but steady progress toward eliminating poverty and raising living standards over time. This momentum can fill more than a third of the empowerment gap. It also generates tax revenue, creating resources to fund social safety nets.

[83] The analysis presented here is not a projection or a prediction. Instead, it is a scenario-based analysis of how specific empowerment and sustainability goals could be financed. For the latter, our starting point is the NGFS Net Zero 2050 scenario.

Exhibit 10

Market-led opportunities and continued current policies could potentially get the world halfway toward the combined goals.

Avenues for filling each gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific empowerment levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For net-zero investments, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending. Assumptions about policies and current commitments are as of 2021, reflecting the NGFS scenario.
[1]2020 $.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

However, baseline growth alone (not incorporating any technological advancement or switching from high- to low-emissions investment) makes a smaller contribution to closing the net-zero investment gap. The current level of investment in low-emissions assets is far too low to get to net zero. Maintaining it only in line with modest GDP growth would not deliver all the infrastructure and low-emissions technologies required.

Business-led innovation: The power of productivity

Even under current market frameworks, the private sector has opportunities and incentives to advance inclusion and sustainability faster than a scenario of baseline growth suggests. Pushing for higher productivity is in every enterprise's interest—and higher productivity

can raise wages and give consumers more spending power (both from wages and from the development of better-quality products and services).

By scaling up opportunities from the micro-level across farm and non-farm sectors, our prior MGI research suggests the potential to raise productivity by at least 0.5 to 1.0 percent each year across regions, at an aggregate level.[84] This is not only about cost-saving efficiencies; it is also about innovation and new business creation, new types of work, and products and services that address new markets. If global growth could reach 3.4 percent annually by harnessing such opportunities, more resources would also become available for public goods and social spending.

How could this unfold? Our previous research suggests the potential for advanced technologies, including automation, to diffuse well beyond firms at the frontier and into traditional sectors and small and medium-size enterprises.[85] Recent breakthroughs in generative AI, in particular, show remarkable potential to boost labor productivity.[86] In much of the world, democratizing access to technology and finance and harnessing the power of data can yield major productivity gains, especially in the informal sector, for agricultural producers, and for small businesses. In developing countries, capital deepening in infrastructure, construction, and export-oriented manufacturing and services can boost opportunities for higher growth and more gainful work.[87]

Is hoping for a burst of productivity realistic after a prolonged period of lackluster performance globally? We note that the accelerated growth projection in our analysis is not a forecast; instead, it is a scenario meant to illustrate the benefits and importance of higher productivity growth. However, there are real avenues to achieving it. Remarkable technology advances have not turbocharged productivity growth over the past two decades. One possible explanation—and reason to hope for the future—is that it takes time, organizational changes, and complementary innovations for the full impact of fundamental technologies to manifest.[88]

As companies adopt new technologies and push for higher productivity, they create new—and often better-paying—jobs. This is one of the biggest engines of empowerment in our modeling. Employer-led training and upskilling is a vital part of this dynamic. Yet it will require innovation and commitment on the part of businesses to redeploy workers into new opportunities at scale in the face of rapid technological change in developing and advanced economies alike.

On the net-zero side, the world's R&D machinery needs to be fully trained on the goal of making low-emissions technologies cheaper. Technology advances play an important role

[84] Recent research includes *The future of wealth and growth hangs in the balance* (May 2023) and *Rekindling US productivity for a new era* (February 2023).
[85] *Will productivity and growth return after the COVID-19 crisis?* McKinsey Global Institute, March 2021.
[86] *The economic potential of generative AI: The next productivity frontier*, McKinsey & Company, June 2023.
[87] *Outperformers: High-growth emerging economies and the companies that propel them*, McKinsey Global Institute, September 2018.
[88] Erik Brynjolfsson, Daniel Rock, and Chad Syverson, "The productivity J-curve: How intangibles complement general purpose technologies," *American Economic Journal: Macroeconomics*, volume 13, number 1, January 2021.

in accelerating learning rates.[89] In addition, deployment would further help to drive down costs. As a result, more spending and investment would become attractive for private actors, reducing the relative need for subsidies. Relentlessly focusing on technology development is one of the keys to not only getting to net zero but also lowering the price tag associated with doing so. All told, our estimates suggest some $15 trillion of the $41 trillion net-zero investment gap could occur, even without changes to the policy frameworks that existed in 2020. The majority, some $9 trillion, could consist of spending by private actors on low-emissions technologies that are becoming cost-competitive with traditional alternatives.

Our analysis, presented in greater detail in chapter 5, shows that affordability is critical. The total spending required to get to net zero—as well as the share that would need to be public funded or subsidized—depends greatly on whether costs come down in areas such as electric mobility, utility-scale storage, and renewable generation.

These forces have varying potential across regions

On the empowerment side, baseline growth alone can close 37 percent of the gap globally, while business-led innovation can provide an additional 26 percent. In other words, pushing beyond the baseline makes the difference between getting a little more than a third of the way to the combined global aspirations and getting almost two-thirds of the way there.

The effects are strikingly different by region, depending on starting points and growth potential. Among high-income countries, accelerated growth and business-led innovation fills just over half the gap in the United States in our scenario. These forces have the potential to do significantly more elsewhere—in fact, our scenario shows them getting Australia, Canada, and New Zealand more than 85 percent of the way to universal empowerment.

Accelerating beyond baseline growth makes the difference between getting a little more than a third of the way to the combined goals and getting almost two-thirds of the way there.

[89] Learning rates refer to the annual rate of decrease in unit capital expenditures for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale. More broadly, we use the NGFS Current Policies scenario to estimate how much spending is likely under current policy frameworks driven by growth and innovation (with warming of about 3.0°C by 2100). Other "current policy" scenarios may produce slightly different warming outcomes, though all would find a gap with a net-zero trajectory.

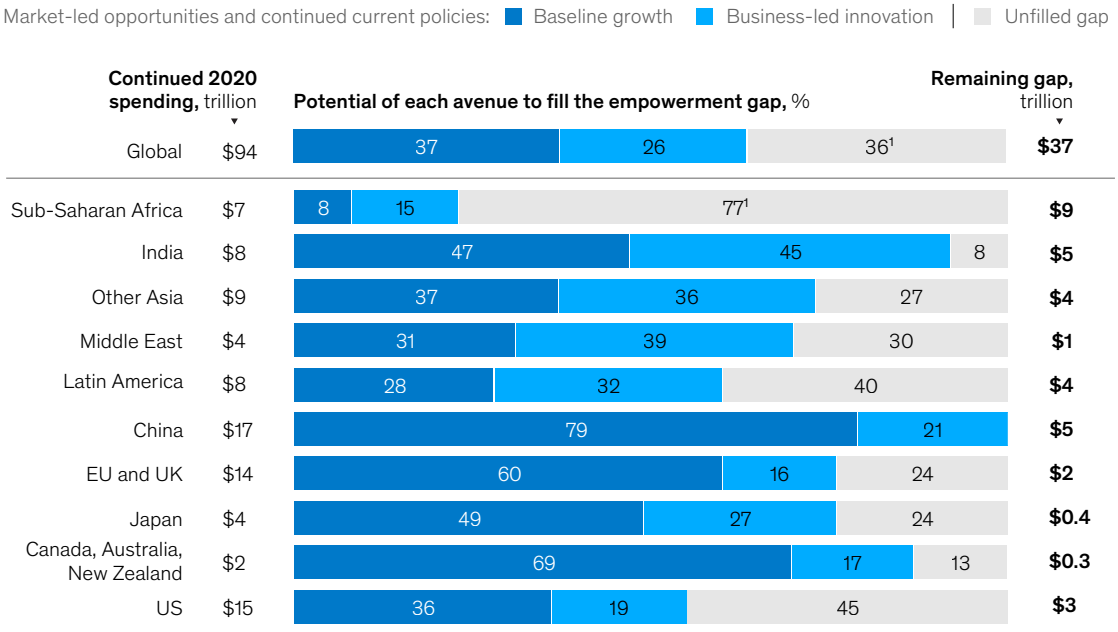
Among emerging economies, China and India stand to get the greatest bumps from growth and business innovation. In fact, these forces have the potential to erase more than 90 percent of India's empowerment gap and virtually all of China's (Exhibit 11).[90] This would lift about 700 million people in India and over 730 million in China above the threshold by 2030. Both countries have made remarkable progress against extreme poverty; raising living standards for a much larger segment of the population is the next step up the ladder. However, both countries have seen productivity growth stall recently, a trend that urgently needs to be reversed. Our model assumes productivity growth rises by almost one percentage point in each of these countries, above their respective baselines.

In other regions, growth and accelerated business innovation contribute to empowerment but could be insufficient to meet the whole need. Latin America, for instance, could be left with

Exhibit 11

Baseline growth and business innovation account for the largest potential contributions to empowerment across regions

2020 continued spending below the empowerment line plus avenues to close the gap by region, from lowest to highest GDP per capita



[1]Getting the full population to 50% of the empowerment line would decrease the unfilled gap to 23% globally and to 56% for sub-Saharan Africa specifically.
Notes: Regions listed represent 95% of global GDP. Figures in 2020 US dollars. Business-led innovation reflects higher growth above the baseline (3.4% global growth annually, 2021–30).
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OEC; Conference Board; McKinsey Global Institute analysis

[90]The lift required for global empowerment is based on 2020 empowerment thresholds. We do not adjust annually, although the line may in fact rise due to increasing per capita income, changes in input costs, and changing expectations. Conversely, we also do not model the potential positive GDP implications of having many more empowered and productive workers.

With accelerated growth, some 770 million people across the African continent could exceed 50 percent of the empowerment line, almost doubling the number from 2020.

40 percent of its empowerment gap unmet. The most challenging picture is in sub-Saharan Africa, where much of the population is below the empowerment line. We estimate that growth momentum can close only 23 percent of the gap by 2030 but will nonetheless be a powerful force in eliminating extreme poverty and raising millions closer to the empowerment line. The importance of substantial economic and labor market transformations in these regions cannot be overstated.

On the net-zero side, our scenario shows that growth and business-led innovation could together fill about 30 to 60 percent of the gap (Exhibit 12). China is at the lower end of the range when it comes to the role of business-led action, despite its clear capacity for innovation. This is due to significant current levels of investment (much of it going into low-emissions power capital expenditures), which are not counted toward the gap directly. When considering the total low-emissions spending need to 2030, which includes current levels of investment, more than half of China's need is met after counting growth and innovation.

While growth and innovation alone will be insufficient to meet the whole need in any region, the opportunities becoming viable are significant and worth seizing. For instance, our estimates suggest that some $1.5 trillion to $2 trillion in low-emissions spending could become cost-competitive with traditional alternatives in this decade in both the EU and United Kingdom region and the United States. China and India could each pursue opportunities of around $0.5 trillion to $2 trillion over the decade. Creating the conditions to unleash this will be critical everywhere, but particularly in these regions, which collectively account for two-thirds of the overall net-zero investment gap.

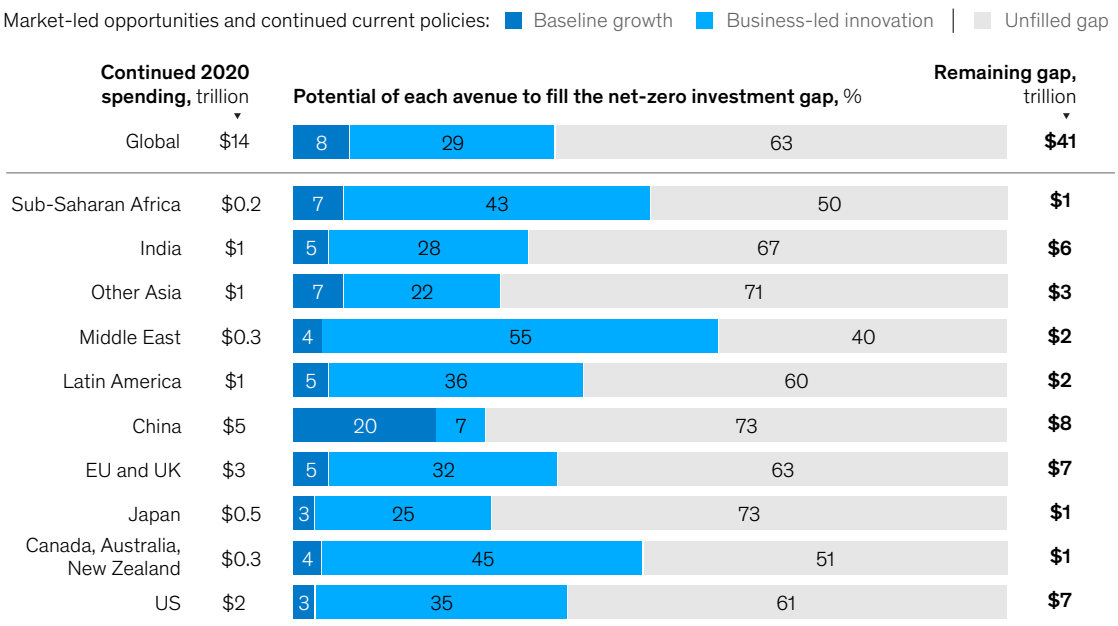
After maximizing growth and innovation, residual gaps remain—and pose hard choices

Market forces and current policy frameworks can make historic progress. Yet after capturing the benefits of growth and what businesses can do, substantial gaps remain unfilled, amounting to $40 trillion across both aspirations. This is the global total, cumulative through the decade, with roughly $13 trillion on the empowerment side and $26 trillion in net-zero spending through 2030.

Exhibit 12

Across regions, businesses drive most low-emissions spending in our scenario, including stand-alone projects plus crowded-in investment

2020 continued low-emissions spending plus avenues to close the gap by region, from lowest to highest GDP per capita



Notes: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. They cover sectors accounting for 85% of global emissions. Figures in 2020 US dollars.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

Each country and region has a unique share of this residual global gap, depending on its current development challenges, its growth prospects, and how carbon-intensive its economy currently is (Exhibit 13). Developing countries account for nearly two-thirds of the difference.

How could these gaps get closer to being fully closed? Societies could reorient growth more intentionally toward inclusion and sustainability through new policies and injections of public support. This could take the form of funding from governments and state-owned enterprises, multilateral agencies, development finance institutions, philanthropies, and social investors. Importantly, these heightened commitments could be designed to activate more from the private sector or to address needs where the economics simply do not work for private actors.

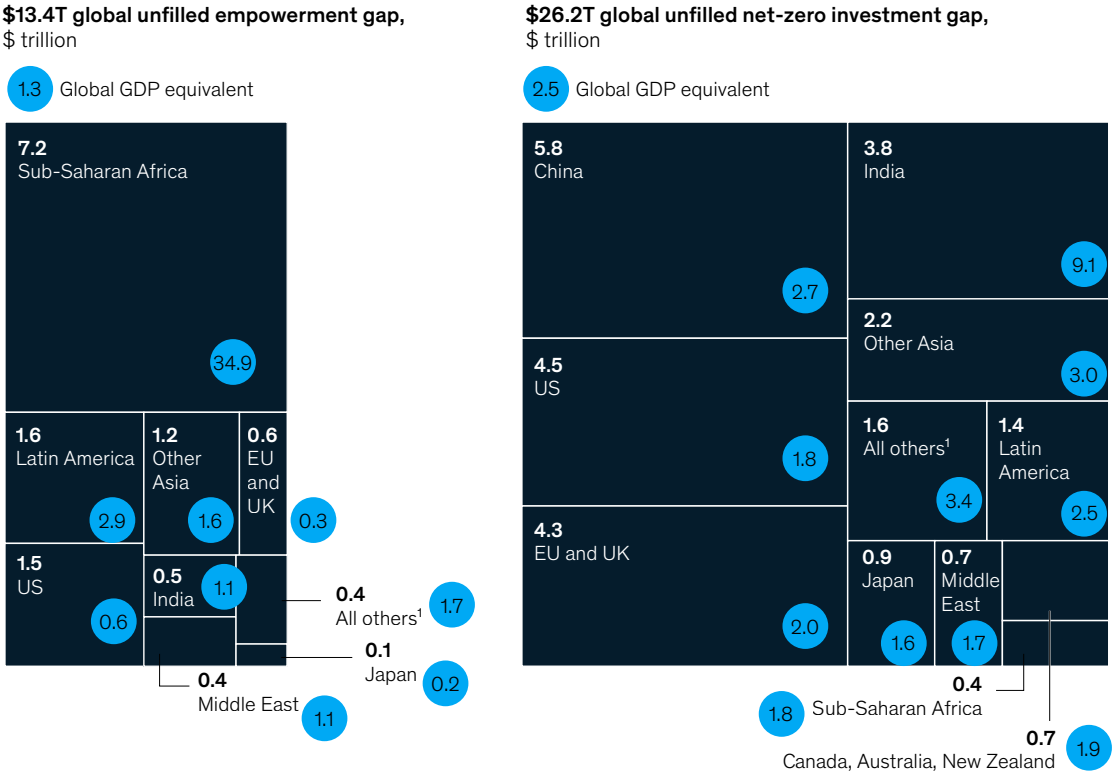
On the inclusion side, such efforts could focus on making the essentials more affordable. Public–private action could be shaped to achieve quality and cost improvements in essential goods and services—by, for example, encouraging more affordable housing, lowering the cost of healthcare, or making it easier to access nutritious food. We use an empirical, productivity-driven lens to size this potential, benchmarking against economies that have managed

Exhibit 13

Sub-Saharan Africa has the highest unfilled economic gap, followed by the United States and China.

Regional breakdown of unfilled empowerment and net-zero economic gaps, cumulative, 2021–30

XX GDP equivalent for each region, annual average 2021–30, %



[1]Includes Canada, Australia, and New Zealand.
Note: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific empowerment spending levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For sustainability, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending. Figures in 2020 US dollars.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

to deliver the most cost-effective improvements in outcomes over the past two decades. Businesses responding to societal expectations and opting to share a greater proportion of productivity with workers through more labor-friendly work arrangements could add another slice.

Yet even after these actions, our scenario shows a gap of $10 trillion remaining, cumulative over the decade, to get to full empowerment. Increased direct transfers to vulnerable households or higher direct public spending on education, healthcare, or housing could potentially address this gap, but the broader consequences for labor markets and growth itself are uncertain.

On the net-zero side, the world's R&D machinery needs to be fully focused on the goal of making low-emissions technologies cheaper.

On the net-zero side, regulation and funding support can be geared toward closing the unfilled gap. Major economies setting clear mandates for the phase-out of traditional combustion-engine vehicles has helped to shift the offerings of most major auto manufacturers, for example, while renewable energy mandates have changed the agenda for utilities.

All interventions imply costs to consumers, so our scenario focuses on filling the residual net-zero investment gap in a way that makes low-emissions technologies cost competitive for private actors, through some combination of public funding and changed market incentives. For example, national grid systems need to be expanded and upgraded to deliver electricity generated from renewable sources; in many places, this would involve installing new transmission lines to connect sunny or windy open spaces to major cities with intensive energy needs. In many countries, the power utilities responsible for building out this infrastructure are public entities—and when they lay the groundwork, private wind and solar projects can come online. Elsewhere, putting public funds into subsidy schemes or blended finance (such as grants, guarantees, or loans at favorable terms) can improve the economics of specific projects and technologies to such a degree that private agents (both companies and households) will act. Tax credits that make electric vehicles cost competitive with traditional vehicles are already influencing the decisions of some car buyers, for example; expanding those credits could sway more of them. And for net-zero projects that are far from being cost competitive with traditional alternatives, public commitments may be the only answer.

All told, we estimate that some $10 trillion of societal commitments globally over the decade could crowd in an even larger amount of private capital and avoid some of the spending need altogether as scaled-up deployment further drives down the cost of low-emissions technologies (see chapter 5 for a more detailed explanation of the assumptions underpinning this scenario).

Different outcomes are possible depending on the extent of growth, innovation, and public-private action

The extent to which economies achieve growth and societies choose to prioritize empowerment and net-zero aspirations suggests a broad range of possible outcomes.

If economic growth stays at the baseline but innovation does not bring down the cost of low-emissions technologies as much as expected, and no additional commitments are made, some 830 million people would cross the empowerment line by 2030, by our estimates. But just under four billion would remain below it, and the world would be on a trajectory to exceed 3.0°C of warming by 2100.[91]

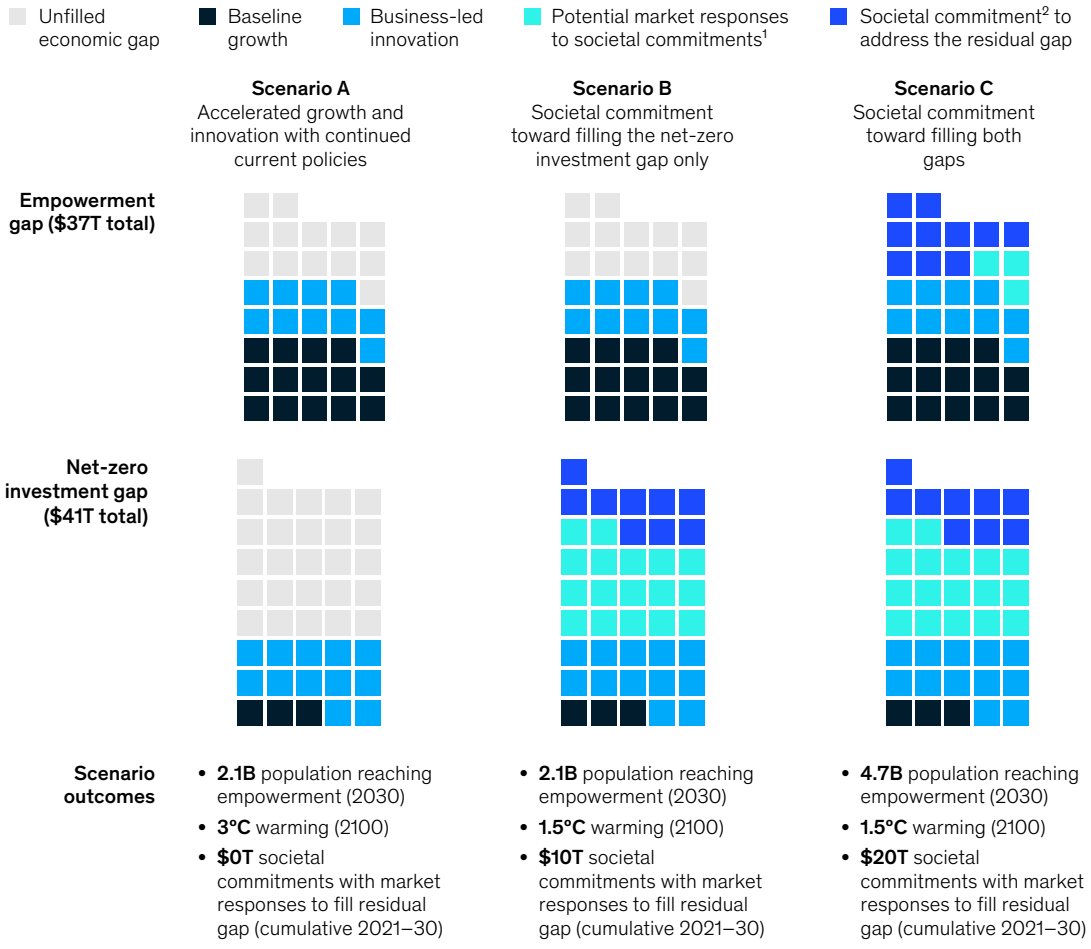
[91] Drawing on expected warming under the NGFS Current Policies scenario as of 2100.

More progress could be achieved in line with higher growth, innovation, and societal commitments. Exhibit 14 shows the degrees of progress in three different scenarios. While these are global results, the trade-offs differ across countries and regions.

Exhibit 14

Scenarios show a range of outcomes that depend on commitments to go beyond what growth and innovation can do.

Gaps by scenario, $ trillion (1 square = $1T)



[1]These include providing more affordable essentials, labor-friendly work arrangements, crowded-in capital, and faster learning rates (decreasing unit capex for low-emissions technologies, which occurs through R&D expenditure, learning by doing, and broader economies of scale).
[2]Societal commitment to address the residual gaps can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
Note: These are not projections or predictions but rather scenarios analyzing how specific empowerment spending levels and net-zero investments could occur. For the empowerment line, our starting point is a global floor of $12 PPP of consumption per capita per day, based on academic research. For net-zero investments, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

— **Innovation-led accelerated growth.** Countries could choose to focus on maximizing what market forces can do, making no additional societal commitments. With higher economic growth and innovation delivering the anticipated productivity improvements and reductions in the price of low-emissions technologies, 2.1 billion people could move above the empowerment threshold, but the world would be on a 3.0°C warming path. This would produce much more progress, especially on the empowerment side, than the current trajectory, although it would be far from closing the gaps.

— **Commitment to partially address either gap.** Assuming high growth and innovation, societies could choose to address one of the residual gaps, leaving the other to be addressed by market forces alone. The exhibit illustrates societies choosing to tackle net zero completely, but not empowerment. The choice is not binary, of course. Many combinations could yield partial progress on both challenges in tandem.

— **Commitment to fully close both gaps.** In this scenario, the global population would be fully empowered with a higher standard of living, and the world would be on track to achieve net zero by midcentury, hopefully limiting warming to 1.5°C by 2100. This would take a best-case scenario of global growth and innovation along with higher commitments that wholly—and effectively—address the combined $40 trillion residual gap over the decade.

The important assumption in the final two scenarios is that public commitments on such a scale would be well targeted and would spur additional private activity and investment. In the final chapter of this report, we illustrate the dimensions of what this would entail if societies choose to go the last mile, exploring options that include not only debt and taxes but also more effective allocation and management of current public spending. However, it is possible that such extensive commitments could distort the baseline economy or have other unanticipated consequences.

Empowerment and the net-zero transition affect each other—and some tensions would need to be managed

As people move toward empowerment, their consumption rises, with implications for sustainability. And as the world moves toward net zero, risks arise for households and labor markets, especially if the transition is "disorderly." These types of spillover effects need to be anticipated and managed to ensure smoother progress toward both goals.

Anticipating a feedback loop: Billions of new consumers and the impact on sustainability

Empowerment as we have defined it rests on faster economic growth and results in billions of people around the world increasing consumption to reach minimum levels of sufficiency. Throughout history, prosperity has frequently come with an environmental cost. As people become more affluent, many increase car travel and shift to a more meat-based diet.[92] Industrialization has increased environmental degradation, pollution, and greenhouse gas emissions.

As mentioned earlier, our analysis builds in the assumption that higher economic growth increases the net-zero financing need, relying on the historical relationship of growth to the production and consumption of energy- and emissions-intensive products. But going further to achieve full empowerment by 2030 could push these needs—and therefore emissions—even higher than what is accounted for in this adjustment.

[92] Norman Myers and Jennifer Kent, "New consumers: The influence of affluence on the environment," *Proceedings of the National Academy of Sciences*, volume 100, number 8, April 2003.

Using data from India, South Africa, the United Kingdom, and the United States, we estimate that moving everyone to the empowerment line could raise demand for energy-intensive products and services, and in turn emissions, by as much as an additional 15 percent above the effects of accelerated growth alone.[93] However, significant uncertainties surround the effects of growth and empowerment on emissions.[94]

Historical patterns could change, for example, if consumers shift behaviors or change what products they buy. Consumption is necessary to improve well-being and the standard of living for populations that are currently deprived, and it is crucial to driving economic growth. Nevertheless, the nature of consumption can evolve in a more sustainable direction. An important part of making this possible will be accelerating innovation to reduce the cost of sustainable technologies.

Eventually, consumer choices will reflect costs and benefits. The preference for sustainable technologies and products is likely to rise in tandem with empowerment levels—as long as those options are affordable. This once again underscores the importance of continued innovation to increase spending on low-emissions technologies.

How the net-zero transition could affect empowerment

As the net-zero transition gains momentum, it is likely to affect jobs and productivity, which in turn affects economic inclusion. This starts with the physical overhaul itself, which could produce a surge of jobs in construction and related manufacturing. Additional shifts are likely in ongoing operations and maintenance. Previous MGI research found that the transition could add just over 200 million direct and indirect jobs worldwide by 2050 while causing about 185 million job losses, a small net impact.[95] Other researchers similarly foresee limited net impacts on jobs and employment.[96]

But that disguises the potential for churn as jobs are redistributed across sectors. Our earlier modeling found the biggest potential shifts (with large numbers of jobs both added and lost) in agriculture, auto manufacturing, and power. This could occur alongside significant outright losses in oil, gas, and coal. Literature finding negative impacts on productivity focuses on short-term transition challenges, such as skills gaps and structural difficulties in reallocating labor, both specifically within the energy sector and across the global economy.[97]

The effects could be concentrated geographically. Regional economies that are dependent on fossil fuel extraction (such as coal mining) and emissions-intensive production could

[93] Data on household energy expenditures from the UK Office for National Statistics, US Consumer Expenditure Survey, Statistics South Africa, and India 68th Round of National Sample Survey. Energy expenditures are uplifted for each decile under the empowerment line, then used to estimate the relative increase in emissions per capita for each country (based on World Bank CO_2 energy-related emissions data for each country's direct emissions). Does not include non-energy and non-CO_2 emissions, which could change the estimate.

[94] In view of these uncertainties, we do not adjust our scenario for this enhanced level of potential energy-intensive demand from higher empowerment. Nor do we adjust our growth assumptions to account for potentially higher economic growth that could be enabled by having a more empowered and productive workforce by 2030.

[95] *The net-zero transition: What it would cost, what it could bring*, McKinsey Global Institute, January 2022. Note that projections in our earlier work examine a longer time frame (through 2050) than this report (which looks at investment needs through 2030). In addition, other forces—most notably automation—will cause occupational shifts alongside the net-zero transition. See *The future of work after COVID-19*, McKinsey Global Institute, February 2021.

[96] See, for example, *World Employment and Social Outlook 2018: Greening with jobs*, International Labour Organization, 2018; *Impacts of green growth policies on labour markets and wage income distribution: A general equilibrium application to climate and energy policies*, OECD Working Party on Integrating Environmental and Economic Policies, 2018; Damien Dussaux, *The joint effects of energy prices and carbon taxes on environmental and economic performance: Evidence from the French manufacturing sector*, OECD Environment Working Paper number 154, 2020.

[97] Alex Bowen, *"Green" growth, "green" jobs and labor markets*, World Bank policy research working paper number 5990, 2012; and Victor Ajayi et al., *Do climate policies explain the productivity puzzle? Evidence from the energy sector*, The Productivity Institute, January 2022.

experience significant dislocation, and the jobs being added may not be in the same locations. In 44 counties within the United States, for example, more than 10 percent of employment is in coal, oil, and gas, fossil fuel–based power, and automotive manufacturing.[98] Challenges in specific sectors and regions make it crucial to consider how to manage job transitions effectively and support the workers, sectors, and regions most affected by job losses.

Apart from quantity, the quality of jobs resulting from the net-zero transition has also come into focus. Although there is no perfect definition of "green" jobs, research has found that they tend to be better-paying (especially at lower skill levels) and less at risk of automation than their "less green" counterparts.[99] Additionally, green policies and related low-emissions innovation could boost labor productivity in low-emissions parts of the economy such as renewables and services, improving the potential wage outlook for workers in those sectors.[100] Some case studies also point to green innovation and environmental standards improving labor productivity at the firm level.[101]

The net-zero transition could also affect consumption, overall economic output, and productivity, with implications for real wages. On the positive side, research indicates that innovation on clean technologies spills over to other sectors of the economy at a faster rate than dirty technologies.[102] Changes in energy prices could also have knock-on effects on other parts of the economy, though the direction, size, and time frame of those changes remain uncertain. Higher energy prices could result, for example, if carbon prices on fossil fuels are imposed before low-emissions energy sources become widely available; in the near term, this could crowd out consumption and investment.[103] But energy prices could also fall over time due to the lower operating costs of renewable energy sources, for example, or through energy efficiency measures. This could have the opposite impact, spurring greater output, productivity, and income.

If interventions such as carbon taxes increase the costs of energy and other goods for consumers, they could create a disproportionate burden for people below the empowerment line.[104] Solutions can minimize the potential toll on displaced workers and on overall economic output. For example, if carbon taxes are applied, the revenues they generate can be recycled into economic development of distressed communities or direct transfers to low-income households.[105] We return to this topic in chapter 6.

[98] *The net-zero transition: What it would cost, what it could bring*, McKinsey Global Institute, January 2022.
[99] See, for example, Anna Valero et al., *Are "green" jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future*, Grantham Research Institute on Climate Change and the Environment and Centre for Economic Performance, London School of Economics and Political Science, October 2021.
[100] Florence Jaumotte, Weifeng Liu, and Warwick J. McKibbin, *Mitigating climate change: Growth-friendly policies to achieve net zero emissions by 2050*, CAMA working paper 75/2021, Australian National University, 2021.
[101] Jing Wu, Qiu Xia, and Zhiying Li, "Green innovation and enterprise green total factor productivity at a micro level: A perspective of technical distance," *Journal of Cleaner Production*, volume 344, 2022; and Magali A. Delmas and Sanja Pekovic, "Environmental standards and labor productivity: Understanding the mechanisms that sustain sustainability," *Journal of Organizational Behavior*, volume 34, 2013.
[102] Antoine Dechezleprêtre, Ralf Martin, and Myra Mohnen, *Knowledge spillovers from clean and dirty technologies*, Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, London School of Economics and Political Science, October 2017.
[103] James Rising et al., *What will climate change cost the UK? Risks, impacts and mitigation for the net-zero transition*, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, May 2022.
[104] Energy prices could rise in the near term, for example, if carbon prices are imposed before low-emissions energy sources are widely available and cost competitive. But they could also decline over the longer term (for example, due to the lower operating costs of renewable energy sources and through energy efficiency).
[105] Jonathan L. Ramseur and Jane A. Leggett, *Attaching a price to greenhouse gas emissions with a carbon tax or emissions fee: Considerations and potential impacts*, US Congressional Research Service, 2019; Frederick van der Ploeg and Maria Chiara Paoli, "Recycling revenue to improve political feasibility of carbon pricing in the UK," VoxEU, October 2021; and Baoping Shang, *The poverty and distributional impacts of carbon pricing: Channels and policy implications*, IMF working paper, 2021.

The two aspirations also have complementary aspects. Not acting to curb temperature rise could harm growth—and empowerment—substantially through effects such as impairing the ability to work outdoors, agricultural losses, and damage to capital stock. Lower-income people would become even more exposed to hazards if climate change is not convincingly addressed. And research has shown that as households become more empowered, they are more likely to be aware of the risks of climate change and, in turn, lend support to net-zero policies.[106] For more on some current initiatives that address both priorities together, see Box 3, "Two for one: Innovations that advance inclusion and sustainability" (in chapter 4).

In this chapter, we offer a high-level overview of the scenario frameworks used in this research. In the two chapters that follow, we will zoom in to explore in greater detail a scenario for closing the empowerment gap and then a scenario for closing the net-zero investment gap.

[106] Higher-income households are more likely to buy products with sustainability-related claims; see "Consumers care about sustainability—and back it up with their wallets," McKinsey & Company, February 2023.

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4. How far can the world get toward universal economic empowerment?

Our analysis of what it would take to lift everyone above the empowerment line focuses on the economics involved in filling this gap. These numbers add up to much more than an abstract exercise. They ultimately represent the lives, aspirations, and prospects of individuals.

As described in chapter 1, empowerment is a complement to the extreme poverty line. It is a higher bar that measures the next stage of progress, incorporating higher minimum living standards. It is calculated to meet a full range of basic needs and get people to the point at which they can begin to save and are no longer at risk of slipping back into poverty. When people have stability, they can begin to invest in themselves and in improving their own circumstances, exercising more choice about where and how they live and the work they do. This would activate much more of the world's vast untapped human potential, broadening the possibilities for the next generation.

However, universal empowerment requires a tremendous rechanneling of economic resources in the short term, while the full benefits may take longer to manifest. The global population currently below the threshold needs to have additional spending power to access a full range of basics—an increase we calculate at $37 trillion, cumulative over the decade. This chapter maps out how portions of the gap can be addressed.

Growth is critical to furthering empowerment. But it needs to translate into gains for people in their roles as workers or consumers, leading to more broad-based prosperity.[107]

Businesses can achieve a great deal of progress by creating more productive jobs and equipping workers to make transitions to better occupations with rising wages. In fact, we calculate that growth plus business-led innovation focused on upskilling workers could produce enough momentum to fill almost two-thirds of the total gap (Exhibit 15).

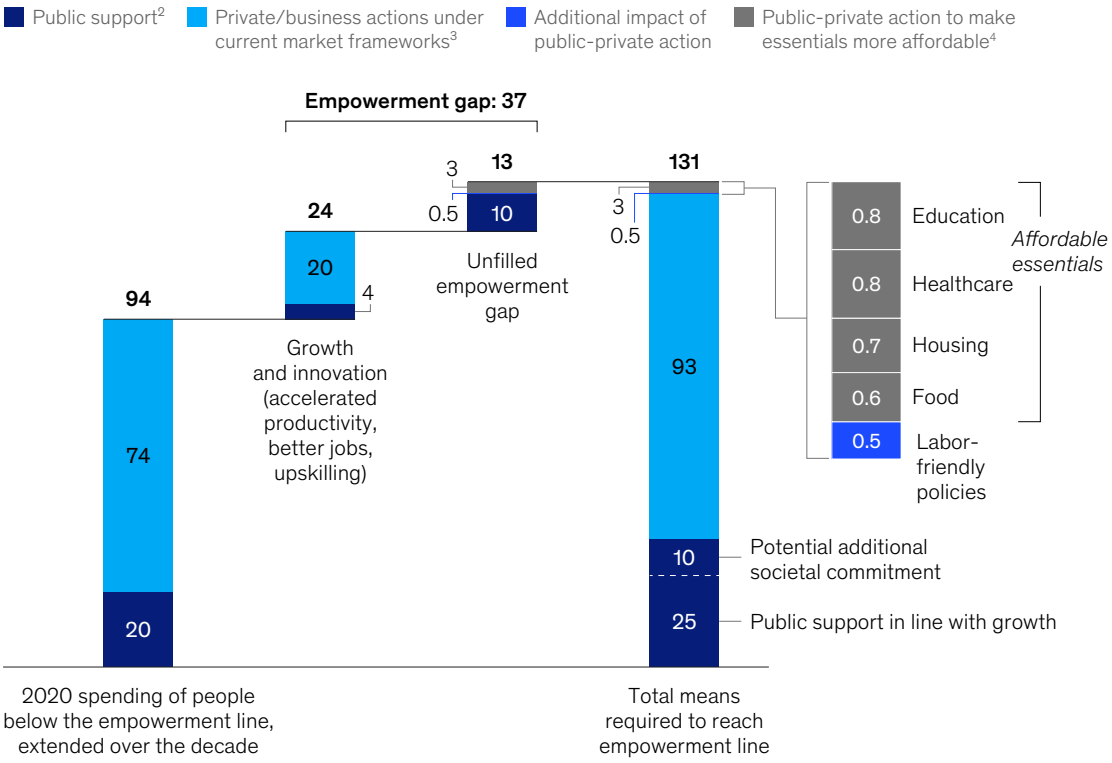
Going further would mean a departure. The unfilled gap could be addressed through a combination of more labor-friendly public and company policies plus public-private action to make essential services more affordable and effective. Depending on their capacity, countries

[107] Daron Acemoglu and Simon Johnson, *Power and progress: Our thousand-year struggle over technology and prosperity*, PublicAffairs, 2023.

Exhibit 15

To address residual empowerment gaps, societies could increase their commitments and make essentials more affordable.

Scenario for potentially closing the empowerment gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific empowerment spending levels could occur.
[1]2020 $.
[2]Additional societal commitment can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
[3]Economically viable under current policies.
[4]Based on matching productivity benchmarks.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

could choose to increase their commitments, fully closing their empowerment gaps through direct transfers or additional investment in social and public goods.

While our research involves a global, macro scenario, inclusion is ultimately about improving individual lives. Exhibits 16 and 17 show how someone in an advanced economy and someone in a developing economy could hypothetically reach the empowerment line.

Empowerment starts with economic growth

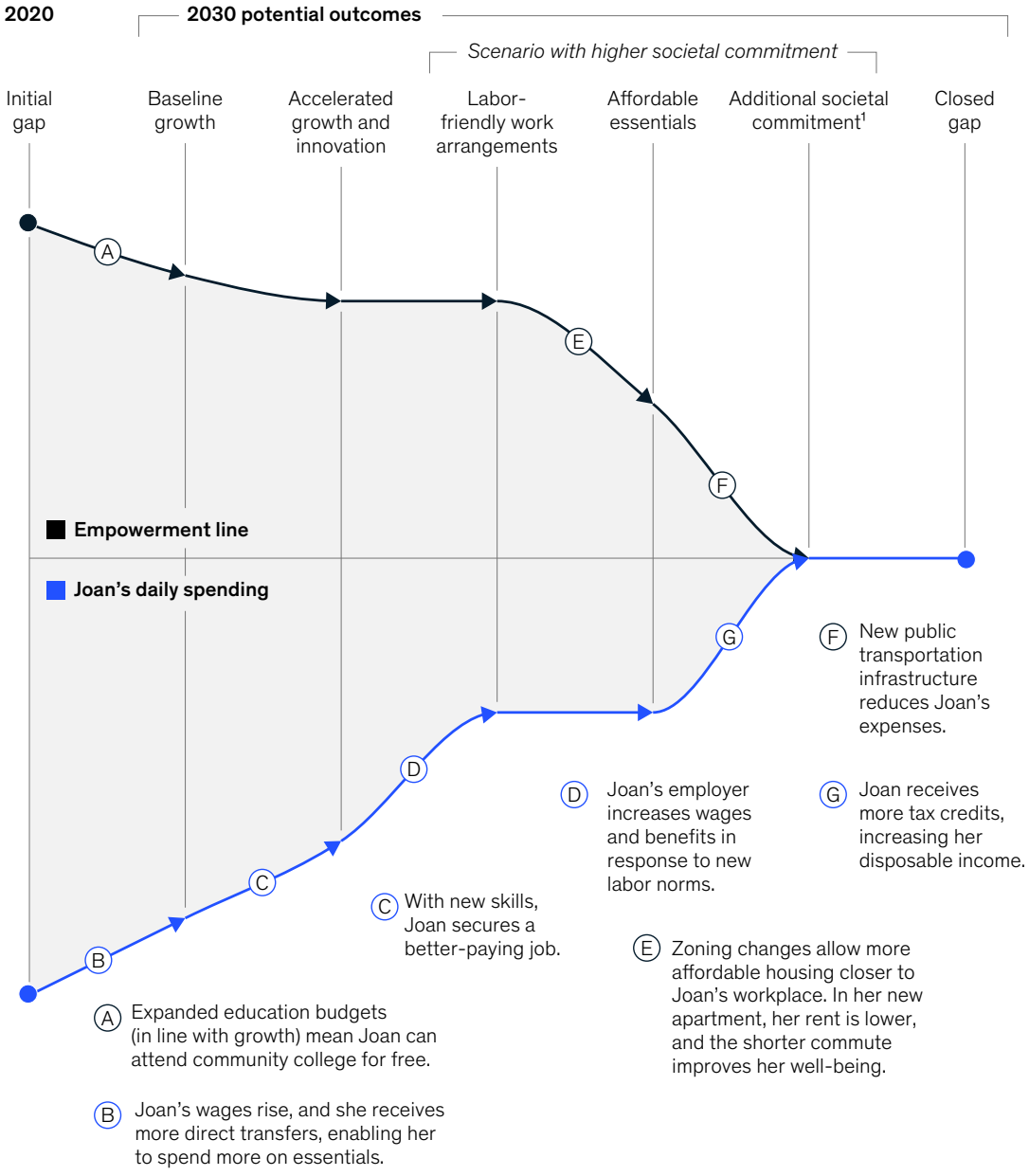
Economic growth has produced historic progress in human development indicators over the past two decades—and its role in doing the same in the years to 2030 cannot be overestimated.

Today, about 60 percent of the global population lives below the empowerment threshold. We estimate that baseline global growth averaging 2.7 percent annually could take that share down

Exhibit 16

Joan's potential journey to empowerment

Illustrative road map to economic empowerment for an individual below the empowerment line in an advanced economy

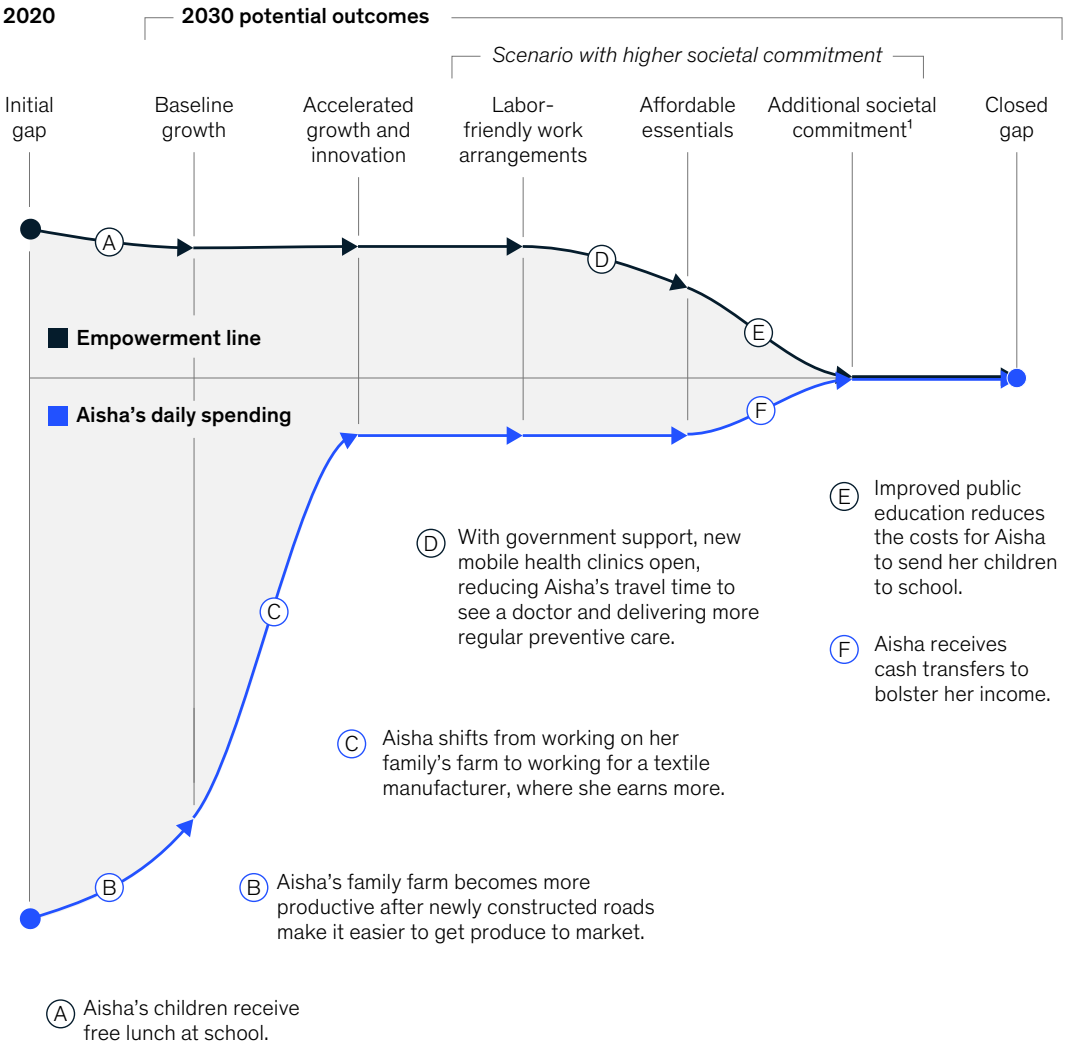


[1]Societal commitments can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; McKinsey Global Institute analysis

Exhibit 17

Aisha's potential journey to empowerment

Illustrative road map to economic empowerment for an individual below the empowerment line in a developing economy



[1]Societal commitments can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities.
Source: World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; McKinsey Global Institute analysis

to 46 percent, assuming growth in line with historical patterns. This effect would occur through job creation, higher wages, and household transfers and social support increasing in proportion to growth. As a result, 830 million people could gain enough purchasing power to cross the empowerment line, filling 37 percent of the global empowerment gap. China, in particular, could all but eliminate its empowerment gap by the decade's end. However, with no additional action,

3.9 billion people worldwide could remain below the empowerment line at the end of the decade, based on our estimates.[108]

Higher productivity can fill more of the gap

Businesses pursuing initiatives in their own interest can fill an additional 26 percent of the empowerment gap. We see two mechanisms for this.

Accelerated productivity growth

First, if the business sector doubles down on productivity to lift global growth to an average of 3.4 percent annually, it could boost wages for workers, even assuming historical patterns hold.[109] Achieving faster productivity-driven growth can narrow the empowerment gap by $2 trillion, lifting an additional 170 million people above the empowerment threshold.

As discussed in chapter 3, many real avenues could boost productivity. The continued digitization of business operations and the accelerating adoption of automation technologies could finally deliver a productivity dividend, particularly for lagging sectors, firms, and regions.[110] Innovators can create new businesses, new types of work, and products and services that address new markets. Farm and non-farm sectors have the potential to raise productivity, in aggregate, by at least 0.5 to 1.0 percent each year across regions, as outlined in prior MGI research.[111]

Upskilling workers for better-paying jobs

A second and related area in which businesses can take action is similarly aligned with their own interests: upskilling workers to prepare them for better-paying jobs as the occupational mix changes across countries.

Investment and technology adoption are important elements of higher productivity. This creates the challenge—and the opportunity—to upskill workers to make successful job transitions into more productive roles. Previous MGI research has explored the scale of the skill shifts and occupational transitions that will likely be needed in the years ahead.[112] Our analysis here suggests that roughly 10 percent of lower- and mid-skill workers globally could see their wages rise if they are equipped to take on higher-skill jobs by 2030 in response to technology, sector-specific growth opportunities, and other trends.[113]

Employers themselves are an underappreciated engine of human capital development; people continue adding skills throughout their working lives. Previous MGI research showed that work experience contributes 46 percent of the average individual's lifetime earnings, and skills learned on the job are an even bigger determinant of incomes for anyone without educational credentials who starts out in low-wage work.[114]

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[108] All calculations are relative to the empowerment gap in 2020. In reality, the threshold will rise as a country develops, so China and other countries could still have populations below a new and higher threshold in 2030 (although by 2020 standards, the gap will be closed).

[109] We note that this is not a forecast; instead, it is a scenario meant to illustrate the benefits and importance of higher productivity growth. While this research discusses aggregate global growth rates, our underlying model incorporates varied growth rates across countries.

[110] Dan Andres, Chiara Criscuolo, and Peter Gal, *The global productivity slowdown: Technology divergence and public policy: A firm-level perspective*, OECD, 2016; and *Rekindling US productivity for a new era*, McKinsey Global Institute, February 2023.

[111] Recent research includes *The future of wealth and growth hangs in the balance* (May 2023) and *Rekindling US productivity for a new era* (February 2023).

[112] See, for example, *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, November 2017.

[113] This analysis builds on MGI's future of work data and modeling.

[114] *Human capital at work: The value of experience*, McKinsey Global Institute, June 2022.

Business-led training and coaching is therefore a major opportunity for people below the empowerment line to gain skills and move into stable jobs with opportunities to advance and build their incomes over time. As countries build out or adapt their physical infrastructure and invest in the energy transition, for example, they would add jobs in construction, utilities, and energy. As the economy continues to digitize, businesses will increasingly need workforces that can use the latest tools to stay competitive. In manufacturing, for instance, automation is likely to make traditional assembly line work recede in favor of more technical roles. More healthcare workers are needed both in high-income economies with aging populations and in developing countries that are expanding their coverage. In all of these areas, employers will need new kinds of skills that may not be readily available, particularly as technologies continue to evolve. They will need to deliver training and apprenticeship to fill these needs, whether they do it themselves or as part of broader coalitions.

Upskilling can close

$8T

of the global empowerment gap

Using MGI's global future of work model, we look at how the mix of jobs is likely to change across economies by 2030. If employers take the lead in training workers to move into new, more remunerative types of roles they need to fill, wages could rise for the workers who successfully make these transitions, as a by-product. While this dynamic would benefit the entire labor force, we isolate the impact for workers below the empowerment line only, since that population is the subject of our research. Globally, we estimate that upskilling could close an additional $8 trillion of the global empowerment gap as people move into better-paying jobs. But upskilling does not happen without intentional effort. It will be a heavy lift for businesses to improve this dynamic, especially where the process involves bringing people from subsistence farming or informal sectors into more productive work.

Historic progress is possible: Lifting more than two billion people to the empowerment line and 600 million out of poverty

All told, we estimate that higher growth combined with creating and filling more productive jobs could close $10 trillion of the global empowerment gap over and above what baseline growth alone could account for. This includes the impact of social and public transfers rising in line with higher growth.

This is an opportunity to raise living standards and transform lives on a massive scale, lifting 2.1 billion people into empowerment and 600 million more out of poverty (Exhibit 18).[115] In this scenario, the share of the global population below the empowerment line drops from about 60 percent to 30 percent and the share in poverty shrinks to 3 percent over the decade. By way of comparison, in the two decades from 2000 to 2020, the share of the global population below the empowerment line dropped some 20 percentage points, as 1.9 billion people rose above it. Getting to the full aspiration would require a significant acceleration over the historical rate of progress.

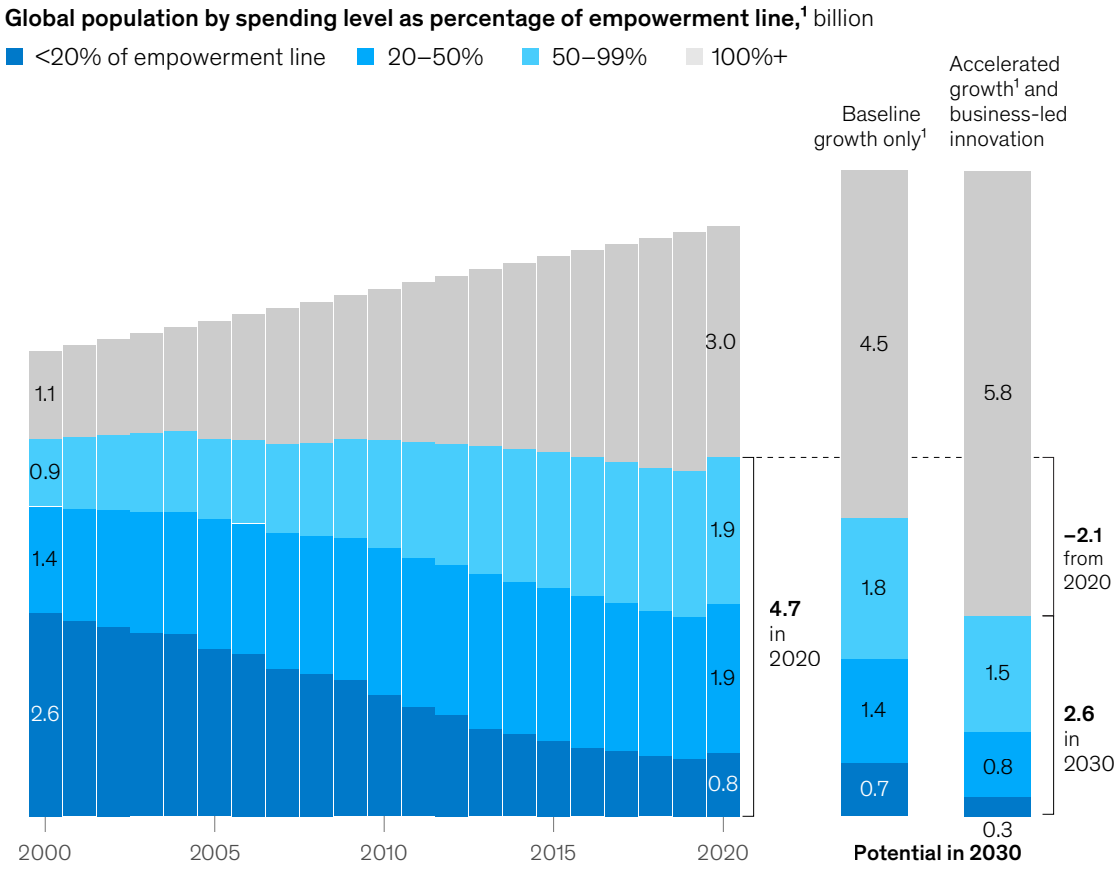
Assuming that societies do not make additional commitments to raise living standards at the lower end of the pyramid, most countries would take longer to achieve full empowerment. But accelerated economic growth would still help achieve historic progress, eliminating the most severe forms of poverty in much of the world by 2030 (although we note the unique difficulties in places where conflicts are ongoing, among other deep-rooted structural issues).

The toughest empowerment challenge is in sub-Saharan Africa. If economic growth remains at the baseline, the absolute numbers of those experiencing the most extreme deprivation (set at

[115] Defined here as 20 percent of the empowerment line, which is just above the World Bank's extreme poverty line.

Exhibit 18

Accelerated economic growth and business-led innovation could bring another 2.1 billion people above the empowerment line and 600 million out of poverty.



[1]Our scenario uses a baseline global growth rate of 2.7% annually (2021–30) and a higher productivity-driven global growth rate of 3.4% annually (2021–30).
Source: World Data Lab, WageIndicator Foundation, World Bank, Oxford Economics, McKinsey Global Institute analysis

20 percent of the empowerment line, roughly equivalent to extreme poverty) might actually tick up as the population rises. But accelerated productivity-driven growth could cut that population in half, which translates to 250 million people exiting poverty. The gap remaining to fully erase poverty in this scenario amounts to a spending lift of $100 billion over a decade, equivalent to about 5 percent of total public spending in these countries, projected at historical rates. At the same time, living standards would continue to improve for the rest of the population. In a high-growth scenario, the population that achieves at least 50 percent of the empowerment standard would rise from 260 million in 2020 to 550 million in 2030. Transforming so many lives would expand the continent's possibilities in profound ways.

How could the rest of the empowerment gap be addressed?

Economic growth and business-led innovation could make tremendous progress toward empowerment. However, in most countries, portions of the gap would remain unfilled.

Societies could choose to go further and close these gaps in full. Part of that could involve creating enablers to activate more from businesses. One avenue is for employers to reshape work arrangements. Working individually and with industry coalitions, employee associations, and policy makers, businesses could potentially increase labor's share of income in line with the best trends achieved by peer countries. Another avenue is for organizations to deliver more affordable essential products and services, with better quality and outcomes, by matching the productivity improvements achieved historically in some economies. Together, these avenues could collectively close an additional 9 percent of the global empowerment gap. The remaining unfilled gap could be addressed with direct transfers to vulnerable households or with increased investment in public goods.

However, as discussed in chapter 3, getting to full universal empowerment implies rising consumption and energy demand that could affect the net-zero challenges. It will be important to look for solutions that address the intersection of these issues (see Box 3, "Two for one: Innovations that advance inclusion and sustainability").

Implementing more labor-friendly policies

In the previous section, we discussed how labor income can increase if accelerated productivity growth enables workers to take on better-paying jobs. Beyond focusing on growth and

Box 3

Two for one: Innovations that advance inclusion and sustainability

A resource-constrained world needs solutions that advance sustainability and inclusion together. Innovating at the intersection of these goals can have mutually reinforcing effects. We discuss some examples below for consideration, while noting that each country should evaluate what could be most applicable and effective for its own context. Local innovation could adapt these ideas (and find many more) that deliver what newly empowered populations and communities actually want and need to make their lives better.

— **Clean cookstoves:** The International Energy Agency (IEA) estimates that more than 2.5 billion people lack access to clean cooking facilities. Many poor households resort to burning coal, kerosene, wood, or animal dung; this produces indoor air pollution that carries health risks while contributing to emissions and deforestation. It also means drudgery for millions of women and girls who must gather this fuel and cook in unsafe conditions.[1] Around the world, a number of companies, entrepreneurs, and nonprofits such as the Clean Cooking Alliance have developed clean cookstoves that can be manufactured, installed, and operated at low cost. Climate Impact Partners and CQuestCapital are two companies that offer other companies the opportunity to underwrite cookstove deployment for carbon credits.

— **Sustainable affordable housing:** Countries around the world have a shortage of decent affordable housing. As they expand the supply, developers, builders, and governments can incorporate sustainable design principles and materials as well as installing features such as rainwater harvesting equipment, solar panels, and green roofs. Mexico's EcoCasa program, for example, is a joint venture between the country's federal mortgage provider, the Inter-American Development Bank, and Germany's development bank (KfW), capitalized with international

[1] *Accelerating clean cooking as a nature-based climate solution*, Clean Cooking Alliance, August 2022.

Box 3 (continued)

Two for one: Innovations that advance inclusion and sustainability

climate funds. It has financed dozens of developers to build more than 65,000 affordable energy-efficient homes, providing both concessional loans and technical assistance.[2] Habitat for Humanity, one of the largest nonprofit builders of affordable homes in the United States and around the globe, ensures that its homes are sustainable, durable, and energy efficient. The organization aims to provide homeowners with healthy environments and lower their life-cycle costs.[3]

— **Mass transit:** Expanding access to public transportation can keep cars off the road and lower commuting costs, which can be a boon for those who are not yet economically empowered. In Bogotá, a city with heavy traffic congestion and an overwhelmed mass transit system, a new public bus company called La Rolita expanded transit into underserved neighborhoods. It operates a fleet of almost 200 new electric buses that are easy to maintain and thus more reliable. The company also made it a point to hire women for traditionally male-dominated driving roles, advancing gender equity and creating jobs that have brought people out of the informal economy.[4] More local authorities are experimenting with making public transit free. These include Tallin, Estonia; Dunkirk, France; and Kansas City, Missouri. Luxembourg eliminated all transit fares nationwide, and Washington, DC, is now making all public bus rides free.

— **Distributed energy:** According to IEA data, almost 775 million people lacked electricity in 2022, most of them in sub-Saharan Africa.[5] In late 2022, the World Bank announced a partnership with governments, private investors, and development agencies to fast-track off-grid solar technology and mini-grids in Africa, with an eye toward eventually expanding them globally. Among the project priorities will be systems for schools and medical facilities as well as cold chain storage for farmers.[6] Expanding the off-grid energy sector can also be a source of jobs.

— **Low-cost two- and three-wheel EVs:** While electric cars have made real inroads in high-income economies, they have lower penetration in many low- and middle-income countries. Two- and three-wheelers can provide viable transportation options to households that cannot yet afford cars—and some consumers prefer their mobility and ease of parking in highly congested cities. Shifting from diesel-powered motorbikes and making affordable electric versions available can also reduce air pollution and create an opportunity for developing countries to establish new manufacturing value chains.[7]

— **Supporting smallholder farmers:** The half billion smallholder farmers worldwide are critical to global food security and stewards of natural resources. But many are impoverished rural residents who are heavily exposed to climate change and environmental degradation. Supporting these farmers to boost food production in harsher conditions is in everyone's interests. The International Fund for Agricultural Development, a UN agency, focuses on improving land management and farming practices in developing countries.[8] Recent McKinsey research identified more than 30 measures that could help smallholder farmers adapt to and mitigate climate change; these include pest management, drought-tolerant seed varieties, soil testing and amendment, animal health monitoring, rotational grazing, and more. Governments, investors, and development finance institutions all have a role to play in scaling up more sustainable practices.[9]

[2] Lucy Oates et al., *Creating safe, affordable and sustainable housing in cities: Lessons from EcoCasa in Hermosillo, Mexico*, Coalition for Urban Transitions and University of Leeds, 2021.
[3] See "Habitat home construction technologies," Habitat for Humanity, accessed August 23, 2023.
[4] Jose Orozco, "Colombia's women-led electric bus fleet is reshaping Bogotá's public transit," Bloomberg, May 8, 2023.
[5] "For the first time in decades, the number of people without access to electricity is set to increase in 2022," IEA, November 2022.
[6] "World Bank Group announces major initiative to electrify sub-Saharan Africa with distributed renewable energy," World Bank, November 9, 2022.
[7] *The economics of electric vehicles for passenger transportation*, World Bank, 2023.
[8] See "Climate and environment," International Fund for Agricultural Development, accessed August 23, 2023.
[9] "What climate-smart agriculture means for smallholder farmers," McKinsey & Company, February 2023.

upskilling, additional steps can address labor's declining share of national incomes—that is, the share of economic output returned to workers as compensation. This share has been trending downward in recent decades across multiple countries, both high-income and developing (Exhibit 19).[116] This decline has broad implications for workers' earnings and prospects. It reflects wages growing more slowly than productivity and a hollowing out of the middle class, while a greater share of income now goes to companies and investors (in the form of profits, interest, and dividends).

Labor-friendly work arrangements could help alleviate this trend, after accounting for the improvement possible through employment shifts.

Employers themselves can take action to implement more worker-friendly arrangements. This could involve choices to pay living wages, improve working conditions, expand leave policies and dependent care support, or improve workers' retirement security. Market forces and demographics may mean that companies improve their value propositions for employees in part to stay competitive. Across multiple economies, many workers not only changed jobs during the COVID-19 pandemic but came away with higher expectations for what they will accept. In the longer term, many major economies have aging populations, and structural labor shortages will continue to favor workers. Larger companies have the ability to foster more labor-friendly work arrangements throughout their supply chains. They also have the option of creating employee ownership plans, which help workers build wealth and create incentives for the workforce to ensure the organization's performance.

Employer actions could be spurred through policy measures such as raising the minimum wage and strengthening labor regulations for overtime, employee classification, and benefits. Strengthening the ability to organize and bargain collectively is another potential pillar; the shrinking role of unions has been suggested to be a driver of the declining labor share of income in the United States, in particular.[117] Competition policy is another area to examine; industry consolidation and superstar effects have also contributed to the decline.[118] However, the implications for the baseline economy and growth would need to be assessed.

How much could improving the labor share of income contribute to closing the empowerment gap? We arrive at an estimate by sorting countries into cohorts and quantifying the potential if countries matched their best-performing peers in historical labor share trend; this gives us a benchmark that is reasonably attainable, based on empirical evidence. After calculating this potential, we separate out the share of those gains related to moving into better-paying jobs and upskilling (as described earlier); we then attribute the rest to changes in company or public policies.[119] Not all of the resulting gains in income would go to workers below the empowerment line. But those that do could help to shrink the empowerment gap by an average of just over 1 percent, or $500 billion, by our estimates.

[116] See, for example, *The labour share in G20 economies*, International Labour Organization and OECD, February 2015; and Gene M. Grossman and Ezra Oberfield, *The elusive explanation for the declining labor share*, NBER working paper number 29165, August 2021.

[117] Anna Stansbury and Lawrence H. Summers, *The declining worker power hypothesis: An explanation for the recent evolution of the American economy*, Brookings Papers on Economic Activity, Spring 2020.

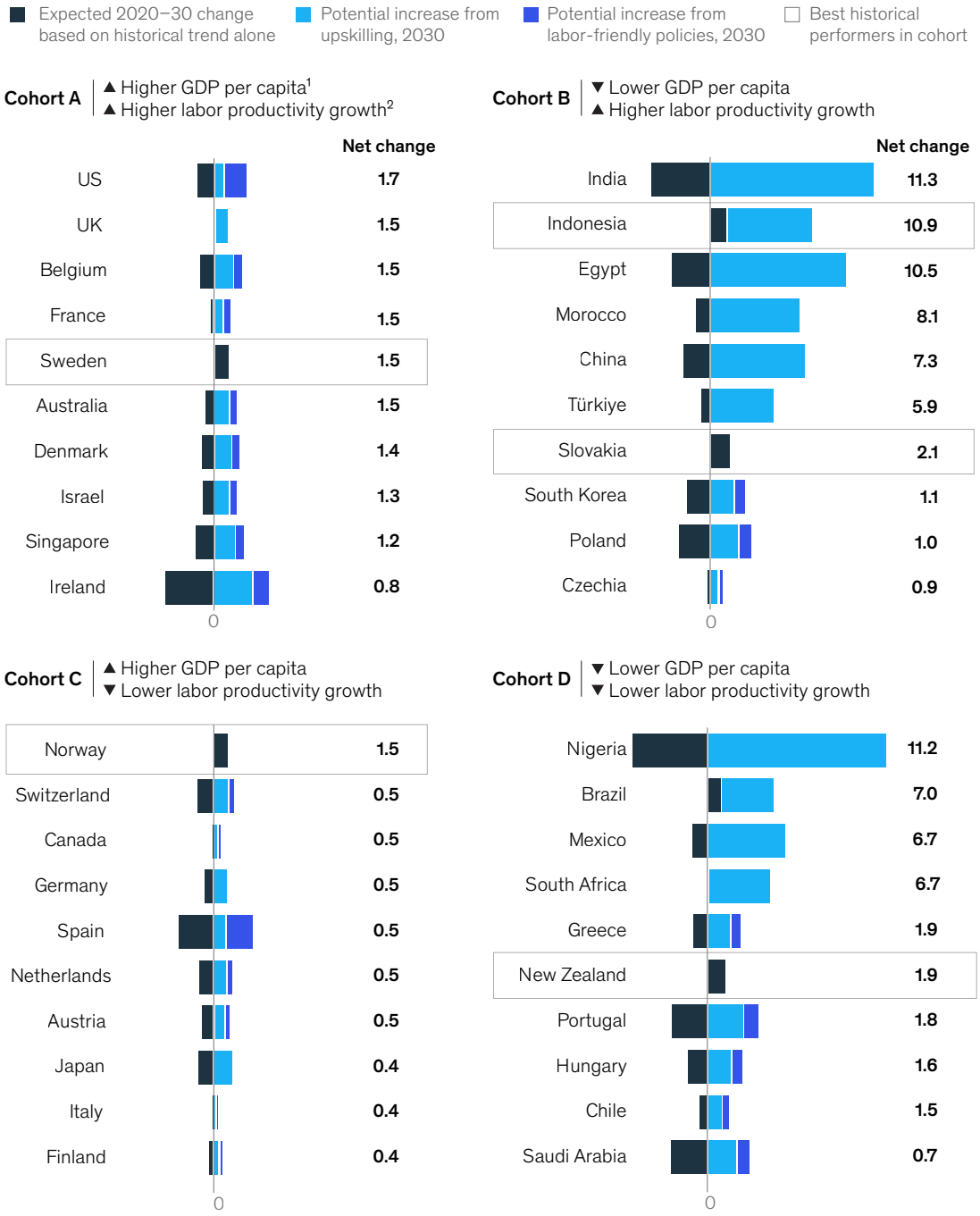
[118] *A new look at the declining labor share of income in the United States*, McKinsey Global Institute, May 2019.

[119] To separate out the share of those gains that are related to the occupational mix changing over time (with a heavier representation of higher-skill jobs), we use MGI's future of work models. We assume that companies will fill those roles and provide the necessary upskilling, as described earlier in this chapter. These gains tend to be much larger for developing countries. Capturing the remaining potential would require shifts in policy and business practices as described here; this would have more effect in high-income economies. The labor force can also grow in sectors that historically have paid a greater share of income to labor, such as construction and retail, with expanded affordable housing.

Exhibit 19

Reversing declines in labor's share of national income through upskilling and labor-friendly policies would be central to reaching universal empowerment.

Potential change in labor share of income, 2020–30, grouped by income and productivity cohort,[1] percentage points



Note: Within each cohort, we identified the best historical performer based on each country's rate of change in labor's share of national income from 2000 to 2018. For high-income economies (based on the 2020 World Bank definition), we used the best performer's rate of change as the upper limit on future growth in the labor share from 2020 to 2030. For other countries, we allowed for additional upskilling growth based on MGI's future of work projections.
[1]$ in 2000. [2]Growth over 2000–19.
Source: Conference Board, World Bank, Oxford Economics; McKinsey Global Institute analysis

Improving the affordability and quality of essential goods and services

Just as taking a holistic approach to sustainability, inclusion, and growth can create a virtuous cycle, the same principle applies to the essential goods and services needed by households. Around the world, a nutritious diet, secure housing with access to clean drinking water, sanitation, and energy, along with healthcare and education, work in concert to support an individual's well-being, social inclusion, and productivity.

One of the biggest factors influencing empowerment is the cost and quality of these essential goods and services. Previous MGI research documented that rising real prices for essentials such as housing, education, and healthcare eroded half of the median household's real income gains in many high-income economies.[120] In developing countries, such as Brazil, Mexico, and Peru, food and energy account for more than 40 percent of household consumption.[121] When the basics require such a high share of wallet, there is little room left for discretionary spending or savings, and price spikes are keenly felt. When the price of food increases, even people who are not in extreme poverty can face hunger. Today millions of people across the Middle East and North Africa are struggling to afford staples.[122]

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reduction in the empowerment gap through productivity improvements in essential services

We take a purely productivity-based approach, looking at potential cost reductions and outcome improvements that could benefit the population below the empowerment line. Globally, we find that the amount of daily spending required to be empowered could be reduced by an average of 9 percent by 2030 if countries matched their best-performing peers in productivity within construction, healthcare, and education, and in keeping food price levels in line with overall inflation.[123] This opportunity varies between advanced economies and emerging markets, depending on the spending category. Housing and healthcare make up a greater share of the savings opportunity in advanced economies, while developing economies could also see significant gains in empowerment from education and food affordability. We assume that the higher productivity gains are passed on to people living below the empowerment threshold in proportion to their use of such essentials. Making that happen in practice could imply changes to policy or incentives, perhaps providing resources to support demand in affordable segments or making greater supply viable.

For more on these topics, see the "Spotlight" feature at the end of this report.

Healthcare

The COVID-19 pandemic drove home just how much health matters for individuals, society, and the global economy. Health and growth are inextricably linked. One study estimates that about a third of economic growth in the past century can be attributed to improvements in global health.[124]

Many low- and middle-income countries are building out healthcare systems, investing more to expand access and train more healthcare professionals. This already implies greater expenditure. But there is also a major opportunity for countries at every income level to focus

[120] *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.
[121] Carlos Felip Jaramillo and Robert Taliercio O'Brien, "Inflation, a rising threat to the poor and vulnerable in Latin America and the Caribbean," World Bank blog, April 18, 2022.
[122] "Food inflation and currency collapse threaten food security in Middle East and North Africa," World Food Programme, March 23, 2023.
[123] Our scenario assumes that any productivity gains are passed on to consumers in the form of lower prices; in practice this would need appropriate market frameworks, new incentives, or regulations, depending on the context.
[124] Suchit Arora, "Health, human productivity, and long-term economic growth," *Journal of Economic History*, volume 61, number 3, 2001.

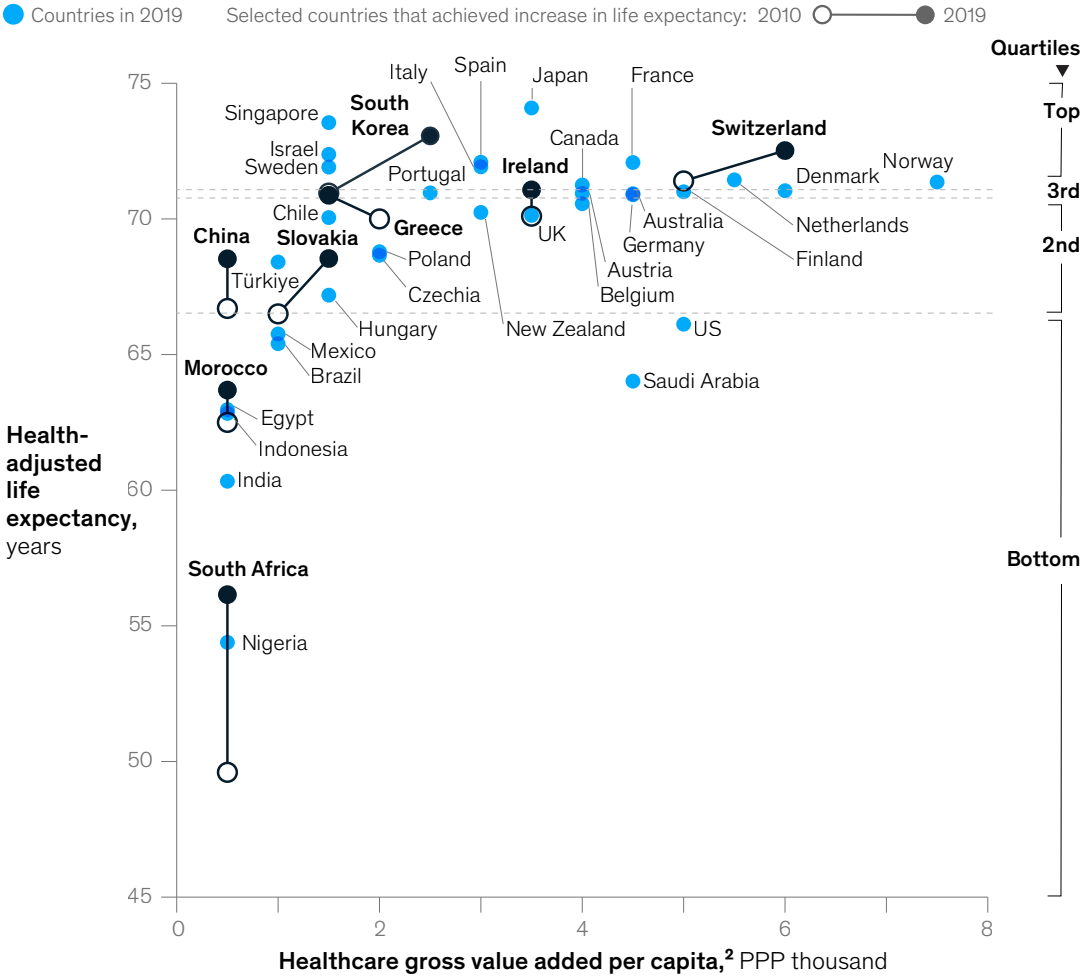
on productivity—that is, improving delivery and getting better health outcomes for every dollar spent.

Exhibit 20 maps healthy life expectancy at birth for selected countries against the total gross value added of their healthcare sectors. It shows that health outcomes range widely at any given level of spending. The countries highlighted in red arrows illustrate what kind of improvement in outcomes (per dollar of spending) is possible to achieve over time. Several countries, including Israel, Singapore, and South Korea, stand out for getting strong outcomes in relation to their

Exhibit 20

At every level of spending, health outcomes vary across countries, indicating significant room for more efficient and effective healthcare delivery.

Healthy life expectancy at birth (HALE), 2019,[1] years



[1]Metric from the World Health Organization that combines quality of life as well as length of life.
[2]2019 and 2010 data is used for select countries to show change in productivity. 2019 is the latest available HALE data. 2019 GVA per capita in 2020 PPP is used due to unavailable HALE data past 2019.
Source: World Health Organization; Conference Board; Oxford Economics; United Nations; McKinsey Global Institute analysis

Every country can benefit from improving healthcare delivery and getting better health outcomes for every dollar spent.

per capita spending. Some countries, such as Greece and South Africa, have improved health outcomes while maintaining or reducing the level of per capita healthcare spending, while others, like Slovakia and Switzerland, have improved their outcomes while expanding spending.

We consider a scenario in which each country matches the recent productivity gains of its best-performing peer over the next decade. We find a 36 percent opportunity to improve health outcomes globally, even keeping current levels of private and public healthcare spending across countries constant.[125]

Housing

Adequate and affordable housing is a foundational need that has spillover benefits on health, education, physical security, and economic stability. Yet rents and home prices have risen far faster than incomes in many countries, particularly in large cities where job opportunities are concentrated.

One significant cause of high housing costs is low productivity in constructing homes. Productivity within the construction sector overall is consistently poor around the world, averaging only 1 percent a year globally over the past two decades, compared with 2.8 percent for the total world economy and 3.6 percent in the case of manufacturing.[126]

We estimate that improvements to construction productivity could lower housing expenditure by 11 percent globally if all countries emulated their best-performing peers.[127] This involves further digitizing the design and construction management processes as well as streamlining regulatory compliance and innovations such as modular construction. The Netherlands and Singapore stand out as top historical performers; China, too, has raised construction productivity (Exhibit 21). Local governments can make regulatory changes to address drags on productivity and stimulate supply.[128]

[125] For high-income economies, the opportunity is on average 26 percent, while for middle- and lower-income economies, the average is 39 percent. Despite this, high-income economies tend to spend a larger share of their consumption on healthcare, so the overall opportunity is greater in these countries.

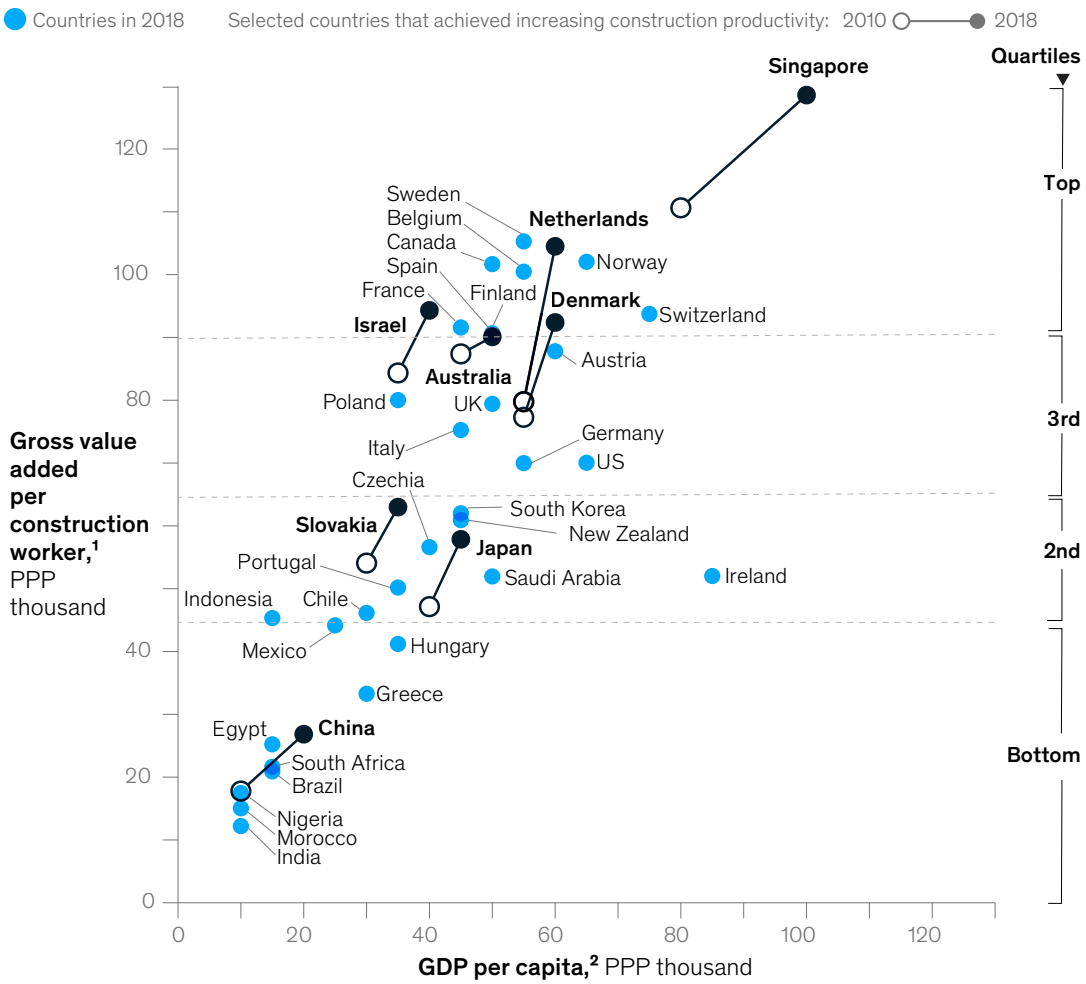
[126] *Reinventing construction: A route to higher productivity*, McKinsey Global Institute, February 2017.

[127] For high-income economies, the opportunity on average is 13 percent, while for middle- and lower-income economies, the average is 11 percent. High-income economies also tend to spend a larger share of their consumption on housing, so housing affordability has a larger opportunity for improvement.

[128] See, for example, Ryan Greenaway-McGrevy and Peter C. B. Philips, "The impact of upzoning on housing construction in Auckland," *Journal of Urban Economics*, volume 136, July 2023; and *Affordable housing in Los Angeles: Delivering more—and doing it faster*, McKinsey Global Institute, November 2019.

Exhibit 21

Countries at all levels of income have found ways to increase the productivity of construction.



[1]For all data in 2018, values are given for 2018 in 2020 PPP. For all 2010 selected countries, values are given for 2010 in 2020 PPP.
[2]For all values with 2018 GVA per construction worker, 2020 GDP per capita (in 2017 constant PPP). No values were available for GVA per construction worker after 2018. For all values with 2010 GVA per construction worker, 2010 GDP per capita is used (in 2017 constant PPP).
Source: Conference Board; International Labour Organization; Oxford Economics; World Bank; McKinsey Global Institute analysis

Education

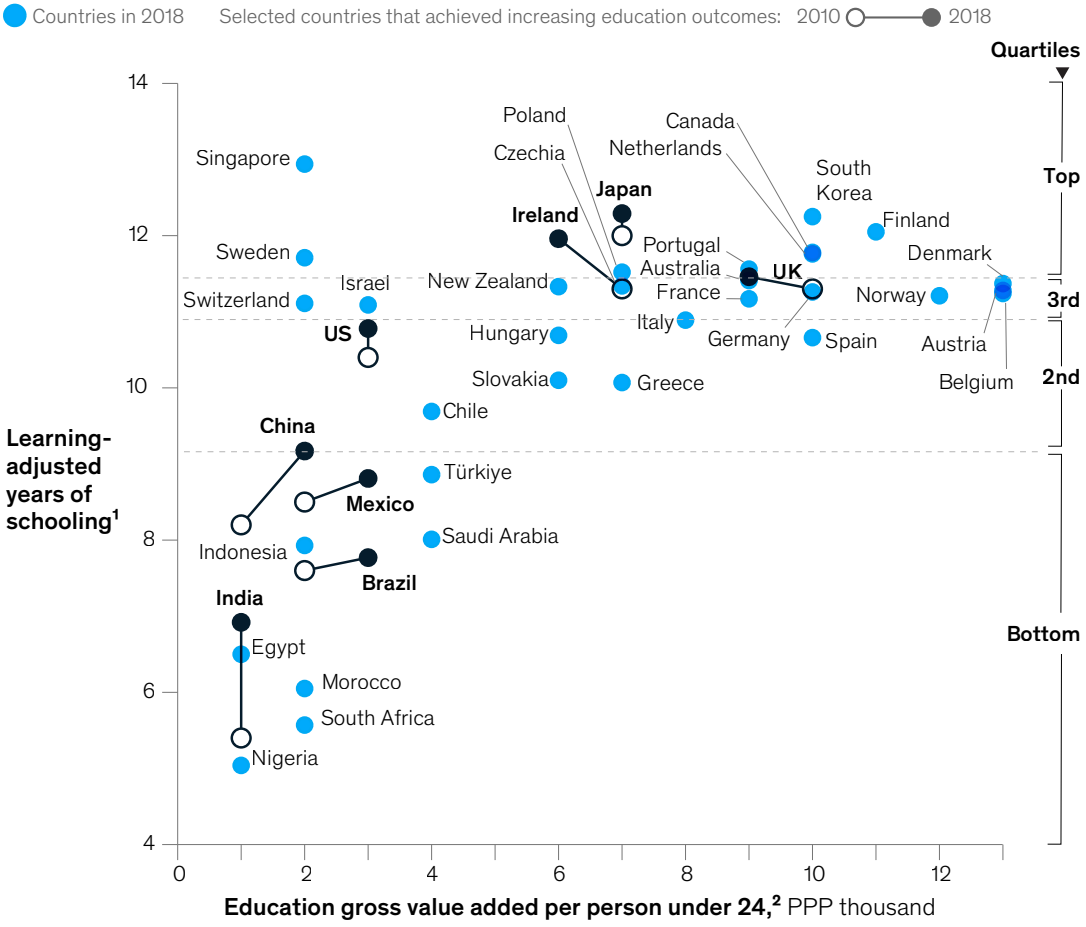
Given their stage of development, many lower- and middle-income economies are investing to expand their education systems. But many families in these countries also have to spend out of pocket to improve their children's learning outcomes. Countries at every level of income and education spending can deliver more—and all will need to evolve to prepare students to participate in a more global and digital economy.

Globally, we find an opportunity to improve education outcomes, given current input spending per young person on education, by 42 percent.[129] Exhibit 22 maps learning-adjusted years of schooling against per capita education funding for the population under age 24.[130] Using this

Exhibit 22

Countries can improve learning outcomes through a combination of increased investment and more effective educational approaches.

Education outcomes



[1]LAYS is a World Bank metric that weights length of schooling by the quality of a nation's school system as determined by performance on international tests. Unless noted as "2010 select countries," all values are in 2018 LAYS. For China and India, 2010 LAYS were not available. Instead, the difference between 2010 and 2020 mean actual years of schooling was used to scale down the 2018 LAYS values.
[2]All values are in 2020 education GVA per person under 24 unless otherwise noted as being in 2010 for selected countries to show change over time.
Source: World Bank; Conference Board; Oxford Economics; United Nations; McKinsey Global Institute analysis

[129] This spending category has the largest variation across high-income economies versus middle- and lower-income economies. The improvement opportunity for the former is only 16 percent, while for the latter it is 49 percent. Food affordability also has a bigger effect on empowerment in middle- and lower-income economies than in high-income economies.
[130] Learning-adjusted years of schooling, or LAYS, is a World Bank metric that reflects both the length and quality of schooling (number of years spent in school weighted by quality of a nation's outcomes as determined by performance on international tests). See Deon Filmer et al., "Learning-adjusted years of schooling (LAYS): Defining a new macro measure of education," *Economics of Education Review*, volume 77, August 2020.

view, Ireland, Singapore, and Sweden stand out as having exceptionally productive education systems. Among developing countries, India has significantly expanded learning-adjusted school years while maintaining education spending per capita within its historical band, while China has done so while expanding spending.

Choices on social support for the rest

After considering the channels described earlier, a $10 trillion global gap remains unfilled. Beyond opportunities for business-led growth, labor market opportunities, and productivity-based improvements in cost of living, societies can choose to directly raise the spending power of their poorest segments—and, by extension, their living standards.

In tandem with striving for productivity improvements in essential goods and services (described above), public actors could consider increased direct funding for affordable housing, health, and quality education. In Vienna, for example, local government has invested in affordable public housing, which has prevented rents from skyrocketing as they have in many other large cities.[131] Initiatives can come from governments, philanthropies, social investors, development finance institutions, and multilateral agencies.

Another option is crafting effective social programs to reach people who need them.[132] Ambition levels in terms of targeting might vary across countries, but it would be especially important to support those who do not benefit from labor market opportunities, including the very poorest, those living in remote communities, children, the elderly, and people unable to work. Efficient, transparent implementation is critical to maximizing every dollar deployed, and in many places, there is room for improvement. Digital tools can spot leakages while streamlining eligibility processes and delivering benefits more efficiently.[133]

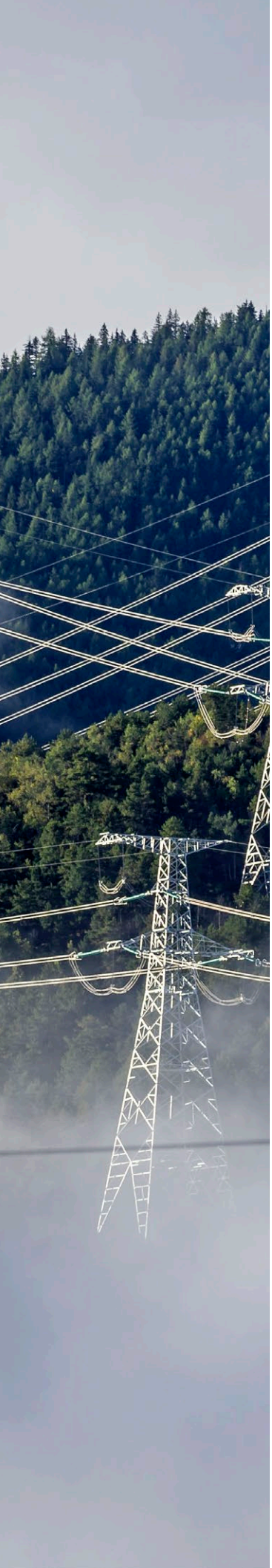
Fully closing the empowerment gap by 2030 would be a tremendous stretch for the lowest-income countries, although those that improve productivity to boost economic growth still have the potential to make remarkable progress against poverty. International aid, including assistance from multilateral institutions and debt relief programs, could be part of the solution as well.

Countries that decide to fully close the empowerment gap will face political debates about which mechanisms to use. However, that presumes that governments have the fiscal resources at hand—and not all of them do. We return to this topic, and to broader issues of public funding, in chapter 6.

[131] See, for example, Francesca Mari, "Imagine a renters' utopia. It might look like Vienna," *New York Times Magazine*, May 26, 2023.

[132] See, for example, Harold Alderman and Ruslan Yemtsov, "How can safety nets contribute to economic growth?" *World Bank Economic Review*, volume 28, number 1, 2014; and Ariel Fiszbein and Norbert Schady, *Conditional cash transfers: Reducing present and future poverty*, World Bank Policy Research Report number 47603, 2009.

[133] Abhijit Banerjee et al., "Public programs: Experimental evidence from a financial management reform in India," *American Economic Journal: Applied Economics*, volume 12, number 4, October 2020; *Improper payments: Fiscal year 2022 estimates and opportunities for improvement*, US Government Accountability Office, March 2023; and Susan Cunningham, Jonathan Davis, and Thomas Dohrmann, "The trillion-dollar price: Plugging government revenue leaks with advanced analytics," McKinsey & Company, January 2018.



5. How could the world get onto a net-zero pathway?

Decarbonizing the global economy to reach net-zero emissions involves broad deployment of low-emissions technologies. As described in chapter 2, the world would need a total of $55 trillion in low-emissions spending in this decade based on the decarbonization scenario we analyzed—a figure that reflects the continuation of current investment levels plus addressing a massive net-zero investment gap of almost $41 trillion. We arrive at this estimate through detailed sector and regional views that break the required spending down into clear components.[134]

Beyond analyzing how much spending it would take through 2030 and where that money would need to flow, our analysis maps out how portions of the gap can be addressed. We start by considering how much economic growth and innovation could yield under current policy frameworks. Then we consider a scenario that shows how the residual gap might be filled, if societies choose to make the commitment (see Box 4, "A note on methodology").

Our model starts by assuming that the level and pattern of low-emissions spending in 2020 continue over the decade. That year's total was about $1.4 trillion, of which about 10 percent was fully private.[135] Extended over the decade, an additional $14 trillion would come on stream by 2030, with most of it publicly funded or subsidized.[136]

After that, growth and innovation play a critical role, as with empowerment. We examine this using assumptions that build on the NGFS Current Policies scenario.[137] This is a world operating without

[134] We acknowledge the many uncertainties surrounding the total investment need, which could vary based on factors such as the specific transition pathway and evolution of technology costs. See chapter 2 for further details, including the scope of what is included in our investment gap.

[135] We have triangulated our results from 2020 with external estimates and find them broadly in line. Any discrepancies are likely due to differences in how subsidies are accounted for.

[136] We focus on the period between 2020 and 2030 because it is a decisive decade for altering the world's path on emissions. As of 2020, the IEA estimated about 33.9 Gt of annual CO_2 emissions from the energy system and 5–6 Gt of annual CO_2 emissions from land-use systems. In the IPCC 2021 annual report, the authors found that the residual global carbon budget to remain within 1.5°C warming with 67 percent probability was 400 Gt. Therefore, from this report's effective measurement start date of 2020, the climate budget to limit warming to 1.5°C (assuming constant emissions) would run out in roughly 10 years, or around the end of 2030. We use a 2020 starting point to give a clear decade-long line of sight and because the NGFS scenarios, which provide the basis for our analysis, include historical data for energy use only up to 2020. Based on clean energy investment in 2021 and 2022, the scale of investment still needed by 2030 has not shifted dramatically since 2020.

[137] The NGFS provides climate scenarios based upon detailed and well-established integrated assessment models of the interaction between human activities and environmental processes. The Current Policies scenario "assumes that only currently implemented policies are preserved." It provides a good proxy to estimate spend that would take place without a fundamental step-up in policies relative to 2020 levels. We build on this scenario and adjust it for different levels of economic growth, as discussed in chapter 2.

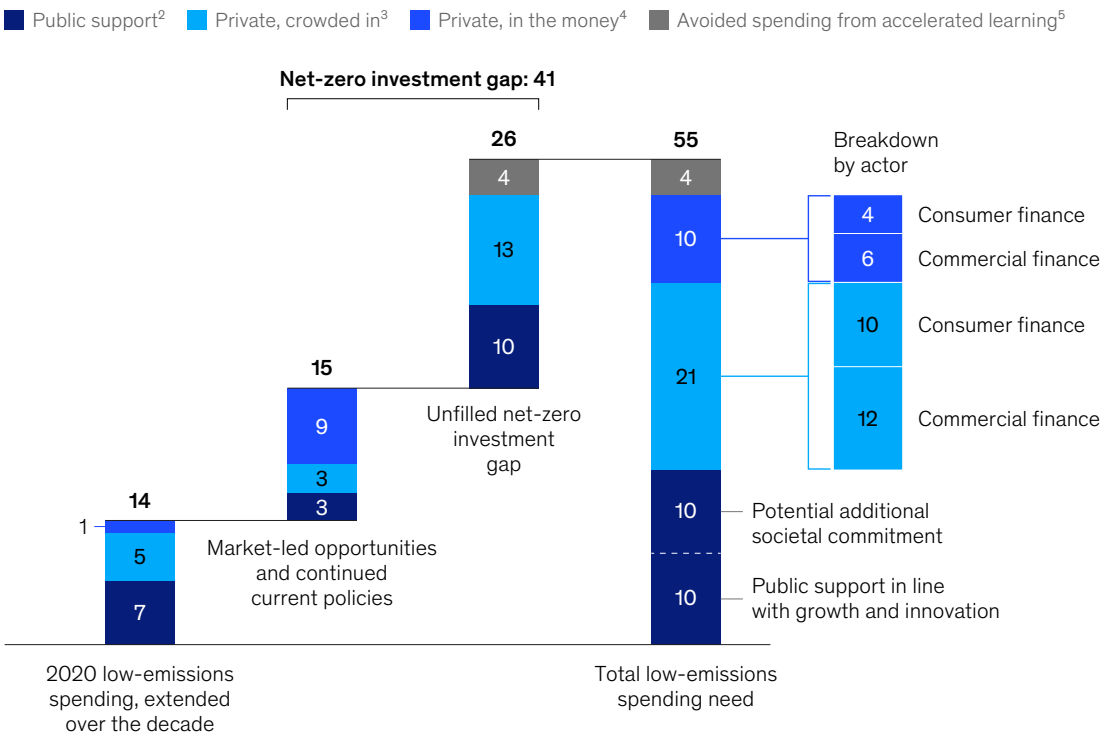
significant carbon taxes or major public funding commitments beyond those already in place as of 2020. Economic growth enables more public and private funding, and our scenario assumes that spending would increase in line with that growth. More importantly, innovation can unleash technology advances and drive down costs, clearing the way for businesses to drive and pursue opportunities that are currently or soon to be "in the money" (that is, cost competitive relative to traditional alternatives). Public finance can also "crowd in" or underwrite further private spending to some extent, even under current policy frameworks. The many subsidies and tax breaks for renewable energy investment and consumer purchases of electric vehicles illustrate this in action.

In this world, slightly less than 40 percent (some $15 trillion) of the gap is filled, but huge initial progress is possible. A total of $10 trillion (including $9 trillion above and beyond a continuation of today's levels) would become viable for private investors and consumers by 2030 (Exhibit 23).

Exhibit 23

Fully closing the net-zero investment gap relies on the assumption that higher public commitments can activate more private capital.

Scenario for potentially closing the net-zero investment gap, cumulative, 2021–30, $ trillion[1]



Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. This analysis covers sectors accounting for 85% of global emissions.
[1]2020 $.
[2]Additional societal commitment can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities; when provided by state-owned enterprises and development finance institutions, could be at market rates.
[3]Crowding in is a phenomenon that occurs when higher public commitments lead to increased private investment (for example, through subsidies or guarantees).
[4]A low-emissions technology is "in the money" if it is cost-competitive with its high-emissions alternative (that is, its total cost of ownership is lower).
[5]Learning rates refer to the annual rate of decrease in unit capex for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

After accounting for market forces, technological advances, and the continuation of current policies, the remaining unfilled gap is $26 trillion, cumulative through the decade. This is equivalent to 3 percent of global GDP annually.

The remaining 60 percent of the $41 trillion net-zero investment gap could be addressed through combined public and private efforts. We present a scenario illustrating how this could play out if countries elect to go down that path.[138] In such a scenario, public action could take the form of additional policy mechanisms as well as greater public funding. The latter would include increased grant and concessional funding as well as direct investment from state-owned entities.[139] This increased societal commitment would also further unleash the world's innovation machinery to continue developing new low-emissions technologies with a relentless focus on bringing down their costs. As a result of greater public support and innovation, more private spending would be crowded in. However, we caution that the scale of public support explored in this scenario involves the unproven assumption that such large investments and shifts do not damage the base economy.

Even if societies do not address the remaining unfilled gap in full, pursuing everything that market forces can do would be a tremendous acceleration of progress toward net zero in itself. At this scale, and with this additional momentum, the environment becomes more fertile for breakthroughs and societal shifts that we cannot foresee today. This argues for a continued focus on growth and innovation.

Growth and technology advances can address $15 trillion of the net-zero investment gap, even under current policies

To recap the start of our net-zero journey, the total low-emissions investment required for the 2021–30 pathway we model is $55 trillion. We assume that 2020 levels of investment in low-emissions assets and technologies ($1.4 trillion) could continue throughout the decade at the same scale and with the same public–private split as in the past. (Only about 10 percent of the 2020 investment was fully private; the vast majority was either public or publicly subsidized. Slightly more than half of the total amount came from public sources.) Continuing 2020 spending levels through this period provides $14 trillion cumulatively through 2030. This leaves a $41 trillion investment gap to fill.

Current levels of spending rise modestly with baseline growth

The first piece of the gap can be filled by economic growth. If investment from the private and public sectors continues at the same share of GDP as in 2020, rising only in line with baseline economic growth of 2.7 percent globally, an additional $3 trillion worth of opportunities could come on stream this decade. Overall, the current level of investment in low-emissions assets is too low to get to net zero based on the impact of modest GDP growth alone.

Most of this $3 trillion in spending would involve the continuation of current developments. BEVs already represent more than 10 percent of new car sales as of 2022; if their market expanded at the same rate as baseline GDP growth, they could account for about $700 billion in low-

[138] This is based on the NGFS Net Zero 2050 scenario. This scenario assumes that governments enact strong climate policies, technological innovation proceeds at a rapid pace, and carbon removal is widely practiced. It reaches net-zero CO_2 emissions by 2050 for the economy as a whole; this means there are some residual gross emissions in hard-to-abate sectors and regions, but they are offset by CO_2 removals. This ultimately limits warming to only 1.5°C by 2100. This is in line with the net-zero aspiration we frame in this paper.

[139] Public funding can come from multilateral agencies, development finance institutions, philanthropies, and social investors as well as from governments.

Box 4

A note on methodology

To explore how the net-zero gap could be filled, we first estimate the full investment gap using the NGFS Net Zero 2050 scenario, as described in chapter 2.[1] We then estimate the scale of low-emissions spending likely under current policy frameworks. To do this, we rely on the NGFS Current Policies scenario, which enables us to estimate how much spending is likely to be unlocked via growth and innovation under current frameworks (resulting in warming of about 3.0°C by 2100). Other scenarios estimating the impact of "current policies" may produce slightly different warming outcomes, though all would find a substantial gap with a net-zero trajectory. In both cases, we build on these NGFS scenarios but adjust them for different expectations of economic growth, as discussed in chapter 2. We perform this analysis for about 50 key low-emissions technologies, considering variations over the decade across seven sectors and 12 regions; their deployment could collectively address 85 percent of global greenhouse-gas emissions.

In each case, we employed the McKinsey Transition Finance Model (TFM) to allocate the investment needs associated with each technology and each region to economic agents with the ability to address them (consumers, private companies, and public actors).[2] This analysis helped us identify the role that private actors can play toward achieving net-zero goals, and the opportunities that a net-zero transition would create for them. The spending allocation is based on four factors: historical investment patterns, technology risk profiles, market risk profiles, and estimated total cost of ownership.

Historical data is incorporated to assess the role that could be played by specific agents in key sectors, such as state-owned enterprises in the power sector. TFM incorporates the other three factors to calibrate the role of different economic actors. In particular, the role of public spending is larger for technologies further away from commercial maturity (those with higher technology risk) and in regions with lower ease of doing business (those with higher market risk). In these cases, public spending in the form of grant and concessional funding goes toward lowering risks for private actors, enabling them to participate.

Public actors also provide further grants and concessional financing to support low-emissions technologies that are not cost competitive relative to traditional alternatives. To quantify this, we compare the total cost of ownership of low-emissions alternatives against that of traditional high-emissions assets—for instance, a battery electric car against an internal-combustion-engine car, or an electric arc scrap steel furnace against a blast steel furnace. Total cost of ownership is determined by the capital expenditures associated with purchasing the asset as well as operating expenses. Public spending would bridge the gap in total cost of ownership between low- and high-emissions assets, therefore crowding in private spending.

In our analysis, a low-emissions technology is considered "in the money" for private actors if it is cost competitive with its high-emissions alternative (that is, its total cost of ownership is lower) under current policy frameworks. Importantly, even if a technology is in the money, some amount of public spending may still be needed to reduce technology and market risks.

Any further private spending that may occur above and beyond what would occur under current policy frameworks is not considered in the money, as it would not take place without societal commitments that go beyond today's levels.

Rather than relying on grant and concessional funding to bridge cost competitiveness gaps, another approach would be imposing a carbon tax to encourage switching away from high-emissions assets. This research assumes that subsidies produce the same outcome as discouraging high-emissions spending (which raise the total cost of ownership through a tax). In practice, however, a mix of policy mechanisms would likely be needed to limit high-emissions spending.[3]

The resulting analysis should be read as scenarios rather than forecasts. The TFM assumes that individuals and companies are economically rational, make spending decisions based on the total cost of ownership and risk level of the assets they plan to acquire, and are forward-looking and possessed of perfect foresight. In reality, these assumptions may not hold, which would increase the public support needed to close the gap beyond what is modeled here. The scale of private financing needed would also vary based on how technology capital costs and total costs of ownership evolve. A multitude of other factors, such as evolving consumer preferences for green technologies, could also influence the scale of public commitments needed.

See the technical appendix for a more detailed discussion of our methodology and data sources.

[1] We note that NGFS recently released a Phase III scenario; however, the trajectory is fundamentally similar. We do not expect that trends in the past two to three years have materially changed the picture. We rely on the Phase II scenario for consistency with our previous analysis, published in January 2022.
[2] Public actors could include state-owned enterprises, governments, multilateral agencies, development finance institutions, and philanthropic entities.
[3] We focus on the scale of public support needed but stop short of recommending a specific method of financing; societies and governments will determine the best course of action for their own circumstances. See chapter 6 for further discussion.

emissions spending over the decade.[140] In 2020, some $300 billion was invested in solar and wind generation; the continuation of this level rising in line with baseline growth would imply almost $4 trillion of spending over the decade.[141] In the buildings sector, 180 million heat pumps had already been installed globally as of 2020, satisfying 7 percent of heating demand.[142]

A number of varied programs are already putting public money to work in current policies. Norway, for instance, removed its import tax on electric vehicles in 1990. Since 2000, the government has continued to enhance a package of incentives to buy or lease EVs, including waiving value-added tax, exempting EV drivers from tolls and parking fees, and offering free access to bus lanes and ferries.[143] In addition, housing associations received subsidies for installing charging stations. As a result, some two-thirds of new vehicles sold in Norway are now electric.[144] In the buildings sector, Lithuania, a country with aging housing stock, implemented a program that disbursed €250 million in grants for retrofits; it attracted more than double that amount in private financing by using part of the grants to bring down the cost of loans from private lenders. The European Investment Bank is now planning to expand Lithuania's approach across the EU.[145]

Business-led innovation fuels faster growth, progress, and more private activity

Faster GDP growth, and, even more importantly, innovation to develop new technologies and lower their costs could deliver greater progress than baseline growth alone. All told, we find that accelerated growth and innovation could provide an additional $12 trillion. Adding onto the effects of baseline growth described immediately above, this brings the total portion of the net-zero investment gap that could be filled from growth and innovation under current policy frameworks to $15 trillion.

To understand how this could come about, we consider a world that achieves the productivity gains needed to accelerate global economic growth beyond the baseline, to 3.4 percent annually.[146] Faster growth is critical for empowerment. But it means higher production, which ultimately requires greater inputs of energy and physical capital. Therefore, it increases the size of the net-zero investment need by about almost $5 trillion worldwide, as discussed in chapter 2. But this accelerated growth also generates more financing capacity from both the public and private sectors (for more on this, see chapter 6).

$10T

low-emissions spending that is or soon will be cost competitive for private actors

This is also a scenario with technology advancement. Business innovation plays an important role in accelerating learning rates and deployment to reduce technology costs.[147] As a result, the risks and costs associated with new low-emissions technologies would decrease over the decade, making them more cost competitive relative to traditional alternatives even under current policy frameworks. This creates more viable opportunities for private actors to shift their spending choices. As a result of innovation and improved learning rates, about $9 trillion of additional opportunities (above today's levels) would become attractive for private actors over the decade. Adding these to the opportunities associated with extending current levels of investment, our

[140] Global EV Data Explorer, IEA, iea.org/data-and-statistics/data-tools/global-ev-data-explorer.
[141] *World energy investment 2021*, IEA, June 2021.
[142] Table 2.5 in *Net zero by 2050: A road map for the global energy sector*, IEA, May 2021.
[143] "Norwegian EV policy," EIBil, accessed August 22, 2023.
[144] "Norway's evolving incentives for zero-emission vehicles," OECD, November 2022. Many other countries offer EV subsidies and incentives; for a full list by country, see the IEA's Global EV Policy Explorer, iea.org/data-and-statistics/data-tools/global-ev-policy-explorer.
[145] Kriston Capps, "Europe's green-building retrofit leader is one of its smallest countries," Bloomberg, September 21, 2022.
[146] Both baseline and prosperity growth rates are global aggregates; projections vary across countries.
[147] Learning rates refer to the annual rate of decrease in unit capital expenditures for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale.

scenario sees a total of $10 trillion in low-emissions spending becoming cost competitive for businesses and consumers without subsidies. (See Box 5, "Accounting for the evolving costs of low-emissions technologies," for more on our assumptions—and how the scenario might change if technological progress is slower.)

Improved learning rates also have a second impact. As low-emissions technologies mature and their capital cost and total cost of ownership decrease, they require smaller subsidies to make them cost competitive with traditional alternatives. Every dollar of public finance can therefore induce greater private spending. This would reduce the relative role of grant and concessional funding from the public sector. All told, we find that an additional $3 trillion of private capital could get crowded in.

Overall, despite this change in proportion, our scenario shows public support continuing to grow by about $3 trillion over the decade. Beyond the public funding that could come on line with GDP growth, spending from development finance institutions and state-owned enterprises also increases in our scenario. This is again due to the impact of innovation, which helps unlock more investments from these entities, which could be at market rates. Much of this would occur in developing economies. In these countries, state-owned enterprises play a large role in the power sector, which would grow even under current policies to meet rising demand as these regions continue their economic development.

Adding up the combined impact of continued 2020 spending ($14 trillion), economic growth and innovation (an additional $15 trillion), $29 trillion could theoretically be mobilized over 2021–30 in this scenario. Public funding would account for 36 percent of it—a significant relative reduction from 2020 levels, when it accounted for more than half of total low-emissions spending. As technology advances continue, private in-the-money spending would account for 34 percent as private actors can seize the initiative on cost-competitive projects and purchases.

What comes 'in the money'?

The opportunities coming into focus in this decade, even without major policy changes, are mostly in areas that are highly dynamic today.

The power and mobility sectors in China, Europe, India, and the United States collectively make up about 70 percent of this category. Across these regions, we find that 10 to 60 percent of the investment needed in this decade in the power sector and 50 to 70 percent in mobility will be viable with expected rates of technological advancement.[148]

Electric car sales reached record highs in 2021, with registrations tripling in China compared with 2020.[149] While BEV cars are not cost competitive with traditional vehicles today based on their total cost of ownership, they could reach cost parity in the latter half of the decade in many parts of the world, thanks to factors such as the falling costs of battery packs, improvements in power electronics, innovation in longer-range charging, and economies of scale.[150] This drives around $3 trillion of in-the-money spending from consumers and companies in BEV cars in the four aforementioned regions in our scenario.

[148] Note that while the majority of the private investment we discuss goes to mobility and power, it fills only a portion of the total low-emissions step-up needed in these sectors: just under two-thirds ($14.9 trillion) of the need in mobility (with an additional $5.5 trillion needed) and a little more than 10 percent of the $14.1 trillion needed in power (where an additional $12.4 trillion is required). In each case, the needs are so massive that addressing them takes every avenue.

[149] *Global EV outlook 2022*, IEA, May 2022.

[150] "Battery electric and fuel cell vehicles cost parity," Argonne National Laboratory, US Department of Energy, accessed August 22, 2023; and "Making electric vehicles profitable," McKinsey & Company, March 2019.

Box 5

Accounting for the evolving costs of low-emissions technologies

Estimates of the spending required in the current decade to reach net zero by 2050, as well as the level of public support needed, depend on projections for how the cost of low-emissions technologies could evolve. Two key sources of uncertainty surround these projections. First is the price of the inputs required for key technologies; second is the decrease in unit capital cost that can be achieved (for example, via R&D, economies of scale, and learning by doing).

When it comes to input prices, sufficient (and sustainably sourced) mineral supplies are vital.[1] Metals such as copper, cobalt, nickel, and lithium play a critical role in renewable generation, electricity networks, and battery storage technologies.[2] Demand-side pressures could lead to significant increases in prices of these minerals. One study estimates that, on a net-zero trajectory, the price of copper could increase by about 60 percent and the price of lithium could more than double between 2020 and 2030.[3] In addition, costs may also be significantly affected by supply-chain issues. In 2021, for example, freight fees increased almost sixfold, which had a significant impact on the cost of new renewable generation projects.[4] While supply-chain issues are economy-wide challenges, they may disproportionately affect the total cost of ownership of low-emissions technologies such as photovoltaic and wind generation. This would negatively affect their cost competitiveness when compared with high-emissions alternatives.[5]

When it comes to learning rates and supply-side efficiencies, considerable uncertainty surrounds the magnitude of capital cost reductions that key low-emissions technologies can achieve during the current decade.[6] If policies facilitating faster innovation are not enacted and innovation is slower than in the scenario modeled here, it would take more total spending to achieve net zero. Furthermore, the share of technologies that are in the money would decrease, meaning that it would take a higher level of public support to meet goals for reducing emissions.

To assess the possible impact of these factors, we modeled a "high-cost" scenario incorporating slower learning rates as well as higher projected input costs for key materials and higher freight costs. The exhibit below illustrates how the total spending need and its allocation would change as a result. First, if learning rates were relatively slow (about 2 percent, compared with 3.4 percent as in the main scenario described in this chapter), an additional $4 trillion of spending would be needed from private and public sources, driven largely by higher costs for renewable generation and low-emissions heating. Second, if the prices of key inputs increase on top of these slower learning rates, the total spending over 2021–30 would rise by an additional $3 trillion. The main driver would be the higher cost of batteries. This would affect electric mobility and utility-scale storage, which account for about two-thirds of the increased spending.

Combining the potential impact of higher input prices and slower learning rates, the share of private in-the-money investment opportunities would decrease significantly, from 18 percent to only 8 percent of the total spending needed. Total public spending over the decade would need to increase from $20 trillion to $25 trillion if societies choose to pursue a full net-zero pathway.

This sensitivity shows that affordability is critical. The total spending required to get to net zero—as well as the share that would need to be publicly funded or subsidized—depends greatly on whether costs come down in areas such as electric mobility, utility-scale storage, and renewable generation. This depends in turn on minimizing the risks of supply-chain disruptions and bottlenecks in mineral supply. A smooth transition requires increased dialogue and coordination between companies operating at different parts of the value chain, between the public and private sectors, and between governments.[7] It is equally important for the world's R&D machinery to prioritize the task of making low-emissions technologies cheaper.

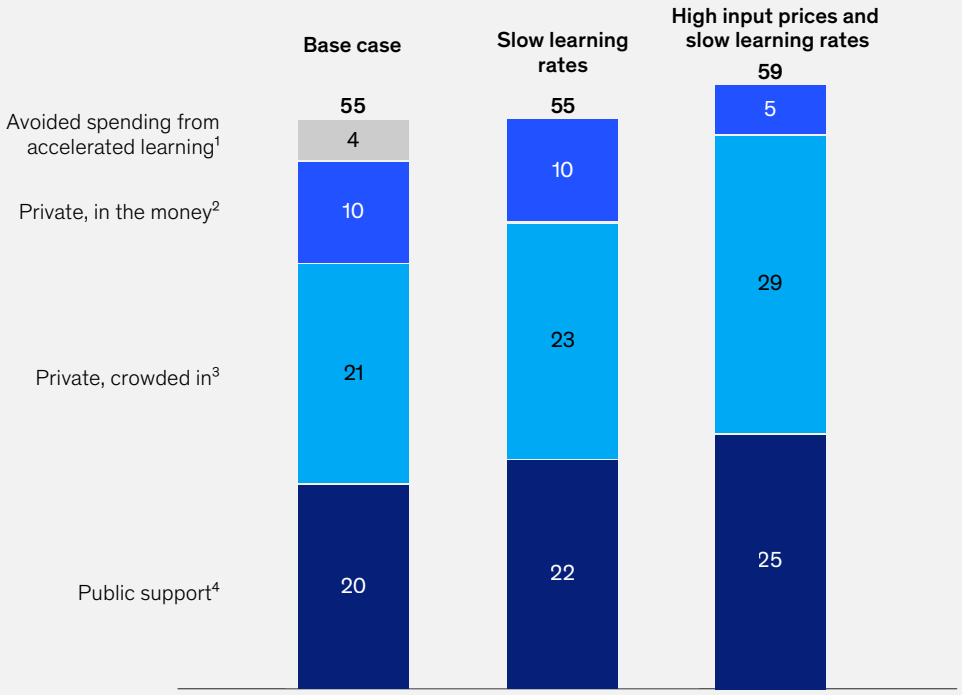
1 See, for example, *The net-zero materials transition: Implications for global supply chains*, McKinsey & Company, July 2023; and *The role of critical minerals in clean energy transitions*, IEA, May 2021.
2 *The role of critical minerals in clean energy transitions*, IEA, May 2021.
3 Nico Valckx et al., "Metals may become the new oil in net-zero emissions scenario," VoxEU, November 5, 2021.
4 *Renewables 2021: Analysis and forecast to 2026*, IEA, November 2021.
5 Ibid.
6 See, for instance, Rupert Way et al., "Empirically grounded technology forecasts and the energy transition," *Joule*, volume 6, number 9, 2022.
7 *Critical materials for the energy transition: Rare earth elements*, International Renewable Energy Agency, 2022.

Accounting for the evolving costs of low-emissions technologies

Exhibit

Higher costs would decrease 'in-the-money' spending, increasing the need for public support.

Cumulative 2021–30 low-emissions spending breakdown to meet the net-zero investment need, $ trillion



[1]Learning rates refer to the annual rate of decrease in unit capex for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale.
[2]A low-emissions technology is "in the money" if it is cost-competitive with its high-emissions alternative (that is, its total cost of ownership is lower).
[3]Additional private investment can be induced by higher public support.
[4]Additional societal commitment can come from a broad range of societal sources, including more efficient use of public funds, reprioritized government spending, taxes, multilateral agencies, or philanthropic entities.
Note: This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. Figures are in 2020 US dollars.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

The role of intermittent renewables remains somewhat limited globally in the current policy framework scenario, which shows the share of solar and wind in generation (measured as a share of overall megawatt-hours of electricity generation) growing from about 8 percent in 2020 to about 20 percent by 2030. One reason for the relatively low penetration of renewables is the need for transmission and distribution infrastructure to accommodate them. Building that infrastructure entails greater capital spending. Yet more projects do become feasible in the scenario modeled here, which has growth, technology advances, and continued cost reductions

creating around $850 billion of viable investment opportunities in solar and wind generation.[151] Additional in-the-money opportunities in the power sector, including commercially viable investment in transmission and distribution networks and in hydropower generation, together account for about $1.7 trillion of the increase in private spending.

Addressing the remaining $26 trillion gap could involve increasing societal commitments to activate more from the private sector

The combined actions described above would represent major progress. But getting the rest of the way would mean addressing additional needs of just over $26 trillion globally. This would take a combined public–private effort, banking on the assumption that higher societal commitments can activate even more private capital and scale up deployment even further. We present a scenario, cautioning again that the effects of such large investments and shifts on the base economy are unknown.

How this scenario plays out

First, clear road maps and other policy mechanisms can move markets. Policy certainty can offset some of the risks that could otherwise limit inflows of private capital. Various examples already exist. The shift to EVs, for example, is being driven not only by incentives but also by other types of policies. Governments from Canada, Ireland, and California to Singapore and South Korea have set target dates for phasing out sales of traditional internal-combustion-engine vehicles.[152]

Second, we consider higher societal commitments. These could be delivered through grants and concessional finance (that is, lending below market rates) from governments or other quasi-public actors; they could also be direct investments made by state-owned enterprises or development finance institutions. By our estimates, public actors would need to inject almost $10 trillion in funding, on top of levels of support described earlier, if they aim to close the gap fully. This includes funding for some projects that are necessary but remain "out of the money" for any private agent as well as projects undertaken by state-owned enterprises.

Governments around the world are considering measures of this kind. The US Inflation Reduction Act, for example, is providing multiple types of subsidies to the tune of $400 billion.[153] Some of these incentives are attracting interest from foreign direct investors in fields such as green hydrogen.[154]

Our scenario shows that this $10 trillion infusion of public funding could unlock $17 trillion in additional progress. This has two components. The largest part—some $13 trillion—is another tranche of private investment and spending that is crowded in. An additional $4 trillion is spending that could be avoided altogether because of faster technological progress that reduces the costs of low-emissions assets.

[151] "In the money" opportunities in renewable generation do not require direct subsidies to ensure cost competitiveness vis-à-vis conventional alternatives, but they may still receive public support via network connection guarantees or government-supported site investigations. This is in line with the how the term "zero subsidy" has been used to describe recent wind auctions in Northern Europe. See, for instance, "German offshore wind to enter new era as 7 GW auction closes," S&P Global, June 1, 2023.

[152] See the IEA's Global EV Policy Explorer.

[153] For more on the impact of the Inflation Reduction Act, see "Inflation Reduction Act of 2022," IEA, April 26, 2023. IRA spending includes measures similar to the grant and concessional funding described in this research as well as other forms of funding (for example, loan programs). The funding in the IRA is therefore not directly equivalent to the scale of public support described here.

[154] "Hydrogen firm Thyssenkrupp Nucera says IRA spurring US interest," Reuters, March 9, 2023.

In our scenario, a $10 trillion infusion of public support could unlock an additional $17 trillion of progress.

Exhibit 24 illustrates how this might work. The darkest segments show the share of currently or soon-to-be viable investment opportunities for private actors (as outlined earlier in this chapter). The bright blue segments represent the private spending that could be induced if more public finance is deployed strategically to change risk and cost profiles. With a higher scale of societal commitment, many more sectors and geographies could attract private capital, with more projects involving blended finance or incentives.

What this could mean across sectors

One of the prime examples of projects needing this type of push is electricity transmission and distribution. National grid systems would need to be expanded and upgraded to deliver electricity generated from renewable sources, often with new transmission lines connecting the sunniest and windiest open spaces to major cities with intensive energy needs. Investment is also needed to build generation capacity, at a large scale, as the power sector becomes the backbone of the energy system under a net-zero transition.

In many countries, power utilities responsible for building out these assets are public entities. As part of its 2021–22 budget, India's government, for example, announced an additional capital infusion of about $150 billion to the Solar Energy Corporation of India to develop more solar photovoltaic capacity; the following year saw another increase in solar investment of almost 30 percent.[155] Across China, India, and the rest of Asia (outside of Japan), the need to expand the electricity sector while remaining on a net-zero pathway would increase the investment need by $6 trillion compared with what would be expected under current policies. Across these regions, power sectors have historically relied on financing via state-owned enterprises, and the scenario modeled here assumes this remains the case. Combined with concessional and grant financing, the public sector would provide $3 trillion of incremental support (above and beyond that under current policies), to the power sector in these regions, spurring more private projects. A $700 billion, publicly financed step-up takes place in T&D in our scenario. For many countries, prioritizing power grids may be the factor determining whether they can carve out a pathway toward net zero.

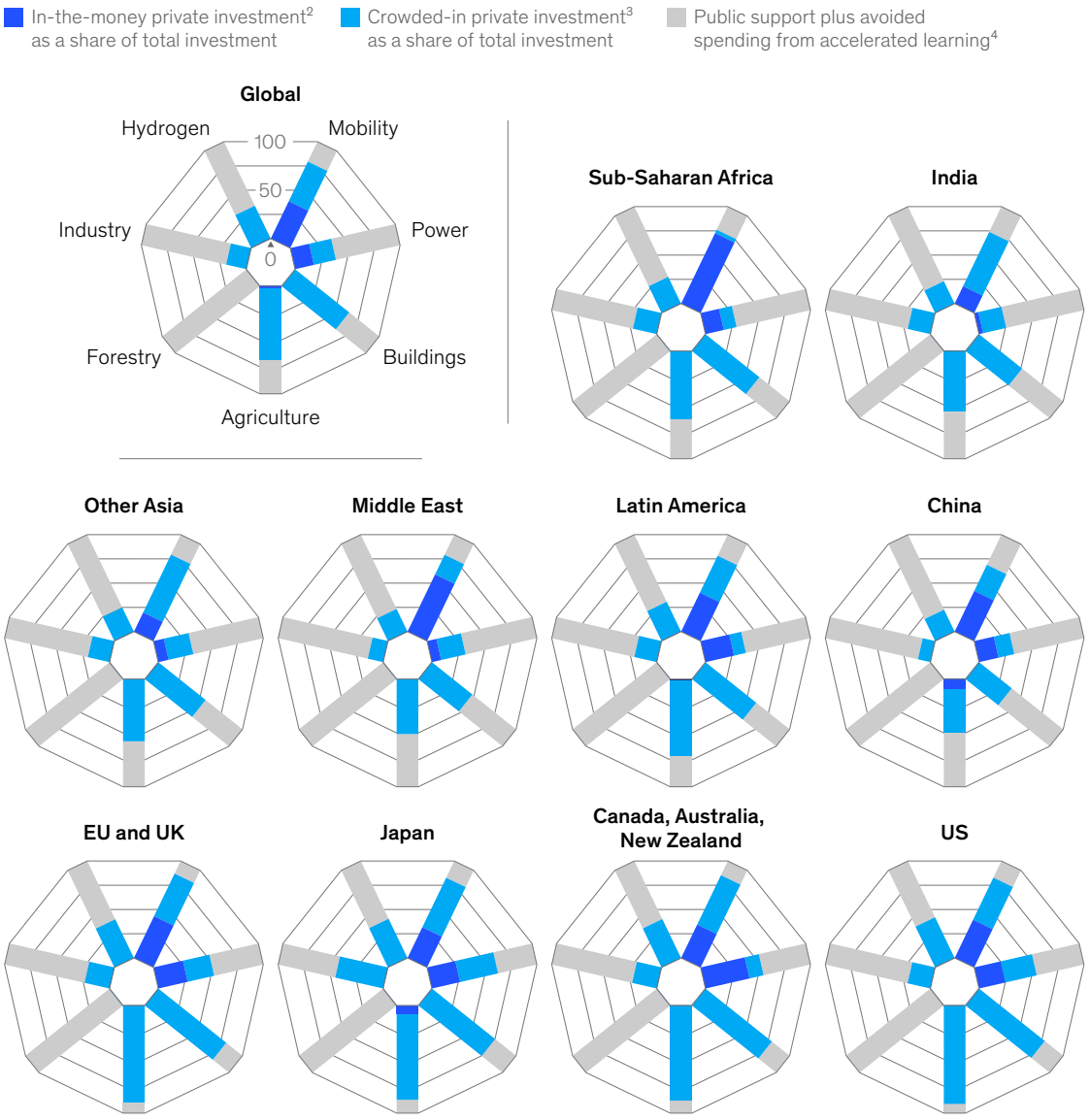
Some of the other sectors mentioned earlier in this chapter would also need to be part of this substantial push to fill the residual gap. The initial waves of subsidies and private investment anticipated under current policies are enough to get things moving but not sufficient to complete all aspects of the transition or reach into all geographies. Buildings, for example, would need sustained public support as some of the key decarbonization technologies, such as heat pumps, are not yet cost competitive relative to gas boilers. We estimate that more than $1.5 trillion of public funding could mobilize about $3 trillion of private spending in low-emissions heating. Ireland's Sustainable Energy Authority, for example, has established a chain of one-stop shops

[155] "Renewable energy investment," Renewables Policies Database, IEA, April 5, 2022; and "Union budget 2022–23: India embarks on a solar journey," Ministry of Information and Broadcasting, Government of India, March 2022.

Exhibit 24

Increased public support can unlock more private investment and spending across sectors and geographies.

Breakdown of low-emissions spending needed in 2021–30 for a 2050 net-zero 1.5°C pathway, by region and sector,[1] %



[1]Percentages reflect share of investment within each sector rather than share of total low-emissions investment.
[2]Low-emissions spending that is cost-competitive with traditional alternatives.
[3]Additional private investment induced by higher public support.
[4]Learning rates refer to the annual rate of decrease in unit capex for a given technology, which occurs through R&D expenditure, learning by doing, and broader economies of scale.
Note: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. They cover sectors accounting for 85% of global emissions.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

to organize home retrofits by accredited contractors. The shops offer homeowners substantial subsidies, convenience, and the assurance that heat pumps, solar panels, and insulation will be installed by people who know how to do the work properly.[156]

Similarly, public support could still be needed in the early part of this decade to generate sufficient momentum across the entire globe in mobility. This is the case especially for heavy-duty BEVs, which are expected to take longer than passenger BEVs to reach cost competitiveness with traditional alternatives (in this case, internal-combustion-engine trucks).[157] To ensure that their adoption is consistent with a net-zero pathway, we estimate that an increase in public support of some $200 billion beyond what is expected under current policy frameworks could in turn mobilize around $350 billion of additional private spending.

In our scenario, hydrogen-based mobility, green hydrogen production, and the decarbonization of heavy industry in particular would rely on public funding to crowd in private investment to address their unfilled gaps for the entirety of the decade. The underlying technologies are not yet mature, which in turn affects their cost profiles relative to traditional alternatives. It would take about $1.9 trillion of additional funding beyond current policies to ensure that these sectors progress toward net zero at the required pace; we estimate that societal commitments could provide about 40 percent of this sum. Decarbonizing heavy industry in China alone would require about $400 billion of this step-up in the scenario analyzed here.

$4T

in low-emissions spending can be avoided through accelerated learning

In our scenario, the remainder of the positive impact from increased societal commitments occurs as a by-product of the huge wave of public and private spending described above. This would likely lead to faster learning that further lowers the unit capital costs of low-emissions technologies for governments, businesses, and consumers. We estimate that these accelerated learning effects could lower the total spending needed for the transition by about $4 trillion.[158] Almost three-fourths of this effect in our scenario occurs in the power and buildings sectors.

In the power sector, about $1.7 trillion of investment could be avoided through accelerated learning. Investment in photovoltaic generation could be reduced by about $600 billion, and a similar benefit could occur with wind generation. The cost of utility-scale photovoltaic systems decreased by 82 percent in the United States from 2010 to 2020, for example.[159] But this is not the only factor determining whether solar installations are cost-effective for residential and commercial consumers. The costs of the labor and other materials needed for these installations (known as balance-of-system, or BOS, costs) are country-specific and now account for the majority of the price tag attached to photovoltaic systems. But in the years ahead, accelerated learning could help lower these BOS costs as well.[160]

[156] Leyla Boulton, "Ireland's one-stop shops show path to greener UK homes," *Financial Times*, May 17, 2023.
[157] See, for example, Beia Spiller, "Why are electric truck prices so high?" Resources for the Future, May 3, 2023; and "Decarbonizing medium- and heavy-duty on-road vehicles: Zero-emission vehicles cost analysis," National Renewable Energy Laboratory (US), March 2022.
[158] Accelerated learning rates are well established in academic literature. However, there is no consensus on the exact relationship between increased production and unit cost reductions, and a variety of factors, linked to R&D or to learning by doing, may play a role; specific examples include higher labor productivity and "effort," improved manufacturing methods, increased operational experience, optimized system designs, and lower equipment procurement costs. Our analysis does not attempt to isolate the impact of specific factors: the term "accelerated learning" refers to multiple dimensions that may drive reductions in capital costs. To estimate the magnitude of the accelerated learning, we rely on the work of Way et al., who elaborated probability distributions for future costs of key low-emissions technologies. The acceleration in unit capital expenditures reduction modeled in our analysis is equivalent to that measured by Way et al., when moving from the median unit capital expenditures reduction to the 75th percentile one. Over 2021–30, the average annual unit capital expenditures decrease in the low-emissions technologies we analyze is about 1.97% in a non-accelerated learning scenario, and 3.44% in an accelerated learning scenario. *See* Rupert Way et al., "Empirically grounded technology forecasts and the energy transition," *Joule*, volume 6, number 9, 2022.
[159] David Feldman et al., *US solar photovoltaic system and energy storage cost benchmark: Q1 2020*, National Renewable Energy Laboratory, US Department of Energy, January 2021.
[160] Ibid.

In the buildings sector, heat pumps are the key lever that would benefit from accelerated learning, since they are a relatively new technology with ample room for cost decreases. Heat pumps have already enjoyed learning rates of more than 20 percent in some countries.[161] In our scenario of bolder policies and faster technological progress, their learning rates would be expected to continue on that trend, with unit capital expenditures decreasing to 67 percent of the 2020 cost by 2030.[162] We estimate that savings of about $750 billion could materialize during the current decade if unit costs drop substantially.

Some sectors have more in-the-money opportunities than others, which influences the role of different actors

As shown in Exhibit 23, near the beginning of this chapter, we estimate that one-quarter of the total $55 trillion needed in low-emissions spending through 2030 could be fully in-the-money spending (plus avoided spending), up from 10 percent in 2020. In total, some $31 trillion could potentially come from private actors; this includes what is expected to become cost competitive as well as what could be unlocked through additional policies and subsidies.

36%

public support as a share of total low-emissions spending in our scenario

Public support alone makes up some 36 percent of the total in this scenario.[163] While this involves a large increase in absolute terms relative to today's levels, it would be a decrease in the public sector's relative share, which was about half in 2020, when the vast majority of the spending that took place was either fully public or subsidized. Just over 20 percent could be delivered through grants and concessional finance (that is, lending on better-than-market terms). Projects undertaken by public actors on market terms could account for an additional 15 percent, with state-owned enterprises accounting for most of this piece (based on their historical roles) and development finance institutions making up the remainder.

Most of the total capital needed across sectors can come from private sources, although the majority of this would need some level of public subsidies to bridge gaps in cost competitiveness and risk. In our scenario, fully viable private spending from businesses and consumers meets 18 percent of the total need, while private spending crowded in with some type of subsidy could account for more than twice that share.

[161] Accelerated learning for heat pumps is factored into the IEA's Sustainable Development Scenario (which sees net-zero emissions by 2070 and warming limited to 1.8°C. "Cumulative capacity and capital cost learning curve for vapour compression applications in the Sustainable Development Scenario, 2019–2070," IEA, updated July 2, 2020. However, heat pump learning rates are not global. See *Energy technology innovation: Learning from historical successes and failures*, Arnulf Grübler and Charlie Wilson, eds., Cambridge University Press, 2014; and *Technological learning in the transition to a low-carbon energy system*, Martin Junginger and Atse Louwen, eds., Academic Press, 2020.

[162] This is in line with other projections: in the IEA's Net Zero by 2050 scenario, heat pump unit capex is projected to fall to about 85 percent of 2020 levels by 2030.

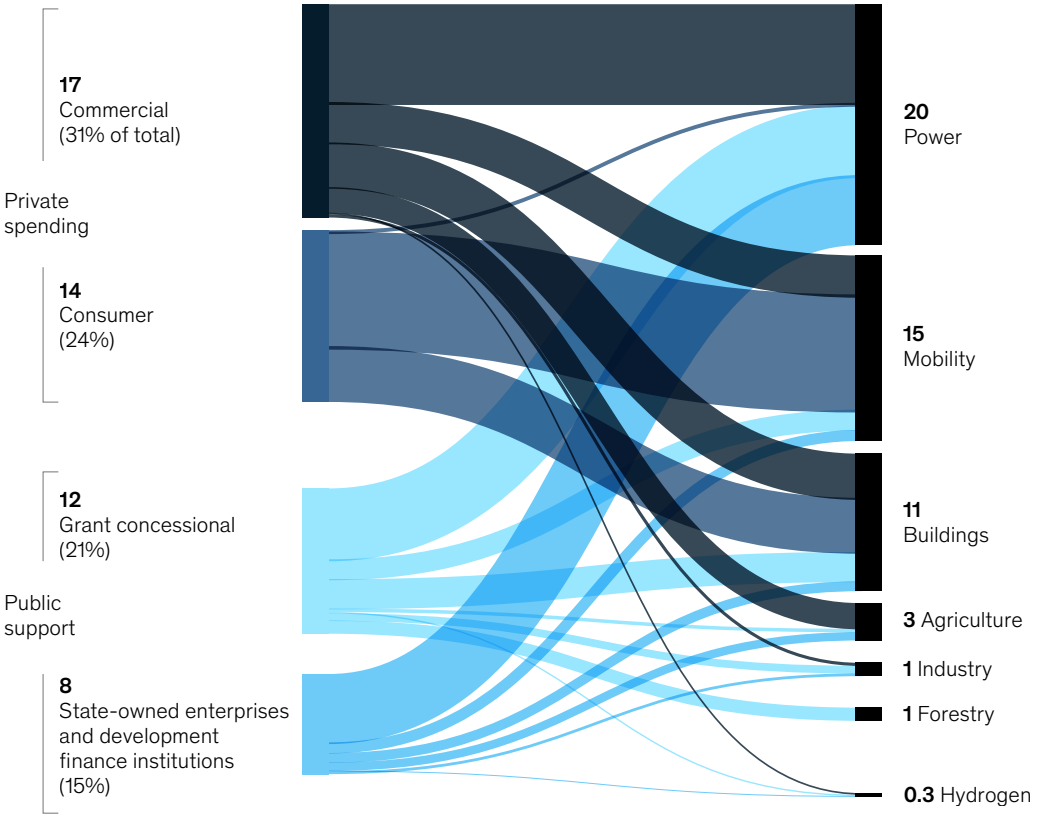
[163] As discussed above, this need varies across regions.

Commercial actors provide the majority of private financing in our scenario; these investors in particular take the lead in power, agriculture, and hydrogen (Exhibit 25). Another substantial share falls to consumers. As owners of homes and cars, they are the primary actors in buildings and mobility. Just as government incentives can crowd in commercial investors, they can influence consumer purchases as well—as we are seeing today when governments offer programs to lower the cost of home energy-efficiency upgrades and electric vehicles.

Exhibit 25A

Most consumer spending on low-emissions technologies would occur in buildings and mobility, while power would have the largest share of commercial spending.

Potential low-emissions spending by actor, 2021–30, on a 2050 net-zero pathway, $ trillion

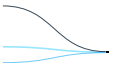
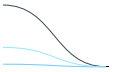


Note: Flows do not visualize the $4.0T (7% of funding) that is avoided spending from accelerated learning, but funding percentages on the left-hand side and sector totals on the right-hand side do account for this. Sector total spending figures take into account avoided spending from learning. This is not a projection or prediction but rather a scenario analyzing how specific sustainability goals could be financed. Our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates exclude high-emissions spending. They cover sectors accounting for 85% of global emissions. Figures are in 2020 US dollars.
Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

Exhibit 25B

Most consumer spending on low-emissions technologies would occur in buildings and mobility, while power would have the largest share of commercial spending.

Potential low-emissions spending by actor, 2021–30, on a 2050 net-zero pathway, $ trillion

		Financing flows	Example technologies
Power		Commercial actors and state-owned enterprises Depends on large SOE and concessional funds Equal public/commercial	Wind, solar generation Transmission, distribution Battery storage
Mobility		Primarily consumer driven Needs public funds, but majority commercial Half commercial, half public funding	Passenger battery electric vehicles Commercial battery electric vehicles EV and hydrogen infrastructure
Buildings		Public grants for about a third of need; rest privately funded Relies on commercial, public, consumer equally	Commercial and residential heat pumps Insulation retrofits
Agriculture		Mostly by commercial actors; some public (esp SOE) support	Low-emissions farming practices
Industry		Funded mostly by public actors to bridge gaps in cost-competitiveness	Low-emissions steel, cement, biofuels
Forestry		All public grants	Afforestation
Hydrogen		Mostly public funding, small commercial component	Technology for green hydrogen

Source: McKinsey proprietary models; NGFS; Oxford Economics; World Bank; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; McKinsey Global Institute analysis

One of the major takeaways from our road map toward net zero is the dynamic of public support crowding in more private capital. This can occur through grant and concessional funding that bridges gaps in cost competitiveness and lowers risks for private actors, or through SOEs providing financing. The next chapter considers how much fiscal headroom governments have and the tools at their disposal, as well as the implications for helping low- and middle-income countries that may lack the resources to pursue these aspirations.

6. A decisive moment: Implications and questions

Economic growth, higher productivity, upskilling for better-paying jobs, and technology advances can deliver remarkable progress on empowerment and the net-zero challenge. But after maximizing the potential contributions from these forces, significant gaps remain on both fronts, as we have described.

Societies around the world are then left with decisions about whether they have the appetite, capacity, and ability to deploy additional resources against those remaining gaps. Countries might prioritize one of these transformations over the other, make partial progress on both fronts, or leave both priorities unaddressed beyond what market forces can do.

In chapters 4 and 5, we outlined scenarios in which societies choose to fully close both gaps. This involves going beyond what growth and business innovation can do under current frameworks. To get to full empowerment, our scenario suggests that $3.5 trillion cumulatively could come from enabling more affordable essentials and labor-friendly work arrangements. But that still leaves a $10 trillion gap that could likely be addressed only through public support, if societies chose to do so. On the net-zero side, the scenario suggests that $10 trillion of incremental public support cumulatively to 2030 could unlock an additional $17 trillion of private spending, assuming that societies choose to prioritize getting to net zero and private actors respond in full.

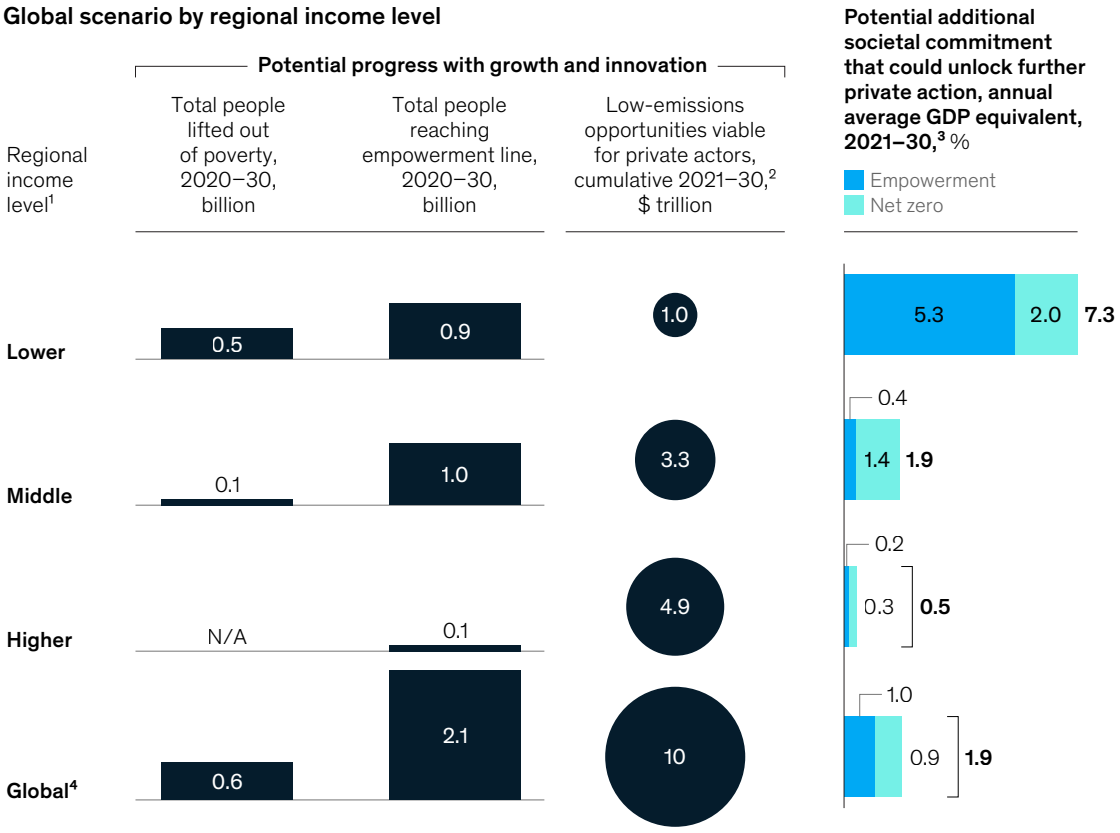
Combining the two scenarios, the additional societal commitments of $20 trillion needed to close both gaps in full, cumulative through 2030, would be the equivalent of about 2 percent of global GDP annually over the decade. This is over and above what is already being spent (or has been committed) from public resources on the twin priorities. The distribution would vary across countries. Lower-income regions would need relatively higher commitments of as much as 5 percent of GDP on an average annual basis for empowerment and an additional 2 percent to unlock the net-zero investments needed (Exhibit 26).

What form could such societal commitments take?[164] On the inclusion side, they could involve direct household transfers; greater direct investment in housing, healthcare, and education to expand access or improve the affordability of these services; or both. On the sustainability side, an additional infusion of subsidies and other incentives could crowd in even more private capital,

[164] Societal commitments can come from governments, state-owned enterprises, multilateral agencies, development finance institutions, philanthropies (including corporate social responsibility initiatives), and social investors.

Exhibit 26

While growth and innovation can make historic progress, even with current policies, questions remain about closing the remaining gaps.



[1]"Lower" includes Sub-Saharan Africa, India, and Other Asia; "middle" includes the Middle East, Latin America, and China; and "higher" includes the EU and United Kingdom, Japan, Canada, Australia, New Zealand, and the United States.
[2]Cost-competitive relative to traditional alternatives.
[3]Additional societal commitment can come from a range of sources, including more efficient use of public funds, reprioritized government spending, taxes, debt, multilateral agencies, or philanthropic entities. Based on a scenario of accelerated global growth of 3.4% annually, 2021–30.
[4]The global total includes regions not in focus in this analysis; totals may not sum.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

potentially raising private spending and lowering costs to avoid spending. Beyond funding, new policies could spur action to close the gaps.

But investments on this scale would demand more attention to maintaining growth and stability. Will countries confront the scope and urgency of both needs and choose to take them on? And if they do, what are the funding options? This chapter looks at the implications and considers potential approaches to address the last-mile gaps.

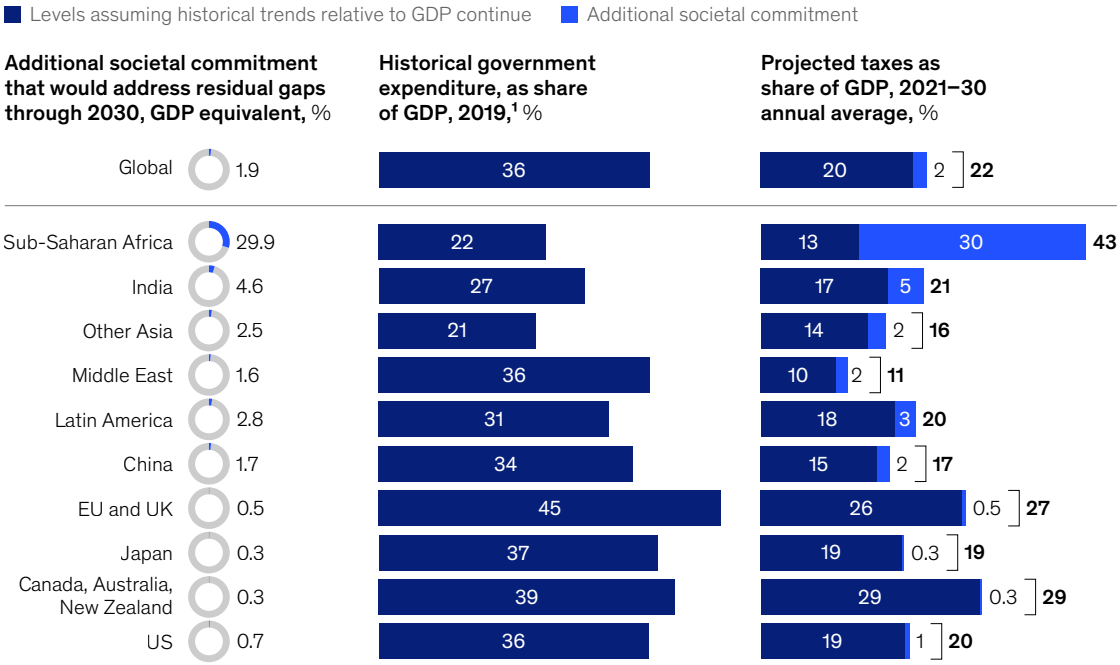
What are the options to raise public funds?

While some capital could come from philanthropies, multilateral agencies, and institutions or social investors, the bulk of societal commitments would likely come from governments. Governments have several options to generate resources for big priorities, depending on their choices, their fiscal health, and political feasibility (Exhibit 27).

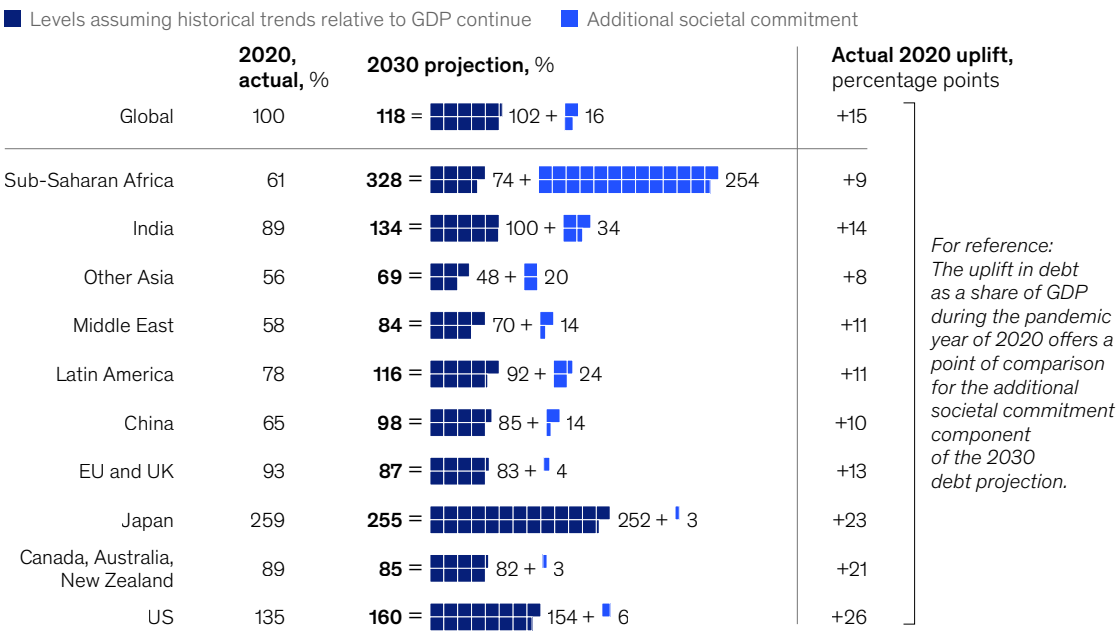
Exhibit 27

Additional societal commitment could come from more efficient or reprioritized government spending, debt, or taxes.

Potential sources by region, regions from lowest to highest GDP per capita



Projected public debt as share of GDP



For reference: The uplift in debt as a share of GDP during the pandemic year of 2020 offers a point of comparison for the additional societal commitment component of the 2030 debt projection.

[1]Government spending covers public services; defense; public safety; economic affairs; environmental protection; housing and community services; health; recreation, culture, and religion; education; and social protection (functional spending areas as defined by the IMF). Within current spending, countries can find efficiencies or choose to reallocate.
Note: Debt-to-GDP projected by including cumulative 2021–30 deficits (constant at 2019 deficit-to-GDP ratio) and considering 2020 debt stock as starting point. Tax-to-GDP held constant at 2019 levels. For simplicity, we have aggregated to a regional level, but debt, taxes, and reprioritized spending would not necessarily flow seamlessly within a given region. Regions listed represent 95% of global GDP.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

Improved efficiency of public spending and reallocated spending

First and foremost, residents of every country want to ensure that public dollars are being used as efficiently and effectively as possible. Governments already spend the equivalent of some 36 percent of GDP globally on a variety of social, economic, and defense priorities. They have substantial opportunities to make existing spending programs more transparent, targeted, and productive.[165]

Digital tools can spot leakages (whether caused by fraud or errors), streamline eligibility processes, and deliver benefits more efficiently.[166] India's digital identification structure, Aadhaar, for example, linked to mobile bank accounts and reduced leakage in the delivery of benefits to the poorest citizens.[167] Grassroots community-based approaches could also work. Ethiopia's Productive Safety Net Programme, for instance, follows local cultural norms by delivering transfers to local leaders of nomadic clans, who redistribute them to families in need for accurate targeting, while Brazil relies on door-to-door community health agents to administer its Bolsa Familia safety net program.[168]

Governments also have the option of reallocating funds from other areas to high-priority initiatives that can further empowerment and the net-zero transition. This requires careful evaluation and consideration of the potential impacts on other programs or services. Most developing nations do not have great flexibility, however. In India, for example, the additional societal commitment needed to get on a net-zero pathway is more than 50 percent higher than the share of GDP that currently goes to social protection spending, based on IMF data.

Additional debt or taxes

Countries (and local governments) can also choose to take on more public debt, whether through bond issuance or loans. Borrowing enables governments to access immediate funds for priority projects, repaying the debt over time with interest. The ability to borrow depends on each government's capacity to manage debt sustainably and, ultimately, on whether growth is sufficient to pay for the debt—and these issues are the subject of ongoing debate.[169] For Japan and the United States, for example, borrowing to cover the societal commitments needed to close both gaps in full (after accounting for what growth, innovation, and technology advances deliver) would make existing debt-to-GDP ratios go up only modestly. But for sub-Saharan Africa, taking this approach would make its debt soar to more than five times 2020 levels as a share of GDP.

Public support to finance empowerment and net-zero investments could also come through improved revenue collection. Opportunities for countries to strengthen their tax revenues by

[165] See, for example, *Improper payments: Fiscal year 2022 estimates and opportunities for improvement*, US Government Accountability Office, March 2023; Gerd Schwartz et al., "How strong infrastructure governance can end waste in public investment," IMF blog, September 3, 2020; and *A global procurement partnership for sustainable development: An international stocktaking of developments in public procurement*, World Bank, 2021.

[166] Abhijit Banerjee et al., "Electronic food vouchers: Evidence from an at-scale experiment in Indonesia," *American Economic Review*, volume 113, number 2, February 2023; Prabhat Barnwal, *Curbing leakage in public programs with direct benefit transfers: Evidence from India's fuel subsidies and black markets*, World Bank, 2016; and Susan Cunningham, Jonathan Davis, and Thomas Dohrmann, "The trillion-dollar prize: Plugging government revenue leaks with advanced analytics," McKinsey & Company, January 2018.

[167] *Digital identification: A key to inclusive growth*, McKinsey Global Institute, April 2019.

[168] Marin MacLeod et al., "How to deliver cash transfer programs more effectively to hard-to-reach populations," *Stanford Social Innovation Review*, August 2021.

[169] See, for example, Christina D. Romer and David H. Romer, *Fiscal space and the aftermath of financial crises: How it matters and why*, Brookings Papers on Economic Activity, Spring 2019; and Oliver Blanchard, "Public debt and low interest rates," *American Economic Review*, volume 109, number 4, April 2019.

pursuing reform in tax administration and compliance are well documented.[170] Carbon taxes are one targeted option, discussed below. High-income regions could fully close their residual gaps with tax revenue increases of less than one percentage point as a share of GDP. The implied increase to do the same would be two to five percentage points in China, India, other Asian economies, Latin America, and the Middle East, while it would be 30 percentage points in sub-Saharan Africa.

This exercise is meant to illustrate the dimensions of each of these fiscal solutions and their limits. Of course, the solution does not have to be all or nothing. Governments can employ a combination of these approaches, tailored to their specific circumstances and working within their means. Other options could include introducing user fees for certain services and monetizing public assets. Previous MGI research suggests that more than one-third of the assets on government balance sheets consist of buildings, infrastructure, and public land of significant value that may be understated under current accounting standards. They could provide avenues to generate revenues that could be recycled back into national priorities.[171]

Pricing carbon

Putting a price on emissions gives firms and consumers motivation to change their consumption choices. This price could come in different forms, including carbon taxes, cap-and-trade regimes, and stricter regulation that puts an implicit price on carbon.

Carbon taxes could be an efficient tool to contain emissions if they impose costs on all emitters that reflect the marginal damage of emissions (the "social cost of carbon"). While they would particularly target high-emitting sectors, raising their total costs of production, they would encourage all economic actors to switch to low-emissions alternatives or reduce energy use altogether. Advocates hold that carbon taxes are uniquely effective because they use market forces (incentives) to shift behavior.[172] They are also a source of government revenue.

Some scholars have pointed to carbon taxes and subsidies as complements rather than a binary choice, especially at early stages of the energy transition.[173] Subsidies could help encourage early high-risk investments in new technologies, advancing learning; then, once learning advances to create viable market alternatives, taxes encourage switching away from high-emissions assets. Implementing a carbon tax would also involve setting up monitoring and reporting systems.

The model used in the scenarios in this research assumes that the societal commitment needed for the net-zero investment gap is delivered through subsidies; it also assumes that this would have the same outcome as discouraging high-emissions spending via a carbon tax. However, we did model how the need for additional commitments for both goals would change if carbon taxes rather than subsidies were the primary vehicle used.[174] To do this, we rely on carbon prices

[170] See, for example, Bernardin Akitoby, "Raising revenue," *Finance & Development*, March 2018; "Ten quick steps to unlocking tax-revenue collection in rapidly growing markets," McKinsey & Company, July 2013; Oyebola Okunogbe and Fabrizio Santoro, "The promise and limitations of information technology for tax mobilization," *World Bank Research Observer*, volume 38, issue 2, August 2023; and "Would increased funding for the IRS narrow the tax gap?" Peter G. Peterson Foundation blog, March 2023.

[171] *The rise and rise of the global balance sheet: How productively are we using our wealth?*, McKinsey Global Institute, November 2021.

[172] See, for example, "Economists' statement on carbon dividends," *Wall Street Journal*, January 17, 2019. This statement was signed by 27 Nobel laureates in economics, four former chairs of the US Federal Reserve, 15 former chairs of the US president's Council of Economic Advisers, and two former US Treasury secretaries. See also Gilbert E. Metcalf, *Paying for pollution: Why a carbon tax is good for America*, Oxford University Press, 2019.

[173] Daron Acemoglu et al., "The environmental and directed technical change," *American Economic Review*, volume 102, number 1, February 2012.

[174] We use carbon prices estimated by the NGFS that range from about $78 per ton of emissions in emerging economies like India to about $300 in the United States.

estimated by the NGFS, which vary by country. For example, its carbon prices per ton of CO_2 in 2030 are $302 in the United States, $162 in China, and $78 in India.

We found that carbon taxes at this level would reduce the need for additional societal commitments to reach net zero by 0.4 percent of global GDP (on average annually), from 1 percent (the latter corresponds to the $10 trillion in additional societal commitments described in the net-zero scenario in chapter 5). At the same time, the additional commitments needed for empowerment would rise by 0.2 percent of GDP (on average annually) in the absence of revenue recycling.[175] While carbon taxes could be effective, they could also be regressive in some economies, creating a disproportionate burden for low-income households that devote a larger share of their overall spending to energy.

One way to address these potentially regressive effects is through revenue recycling—that is, returning the revenues raised through the carbon tax to vulnerable households through transfers.[176] Revenue from carbon taxes could improve public finances or be explicitly earmarked to support vulnerable households, but the feasibility and design could vary by country.

Another concern for governments is whether imposing a carbon tax could be a competitive liability in global markets or even cause industries to relocate to regions without a tax—a development that would simply shift emissions rather than reducing them on a global basis. However, if a critical mass of countries were to implement similar carbon pricing mechanisms, it can keep the playing field level and alleviate those concerns. This would require global coordination and alignment of carbon pricing strategies.

Questions surrounding cross-border assistance

High-income countries might have the resources to make higher commitments. Yet the choice of whether to aim for full empowerment, net zero, or both would still involve difficult trade-offs with other national priorities. Meanwhile, as noted earlier, achieving full empowerment and a net-zero trajectory in the current decade is more challenging for lower- and middle-income countries. Debt is problematic for the developing world: the IMF estimates that 60 percent of low-income countries are already in debt distress or approaching it.[177]

In international forums, the fault lines between countries are becoming more evident, creating a new consensus that challenges on this scale need new approaches. At the 2022 UN General Assembly, for instance, some representatives noted that wealthy nations have not followed through on pledges of international assistance to date.[178] At the 2023 COP27 conference, others also reiterated that the developing world is responsible for only a fraction of the world's

[175] About half of the additional $10 trillion in societal commitment would still be needed to close the net-zero investment gap in full, even with the presence of carbon taxes. This is because carbon taxes, as applied in our modeling, would help address cost competitiveness gaps between low-emissions technologies and traditional alternatives. However, some remaining societal commitment would still be needed to support initiatives undertaken by state-owned enterprises, to the tune of about $4 trillion. Another step-up of $1 trillion in grant and concessional funding would be needed across all sectors to overcome hurdles to private spending that are not simply cost-competitiveness gaps (namely technology and market risks). The inclusion impacts are based on changes in private consumption seen in the National Institute Global Econometric Model (NiGEM) from the National Institute of Economic and Social Research (UK), which projects global GDP and other macroeconomic variables in different NGFS climate scenarios. We compare NiGEM's no transition, no physical risk baseline to a net-zero scenario, looking forward to 2030. The NiGEM model incorporates NGFS carbon prices as taxes, as well as NGFS energy prices.

[176] David Klenert et al., "Making carbon pricing work for citizens," *Nature Climate Change*, volume 8, July 2018; and Julie Anne Cronin, Don Fullerton, and Steven E. Sexton, *Vertical and horizontal redistributions from a carbon tax and rebate*, NBER working paper number 23250, March 2017.

[177] "Debt dynamics," in *Crisis upon crisis: IMF annual report 2022*, International Monetary Fund, September 2022. See also *The human cost of inaction: Poverty, social protection and debt servicing, 2020–2023*, UNDO Global Policy Network Brief, July 2023.

[178] See, for example, "Developed countries must deliver on climate change, finance commitments, delegates stress, as Second Committee continues its general debate," UN General Assembly, October 2, 2022; and Rahul Tongia, "It is unfair to push poor countries to reach zero carbon emissions too early," Brookings Institution blog, October 26, 2022.

emissions but is disproportionately exposed to the worst effects of climate change.[179] The gathering ended with a deal to create an international fund to assist low-income countries coping with climate disasters.[180] This will take time to implement, but our numbers suggest it is worth exploring more solutions of this kind.

If sustainability and inclusion are viewed as global projects, the ramifications do not stop at national borders. For context, we calculate that if high-income countries were to take on the additional societal commitments needed to close the residual empowerment and net-zero gaps for the entire world, it would require some 3.5 percent of their GDP on an average annual basis, up from less than 1 percent of GDP to bridge only their own gaps. The global financial system would need to be geared to managing both larger public debt for high-income countries as well as cross-border imbalances in flows of capital that bring their own considerable risks.[181]

To help the lowest-income countries achieve these goals, the world could explore a mix of solutions that could include cross-border aid, additional mechanisms for assistance from multilateral institutions, and debt relief. This is starting to occur within the climate space. The Green Climate Fund is the largest vehicle of its type, with $12 billion in capital that has catalyzed total investments of $45 billion in developing countries.[182] There is also a growing movement toward creative debt-for-nature and debt-for-climate swaps.[183] In 2021, Belize, for example, refinanced its national debt, reducing it by 10 percent in a deal with The Nature Conservancy to protect the biodiversity of its barrier reef.[184] Ecuador recently bought back some $1.6 billion of national debt at a steep discount and sold a $656 million "blue bond" that will generate resources for preserving the Galápagos Islands; the bond was backed by guarantees from the Inter-American Development Bank and the US International Development Finance Corporation.[185]

These types of approaches would need to be scaled up many times over to tackle the full scope of the need, especially if high-income countries were to commit to accelerating not only the net-zero transition but also empowerment in the developing world.

Donor countries would also need assurance that their capital is going where it is needed. Substantial international transfers would not continue to flow if corruption or inefficiency siphons off critical capital. Low-income countries that need international assistance to meet these goals would need to strengthen weak institutions where needed and commit to reform and improved governance to avoid undermining these global projects.

Where should the world lean in?

Investments on this scale would have unknown effects on base economies, which demands more attention to maintaining growth and stability. As societies debate whether and how to tackle these gaps in a definitive way, two areas stand out as immediate priorities.

[179] William James, Richard Valdmanis, and Dominic Evans, "COP27: Polluters must pay for climate change, poor nations tell rich," Reuters, November 8, 2022.
[180] Valerie Volcovici, Dominic Evans, and William James, "COP27 delivers climate fund breakthrough at cost of progress on emissions," Reuters, November 20, 2022.
[181] See, for example, Claudio Borio and Piti Disyatat, *Global imbalances and the financial crisis: Link or no link?* BIS working paper number 346, May 2011.
[182] *GCF-1 progress report*, Green Climate Fund, May 2023.
[183] Kristalina Georgieva, Marcos Chamon, and Vimal Thakoor, "Swapping debt for climate or nature pledges can help fund resilience," IMF blog, December 14, 2022.
[184] Nicholas Owen, "Belize: Swapping debt for nature," *Finance & Development*, IMF, March 2022.
[185] Marc Jones and Rodrigo Campos, "Ecuador seals record debt-for-nature swap with Galápagos bond," Reuters, May 9, 2023.

Accelerated growth gives governments more fiscal flexibility and financing capacity.

The importance of productivity-driven growth cannot be overstated

Faster growth propels inclusion. High-growth emerging economies have delivered powerful proof of this phenomenon. The share of the global population living in extreme poverty declined roughly 30 percentage points between 1990 and 2020.

Globally, the gaps are a significantly higher hurdle in a scenario of baseline growth only (averaging 2.7 percent globally), especially for developing countries.

Accelerated economic growth brightens the picture. Our scenario shows that adding less than one extra percentage point of growth—along with innovation that creates effective large-scale workforce transitions—can shrink the unfilled gaps and therefore size of the societal commitment that would be needed to achieve to close them in full (Exhibit 28).[186] In India, faster growth shrinks the size of those commitments by more than half, to 4.6 percent of GDP. Almost all of this is for the net-zero transition, as faster growth alone nearly closes the empowerment gap. China would reach full empowerment in this scenario with little to no additional commitments. The burden for sub-Saharan Africa would still be high, but it would drop from an amount equivalent to 44 percent to 30 percent of GDP.

Meanwhile, the additional commitments that could close residual gaps in full also drop by about half for high-income regions in a scenario of faster growth. It would take an amount equivalent to less than a half percentage point of GDP annually for the EU and the United Kingdom, Japan, and Australia, Canada, and New Zealand. The United States could close both gaps with an amount equivalent to less than one percentage point of GDP in additional societal commitments annually with faster growth.

Accelerated growth can also give governments more fiscal flexibility and financing capacity, which affords more choice in funding projects. Achieving growth of 3.4 percent globally creates headroom for an additional $31 trillion of debt (as compared to baseline growth alone), cumulative through 2030, without increasing debt-to-GDP ratios beyond their 2020 levels.[187] At a global level, and especially for high-income regions, this additional debt capacity exceeds the size of the societal commitment to address residual gaps. Yet there are real questions regarding whether those countries can assume that kind of debt in practice and where it would best be allocated.

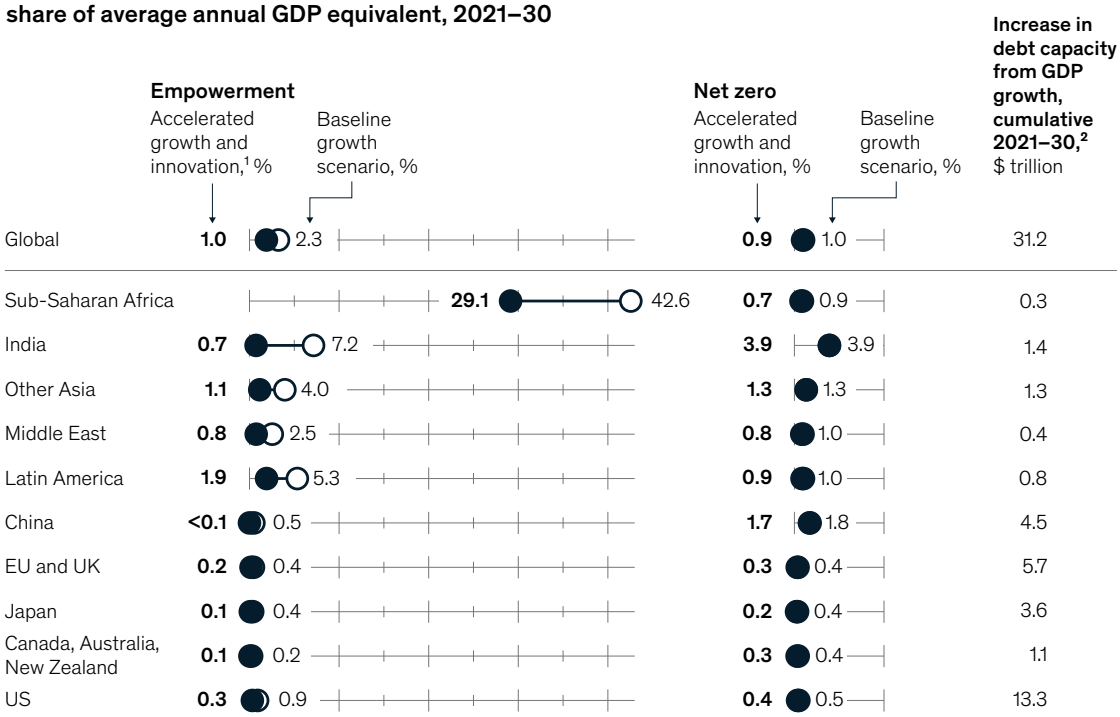
[186] As in previous chapters, our model assumes baseline global growth of 2.7 percent annually on aggregate (varying by country), in line with scenarios developed by Oxford Economics. Our accelerated, or "prosperity," growth scenario assumes that productivity boosts global growth to 3.4 percent annually on aggregate (again, varying by country).

[187] According to the IMF, global public debt as a share of GDP was 100 percent in 2020.

Exhibit 28

Growth reduces the size of additional societal commitments that would be needed to fill residual gaps, while also creating financing capacity.

Additional societal commitment in a scenario of fully closing residual gaps by region, from lowest to highest GDP per capita, share of average annual GDP equivalent, 2021–30



[1]Includes upskilling, innovation for affordable essentials, and labor-friendly policies.
[2]Calculated as the difference in cumulative GDP (2021–30) between a high-growth (3.4% p.a. global growth) and baseline (2.7% p.a. global growth) scenario, multiplied by the 2020 debt-to-GDP ratio by region. In this calculation, deficit-to-GDP ratios implicitly change across both scenarios and years. Figures in 2020 US dollars.
Notes: Regions listed represent 95% of global GDP. This is not a projection or prediction but rather a scenario analyzing how specific empowerment and sustainability goals could be financed. For sustainability, our starting point is the Network for Greening the Financial System (NGFS) Net Zero 2050 scenario using REMIND-MAgPIE (phase 2), modified for a higher-growth scenario. Our estimates include the necessary low-emissions spending on energy- and land-use systems and exclude high-emissions spending. They cover sectors accounting for 85% of global emissions.
Source: McKinsey proprietary models; NGFS; Climate Policy Initiative; FAOSTAT; IEA; Damodaran data; World Data Lab; WageIndicator Foundation; Oxford Economics; World Bank; IMF; OECD; Conference Board; McKinsey Global Institute analysis

For developing economies, the prospects for more people to exit poverty do not hinge solely on international aid; they depend crucially on growth. These countries would need to double down on productivity, skill development, and technological leapfrogging.[188] They may also need institutional reforms, from clearer legal frameworks for property rights to stronger oversight that prevents leakages of public spending.[189] New collaborations may be needed to integrate low-income countries more fully into global flows of trade, finance, technology, and knowledge.

The upside is compelling: higher growth and innovation could lead to some 600 million people in lower-income regions moving out of poverty and taking significant steps on a longer journey toward full economic empowerment. While short of the high aspirations outlined in our research,

[188] See, for example, *Reimagining growth in Africa: Turning diversity into opportunity*, McKinsey Global Institute, June 2023.
[189] *Realizing property rights*, Hernando de Soto and Francis Cheneval, eds., Frank/Wynkin de Worde, 2006.

it would nevertheless create historic progress in human development. Even in the absence of greater commitments and international transfers, growth and the actions of businesses can unlock real progress that changes lives.

Innovation at scale is critical for affordability

Relentlessly focusing on technology development is a fundamental part of any pathway to net zero. The significant recent drops in the costs of wind and solar power offer reason for hope. R&D, learning by doing, and scaling up eventually drive costs down. The rate at which this happens is key: If innovation and R&D stall, this could both raise the overall price tag of the transition and reduce what could be financed by the private sector. Much of this is within the realm of businesses—and they can drive exponential progress. Beyond unlocking trillions of in-the-money spending, their efforts could set the stage for breakthroughs that are hard to foresee today.

Innovation is essential for inclusion, too. It generates demand for higher skills and thus upskilling opportunities, and it brings down the costs of meeting basic needs, from housing and food to education and healthcare. Some of this can come from private actors, such as improvements in construction productivity or implementing digital technologies to their fullest extent across healthcare systems. Others can involve smart policy design or creative programs delivered by nongovernmental organizations and nonprofits. UNICEF, for example, has an entire Office of Innovation focused on pilot programs and integrating technology into its local interventions.

Our analysis in chapter 4 shows that many countries do need to invest in expanding housing supply as well as healthcare and education systems—but it is not only about spending more. It is also about getting more out of every dollar to deliver essential services with higher quality and greater effectiveness. Some countries manage to achieve better results than others with lower levels of spending.

Innovation is also needed in a broader sense. Lifting minimum living standards and containing climate change would involve sweeping transformations, requiring bold approaches in policy, finance, technology, and industry. The possibilities could include creating new multilateral financing vehicles; integrating low-income countries into global flows of capital and trade in a way that lifts local communities and small businesses; developing sustainable cities with affordable housing; strengthening education and healthcare systems worldwide; and designing effective carbon markets, including incentives for countries to preserve biodiversity and critical carbon sinks.

Progress toward empowerment and net zero would depend on private actors, governments, and nongovernmental organizations and nonprofits combining their capabilities and expertise—and thinking without limits about how they can contribute to meeting this moment. Regardless of whether countries fully close the gaps, they have real opportunities to get started today on the task of building a more stable, prosperous future. Tackling the projects that are already feasible without further delay would represent historic progress in and of itself.

Our research has put very large numbers against what would need to be done to deliver against bold aspirations for inclusion and net zero. While the immediate price tag and the work ahead are daunting, they could produce a tremendous, long-horizon payoff in the form of a more prosperous, stable world. We recognize the scope of the task, not only in financing but also in implementation, scaling up supply chains, and retrofitting enormous systems. We also recognize the political realities and the difficulty of shaking off inertia. Countries that decide to take on these goals on an accelerated time frame will need an entirely different magnitude of public–private cooperation, bolder policies, the right physical and social infrastructure, and every last bit of innovation and collaboration the world's best minds can apply. The world has many opportunities waiting right now—and every incremental step advances the continuum of progress.

Spotlight: Improving the quality and cost of essentials

We see a number of openings to deliver essential goods and services more effectively—with greater access, better quality, and lower costs. In each of these areas, the role of the private and social sectors varies depending on the country context.

Food

Most of the world's poorest populations can afford enough food to provide calories but not a nutritious diet.[1]

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But crises can tip them into hunger. The importance of food security was on full display when war erupted in Ukraine, a major global supplier of wheat and other grains. The disruption sent food and energy prices soaring worldwide. The World Food Programme estimates that 345 million people worldwide were facing acute hunger by late 2022, up from 282 million at the start of the year.[2]

Some government programs **directly provide food or purchasing power to low-income households.** Food assistance can be offered in a variety of forms, including food vouchers, cash transfers, and free school meals.[3] India has the some of the largest food assistance programs in the world.[4] In addition to the Midday Meal Scheme, which provides all elementary school students with cooked lunches, the government distributes subsidized food commodities to about 800 million people in specially designated "fair price" food shops.[5] In Europe, Estonia, Finland, Latvia, Lithuania, and Sweden offer universal free meals in schools.[6] In the United States, the Supplemental Nutrition Assistance Program (SNAP) provides benefits to low-income individuals and families, issuing benefits via debit cards that can be used to purchase eligible food products in retail stores.

Other policy options focus on producers, including **support to farmers, price subsidies, and price controls.** Ghana's fertilizer subsidy program, for example, was found to boost crop yield by almost 25 percent.[7] In 2019, the EU spent €38 billion on direct payments to farmers, plus €2.4 billion to support the market for agricultural products.[8] Public investment in irrigation and distribution infrastructure can increase yields and reduce spoilage. China recently unveiled a five-year plan to build out a network of product storage and cold chain logistics facilities to meet demand for produce and frozen foods.[9]

While policy can provide support and tools, it is ultimately farmers themselves—whether smallholders or large agricultural corporations and food processors—who will do the hard work of feeding a global population that is expected to reach almost ten billion by 2050.

Farmers will have to meet the challenge of **boosting production while reckoning with climate change.** Agriculture and the overall food supply chain are a significant source of emissions. Farming is also highly vulnerable to the destructive impact of climate change, including droughts, flooding, and severe storms. McKinsey has estimated that up to 14 percent of global rain-fed cropland was affected by moderate to extreme drought in 2022.[10] The world also can't afford to lose more forests, which absorb carbon, so the challenge will be boosting yields on existing farmland without expanding agriculture's footprint.[11]

Growers will need to focus on **resilience, adaptation, and emissions reduction**

in tandem. Climate-smart agriculture is a concept that takes an integrated approach to these goals.[12] While tilling the soil is an ancient practice, new "precision farming" approaches that use sensors, data, and analytics can guide farmers to treat plants and soil according to site-specific needs in real time, improving crop management to boost healthy yields.[13]

Healthcare

The COVID-19 pandemic drove home just how much health matters for individuals, society, and the global economy.

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Yet the policy debate often frames healthcare as a rising cost rather than an investment with immense returns. Health and growth are inextricably linked. One study estimates that about a third of economic growth in the past century can be attributed to improvements in global health.[14]

Recognizing disparities

Uneven spending across regions has created highly unequal healthcare systems. In 2019, about 80 percent of global spending on healthcare occurred in high-income countries, where about 70 percent of that came from government budgets. In low-income countries, 44 percent of healthcare spending was out of pocket, and 29 percent came from external aid.[15] The residents of developing countries pay more than half a trillion dollars, or $80 per capita, annually out of pocket—costs that can prevent the poor from accessing the full care they need and limit what they have to spend on other essentials.[16]

These types of disparities manifest in varying health outcomes. The gap between low- and high-income countries in life expectancy is 18 years.[17] But high-income countries themselves have gaps in outcomes between rich and poor. The United States, for example, has extreme geographic disparities influenced by both access to care and lifestyle factors that are heavily influenced by the broader environment. Life expectancy in Hawaii is 80.7 years, while in Mississippi, it is only 71.9 years.[18] In short, where you are born plays a major role in determining how long you will live. Access to quality care is especially critical in developing countries, where healthcare systems often need to be dramatically expanded to cover the full population.

To expand healthcare access, one key issue to tackle is the training of medical professionals. Africa, for example, has almost a quarter of the world's disease burden but only 3 percent of its healthcare workers.[19] In many countries, the lengthy education required to become a doctor leaves practitioners with substantial debt. However, a number of European countries offer free or heavily subsidized medical education, an approach that removes barriers to

entering the profession and ensures an adequate medical workforce.

The potential of prevention and proven treatments

Previous MGI research estimates that the global disease burden could be reduced by about 40 percent by **applying known interventions** in broader segments of populations and with closer adherence to the most effective tools available.[20] Achieving this would deliver significant health benefits by 2040, including a two-thirds reduction in child mortality, a drop of almost 30 percent in cancer deaths, a decrease of almost 40 percent in deaths from cardiovascular disease, and more than a 60 percent reduction in deaths from neglected tropical diseases and malaria. For people at middle age, this could extend the number of years in good health by a decade. Every region in the world would experience an improvement in this range.

More than two-thirds of these gains could be achieved from **prevention**—specifically, by creating cleaner and safer environments, encouraging healthier behaviors, and addressing social factors, as well as broadening access to vaccines and preventive medicine. The remainder would come from treating disease and acute conditions with proven therapies.

In low-income countries, MGI research found the most cost-effective interventions include childhood immunizations, prevention and treatment of malaria, safe childbirth, better nutrition, and cardiovascular disease prevention. In middle- and high-income countries, the greatest health improvements could come from prevention and treatment of cardiovascular disease, diabetes, and substance-use disorders.

MGI has estimated that focusing on known health improvements could deliver an **incremental economic benefit of $2 to $4 for each $1 invested.** The economic benefits from these health improvements are substantial enough to accelerate GDP growth by 0.4 percent every year. This could be a significant contributor to the higher growth needed to accelerate both inclusion and sustainability in our scenarios.

Shifting a greater share of healthcare spending to prevention could yield a high economic return, since prevention is typically less expensive than treatment and reduces the need for more expensive interventions later on. This approach would require substantial changes in where and how healthcare is delivered, as well as changes to make communities healthier environments.

Continued innovation

Innovation continues to be critical to tackling diseases without a known cure as well as increasing uptake and adherence to proven interventions. Realizing the next wave of health innovations will require ongoing investment in research and development from the private sector, governments, and research institutions. Some of this can come from **scientific technology breakthroughs,** including genomics to deliver more targeted prevention and treatment; data science and AI to detect and monitor disease and enhance research; tech-enabled delivery for better access to care; and advances in the understanding of the biology of aging. But even more is possible if **innovation is also applied to reducing the cost of diagnostics, medical equipment, pharmaceuticals, and treatments.**

Housing

Adequate and affordable housing is a foundational need with spillover benefits to health, education, physical security, and economic stability.

Yet rents and home prices have risen far faster than incomes in most countries, particularly in cities where job opportunities are concentrated.[21] At the heart of the issue is an extreme imbalance in supply and demand. Population growth, urbanization, and rising global incomes are all fueling steady demand increases—and the housing stock of urban centers around the world has not expanded quickly enough to keep up.[22]

The urgency of expanding housing stock

In the United States, 46 percent of all renter households spend more than 30 percent of their income on housing—and a quarter spend more than half.[23] In Europe, at least 100 million low- and middle-income residents spend more than 40 percent of their income on housing.[24] The issue is also acute in the developing world. As of 2018, more than a billion urban residents worldwide lived in slums and informal settlements, with the largest concentrations in Asia and sub-Saharan Africa.[25]

Beyond the stress on individuals and families, a lack of affordable housing eventually constrains economic growth.[26] Restrictive zoning laws in the most productive cities effectively limit the number of workers with access to highly productive jobs, decreasing

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labor mobility—and this effect lowered aggregate US growth by more than a third from 1964 to 2009.[27] Households with a disproportionate share of monthly income going toward rent or mortgage payments have to limit other forms of consumption. To give one example, an MGI study estimated that curtailed consumption in Los Angeles County, which has an acute affordable housing shortage, depresses the region's GDP by up to 5 percent.[28]

National and local governments around the world often address housing gaps by focusing on the demand and financing side. Strategies such as **housing subsidies, privileged financing, and various forms of rent control** offer much-needed relief to the low-income households they cover, and they are legitimate policy choices if carefully designed. But they are expensive to sustain, and they do not address the core issue of an underlying housing shortfall.

Supply-side solutions

It will take a dramatic increase in the number of available housing units to achieve greater affordability. Previous MGI research has focused on several supply-side solutions.

To start, **private-sector builders can boost innovation and productivity.** Productivity within the construction sector is consistently poor around the world, averaging only 1 percent a year globally over the past two decades, compared with 2.8 percent for the total world economy and 3.6 percent in the case of manufacturing.[29] While cities can create a more efficient environment and incentives for innovation, construction firms also have to up their game. The best performing take a value engineering approach to the design process, pushing for repeatable design elements whenever possible. They also avoid delays by focusing on procurement and supply-chain management for just-in-time delivery. Digital tools can improve the design process and monitor materials, labor, and equipment productivity on sites. Cloud-based control towers can coordinate large-scale, complex projects, keeping information flowing to owners, contractors, and subcontractors. Techniques and data that are readily available today can make cost and schedule estimates more accurate.

For their part, **cities can unlock land.** Access to land is typically the biggest constraint on housing development and one of the major drivers of cost. In extreme cases such as San Francisco, land can account for as much as 80 percent of a home's price. Globally, MGI has estimated that unlocking land to the fullest extent could reduce the cost of owning a standard housing unit by up to 20 percent.[30] A comprehensive citywide mapping and inventory exercise can unearth many opportunities. Congested cities can add housing in a more sustainable way by increasing density around transit rather than encouraging sprawl and longer commutes. This may involve redeveloping existing residential

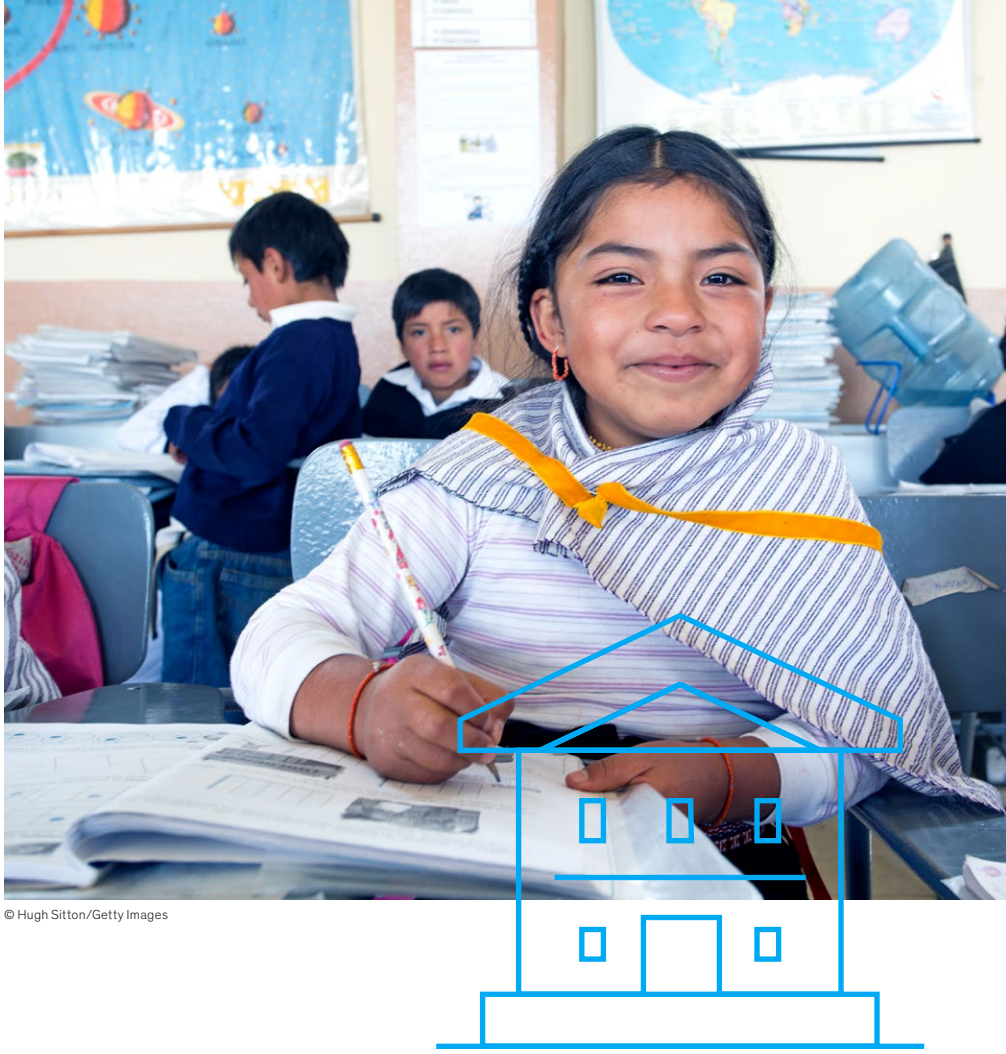
structures or permitting projects with greater density in specific target zones; Hong Kong and Seoul, for example, have intensified land use around transit stops. Another strategy involves building infill housing on vacant parcels; even dense neighborhoods may have empty lots that could serve as viable sites. Taxes on idle land can create an incentive to build. Where appropriate, governments can earmark unused public lands for housing development.

Local governments can also **remove barriers that impede construction.** Governance structures should represent all stakeholders (not just the most entrenched or vocal) and streamline the execution of housing projects. An empowered agency or unit with a mandate to guide housing delivery from end to end can accelerate progress. In many jurisdictions, well-intended approval processes add delays and development costs. Cities can streamline their processes to fast-track permitting for affordable housing projects.

While private builders are the major players in providing housing, governments can also consider **expanding public housing.** Among the cities with best practices is Vienna, where roughly 40 percent of the housing stock is "social housing" for people of all incomes, which avoids segregating low-income tenants. The developments are in desirable areas and must meet architectural and livability standards. Often half of a project's units are reserved for low-income tenants at lower rents, subsidized by higher-income tenants paying market rents. The city continually builds so that supply keeps pace with demand.[31]

India has taken another approach to subsidizing housing. Its PM Awaas Yojana program subsidizes down payments for the urban poor, giving them the means to obtain mortgage loans and buy solid, decent homes.[32] In Thailand, the Baan Mankong program aims to help the urban poor obtain housing with subsidies and low-cost loans to buy or lease land or to build or upgrade their homes. It pools local resources into collectives that negotiate with private owners; this approach is making it possible to give poor residents a voice in community development, including relocation from flood-prone areas.[33]

Housing is not simply an urban issue, of course. In rural areas, substandard housing can pose additional health challenges. Two billion people lacked access to safely managed drinking water in 2020, while about 3.6 billion people had insufficient sanitation services. Achieving universal access to both by 2030, one of the Sustainable Development Goals, requires a fourfold increase in the current rates of progress.[34]



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Education

The developing world has made great progress in expanding access to education, and the number of years of average schooling has been rising.

But there is much more to do. UNESCO estimates that some 244 million children between the ages of 6 and 18 are out of school around the world, including 67 million of primary-school age. Almost 20 percent of children from ages 6 to 11 in sub-Saharan Africa are not attending school.[35]

Getting children into the classroom is one thing, but the next generation needs better learning outcomes to truly be empowered. One measure is the learning poverty rate, or the share of children who are unable to comprehend a simple text by age 10. In 2019, before the pandemic hit, the learning poverty rate was estimated at 57 percent in low- and middle-income countries—and UNICEF estimates that it has jumped to 70 percent after the school closures caused by the pandemic.[36] Learning losses were also steep in high-income countries, but the issue is especially acute for children who lacked remote learning opportunities while schools were closed.

Learning outcomes are highly dependent on having effective teachers. But a quarter of teachers in developing countries lack formal training, and current certification programs are not always effective.[37]

In high-income countries, too, learning outcomes vary depending on where a child lives. In the United States, for example, most states provide some level of baseline funding to local school districts, with the remainder generated by local property taxes. This approach can bake in existing advantages and disadvantages. Residents of affluent neighborhoods, through property taxes on higher-value homes, can fund well-maintained schools with full staffing, technology, and extracurricular programs; residents of poor neighborhoods may not generate enough property tax revenue to do the same.

How can national and local governments and social-sector institutions improve learning outcomes and shore up the weak spots in education?

One of the top priorities is **recruiting, developing, and retaining the highest-quality teachers and school leaders.** One of the major drivers of Singapore's journey from poverty to prosperity was prioritizing education. Teaching is a highly respected, competitive, and well-compensated field that recruits top students. Teachers receive comprehensive training, mentoring in the early part of their careers, ongoing professional development, and holistic performance appraisals. This model has produced some of the world's best student achievement results.[38] However, teacher training programs around the world have highly variable results.[39]

Delivering high-quality instructional curriculum to every student is critical in countries with few trained teachers. Guided systems can focus on literacy and numeracy, using evidence-backed, standards-aligned curricula and assessments. Accelerated learning programs can help children who have missed segments of schooling catch up on literacy and numeracy through interactive, activity-based approaches.[40] Kenya's Tusome program, implemented in partnership with the US Agency for International Development, ran in primary schools across the country with a singular focus on improving foundational literacy. It revised curricula, provided universal access to the content, and trained teachers with opportunities for continued professional development; these interventions produced substantial improvements in reading levels and comprehension.[41]

I**nvesting in early childhood learning** can provide a stronger foundation. Research has consistently found that children who attend high-quality preschool and kindergarten get a head start on learning that continues to yield long-term benefits for themselves and society, including better health and quality of life, better school completion rates, and lower incarceration rates.[42] The return on investment in such programs is large.[43]

In a more digital and knowledge-intensive economy, **students need more technological exposure and critical thinking skills.** MGI's research has consistently shown that digital and social–emotional skills will be needed in the jobs of the future. Governments and businesses can work together to create more pathways to solid jobs that combine classwork with apprenticeship and vocational training.

Finally, **enhancing student well-being can improve attendance and learning.** Educational systems can help to meet students' basic needs through school meals, well-maintained infrastructure, and a stimulating environment; they can be a natural delivery mechanism for health and other community services. Taking a holistic approach to each child's well-being includes focusing on their mental and social–emotional development, physical activity, and opportunities for creativity.

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Acknowledgments

This report builds on a larger body of work from the McKinsey Global Institute exploring how to make prosperity more broad-based through productivity and growth as well as research on human capital and the future of work. It also builds on our past reports on climate change and the net-zero transition.

The research was led by Anu Madgavkar, an MGI partner based in New Jersey; Sven Smit, MGI's chair, based in Amsterdam; Mekala Krishnan, an MGI partner in Boston; Kevin Russell and Rebecca J. Anderson, MGI senior fellows; Jonathan Woetzel, an MGI director based in Shanghai; Kweilin Ellingrud, an MGI director based in Minneapolis; and Tracy Francis, a McKinsey senior partner in the São Paulo office.

Rebecca J. Anderson also led the working team, which included Anushka Baloian, Mairéad Barron, Emily Capstick, Evans Chelal, Fiorella Correa, Cameron Davis, Giacomo Lapo Ghezzi, Aman Gupta, Christine Jeong, Hannah Kitchel, Roos Klaassen, Dhiraj Kumar, Brenden McKinney, Bill Newman, Semilore Olatunde, Nicholas Pingitore, Karolina A. Ryszka, Preeya Shah, Amrita Sood, Rishabh Tagore, Carlo Tanghetti, Ben D. Thomas, Giulio Vannicelli, Sarah Varghese, and Ahan Varkey. McKinsey senior expert Cor Marijs—along with Ryan Barrett, Will Glazener, Julian Payne, Daan Walter, and Jake Wellman—provided valuable leadership and input. We thank Gabriel Moreno for help with macro modeling and Nina Chen, Kendyll Hicks, Marty Kang, and Ishaa Sandhu for their collaboration on the empowerment line.

We are grateful to the academic advisers who challenged our thinking and sharpened our insights: Martin Baily, senior fellow emeritus in economic studies at the Brookings Institution; Hans-Helmut Kotz, resident fellow at the Center for European Studies and visiting professor of economics, both at Harvard University; Rakesh Mohan, president emeritus and distinguished fellow, Centre for Social and Economic Progress, India; Sir Christopher Pissarides, Nobel laureate and Regius Professor of Economics, London School of Economics; Andrew Sheng, distinguished fellow of the Asia Global Institute, University of Hong Kong; Matthew Slaughter, Paul Danos Dean of the Tuck School of Business and the Earl C. Daum 1924 Professor of International Business, Dartmouth College; Michael Spence, Nobel laureate in economics and professor of economics emeritus and a former dean of the Graduate School of Business at Stanford University; and Laura Tyson, distinguished professor, Haas School of Business, University of California, Berkeley. Advising us specifically on the net-zero analysis were Simon Dietz (professor of environmental policy), Marion Dumas (assistant professorial research fellow), and John Ward (visiting senior fellow), all with the Grantham Research Institute on Climate Change and the Environment, London School of Economics; and Samuel Fankhauser, professor of climate change economics and policy at the University of Oxford.

We are also grateful to a number of other experts who generously shared their time, perspectives, data, and support. They include Homi Kharas, chief economist, and Wolfgang Fengler, CEO, of World Data Lab, along with the WDL team; Paulien Osse, co-founder, and Fiona Dragstra, general director, of the WageIndicator Foundation, along with Nii Ashia Amanquarnor, Aakash Bothra, Daniela Ceccon, and Martin Guzi of the foundation's global living wage team; Ian Hurst, associate research director of the UK's National Institute of Economic and Social Research; Indermit Gill, chief economist and senior vice president for development economics, World Bank Group; Rakesh Kochhar, senior researcher with Pew Research Center; Pedro Conceição of the UN Development Programme; Kalpana Kochhar, director of development policy

of the Bill & Melinda Gates Foundation, as well as Matt Eldridge, Joseph Wilson, and Susanna Gable; and Vera Songwe, chair of the Liquidity and Sustainability Facility; co-chair of the High Level Panel, Finance for Climate Action; member of the Global Financial Alliance for Net Zero; and non-resident Senior Fellow of the Brookings Institution.

This project benefited immensely from the perspectives of many McKinsey colleagues. Special thanks go to McKinsey's global managing director, Bob Sternfels, for championing this work. In addition, we thank Abhishek Ahuja, Vishal Agarwal, Mark Azoulay, Tamara Baer, Chris Bradley, Guilherme Cabrera, Andrés Cadena, Alberto Chaia, Michael Conway, Daniel Cramer, Rajat Dhawan, Grail Dorling, Emma Dorn, Andre Dua, Joseba Eceiza, Anas El Turabi, Hauke Engel, Marc Frederick, Rajat Gupta, Eric Hazan, Tom Hellstern, Pablo Illanes, Uzayr Jeenah, Sean Kane, Mike Kerlin, Amit Khera, Gautam Kumra, Mayowa Kuyoro, Vivek Lath, Acha Leke, Philip Lindsay, Ryan Luby, Jukka Maksimainen, Daniel Mikkelsen, Jan Mischke, Tomas Nauclér, Jesse Noffsinger, Tracy Nowski, Asutosh Padhi, Vivek Pandit, Marco Piccitto, Andrew Pickersgill, Jose Maria Quiros, Sidhika Ramlakan, Werner Rehm, Jesse Salazar, Hamid Samandari, Sidney Scott, Shubham Singhal, Bram Smeets, Daniel Stephens, Karl Tojic, Phillia Wibowo, and Haimeng Zhang.

This report was edited and produced by MGI executive editor Lisa Renaud, together with senior data visualization editor Chuck Burke and editorial operations manager Vasudha Gupta. We also thank David Batcheck, Tim Beacom, Nienke Beuwer, Shannon Ensor, Ashley Grant, Cathy Gui, Stephen Landau, Janet Michaud, Charmaine Rice, Diane Rice, Rebeca Robboy, Dana Sand, Julie Schwade, Katie Shearer, Rainee Taylor, Jessica Wang, and Nathan Wilson for their support.

This research contributes to our mission to help business and policy leaders understand the forces transforming the global economy. As with all MGI research, it is independent and has not been commissioned or sponsored in any way by any business, government, or other institution. While we benefited greatly from the variety of perspectives we gathered, our views have been independently formed and articulated in this report. Any errors are our own.

McKinsey Global Institute
September 2023

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