



Asia Pacific's turning point

How climate action can
drive our economic future

August 2021



We have a narrow window of time. The choices made today will determine our future. We have the opportunity to create a new engine for sustainable economic prosperity while preventing the worst consequences of a warming world.

Deloitte Economics Institute

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Foreword

Our planet is our most precious asset and yet, without dramatic efforts to address climate change, the world as we know it is at risk.

We have a narrow window of time—the next 10 years—to take the decisions needed to alter the trajectory of climate change. For Asia Pacific, this is also a window of opportunity to lead the way and show how the narrative of climate action is not one of additional cost burden but one of extraordinary possibilities for economic growth and shared prosperity.

Since 1990, Asia Pacific has seen incredible economic growth that has lifted hundreds of millions of people out of poverty. But this growth has come at a high cost for the environment. Given this region's large share of the global population and emissions, and its vulnerability to the impact of climate change, it is clear the global fight against climate change will be won or lost in Asia Pacific.

This report is timely and critical because it challenges one of the main assumptions about acting on climate change—the cost burden. Our research reframes the debate and shows a direct connection between action on climate change and future economic prosperity.

We can avert the worst impacts of climate change by rapidly reducing emissions.

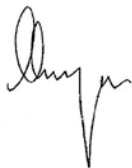
Taking the right actions now and over the next decade will enable the economies of the region to get much closer to net zero emissions and to keep global warming averages to around 1.5°C. This is a scenario that will minimize the impact of climate change for both Asia Pacific and rest of the world and will create a new economic engine for growth.

Climate change tends to be measured in superlatives, but ultimately it's about people. It's about our families and friends, the organizations we work for, the things we consume, and the way we live our daily lives. It is about all of us. To move forward, we must reimagine, reinvent, and redesign how our businesses and economies operate, and many aspects of our day-to-day lives.

The fight against climate change will be won or lost in Asia Pacific.

At Deloitte, we have set a target to reach net zero emissions by 2030. We are also empowering our professionals, connecting with our clients, and engaging our broader ecosystem to create solutions that facilitate the transformation to a low-emission economy in Asia Pacific and globally.

The choices made today and over the next decade are the choices that will determine our future. We are at a turning point and it is time for Asia Pacific to reshape the arc of economic history. But it can only happen if we do it together and we act now.



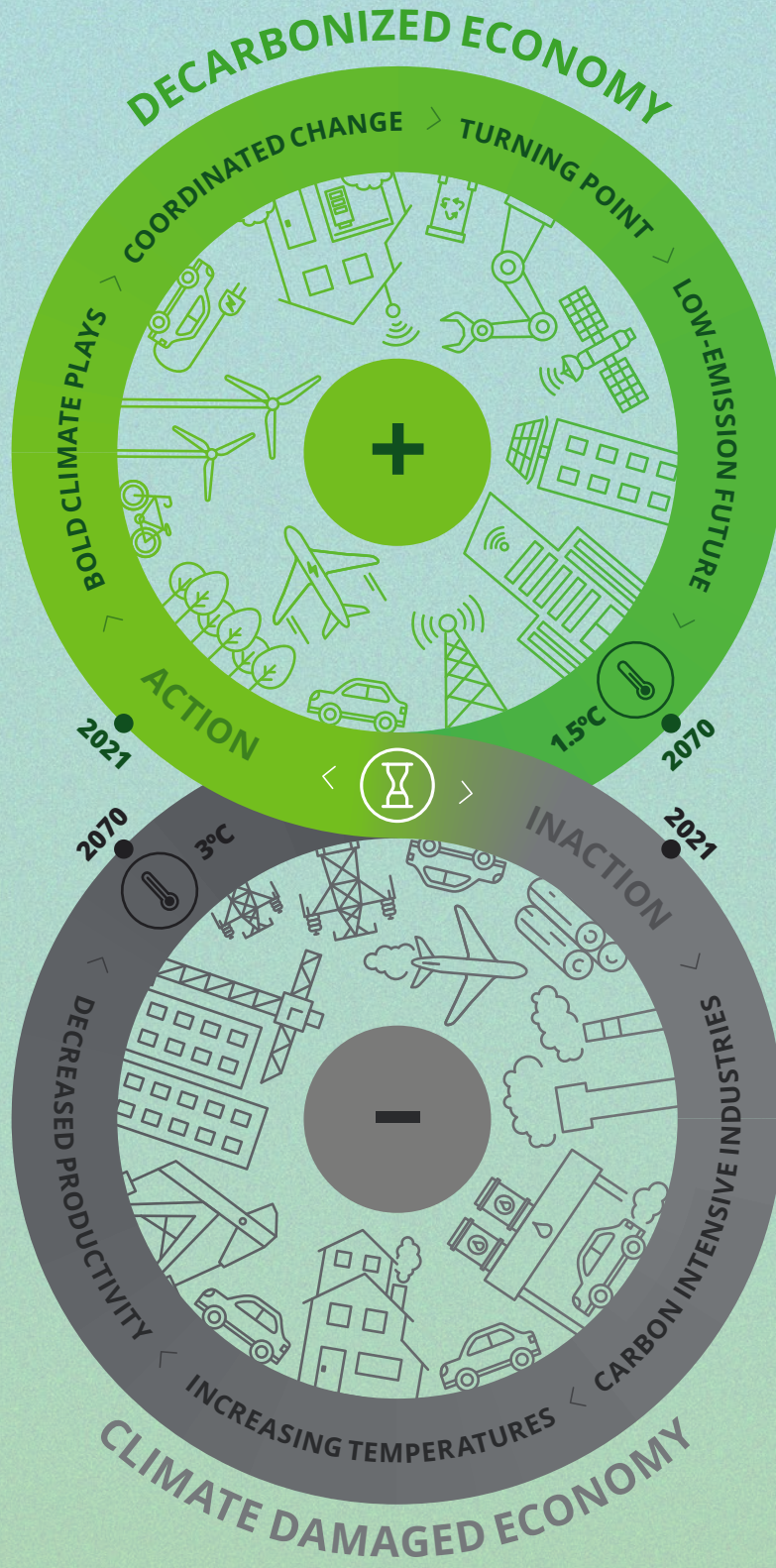
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Executive summary



Leading the world toward a low-emission future

Unchecked climate change will impose significant economic costs on economies in Asia Pacific. This new reality threatens the progress and prosperity our region has enjoyed in recent decades.

Doing nothing, or simply delaying action, now comes at a cost.

Our research shows that three-quarters of Asia Pacific's economic output and half of the region's labor force is exposed to significant disruption from climate change.

If global average warming exceeds 2°C in 2050, the region's gross domestic product (GDP) will be more than 5.5 percent—US\$3.4 trillion—lower than it otherwise would be. And it gets worse quickly. By 2070, the loss would rise to 12 percent of GDP (US\$16 trillion). Over the next 50 years to 2070, the net present value of losses over this period would amount to around US\$96 trillion.

But this is not a foregone conclusion.

Action on climate change, beginning now, could change our future by avoiding the worst impacts of climate change while also generating new economic growth for the region and the world.

The Asia Pacific region can be at the forefront of this new progress towards economic growth and prosperity.

To realize this future, we need to pivot from seeing efforts to limit global warming as optional costs, and instead view them as necessary and new areas of economic opportunity.

And the dividend of doing so is enormous. With strong climate action, a 12 percent loss in regional GDP in 2070 could be turned into a 7.5 percent gain, converting a US\$96 trillion net present value loss in GDP into an economic gain of US\$47 trillion.

This can only be realized with a change in economic mindset.

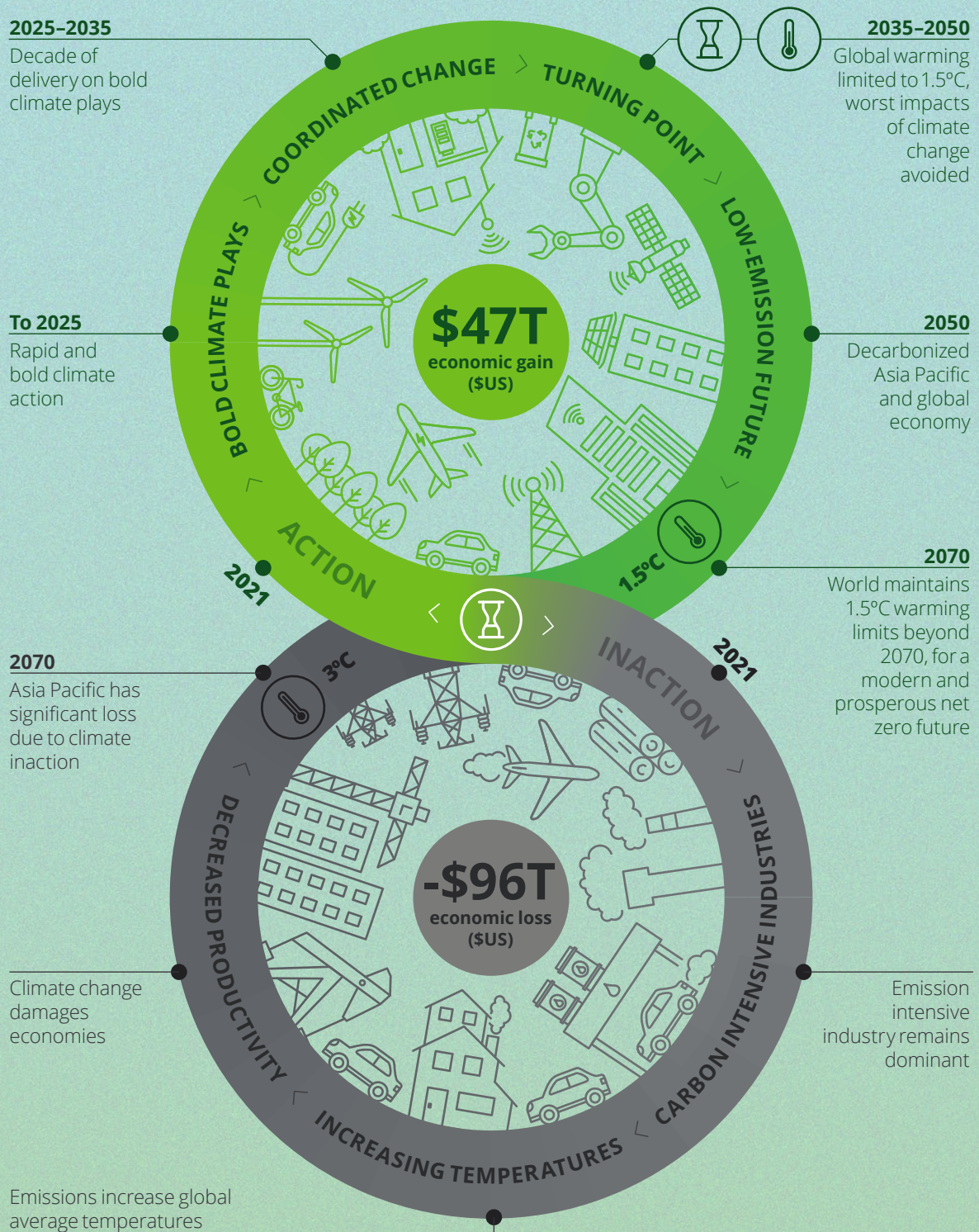
This report helps initiate this shift. It redefines the economic debate by quantifying the costs of inaction against the costs and benefits of achieving net zero emissions by 2050.

At the center of our research is Deloitte's uniquely calibrated Regional Computable General Equilibrium Climate Integrated Assessment Model, the D.CLIMATE model. This model integrates the economic impacts of physical climate change into a baseline economic trajectory to overcome the myopia of many current economic models. By factoring the costs of climate change into the baseline, our framework reveals the tremendous economic harms of inadequate action, and the significant opportunities in transforming the global economy.

Climate inaction would cost Asia Pacific's economies **\$96 trillion** by 2070.

Strong climate action could deliver **\$47 trillion** to Asia Pacific's economies by 2070.

Figure 1.1: Economic growth in Asia Pacific is the trend in a 1.5°C world



Source: Deloitte Economics Institute.

Note: Asia Pacific's stylized economic loss pathway reflects global average warming aligned with the RCP 6.0 baseline. The stylized economic growth pathway reflects limiting global average warming to no more than 1.5°C by 2050, in line with the current ambition of the Paris Agreement.

The cost of climate inaction

Dominant economic projections do not account for the consequences of climate change. They tend to assume that economies will grow according to a “business as usual” trend completely unaffected by the damages caused by climate change.

Against such a baseline, any action on climate change simply appears as a cost.

This is an unhelpful way of looking at the economics of climate change.

The reality is simple: if no further significant action is taken to mitigate climate change, the path for the economies of Asia Pacific and the world will be a baseline of lost economic potential as the negative impacts of climate change affect our economies.

Inaction on climate change negatively impacts economic growth, compared to a world without further climate change. This is the new baseline outlook provided in this report.

By 2070, Asia Pacific's economies stand to lose a total of US\$96 trillion in GDP (in present value terms) due to inaction on climate change.^a In such a future without action, Asia Pacific would lose 12 percent of GDP (US\$16 trillion) in 2070 alone. A loss of this scale is more than China's entire current economy.

Figure 1.2: Equivalent economic loss in Asia Pacific due to climate inaction



Source: Deloitte Economics Institute, World Bank national accounts data, and OECD National Accounts data file.

Note: Figures represent current World Bank GDP estimates.

a. Total net present value (NPV) of deviation loss to GDP in Asia Pacific over the period to 2070, at a 2 percent discount rate. Refer to the accompanying Technical Appendix for a discussion on the selection and application of the discount rate.

In this new baseline, the cost of inaction is built in. If global emissions continue to rise, global average warming of more than 3°C by the end of the century is highly likely. This is consistent with the Representative Concentration Pathway (RCP) 6.0 used by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report (AR5).

If Asia Pacific follows the RCP 6.0 trajectory, the region's economic growth will slow to 3 percent per year on average from 2050 to 2070—a percentage point lower than its average annual growth between 2000 and 2020.

That may not sound like much, but this lost percentage of growth would create the severe economic losses described above. It would also change the composition and quality of the region's growth. In this model, productivity declines, innovation and new investment slow, and standards of living and wellbeing slip significantly.

This is because productive capital and knowledge would be concentrated on repairing climate damage, instead of investing in new, value-adding innovations and infrastructure. The quality of life and wellbeing of people in our region would be diminished. As with the COVID-19 pandemic today, efforts would be focused on mitigation rather than achieving the economic progress that could otherwise occur.

Simply put, the hard-earned gains of growth and prosperity in Asia Pacific would be eroded.

Key terms

RCP 6.0

The Representative Concentration Pathway (RCP) 6.0 is one of the emissions scenarios used by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report (AR5). RCP 6.0 assumes a baseline scenario without significant additional efforts to constrain increases in global emissions. This makes it an appropriate baseline for estimating the potential effects of inaction.

1.5°C world

References to a 1.5°C world describe a situation in which nations successfully achieve rapid decarbonization, limiting global average warming to 1.5°C by the middle of the century and maintaining that pathway until the end of the century. Under this scenario, Asia Pacific would achieve near net zero emissions by 2050. This scenario has been dimensioned and modeled by Deloitte Economics Institute.

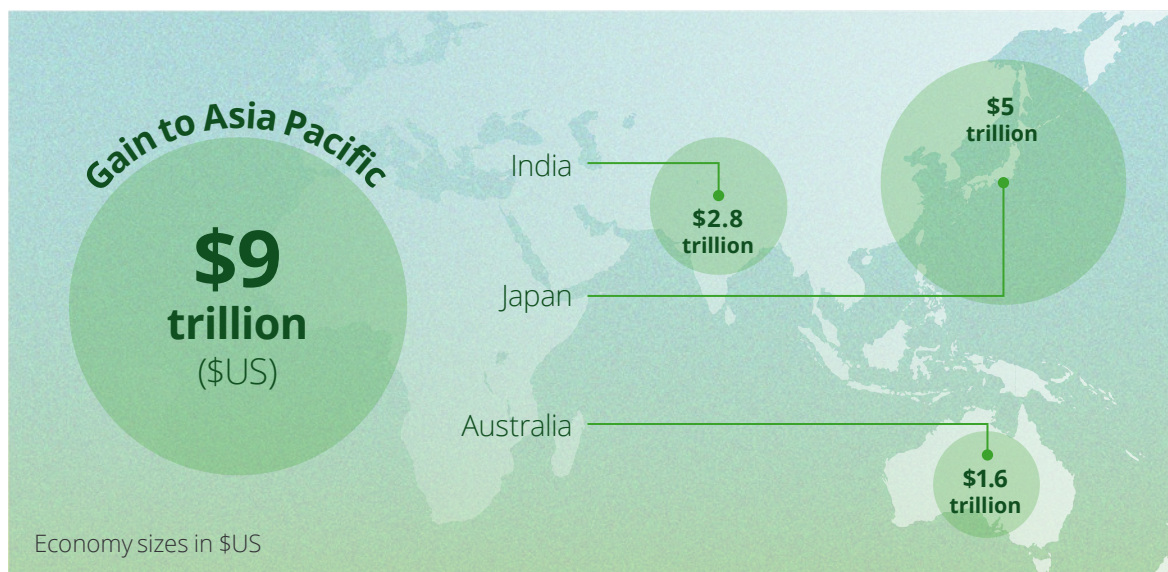
Decarbonization is a new economic engine

However, our modeling also shows that climate action would result in an average annual GDP gain of 2 percent, leading to regional GDP being 7.5 percent higher in 2070 than it would otherwise have been due to climate inaction (RCP 6.0 baseline).

This is an economic gain of US\$9 trillion in 2070, equivalent to adding the entire current economies of Japan, India, and Australia to the region in that year alone.^b

Asia Pacific's projected gains from decarbonization are equal to the entire current economies of Japan, India, and Australia.

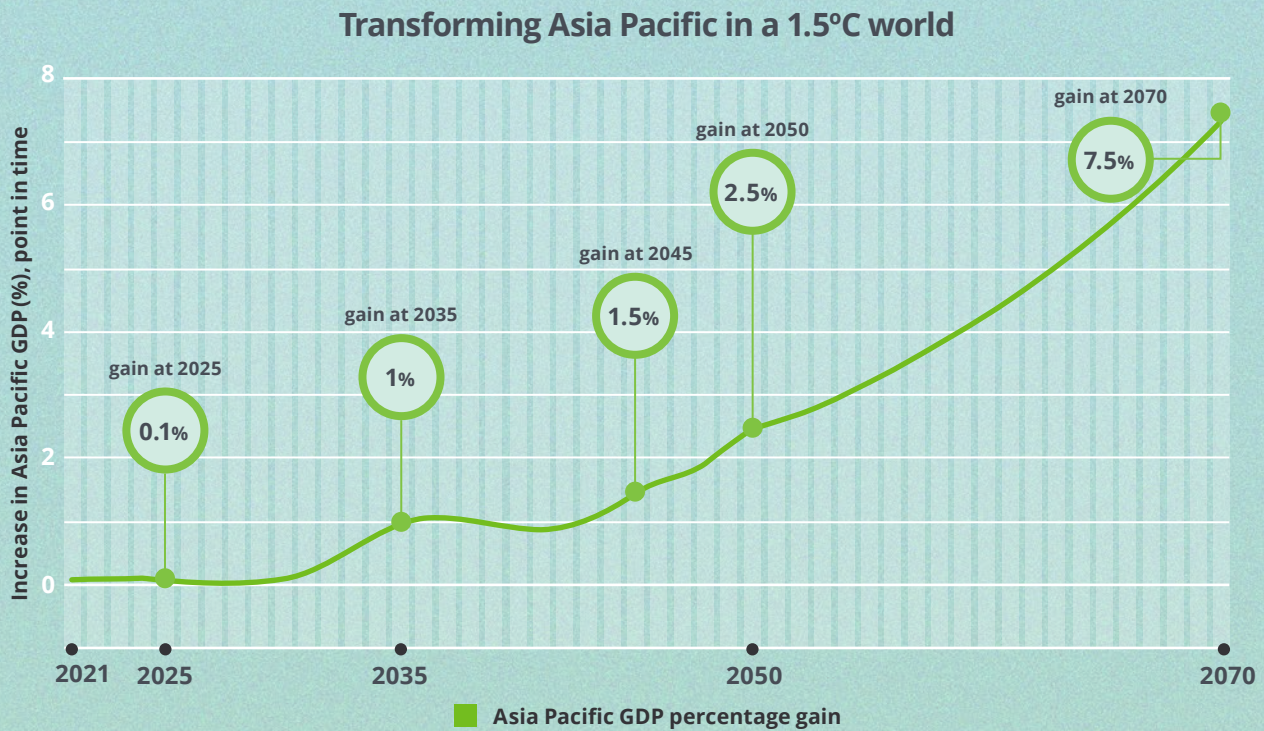
Figure 1.3: Potential economic gain for Asia Pacific due to decarbonization in a 1.5°C world



Source: Deloitte Economics Institute, World Bank national accounts data, and OECD National Accounts data file.
Note: Figures represent current World Bank GDP estimates.

b. World Bank. (2021). Selected data from World Bank national accounts data and OECD National Accounts data files 1960–2020.

Figure 1.4: Four phases of action to achieve a decarbonized Asia Pacific



Geography gains from decarbonization

Largest GDP gain, during phase period

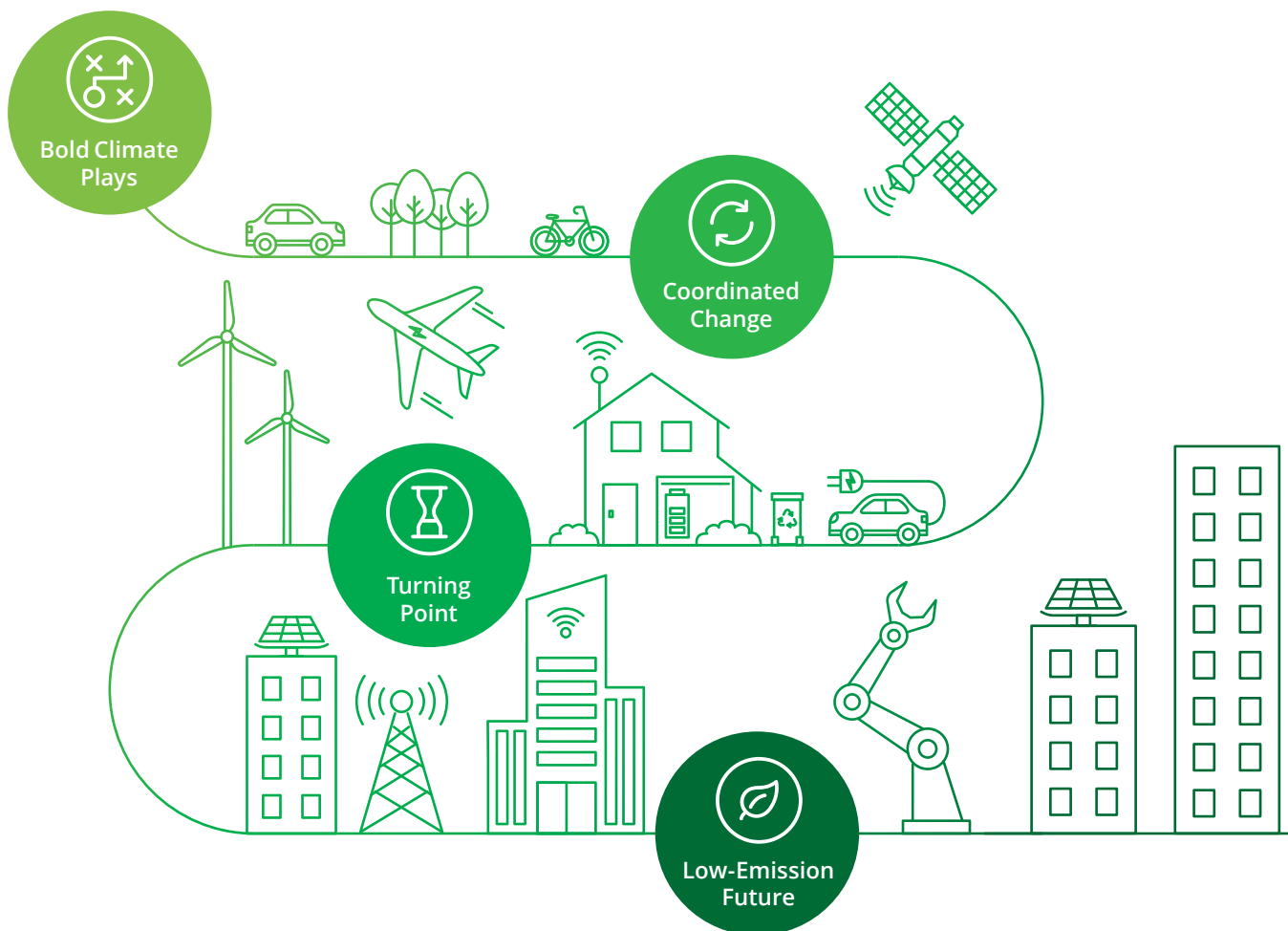
Phase	Description	Geography gains
2021-2025	Bold Climate Plays Some economies enjoy immediate GDP gains due to bold climate plays toward a 1.5°C world.	China Southeast Asia Taiwan Australia and New Zealand
2025-2035	Coordinated Change Some economies gain consistently in the key decade of change toward a 1.5°C world.	China Southeast Asia Japan Taiwan
2035-2050	Turning Point Significant regional decarbonization is achieved and rapidly gaining in a 1.5°C world.	China Southeast Asia Japan South Korea Taiwan Australia and New Zealand Pacific Nations
2050-2070	Low-Emission Future New economic structures and outputs remake Asia Pacific. All regions increase GDP in a decarbonized 1.5°C world.	India Southeast Asia China Japan South Korea Taiwan Australia and New Zealand Pacific Nations

Source: Deloitte Economics Institute D.CLIMATE model.

Note: Geography GDP gain is ordered by the largest gain in level terms (\$US) during the phase of decarbonization. For example, China has the largest GDP level gain in Bold Climate Plays.

Asia Pacific's turning point

In our modeling, the structural adjustment costs of rapid decarbonization would be almost immediately offset by positive returns in the capital and technology that shift economies onto a decarbonized pathway. Rapid decarbonization toward a 1.5°C world would likely occur through the following four economic phases.





Bold Climate Plays

from 2021 to 2025

The next few years set the stage for rapid decarbonization to limit global average warming to 1.5°C. This will require the transformation of supply chains, business operations, innovation, and price signals, to drive decarbonization.



Coordinated Change

from 2025 to 2035

The hardest shifts in industrial policy, energy systems, and consumer behavior would occur in this decade. Businesses and economies would begin to see the consequences of bold climate plays, with different industries and economies transforming at different paces.



Turning Point

from 2035 to 2050

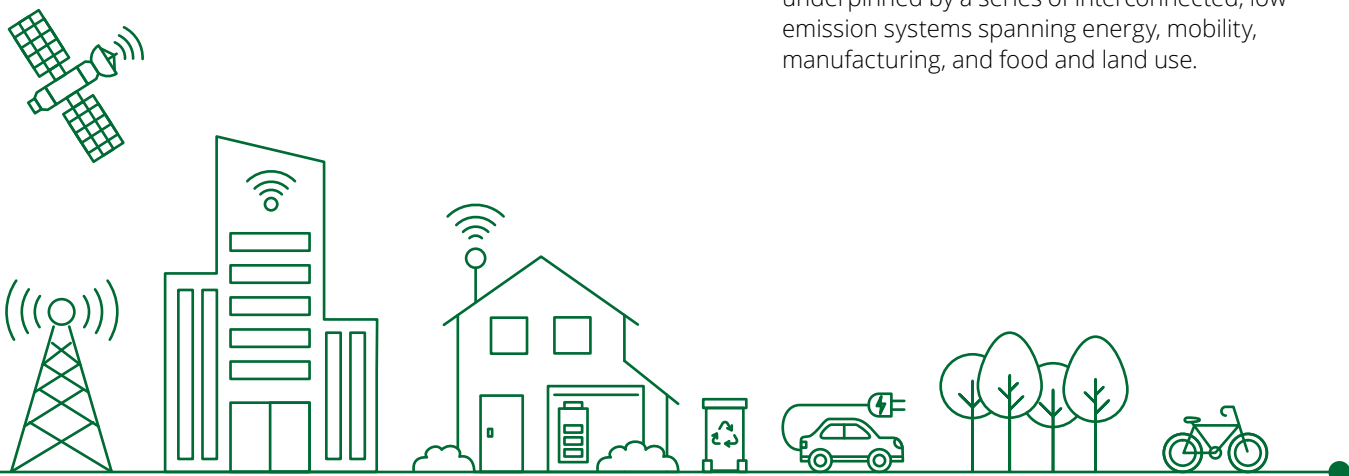
The decarbonization of high-emitting industries should be nearly complete by this period. The cost of new low-emission technologies would be decreasing and net economic gains would be shared more widely. This decade would be the climatic and economic turning point that avoids a “locked in” higher-emission pathway and realizes the economic dividends of technological progress.



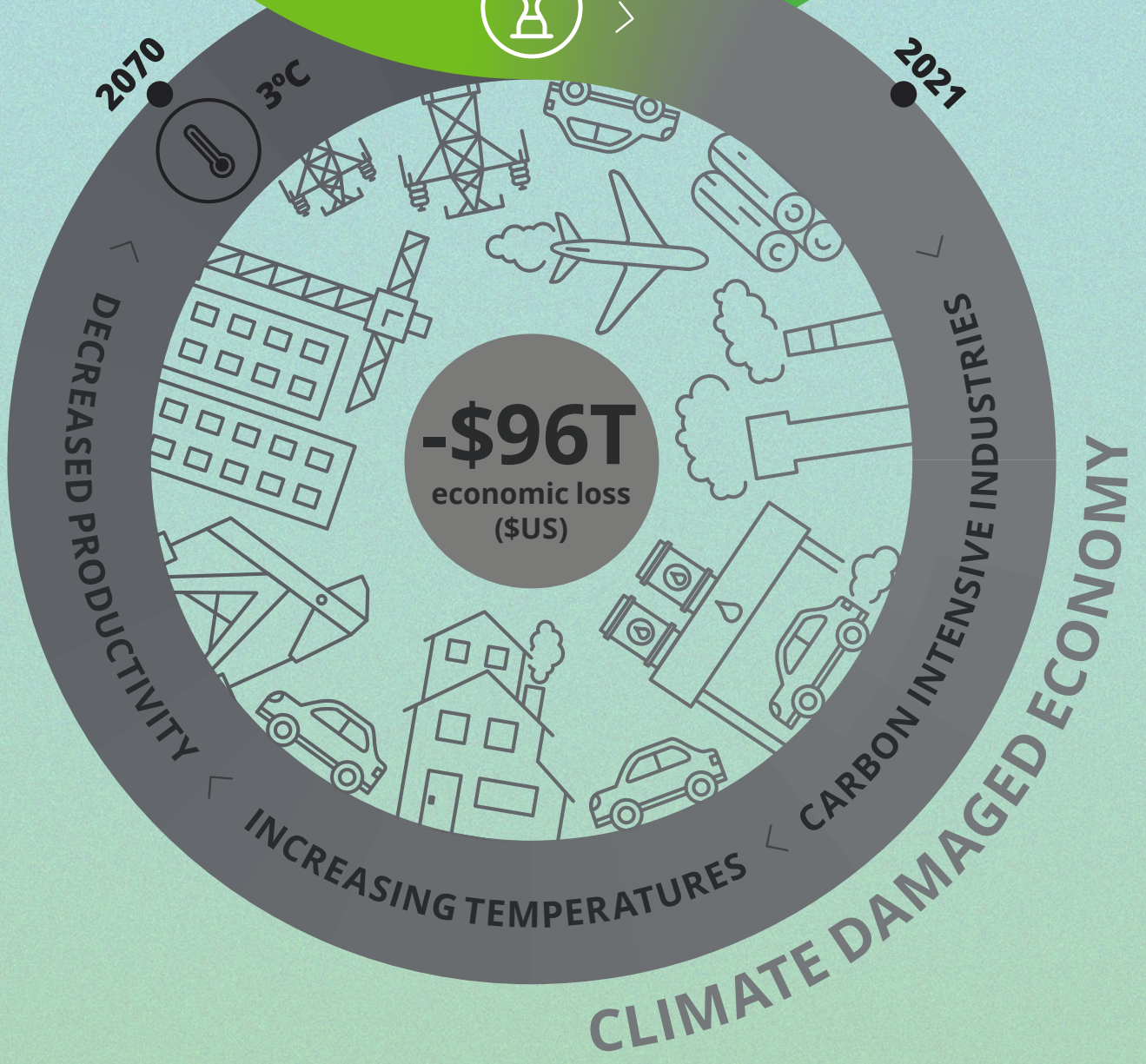
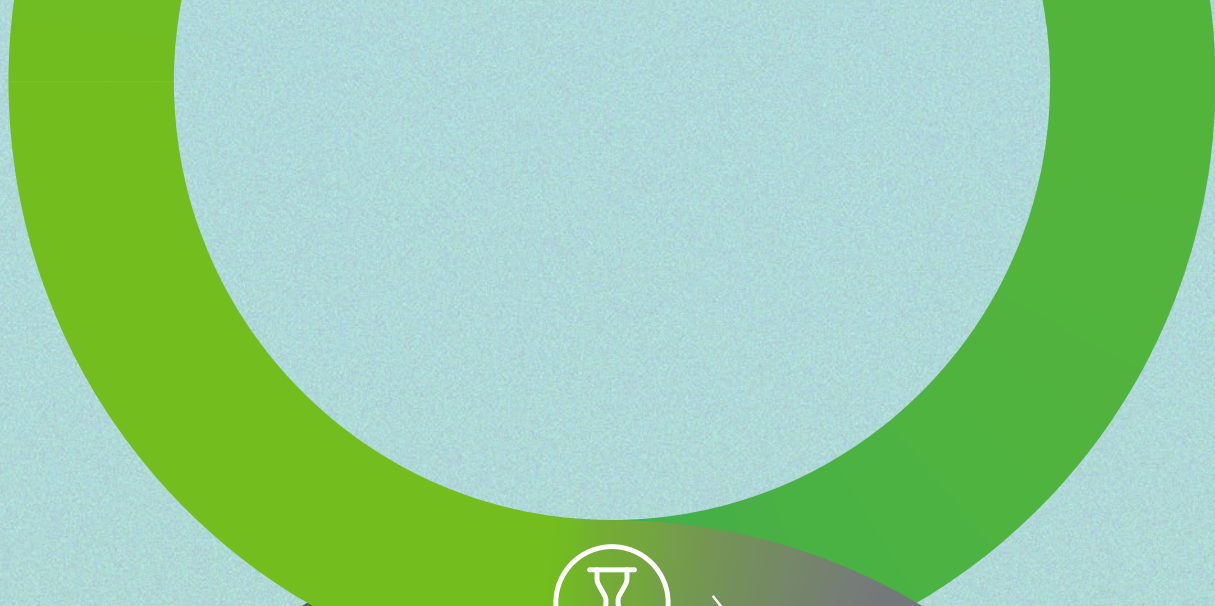
A Low-Emission Future

after 2050

By the end of the century, the economies of Asia Pacific would be near net zero emissions and the economic systems of production would be keeping global average warming to around 1.5°C. Economic structures would be radically transformed, underpinned by a series of interconnected, low-emission systems spanning energy, mobility, manufacturing, and food and land use.



The economic costs of climate inaction



The new normal: a climate-damaged economy

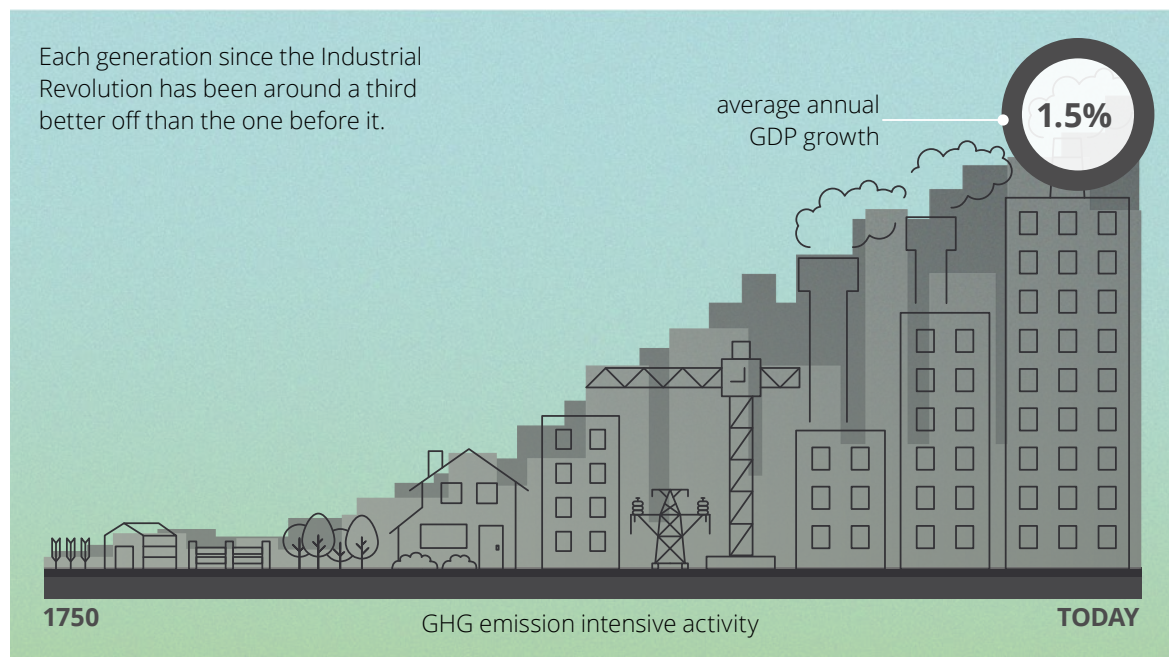
Most economic thinking has it wrong.

Dominant economic projections do not account for the consequences of climate change, or the world's efforts to adapt to or mitigate the impacts. When they do consider climate change damage and mitigation policy, it is often in scenario analyses that compare alternative future states to the same incorrect starting point—and against an erroneous “business as usual” trend that assumes unconstrained economic growth via emissions-intensive economic production. This is the economic baseline that informs how most decisions and investments are made, for governments and businesses alike.

And no wonder. Since the Industrial Revolution, economic growth has moved nearly in lockstep with rising greenhouse gas (GHG) emissions. As humanity burned fossil fuels, removed forests, and converted land to intensive agriculture, it enjoyed the “fruits” of those actions: economic growth, rising standards of living, and better quality of life.^c The world economy has expanded almost every year since 1750. While growth has not been constant or even—across countries or individuals—GDP growth has, on average since the Industrial Revolution, been around 1.5 percent per year.²

That emissions-intensive growth has been perhaps most evident in the Asia Pacific region, where the past several decades have seen dramatic economic expansion and hundreds of millions rising out of poverty—alongside rapidly increasing carbon dioxide (CO₂) emissions.³

Figure 2.1: Global economic growth is based on emissions-intensive production of goods and services



Source: Deloitte Economics Institute (2020), adapted from Bank of England (2019).

c. Economic growth as measured by GDP, and improved standards of living as measured by increasing GDP per person.

This view of the world has now come up against overwhelming scientific consensus—and increasingly our own lived experiences—which indicate that the current system of economic production is generating untenable changes in the climate.⁴ These changes put at risk economic growth and prosperity.⁵

Climate change is not a scenario; it is the baseline trajectory

If the economic impacts of a changing climate are left out of economic baselines, and therefore decision making, the result is likely to be poor forecasts, poor risk management, and dangerously inadequate efforts to address the climate crisis. A growing chorus of voices recognizes the challenge. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS), made up of 69 central banks, released guidance in 2020 on the need to solve this very issue.⁶ Understanding and accounting for the longer-term effects of climate change on productivity, output, and economic growth are critical to shifting the global economy toward a low-emission footing.

Addressing this shortcoming requires reorienting our thinking to consider economic systems and natural systems as inextricably linked. For the foreseeable future, the baseline trajectory for the global economy is profoundly influenced by rising average surface temperatures and the attendant disruptions to the environmental systems we all rely on. Likewise, the impact of economic activities on the climate will no longer be invisible. Deloitte has adopted a framework that integrates the economic impacts of physical climate change into a baseline economic trajectory, correcting the myopia of many economic models. By factoring in the true costs of climate change, this framework reveals the tremendous economic harms of inaction or inadequate action, and the significant opportunities that present themselves in remaking the global economy.

This is true everywhere, but Asia Pacific has more to lose from unchecked climate change than any other region. It is the second-largest region, and comprises lower-income countries that rely on natural capital for roughly half of their national wealth on average.^{7,8} It is also heavily reliant on the highest emitting and most risk-exposed sectors. Today, the five largest contributors to Asia Pacific's economic growth—which account for about 75 percent of its GDP—are emissions-intensive.^{4,9} They also have the highest risk exposure to physical damage caused by climate change, due to the composition of their labor force and capital-intensive industry structures.



But the region also has much to gain in the rapid shift to a decarbonized economic structure. The region is already a pioneer in many of the key technologies needed to decarbonize the economy, from wind and solar generation to batteries and electric vehicles. It also has the experience and know-how to rapidly deploy and scale new solutions to cut emissions. By moving quickly now, Asia Pacific has a unique opportunity to export decarbonization to the world, creating a new engine for sustainable economic prosperity.

d. Modeling from Deloitte Economics Institute based on 2020 industry shares of economic output for heavy manufacturing, construction, retail trade, government, and other services.

The high costs of inaction

Unmitigated climate change threatens to wipe out decades of hard-won economic growth in Asia Pacific.

The foundations of the region's prosperity—its natural and human capital—are at risk, and along with them its standard of living, its prospects for future growth, its place on the global stage, and the wellbeing of its people.¹⁰

If the region's recent economic story is one of growth, unchecked climate change would turn it into one of decline.

Climate change will reverse Asia Pacific's hard-won economic gains.

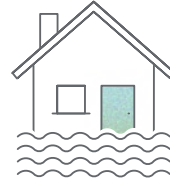


Figure 2.2: How climate change impacts the economy



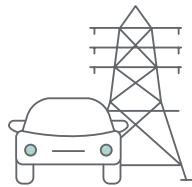
Impacted workers

Heat stress, the “slowing down” of workers, and their reduced ability to perform results in lower labor productivity.



Lost productive land

A loss of productive land through rising sea levels and a reduced level of productive activity on the land impacts low-lying and coastal areas.



Stalling productivity and investment

Economies suffer as investment repairs existing assets instead of contributing to new, more productive capital. Climate change stalls economic progress.



Diminished health and wellbeing

Increased incidence of mortality and morbidity disrupts living standards and the lives of the working population.



Disrupted flow of global currency

The scale of loss of tourism and international money circulating in economies impacts business, jobs, and livelihoods.



Agricultural losses

Despite adaptation, climate change inaction limits what farmers can do. Significant variations in crop yields damage the agricultural sector’s output.

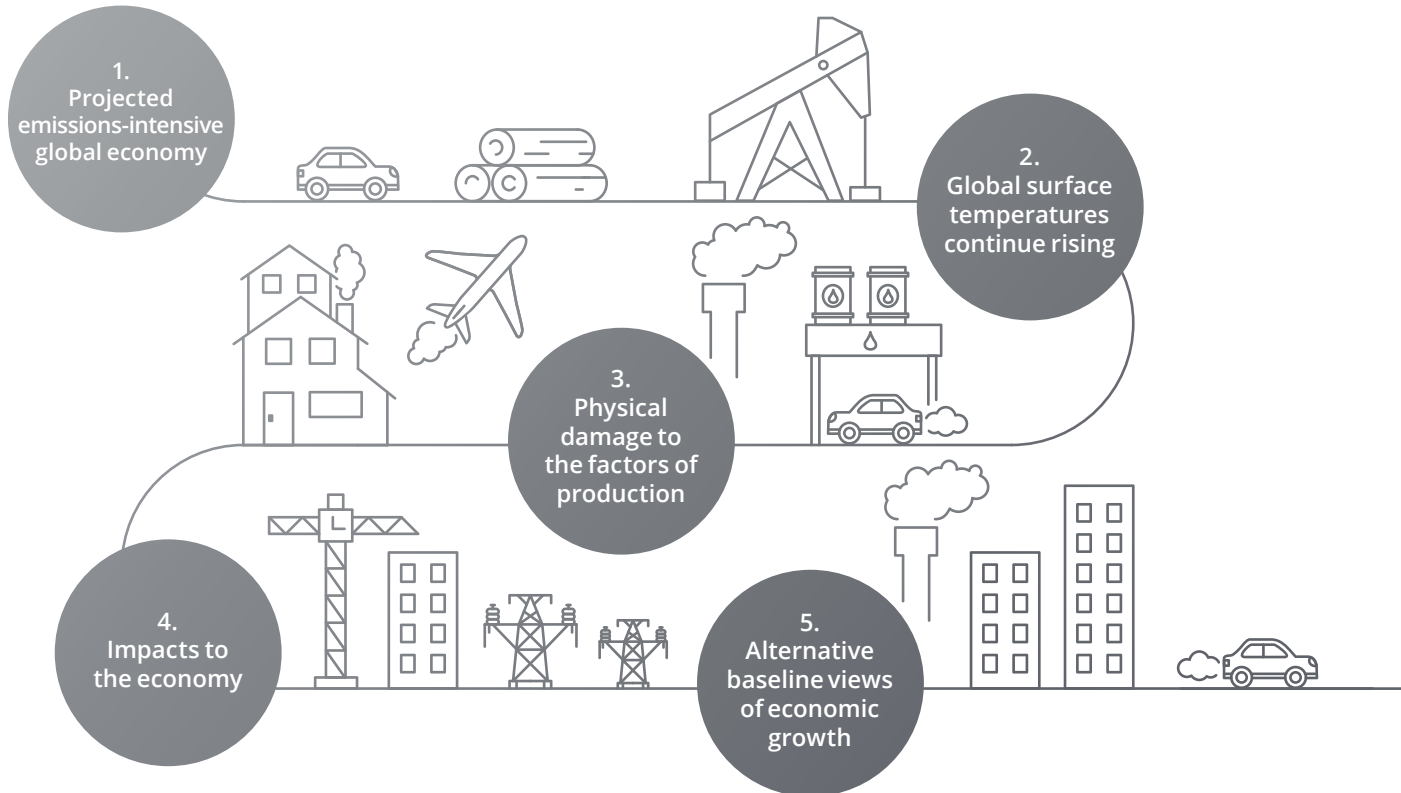
Source: Deloitte Economics Institute.

Modeling climate inaction in Asia Pacific

Global emissions will continue to rise if no further significant action is taken to mitigate climate change. The outcome would be increasing global average warming toward the end of the century. In this world, inaction on climate change would be the baseline path for the economies of Asia Pacific and the world. This baseline scenario would negatively impact economic growth when compared to a world without climate change (refer to the accompanying Technical Appendix for more detail).

This modeling framework involves significant research on region-specific climate and economic impacts across Asia Pacific, which are used as inputs for Deloitte's D.CLIMATE model (refer to the accompanying Technical Appendix for more detail).

To quantify this conclusion, Deloitte modeled the economic impacts of a changing climate on long-term economic growth in Asia Pacific, using the following stepped process.



1

The model projects economic output (as measured by GDP) with emissions reflecting RCP 6.0 to the year 2100.^e RCP 6.0 represents a single scenario without significant additional efforts to constrain emissions (the baseline scenario).¹¹ This results in a projected emissions-intensive global economy.

2

Increased atmospheric GHGs cause average global surface temperatures to continue rising above pre-industrial levels.^f In the RCP 6.0 baseline scenario, global average temperatures increase more than 3°C above pre-industrial levels by the end of the century.^{g,12} (Note that present-day temperatures have already risen more than 1.0°C above pre-industrial levels.)

3

Warming causes the climate to change and results in physical damage to the factors of production. The Deloitte model includes six types of economic damage, regionalized to the climate, industry, and workforce structure of each defined geography in Asia Pacific.

4

This damage to the factors of production is distributed across the economy, impacting GDP. Any change in emissions (and, correspondingly, temperature) over time results in changes to these impacts and their interactions. The economy impacts the climate, and the climate impacts the economy.

5

The key variables of time, global average temperature, and the nature of economic output across industry structures combine to offer alternative baseline views of economic growth. Specific scenario analysis is then conducted, referencing a baseline that includes climate change damage. Scenarios can also include policy actions that either reduce or increase emissions and global average temperatures relative to the RCP 6.0 baseline view.



e. IPCC-adopted emission scenarios vary widely, depending on socioeconomic development and climate mitigation policy settings. RCP 6.0 is chosen as an intermediate baseline scenario as it includes no specific or significant climate mitigation policy effort, making it an appropriate baseline for reference.

f. Pre-industrial is defined in IPCC assessments as the multi-century period before the onset of large-scale industrial activity around 1750.

g. The associated climate data (like annual temperature increases and atmospheric concentrations) are sourced from a synthesis of the models available through the Coupled Model Intercomparison Project (CMIP6). See the Technical Appendix for more detail.

Figure 2.3: Industry loss at 2070, in a climate damaged Asia Pacific in a 3°C+ world



Source: Deloitte Economics Institute D.CLIMATE model.

Figure 2.4: Loss to the economy over 50 years

Japan

-\$0.9 trillion

South Korea

-\$0.8 trillion

China

-\$27 trillion

India

-\$35 trillion

Taiwan

-\$1.4 trillion

Southeast Asia

-\$28 trillion

Pacific Nations

-\$0.1 trillion

Australia & New Zealand

-\$2 trillion



Note: Figures represent total NPV of deviation loss to GDP in Asia Pacific over the period to 2070, at a 2 percent discount rate. Refer to the accompanying Technical Appendix for a discussion on the selection and application of the discount rate.

Economic costs of climate change

In the economic future modeled, global emissions would continue to rise with global economic growth, as no further significant action is taken to mitigate climate change (the RCP 6.0 baseline). The outcome would be global average warming of more than 3°C by the end of the century.

Asia Pacific's economic growth trajectory would slow to 3 percent per year on average from 2050 to 2070, a percentage point lower than its average annual growth between 2000 and 2020.¹³

Asia Pacific's economic growth trajectory would slow to 3 percent per year on average from 2050 to 2070, around a percentage point lower than its average annual growth between 2000 and 2020.

This lost percentage of growth would not only create the severe economic losses in potential growth described above, it would also change the composition and quality of the region's growth. In this economic future, productivity would decline, innovation and new investment would slow, and standards of living and wellbeing would slip significantly. This is because productive capital and knowledge would be concentrated on repairing climate damage, instead of investing in new, value-adding innovations and infrastructure.

Cities and communities would be managing health and wellbeing impacts to their people, instead of meaningfully participating in the workforce and living more conventional lives.

In such a future of inaction on climate change, by 2070 economic losses in Asia Pacific would total approximately US\$96 trillion (in present value terms).^h Over the five decades to 2070, this would amount to an annual average loss of 5 percent to GDP per year for the region's economies, relative to trajectories that do not account for climate impacts.ⁱ

Losses in the economies of Asia Pacific would increase rapidly as temperatures rose. By 2050, with global average warming exceeding 2°C, Asia Pacific's GDP would decline more than 5.5 percent, or US\$3.4 trillion. As global average warming continued to increase, losses would mount to 8 percent of GDP by 2060 (US\$7.5 trillion) and around 12 percent of GDP (US\$16 trillion) in 2070 alone—more than China's entire current economy. The economic activity that remained would result in significantly diminished wellbeing.

By 2070 economic losses in Asia Pacific would total approximately US\$96 trillion (in present value terms).

- h. Total NPV of deviation loss to GDP in Asia Pacific over the period to 2070, at a 2 percent discount rate. Refer to the accompanying Technical Appendix for a discussion on the selection and application of the discount rate.
- i. A percentage point deviation, or loss, to the level of growth in the economy as measured by GDP. This deviation is in comparison to the region's economic potential if there was no climate change due to increased emissions and global average warming.

Figure 2.5: Equivalent economic loss in Asia Pacific due to climate inaction



Source: Deloitte Economics Institute, World Bank national accounts data, and OECD National Accounts data file.
 Note: Figures represent current World Bank GDP estimates.

Significant but uneven losses across industries, firms, and workers

The pace, scale, and degree of economic impacts would vary widely by location, but no industry, workforce, or geography would avoid losses entirely. People in their 20s, 30s, and 40s today could expect to feel those losses in their lifetimes. Their economic futures—and those of their families and friends—would be deeply disrupted by climate change.

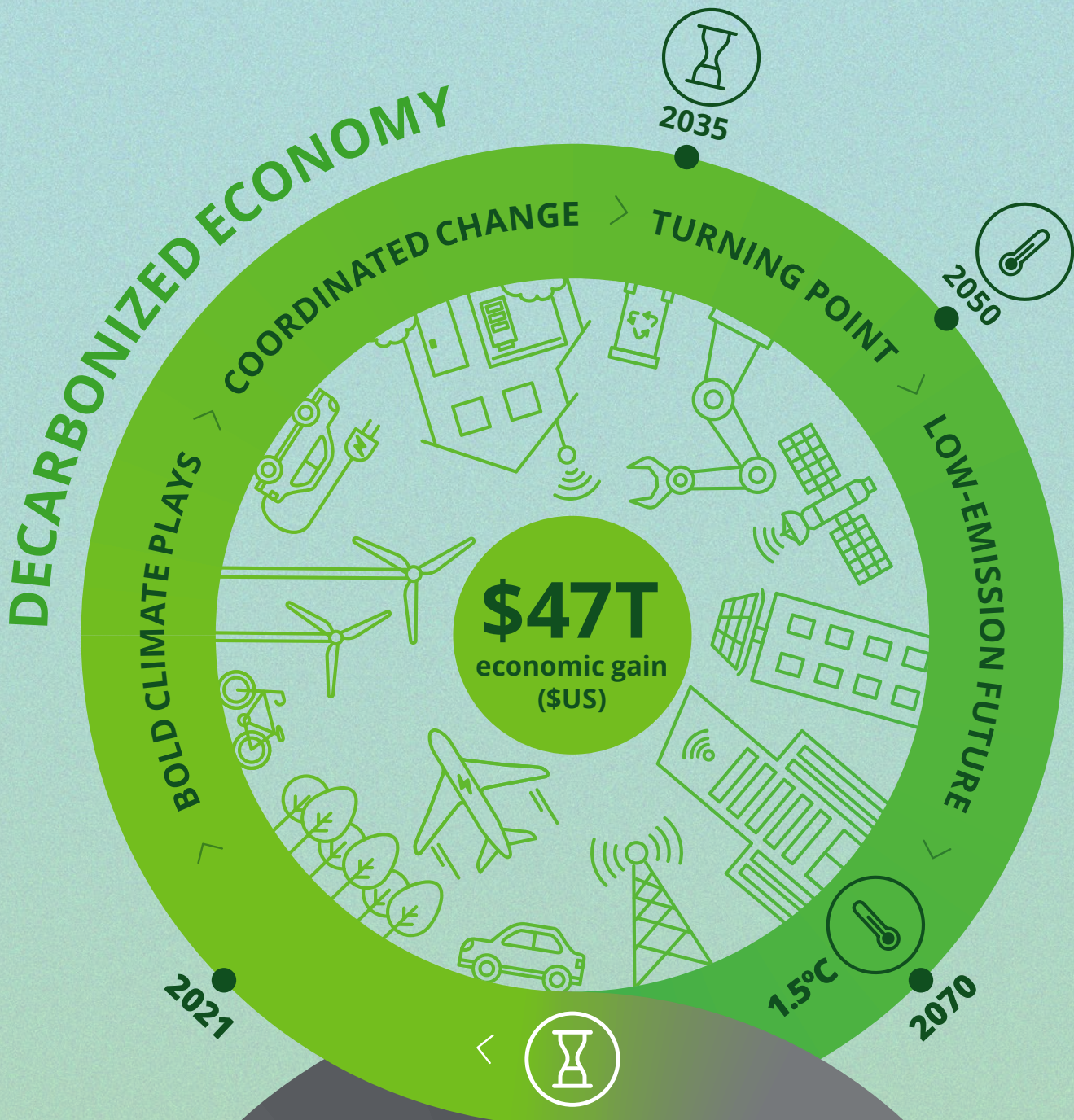
Extreme heat would impact productivity in industries that rely on people power, such as the construction and service sectors. Decreased comfort, reduced hours in which work can be done, and physical limits to undertaking even normal tasks would all undermine labor productivity.

Doing nothing is costly to Asia Pacific's economies.

Industries that rely on continued investment and assets would also be hit hard. As storms, flooding, fires, and other natural disasters increased in frequency and intensity, businesses and governments would be forced to invest in repairing damage and adapting infrastructure—siphoning capital away from new technologies, knowledge, and resources. The losses in long-term productivity growth would be significant globally, but especially concentrated in the economies of the Asia Pacific region. The public and private service sectors, for example, are particularly exposed to heat stress and human health impacts from climate. Productivity losses from these impacts create large regional economic losses due to the scale of employment in these sectors.

Doing nothing would be costly to Asia Pacific's economies. Inaction or insufficient action on climate change is likely to cost Asia Pacific its hard-earned prosperity and economic development. The losses to industry, business, workers, and communities would disrupt the livelihoods and wellbeing of multiple generations.

The economic gains of rapid decarbonization



A new economic climate

The economic costs of climate change are not fixed. Although some degree of global temperature rise and associated climate impacts are already “locked in” due to historical emissions, there is an opportunity to take bold action to decouple economic prosperity from emissions and avert the worst impacts of an altered climate. With the right economic framework in place, there is a clear path to strong, equitable, and shared growth across Asia Pacific.

The economies of Asia Pacific are at the frontier of a new economic era and the development of a new system of production. By making the right choices now, they can chart a more prosperous path toward a low-emission future while accelerating progress in the rest of the world by exporting key technologies, processes, and know-how.

But time is of the essence. Policy and investment decisions made in the next several years will largely shape the economic and climatic future the region and the world will inherit. That narrow window makes it even more important to understand the economics of a warming world and incorporate them into decision making that addresses the multiple market failures of climate change.

Promisingly, there is growing regional agreement on the need to address climate change through domestic decarbonization. China announcing its objective of carbon neutrality by 2060—along with commitments from countries such as New Zealand, Japan, and South Korea to achieve net zero emissions by 2050^j—suggest that Asia Pacific is getting serious about the economic opportunity in climate-led transformation.

Asia Pacific accounts for around 50 percent of global emissions today, with 40 percent of all emissions coming from energy and 70 percent of those energy emissions coming from coal—which has proven and economical substitutes.¹⁴ If Asia Pacific decarbonizes its coal-based energy sector, this alone would lead to an immediate reduction in global emissions of around 14 percent.

Table 1: Commitments to reduce emissions among Asia Pacific's largest emitters

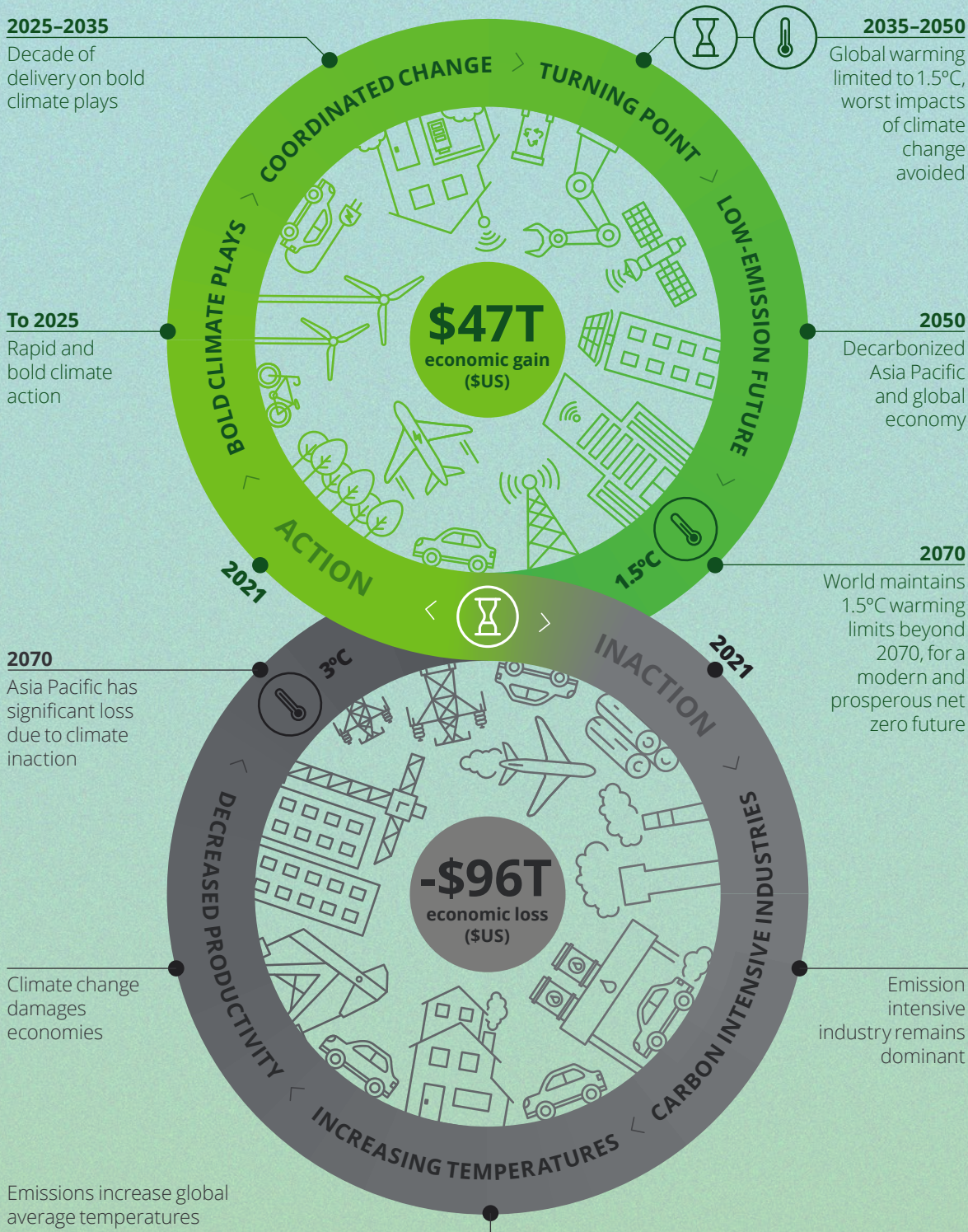
	Share of global carbon emissions	Target
China	27%	Reach peak carbon emissions by 2030, becoming carbon-neutral by 2060
India	7.5%	Reduce emissions to 33–35% below 2005 levels of emissions intensity of GDP by 2030
Indonesia	2%	Reduce emissions to 29% below business as usual by 2030
Japan	3%	Reduce emissions to 46% below 2013 levels by 2030, and become carbon-neutral by 2050
South Korea	2%	Reduce emissions to 24.4% below 2017 levels by 2030

Source: Friedlingstein et al. (2020); Climate Action Tracker; AP News.

Note: Emissions shares reflect CO₂ emissions only, attributed to the country in which they physically occur.

j. Net zero emissions refers to the total annual addition of GHGs to the atmosphere being zero by a given period. In a net-zero-emissions scenario, all emitting activities have ceased, all emitting technologies have been replaced with zero-emissions technology, and/or remaining emissions are balanced by an equal quantity of negative emissions.

Figure 3.1 Economic growth in Asia Pacific is the trend in a 1.5°C world



Source: Deloitte Economics Institute.

Note: Asia Pacific's stylized economic loss pathway reflects global average warming aligned with the RCP 6.0 baseline. The stylized economic growth pathway reflects limiting global average warming to no more than 1.5°C by 2050, in line with the current ambition of the Paris Agreement.

The transformation to a low-emission economy is already underway, even if the challenges are formidable. Prior to the onset of the COVID-19 pandemic, growth in emissions had slowed as primary energy consumption decelerated, and renewables and natural gas had displaced coal in the global energy mix.¹⁶ This shift saw renewable energy consumption reach its greatest increase in energy terms on record.^{k,17} The increase accounted for over 40 percent of the global growth in primary energy in 2019, larger than any other fuel type and growing the overall renewables share in the global energy mix.¹⁸ China led this growth; its use of renewables rose by more than any other country's in 2019.

Asia Pacific, particularly China and India, have helped drive this transition. Rapid and large-scale deployment of wind and solar generation have helped drive down the cost of renewables globally, making them among the cheapest sources of electricity in history.¹⁹

In 2020, China opened the second largest solar farm in the world with a capacity of 2.2 gigawatts.²⁰ India is home to the world's largest solar park, and the biggest floating solar power plant—with a capacity of 100 megawatts—is expected to become operational in Telangana in 2021.²¹ The Solar Energy Corporation of India recently undertook large-scale central auctions for solar parks, awarding contracts for 47 installations with over 25 gigawatts of combined capacity.²²

Others in the region are also playing a significant role. The South Korean Government has unveiled plans to construct the world's largest offshore wind farm, with a maximum capacity of 8.2 gigawatts by 2030; South Korea is also aiming to become the world's largest producer of hydrogen-powered vehicles and fuel cells by 2030.²³ The number of Japanese cities and local governments committed to reaching net zero emissions by 2050 has risen to over 200, representing a population over 90 million.²⁴

k. Including biofuels and all traded renewable electricity, excluding hydro.



Asia Pacific can export decarbonization to the world

As the economies of Asia Pacific decarbonize, they have an opportunity to share the key technologies, approaches, and expertise more broadly, accelerating the global shift to a low-carbon future and opening up new economic opportunities for businesses in the region.

Many of the key low-emission solutions are complex to produce, requiring not only the underlying technology but also the requisite skills, knowledge, research and development ecosystem, economies of scale, and capital.²⁵ In certain future outlooks, over US\$15 trillion will be invested globally in new power capacity by 2050,¹ and Asia Pacific will represent 45 percent of the total (with China and India combined accounting for almost a third).²⁶

Asia Pacific's economies are well suited to the challenge and are already leaders in many key technologies. China is the largest global exporter of renewable energy products.²⁷ There are an estimated 2 million solar manufacturing jobs worldwide, and the largest concentration of workers is in China, which has around 70 percent of global solar photovoltaic component manufacturing capacity, while Southeast Asia has around 10 percent.²⁸

In the past decade, South Korea has seen rapid growth in exports of lower-emission or “green” products, and Japan currently has strong green production capability.²⁹ Beyond energy, China is also the world's leader in the production and sale of electric vehicles.³⁰

This early lead means it is easier for economies in the region to diversify and scale up into new green and low-emission products and services.³¹ The region's high degree of “green economic complexity”—the knowledge, skills, financing, and supply chain connections needed to create low-emission goods and the services that go with them³²—extends these strengths.

Asia Pacific has the economic fundamentals to increase its green export trade ratio—and the types and volume of low-emission products it can competitively export. The region's two largest economies, China and India, are both particularly well placed to quickly develop future green and low-emission capabilities.

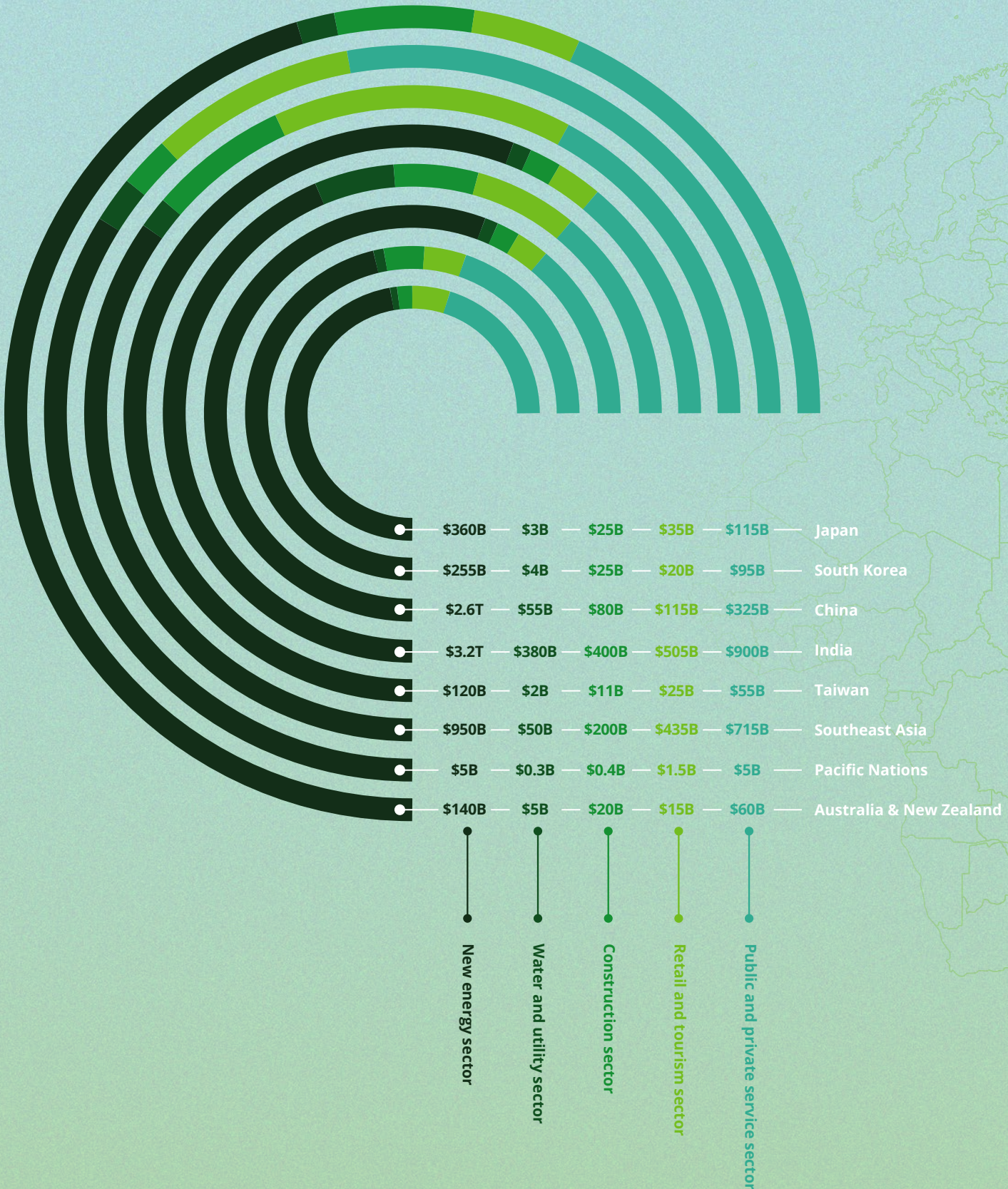
Figure 3.2: Asia Pacific can export what the world needs to decarbonize



Source: Deloitte Economics Institute D.CLIMATE model.

1. BloombergNEF's New Energy Outlook Economic Transition Scenario to 2050 sees a world where energy demand and emissions increase to put the world on track for 3.3°C of global average warming in 2100. This is not a net-zero-emissions scenario.

Figure 3.3: Sector benefits of decarbonization across the Asia Pacific region (\$US, sector gain to GDP) by 2070



Source: Deloitte Economics Institute, D.CLIMATE model.

US\$47 trillion
added to Asia Pacific's economy by 2070

Japan
\$3.5 trillion

South Korea
\$2 trillion

China
\$18 trillion

India
\$11 trillion

Taiwan
\$1.3 trillion

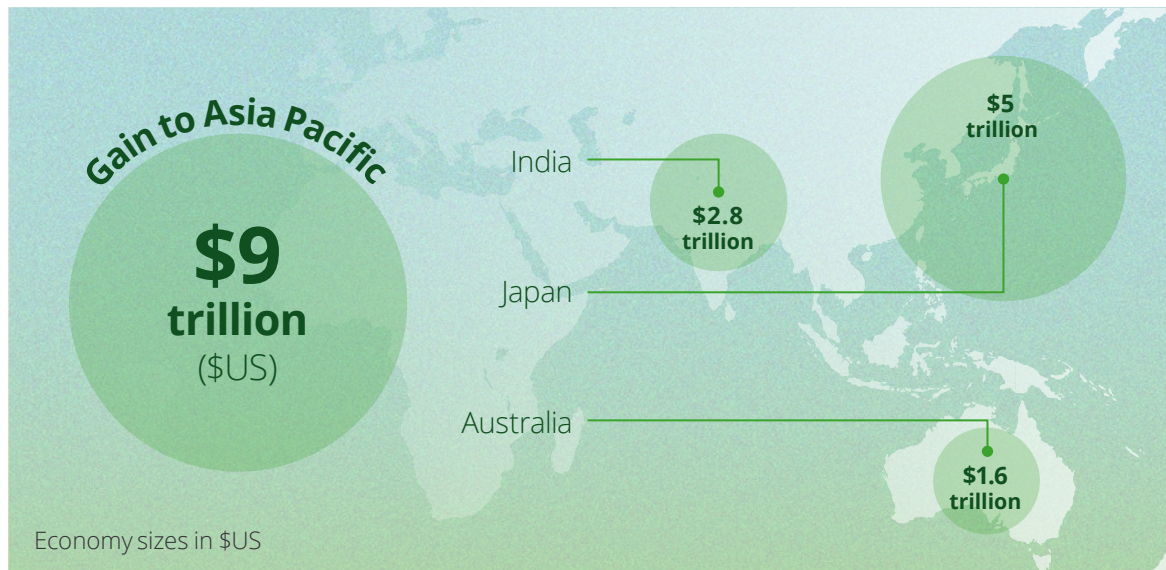
Southeast Asia
\$12.5 trillion

Pacific Nations
\$71 billion

Australia & New Zealand
\$860 billion

Note: Figures represent total NPV of deviation gain to GDP in Asia Pacific over the period to 2070, at a 2 percent discount rate. Refer to the accompanying Technical Appendix for a discussion on the selection and application of the discount.

Figure 3.4: Potential economic gain for Asia Pacific due to decarbonization in a 1.5°C world



Note: Figures represent 2019 World Bank GDP estimates.

Source: Deloitte Economics Institute, World Bank national accounts data, and OECD National Accounts data file.

Decarbonization is a new economic engine

Based on our modeling, rapid decarbonization will result in economic gains of approximately US\$47 trillion (in present value terms) for the Asia Pacific economy by 2070. Compared to a world of climate inaction (following the RCP 6.0 baseline), a decarbonized region in a 1.5°C world would experience an average annual GDP gain of 2 percent over the modeled decades to 2070.

By 2070, that would equate to GDP growth of 7.5 percent and a gain in economic output of US\$9 trillion—equivalent to the entire current economies of Japan, India and Australia being added to the region in 2070 alone.³³

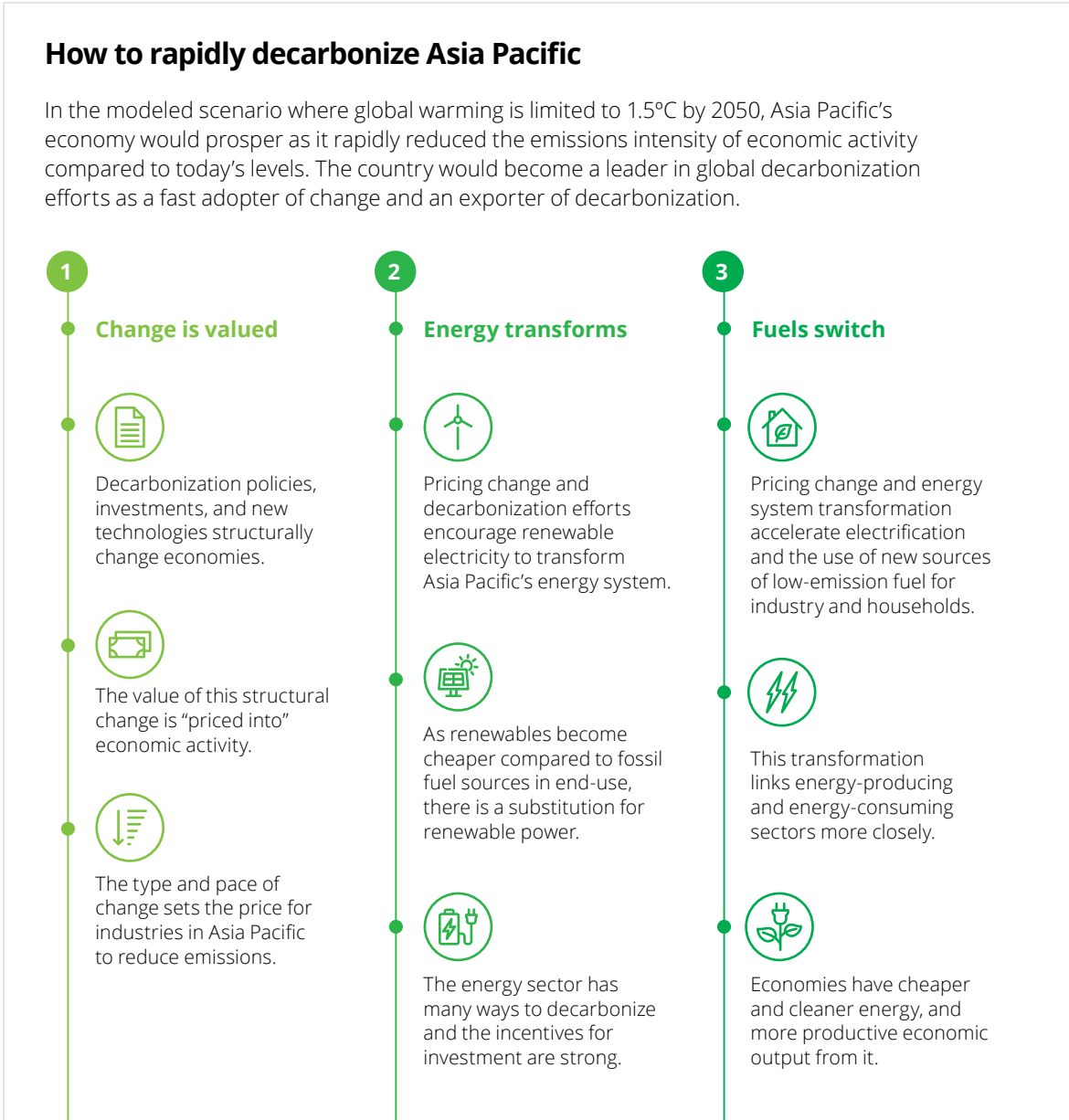
The economic benefits to be gained by taking action would be immediate. Rapid decarbonization involves structural adjustment costs, but they would be offset almost immediately by positive returns in capital and technology that shift the region's economies onto a decarbonized pathway.

In the Deloitte-modeled scenario, renewable energy—primarily wind and solar, but also including the significant expansion of green hydrogen using electrolysis—would underpin the transformation. By 2050, hydrogen would be a globally traded commodity, forming new economic and energy connections as economies in Asia Pacific exported it around the world.

In this scenario, green hydrogen would fulfil around 22 percent of total final energy demand in Asia Pacific by 2050 (refer to the accompanying Technical Appendix for more detail). The transformation in Asia Pacific's new energy sector over the period to 2050 would require an estimated US\$46 trillion investment—more than half of the global capital dedicated to energy systems transformation.^m

m. Figure represents the capital cost required to expand the generation capacity of renewable energy sources (including hydrogen, biofuels, solar, wind, nuclear, and hydro) over the period to 2050. It specifically excludes costs associated with transport and/or storage.

Figure 3.5: The process of economic adjustment to decarbonization in a 1.5°C world scenario

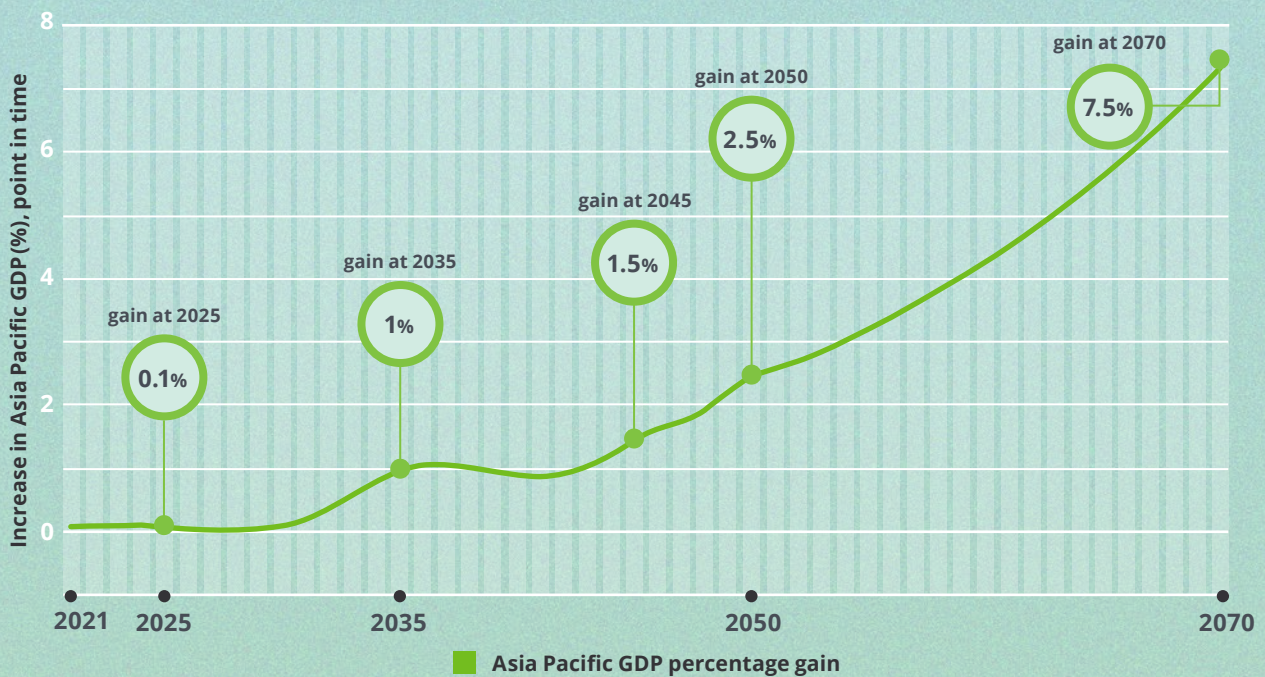


Source: Deloitte Economics Institute D.CLIMATE model.

Asia Pacific's turning point

Deloitte expects rapid decarbonization to a 1.5°C world to follow four key economic phases.

Figure 3.6: Four phases of action to achieve a decarbonized Asia Pacific in a 1.5°C world



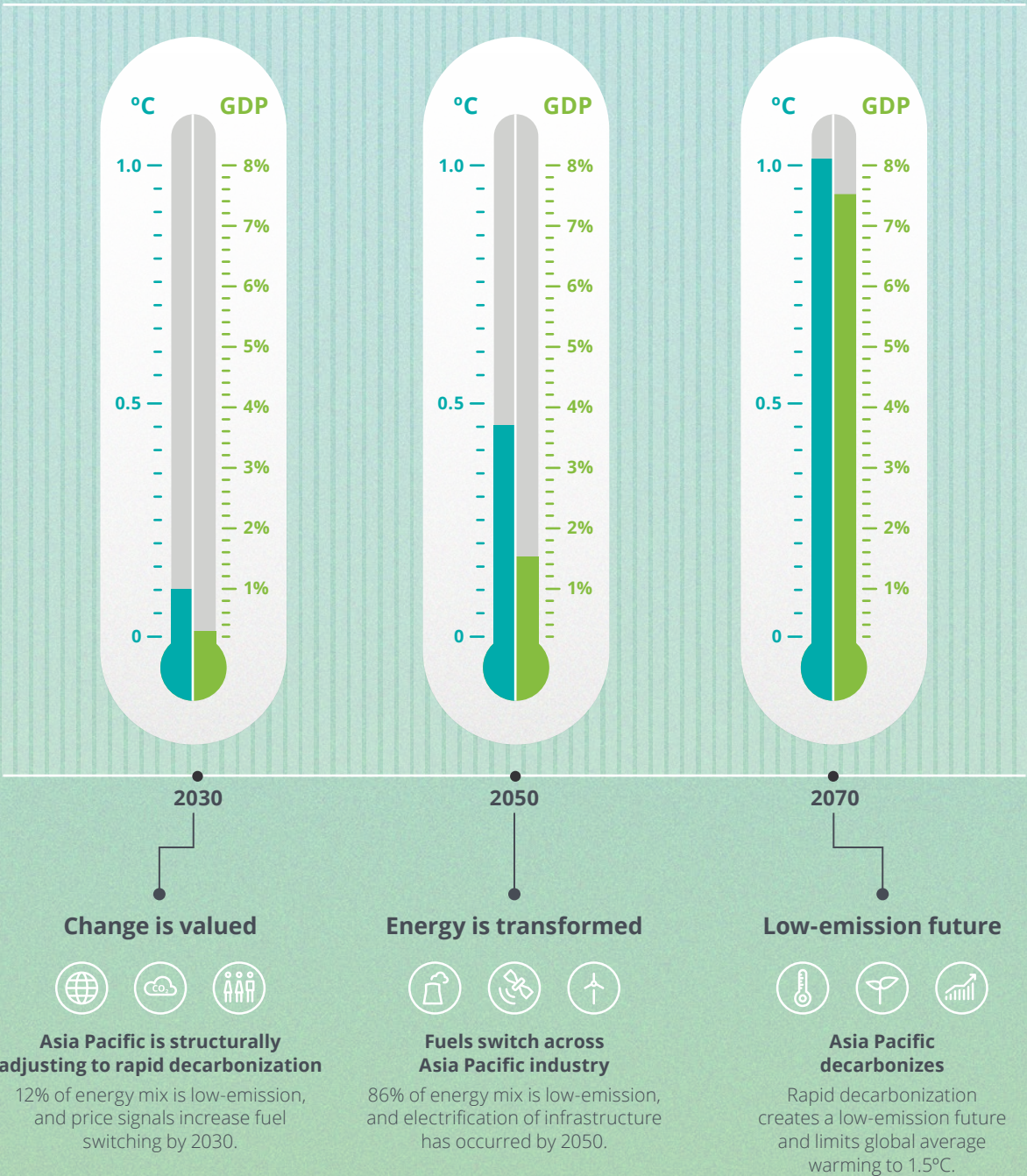
		Largest economic gains during transformation Ordered by largest GDP gain, level terms (\$US)	
	Bold Climate Plays 2021-2025	China Southeast Asia	Taiwan Australia and New Zealand
	Coordinated Change 2025-2035	China Southeast Asia	Japan Taiwan
	Turning Point 2035-2050	China Southeast Asia Japan South Korea	Taiwan Australia and New Zealand Pacific Nations
	Low-Emission Future 2050-2070	India Southeast Asia China Japan	South Korea Taiwan Australia and New Zealand Pacific Nations

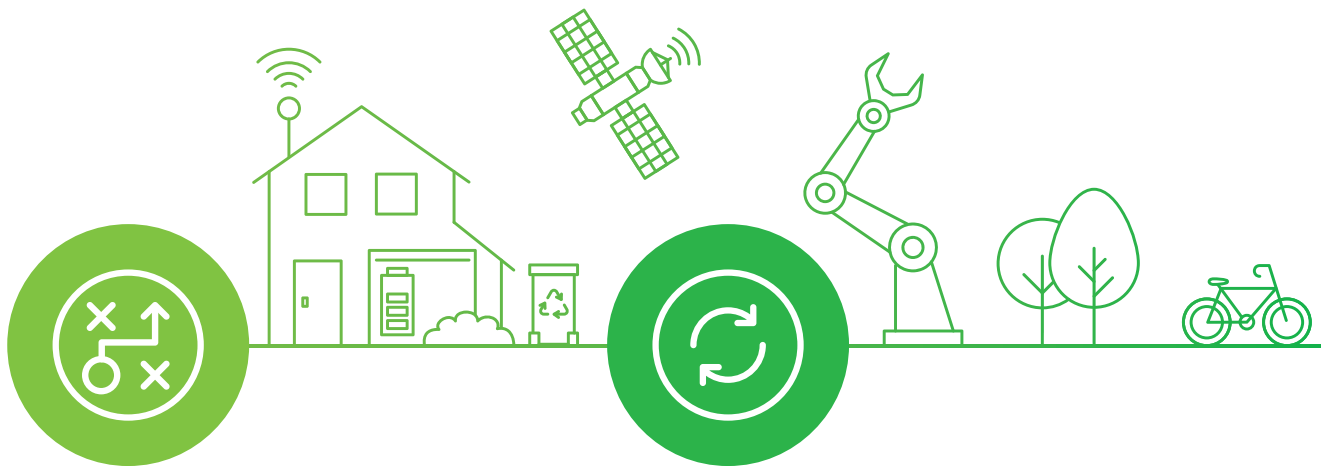
Figure 3.7: Rapid decarbonization in a 1.5°C world

Rapid decarbonization is the turning point for economic growth in Asia Pacific

■ Asia Pacific GDP percentage gain in a 1.5°C world

■ Average global temperature increase avoided by 1.5°C limit





Bold Climate Plays from 2021 to 2025

The next several years set the stage for rapid decarbonization. The decisions by government, regulators, business, industry, and consumers would reinforce initial progress and create the market conditions to deliver decarbonization at pace and scale. This would send price signals, transform supply chains, and lay the foundation for a structural shift that limits global average warming to 1.5°C.

Developed and emissions-intensive economies in Asia Pacific—such as China, Australia, Southeast Asia, and Taiwan—would initially gain. These economies could decarbonize domestically, while exporting knowledge, capital, and policy leadership to the rest of the world.

Coordinated Change from 2025 to 2035

The hardest shifts in industrial policy, energy systems, and consumer behavior would be underway by this point. This would be the decade in which economies, businesses, and industries began to see the consequences of bold climate plays, with different industries and regions transforming at different paces. Economies such as China would consistently gain as they continued exporting decarbonization technologies and goods to the world.

As economies in Asia Pacific changed to a new path of prosperity, the value of fossil fuel assets, technologies, and capabilities would weaken. Jobs would realign to new growth areas, and export revenues in fossil fuel-dominated economies would diminish. Emissions-intensive economies with concentrated export sectors—such as in Australia and Taiwan—would marginally lose economic gains during this period of structural adjustment.

At the same time, Japan would be achieving net economic gains and South Korea would be edging closer to doing so. They could increase their share of imported decarbonization technology and energy, such as green hydrogen, which would accelerate their transformation. This would be a critical decade for economies such as Japan and South Korea to capitalize on the wave of new energy, electrification, and green hydrogen innovation, to support existing competitive strengths and maintain their advantage as the world decarbonized.



Turning Point from 2035 to 2050

Our model suggests the decarbonization adjustments in industry should be almost complete by this decade. The cost of new low-emission technologies would continue to decrease, and net economic gains would be shared more widely. Efforts to curb emissions would begin to manifest in lower global average temperatures relative to a higher-emitting posture—a 0.13°C average decrease across the decade to 2045, compared to the RCP 6.0 baseline. This pathway would result in a 1°C difference in the global mean temperature by 2070, relative to RCP 6.0.

This decade would be the climatic and economic turning point.

This decade would be the climatic and economic turning point, preventing the shift to a “locked in” higher-emission pathway while realizing the economic dividends of systems-level transformations. Owing to their size, level of development, and geography, China and South Korea would gain 2 percent in GDP by 2045, while Japan would gain 2.5 percent. Economic gains would continue to gradually rise towards the end of the century, a product of the direct economic benefits of decarbonization and the avoided costs of unmitigated climate change.

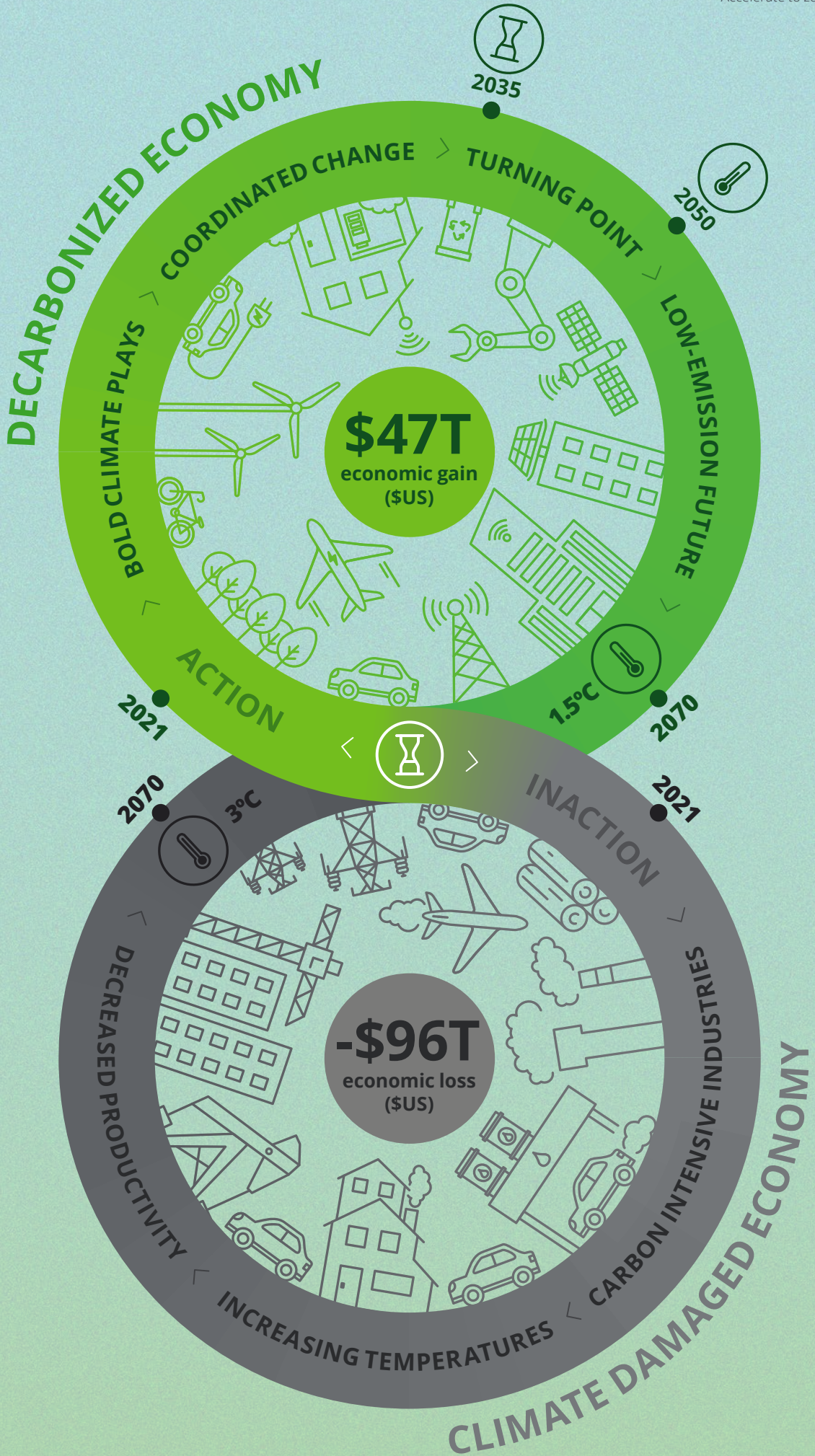
Southeast Asia would gain 2 percent in GDP by 2045, while Taiwan would gain 3.5 percent and Pacific Nations 1 percent, helped especially by the significant avoided costs from unmitigated climate change. These regions, alongside India, have the most to lose from global average temperature rise beyond 1.5°C, due to their geography, industries, and climate. The turning point would offer these economies a path to untapped economic potential, while significantly avoiding downside economic risk due to climate damage.

A Low-Emission Future after 2050

In our modeling, the economies of Asia Pacific would be near net zero emissions by the end of the century, and the economic systems of production would keep global average warming to around 1.5°C. Economic structures would be radically transformed, underpinned by a series of interconnected, low-emission systems spanning energy, mobility, manufacturing, and food and land use.

The energy mix would be dominated by low- or zero-emission sources across every market, with green hydrogen and negative-emissions solutions, both natural and technological, playing prominent roles. Notably, India would be rapidly gaining economic dividends from global decarbonization. A low-emission future would benefit the whole Asia Pacific region and offer the world new sources of economic growth.

Accelerate to zero



Accelerate to zero

For too long, we have been caught in false debate between economic growth and poverty alleviation versus meaningful climate action. We have incorrectly viewed these as mutually exclusive objectives.

This is like saying we have to pick between growth and sustainability.

Even if that were true, this report proves it is no longer the case.

It debunks the myth that growth is not compatible with addressing climate change. It also puts to rest the myth that time is on our side. And it clearly demonstrates that without collective action, we all lose.

The Asia Pacific region is remarkable for its development and growth over the past 50 years. It is now poised to be the economic growth engine of the world, and is on the threshold of becoming the technology and business epicenter for innovation. It is also the world's best source of labor and know-how, and the driver of global trade.

But as we take on this new global growth role, the opportunities of climate leadership also beckon.

Climate action is at the heart of our responsibility and leadership for the region, ensuring the wellbeing of our economy, our communities, and our planet.

This report demonstrates that without any significant and meaningful action—globally and from our region—all of Asia Pacific's economies will suffer. It reveals that the physical risks of climate change will rapidly translate into economic and commercial losses. This will jeopardize the people who live and work in our region, and who look to policy and corporate leaders to build a bright and hopeful future for them and successive generations.

The cost of doing nothing is large and inevitable. This report provides a pathway for us to write our own destiny, which could be one of growth and prosperity if we act on climate change.

Through coordinated action, the economies and societies in the Asia Pacific region can drive global action to mitigate the economic risks from inaction and reap the benefits from our global leadership.

Within the lifetime of children born today, we can turn a \$96 trillion economic loss into a \$47 trillion gain in just 50 years. The loss would be around seven times the size of China's current economy today. The gain would be bigger than the current economies of Australia, Japan, and South Korea put together.

This turnaround is not without cost and pain. Asia Pacific, more than any other region, understands the sacrifices needed to build powerful economies and societies. But this time we can do this together, minimizing the sacrifices needed.

Through concerted and coordinated action focused on technology and finance, we can transform the underlying production systems of our economy.

If we act now, we can gain significant comparative and competitive advantages, claiming new value for our economies. In doing so, we will place Asia Pacific at the forefront of the global knowledge frontier.

We can show the world how this is done, by showing that if it can be done in our region, it can be exported anywhere.

We can transform our energy mix, modernize our capital assets, and catalyze innovation in clean technology and finance. Corporate strategy can be rewritten, adding new value to our economies.

In doing so, Asia Pacific will produce what the world needs: a strategy for saving our planet.

This is a call to accelerate to zero—to chase down a viable future for Asia Pacific and the world.

Taking action is our responsibility.



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A special thanks to the following individuals who provided the support to make this report possible:

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Kate Condon

Adam Davey

Mairead Davis

Ashley Farrar

Jeremy Gehrig

Neil Glaser

Nat Jones

Sarah Kerrigan

Jack Mullumby

David O'Callaghan

Djauhari Pambudi

Derek Pankratz

Hom Pant

Sue Paul

Morgan Richards

Kanak Singh

Chau Tran

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