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Italy's turning point

Accelerating new growth on the path to net zero

November 2021

MAKING AN IMPACT THAT MATTERS since 1845

Transformations are always complex. This report shows the economic opportunity of achieving an accelerated but carefully phased decarbonisation path for the European continent.

Deloitte Economics Institute

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Foreword

The future of our planet depends on the choices we make every day. Our lived experience of natural disasters – wildfires, droughts, floods, and record-breaking heat waves – is a stark reminder of the long-term implications our choices can have. And the pandemic has only served to reinforce that message.

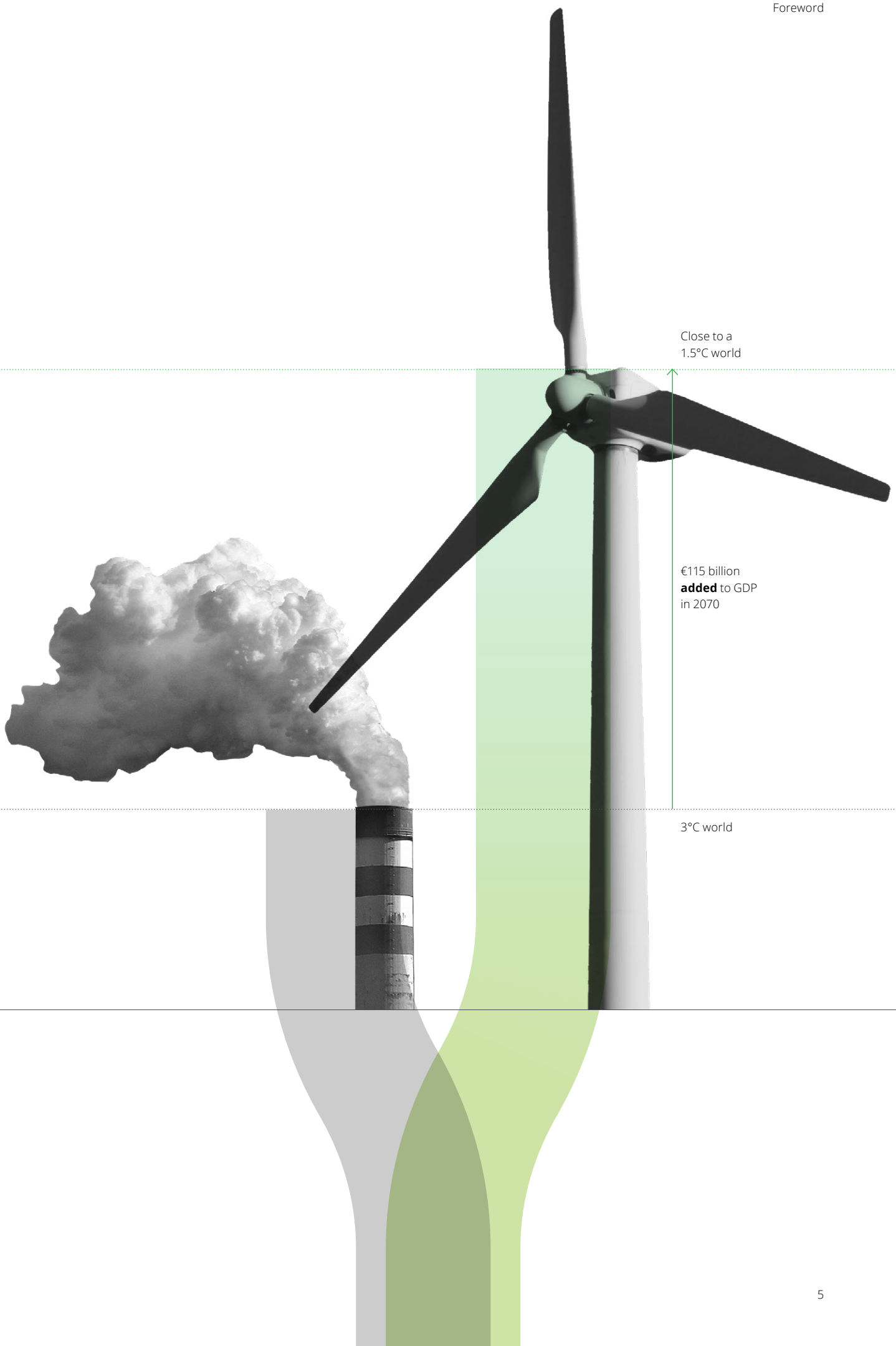
As a global society, we saw our systems tested by COVID-19 in ways we never imagined possible – some of them failing us in our moment of greatest need. It has been a wake-up call, an opportunity to reset and take stock of what we are personally willing to sacrifice to protect the shared infrastructure and societal systems on which we rely.

World leaders are going to gather at the 2021 United Nations Climate Change Conference (COP26) to help decide on a path forward. As a global society, we must choose between insufficient action or bold, rapid investment in decarbonising the global economy – a monumental transformation that must be completed at an unprecedented pace. And we're going to make this choice as Europe faces a complicated energy crunch.

Transformations and transitions are always complex. This report shows the feasibility of achieving a low-emission transformation by adopting an accelerated – but carefully phased and coordinated – decarbonisation path. Using new data from the Deloitte Economics Institute's D.CLIMATE model, this report provides a compelling look at this window of opportunity, particularly for Italy. The analysis accounts for the costs of global climate change within Italy's growth projections to offer a clear picture of what the country's future economy could look like. It also projects the potential economic benefit if Italy – and the world – chooses the path of accelerated action to achieve its low-emission turning point by mid-century. These modelled futures are localized to Italy but depend on global action.

Italy has what it takes to do its part and it could reach net zero emissions in the near future, because it has been investing in clean energy for decades. The cost of transitioning Italy – which some have argued would be too high – would actually be less than 0.7 per cent of its annual GDP through to 2043. Indeed, as the Deloitte analysis shows, investing in an accelerated decarbonisation transition timeline now will cost far less than if the investments are made later, particularly with regards to economic impact, potential climate damage, and an equitable transition for all European countries. Reversing climate change is a massive undertaking. This is not something that any one sector can achieve on its own. We must work together – governments, businesses, NGOs – to develop and implement the kind of innovative solutions the job requires. It is up to each of us to decide if we are bold enough to help lead the way.

Fabio Pompei
CEO, Deloitte Central Mediterranean


Close to a
1.5°C world
€115 billion
added to GDP
in 2070
3°C world

Key insights

In this report, the Deloitte Economics Institute applies model-based scenario analyses to shed light on two pressing questions in the climate policy debate. First, what would be the economic costs of climate inaction for Italy? Second, what are the economic benefits of limiting global warming to close to 1.5°C for Italy?

The report provides findings from 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 demonstrate the economic impacts of climate change if carbon emissions go largely unchecked, and what could happen—and when—if we transform our systems to achieve net zero emissions. By factoring in the costs of climate change into the baseline, the framework reveals the tremendous economic harms of inaction or inadequate action, as well as the significant opportunities that present themselves in remaking the global economy.

The model shows that Italy accelerating progress now will have a transformative impact on the country's economic growth and financial prosperity.

The cost of doing nothing could be very high.

- The result over the next half-century would be climate change-induced economic losses to Italy of approximately €1.2 trillion in present value terms.
- In this future of inaction, Italy loses 3.2% of GDP – or €115 billion – in 2070 alone compared to a world without climate change.
- Italy also faces the possibility of 21 million fewer jobs over 50 years, diminishing the country's long-term economic prospects.
- Rapidly achieving net zero emissions by 2050 (if not earlier) is not an aspirational goal, but an economic imperative.

Italy's commitment to a net zero future could transform sectors, create new jobs, and strengthen economic resilience.

- If Italy accelerates net zero efforts, Deloitte Economics Institute's model shows that it will be one of the earliest countries in Europe to reap the economic benefits of decarbonisation.
- In 2070, Italy's benefit of transition could grow to 3.3% of its GDP.
- By helping to limit global warming to close to 1.5°C, Italy would be €115 billion better off in 2070, compared to a 3°C world, and this benefit could grow with every subsequent year.
- In a net zero economy of 2070, Italy could have 470,000 more jobs than it would in a climate-damaged, emissions-intensive 3°C world. Job growth and new occupations could be created by emerging clean energy, the growth of the hydrogen sector, and the expansion of modern manufacturing.

Italy's core challenge is to decouple emissions from economic growth – and the up front cost of doing so is worth it.

- While some critics argue that decarbonisation would be too costly, our model shows that the cost of the transition is not catastrophic, but manageable: our analysis reveals that Italy can achieve this structural adjustment with a cost of about 0.7% of Italy's GDP, or an average of €15 billion every year to 2043.

- Italy can offset these costs by carefully coordinating the sequence of choices, investments, and technological and industrial changes that together will create a new low-emission economy.

The key to a successful net zero transition will be in the sequence of actions leading up to Italy's turning point.

- Italy's top five largest industries – the basis of the country's economic engine - have the strongest exposure to risks from climate change, due to their economic structures and their workforces. Together, private and public services, manufacturing, retail trade and tourism, transport, and construction account for about 85% of current economic output.
- If Italy chooses the path of decisive decarbonisation today, it could achieve in less than 30 years, what has taken centuries of industrial evolution to accomplish by transforming existing industries into a series of complex, interconnected, emissions-free systems.
- The next few years will be pivotal for accelerating technological innovation and creating the market conditions that can deliver decarbonisation at scale. The decisions by government, regulators, business, industry, and consumers need to reinforce initial progress and create the market conditions to deliver decarbonisation at pace and scale.
- Accelerated innovation, investment, and R&D in the next decade will deploy the requisite technologies in sectors to achieve the harder reductions after 2030.
- After reaching its turning point in 2043, Italy could start to enjoy the net positive economic gains of a modern, productive, and emissions-free economy.
- Early and rapid investments in decarbonisation yield a dividend and reduce the costs of transition post-2035 until the turning point in 2043. The economic cost from today to 2035 reflects the value of the economic effort that Italy has chosen to adopt – ensuring Italy's industries can both meet emerging global demand during transformation, and the most emission intensive industries are appropriately supported in transition.

Economics for a new climate

Notes on the analysis

Since the Industrial Revolution, global economic growth has occurred in near lockstep with rising greenhouse gas (GHG) emissions. Even as the world burned fossil fuels and converted land to intensive agriculture, living standards and quality of life improved. While growth has not been constant or even, global GDP growth per person expanded at a rate of about 1.5% per year from 1750 to present.[1]

This model of conventional economic growth is now running up against an overwhelming scientific consensus—and, increasingly, our own experiences—which indicates that the current system of economic production is rapidly generating untenable changes in the climate.[2]

In this report, the Deloitte Economics Institute presents analysis from the D.CLIMATE framework that models the economic impacts of climate change if emissions go largely unchecked, and what could happen—and when—the countries on the European continent transform their systems to achieve net zero emissions with the rest of the world by 2050. This model is based on significant research on region-specific climate and economic impacts across the European continent, which are used as inputs for the model (refer to the Technical Appendix for more detail). Given the many uncertainties that come with a modelling on 50-year time horizon, this exercise is not a forecast or a prediction, but rather scenario analysis to answer the question, "What if?"

This analysis establishes a better starting point for the global discussion on climate change. Currently, climate change impacts are not typically included in economic analysis, so governments, business and pundits alike have assumed a starting point where the economy will grow unaffected by the changes to our physical environment. If we don't include climate change in our modelling, though, it is difficult to understand the economic impacts of different climate policy options, such as net zero. Despite the limitations that come with any model, D.CLIMATE provides a better starting point by accounting for the inherent cost of global inaction.

The results reveal the magnitude of the challenge, as well as the choices that the world can still make to drive prosperity through a low-emission industrial revolution. The modelling also identifies the moment when the benefits of decarbonisation start to outweigh the costs of action. This is what we call the net gain or the turning point.

Throughout the report, there is reference to several assumptions, scenarios, and specialised terms. The following provides a shorthand description of these ideas to support the understanding of the insights in this report:

- **Climate change is the new normal:**[3] Unless the world takes rapid and coordinated action, an increasingly climate-damaged economy will become the new normal. When evaluating the costs and benefits of mitigation, business leaders and global decision-makers should account for the consequences of climate change. Effective global climate action requires reorienting our thinking to consider economic systems and natural systems as inextricably linked.
- **Without global action, carbon emissions and temperatures will continue to rise:**[4] Without rapid systemic change, the outcome would be increasing global average warming toward the end of the century. In this world, insufficient action on climate change would be the baseline path for the economies of Europe and the world (refer to the Technical Appendix for a detailed discussion).
- **Rapid, coordinated global decarbonisation would not only limit the worst effects of climate change, but could bring an economic and climate turning point:** Transitioning to a net zero world and limiting warming as close to 1.5°C requires an industrial and economic transformation. The turning point concept highlights that choosing transition will mean that, despite initial costs, countries and industries could see dividends in terms of avoided costs from climate damage in the form of new industries and technologies.
- **The net gain or the turning point is different for every economy:** The turning point is different for each economy because it reflects the combined impacts of economic costs and benefits, the economic structure that creates growth today, and how the model is impacted by decarbonisation. It also greatly depends on the exposure to "locked-in" climate change impacts as the world warms by at least 1.5°C over the coming decades.

  Costs:

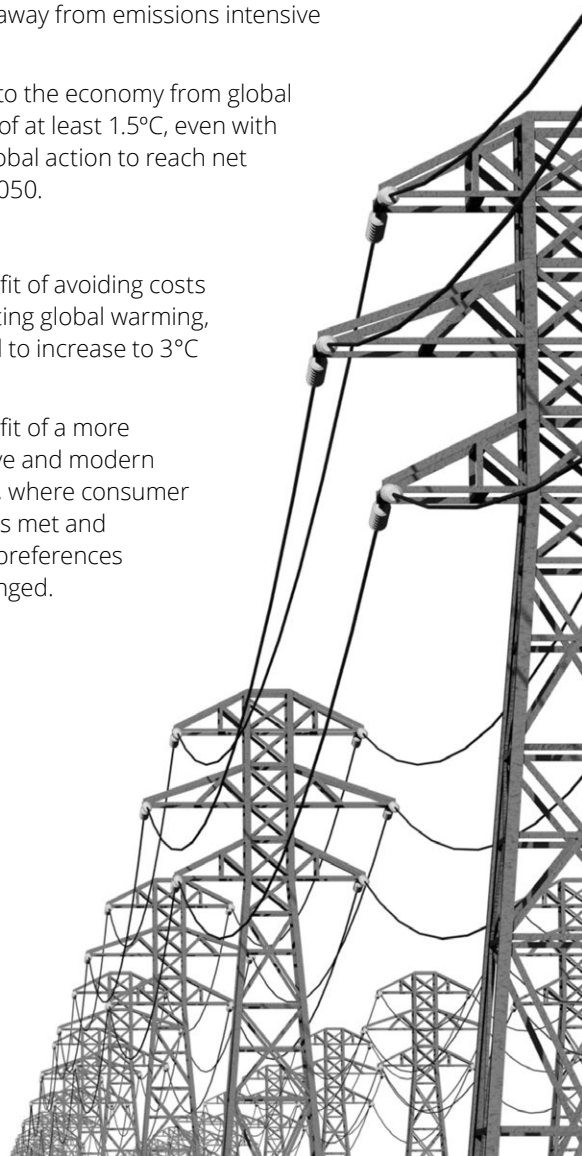
  – The inevitable costs to the economy as it moves away from emissions intensive activity.

  – The cost to the economy from global warming of at least 1.5ºC, even with strong global action to reach net zero by 2050.

  Benefits:

  – The benefit of avoiding costs from limiting global warming, projected to increase to 3°C by 2100.

  – The benefit of a more productive and modern economy, where consumer demand is met and industry preferences have changed.

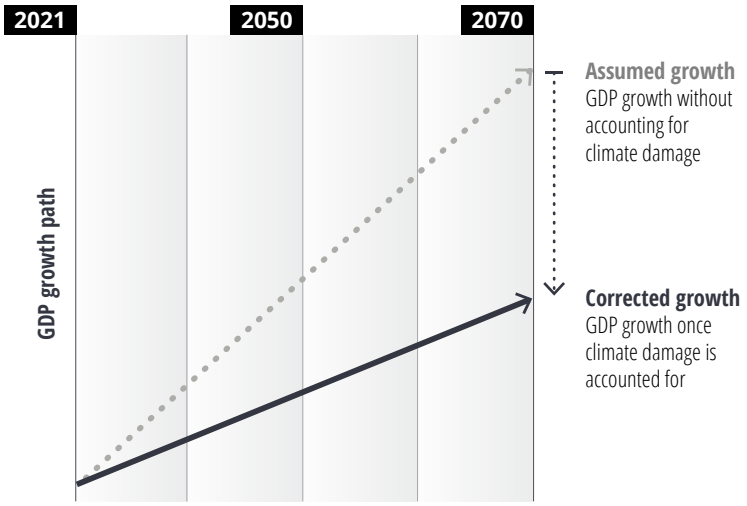


In this report, the Deloitte Economics Institute presents two scenarios. The first describes what could happen if the countries of the world allow the planet to warm on a path to 3ºC by the end of the century. The second reveals the economic opportunities for Europe if the world limits global warming to as close to 1.5°C by mid-century.

1. **We do nothing further and global emissions rise ("Around 3ºC world"):** This economic path represents a future with a higher rate of global GHG emissions, where there are no significant additional mitigation efforts, and the global average temperature increases to near 3°C by 2100. This scenario reflects a widely adopted set of emissions, economic, and population assumptions, referred to as SSP2-6.0. This scenario is regionalised to the European continent and the economies within it. The results of this scenario are presented as a deviation - a comparison to a world that does not have climate change impacts modelled.
2. **We act decisively and quickly to hit global net zero by mid-century ("Close to 1.5ºC world"):** This economic path represents a sequencing of efforts—by government, business, and citizens—to achieve net zero emissions by 2050. This scenario would make it possible for us to limit warming to as close to 1.5°C—well below 2°C. Within this report, this scenario is regionalised to the European continent. The results of this "close to 1.5°C" scenario are presented as a deviation, a comparison to the "3°C world".

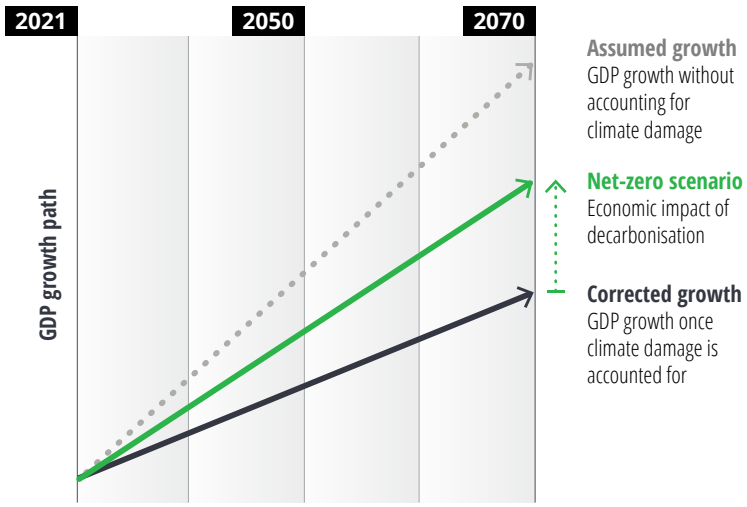
Under each scenario, the rate of economic growth is impacted (deviates from trend) based on different climate and decarbonisation effects.

The impact of accounting for climate change on Europe's growth path



Source: Deloitte Economics Institute.

The opportunity of new economic growth under a net-zero scenario



Source: Deloitte Economics Institute.

Key terms

Additionally, the following references and terms are defined for specific purposes in the context of this report.

Climate change: Changes in the regional and global climate brought about by increased greenhouse gas (GHG) concentrations in the atmosphere.

Turning point: The economic point where the benefits of decarbonisation start to offset the combined costs of "locked in" climate change and the costs to transition the economy to net zero.

Net-zero emissions: A state in which GHG emissions from human activities are balanced by the emissions taken out of the atmosphere. The technical definition of this concept can be found in the Technical Appendix.

Close to 1.5°C world: This pathway describes a net-zero economy by 2050 in which global average warming is limited to well below 2°C and as close to 1.5°C as possible, compared with pre-industrial levels.

Around 3°C world: An economic scenario that relates to a pathway of climate inaction, where the implied temperature change is 3°C above pre-industrial levels toward the end of the century.

Representative Concentration Pathway (RCP): A greenhouse gas concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC).

Shared Socioeconomic Pathway (SSP): A set of pathways adopted by the IPCC Sixth Assessment that explore how the global economy, society and demographics might change over the next century.

The economic impacts of two climate change futures

The economic impacts of two climate change futures

Europe has not been ignoring climate change. From investing in renewable energy at scale to the European Green Deal, the region has long demonstrated its commitment to reducing emissions in line with climate science.

But more work needs to be done across the continent, and the latest science suggests there is limited time to make this transition. According to the 2021 IPCC Sixth Assessment Report (AR6), the world will exceed a best estimate of at least 1.5°C in the coming decades unless deep reductions in emissions occur.[5]

Already, climate change has started to show up in increasingly visible ways in Europe. Recent frost blights have caused billions in damages for winemakers in France.[6] Sea level rise is constantly threatening the low-lying countries of the Benelux, who are at risk despite their leading dike technology. The glaciers in the arctic regions of Scandinavia are melting. Global warming is generating heavier rainfall, increasing the risk of flooding.[7] In July 2021, rivers and streams overflowed their banks across Germany, Belgium and the Netherlands, devastating lives along the way.[8]

Based on existing levels of warming, the next 30 years will bring similar extreme weather events, but they will be more intense, and they will occur more frequently. These changes to our physical environment will put severe stress on our systems —agricultural, healthcare, manufacturing, infrastructure, and financial. Without significant change, we're heading toward a climate-damaged global economy.

Italy has committed to playing its part in Europe's transition – recently announcing a commitment to reducing carbon emissions by 60% by 2030.[9]

Accounting for climate inaction

Despite the urgency of acting on climate change, the cost of climate inaction rarely comes up. Instead, the debate tends to focus on how much it will cost to change entire industries, to enact a price on carbon and invest in new energy systems, while slashing emissions. Within this worldview, economies can continue to grow as they traditionally have, completely unaffected by additional emission and climate change. This makes thwarting climate change seem too difficult, too pricey.

Because what this economic mind-set assumes is that the status quo is somehow a less costly choice. And it is not. But until now, this "business as usual" economic thinking has informed how most decisions and investments are made across governments and businesses alike. It's time to change that thinking.

If the economic impacts of a changing climate are left out of economic outlooks, the result is likely to be poor forecasts, poor risk management, and dangerously inadequate efforts to address the global climate crisis. A growing chorus of voices recognise this challenge. In 2020, the Network for Greening the Financial System (NGFS), a body of global central banks, released guidance on the need to solve this very issue.[10] If we're serious about shifting the global economy toward a low-emission footing, it's critical to understand and account for the longer-term effects of climate change on productivity, output, and economic growth.

To fully assess the costs of climate action, Deloitte's framework integrates the economic impacts of physical climate change into a baseline economic trajectory. Factoring in the costs of climate change reveals the tremendous harms that could befall the economies of the world if climate change goes largely, or wholly, unchecked, as well as the significant opportunities that could arise if we transform our systems to achieve net zero emissions by 2050. The model also identifies the turning point, or the pivotal moment, when the benefits from decarbonisation could outweigh the upfront investments.

Creating Italy's turning point

Most countries in Europe – including Italy - have already made considerable strides toward shifting their energy systems to renewables thanks to supportive policies and the use of proven, mature technologies at scale.

If Italy stays on track—which actually requires picking up the pace —Deloitte's model shows that it will be one of the earliest countries in Europe to reap the economic benefits of decarbonisation. From this economic and climatic turning point, our model shows that Italy's economy will not only be growing but will grow more than it otherwise could if it does not act. In 2070, Italy's benefit of transition could grow to 3.3% of its GDP. By helping to limit global warming to close to 1.5°C, Italy would be €115 billion better off in 2070 compared to a 3°C world – and this benefit could grow with every subsequent year.

If Italy carefully coordinates its transformation, it could not only could prevent the worst effects of climate change, but it could strengthen its economy by increasing the quality of economic growth. The transition from traditional manufacturing to modern, emissions-free production could create new value in the form of professional services, technology solutions, and opportunities for industry diversification. These forms of value could make Italy's economy more resilient, an important metric of success in a low-carbon future.

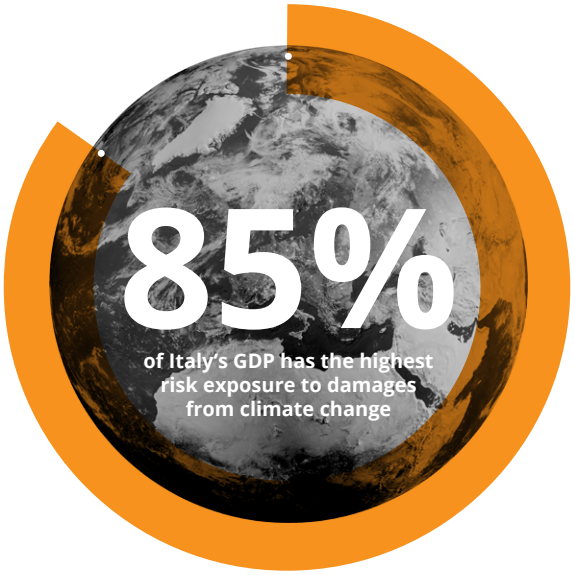
Navigating the transition

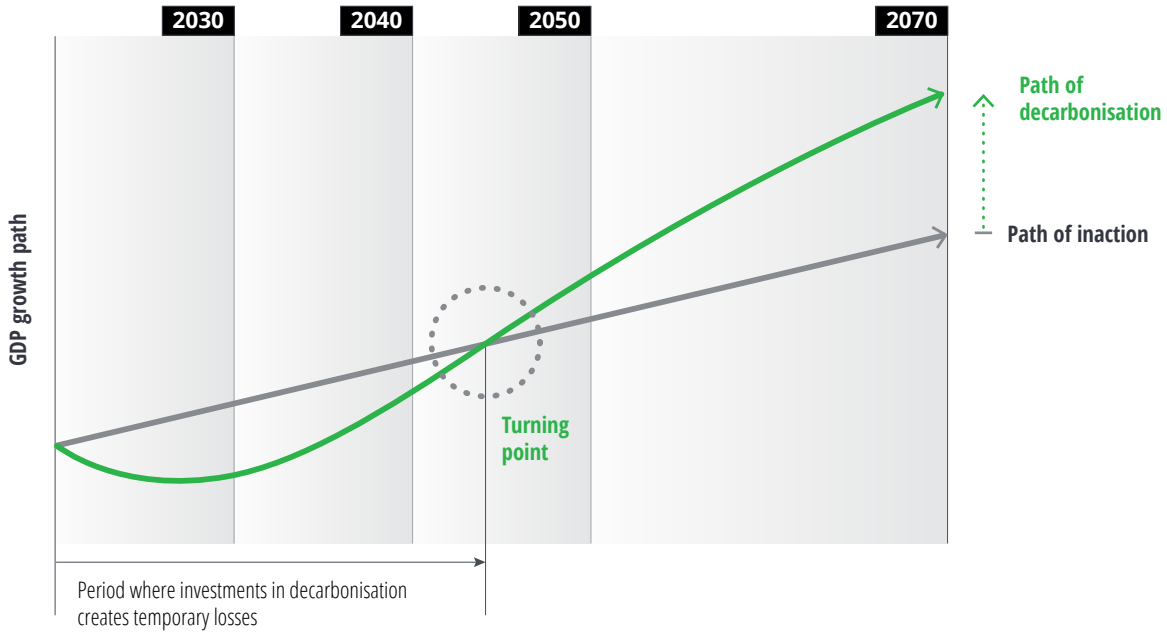
But to reach this turning point of new economic growth, the next three decades will require significant investments, rapid decarbonisation and structural adjustments. To make this change feasible, the cost of the changes needs to be acceptable to local economies.

While some critics argue that decarbonisation would be too costly, we found that the cost of the transition is not catastrophic, but manageable: our analysis reveals that Italy can achieve this structural adjustment with a cost of about 0.7% of Italy's GDP, or an average of €15 billion every year to 2043.

Italy can offset these costs by carefully coordinating the sequence of choices, investments, and technological and industrial changes that together will create a new low-emission economy.

Ambitious action now offers Italy the opportunity to manage and mitigate these adjustment costs, which will be much higher if the region delays and is forced into more abrupt decarbonisation later.

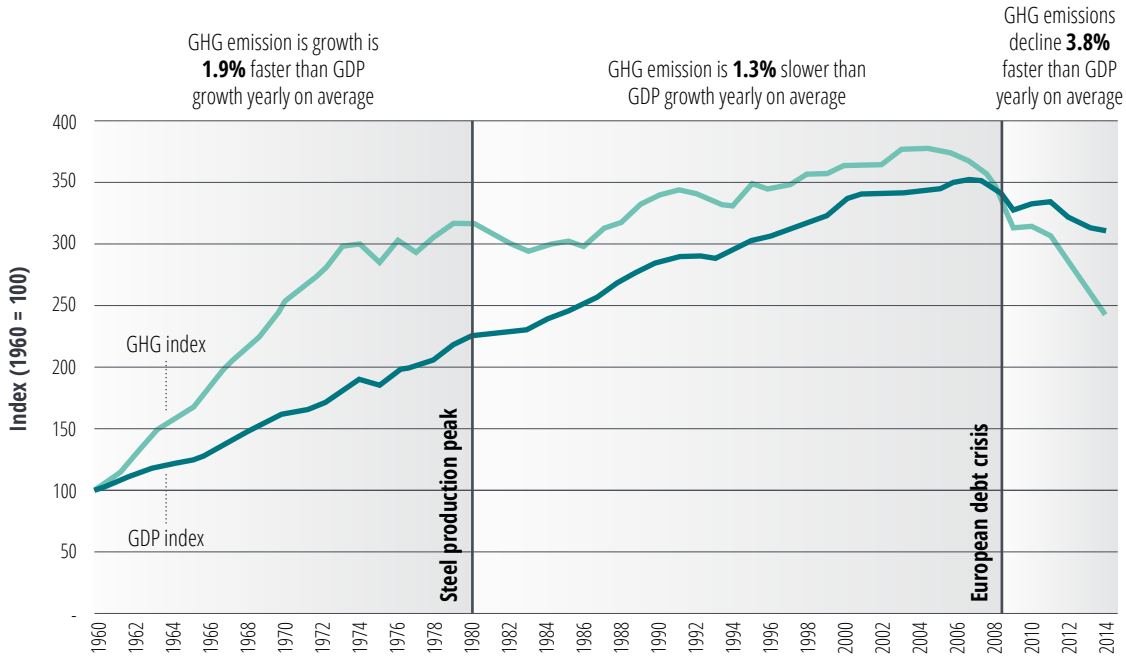




The scale of Italy's decarbonisation task

Industry has been integral to Italy's growth story, but it has also been a driver of Italy's emissions. Northern alpine regions, Turin and Milan, became the epicentre for a textile, chemical manufacturing and a banking boom, while Genoa became a civil and military shipbuilding hub.[11] The diffusion of industrialisation lay the foundation for Italy's economic composition that exists today, and marks the era where Italy first tied the knot between economic growth and carbon-emission intensive activity.[12]

Trends in Italy's per capita GDP growth and carbon emissions[13]



Source: Deloitte Economics Institute analysis of World Bank data

* Per capita GDP growth to 2019; per capita emissions to 2016

Such a growth model has now come up against the overwhelming scientific consensus—and increasingly our own lived experiences. The current system of economic production is generating untenable changes in the climate.[14] These changes put at risk global economic growth and prosperity.[15]

Italy's deep integration with global value chains makes its export-driven economy particularly susceptible to unmitigated climate change. Unlike many landlocked European regions, Italy's western, southern and eastern fronts are bordered by ocean, increasing the risk of heat stress and sea level rise. Today, the five largest contributors to Italy's economic growth, which account for about 85% of GDP,[16] are service-based and manufacturing sectors. These sectors have the highest physical risk exposure to climate change.

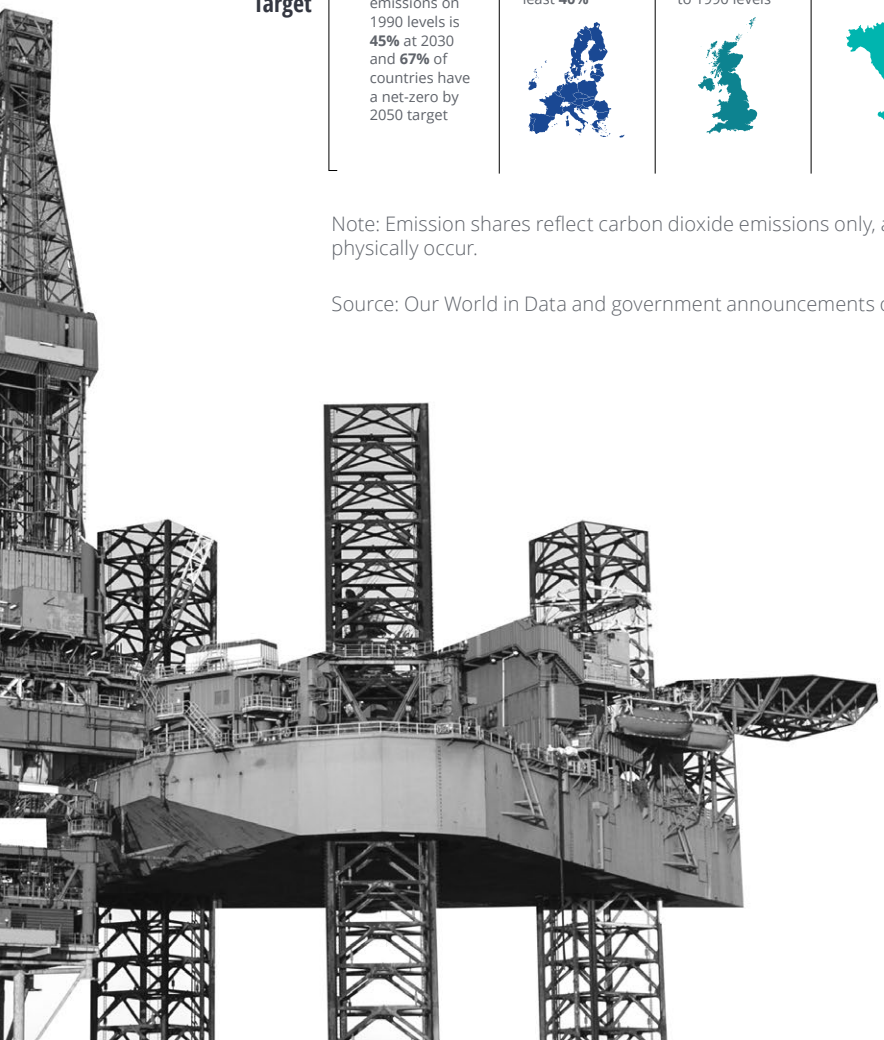
Italy's economic prosperity remains tied to industrial, carbon-emission intensive economic activity. While Western Europe has begun decoupling growth from economic activity since the 1960's as measured by emissions intensity of GDP, Italy has been relatively slower to act.

Europe's largest emitters have commitments to reduce emissions

	Europe	European Union (EU-28)	United Kingdom	Italy	France	Germany
Share of global carbon emissions	15%	9%	1%	0.9%	0.9%	1.9%
Target	Of European countries with interim 2030 and net-zero 2050 targets, the implied reduction in emissions on 1990 levels is **45%** at 2030 and **67%** of countries have a net-zero by 2050 target	Cut emissions by at least **55%** by 2030 All members must reduce emissions by at least **40%**	The UK has an interim target of reducing emissions by **68%** by 2030, and **78%** by 2035 compared to 1990 levels	Italy has an interim target of reducing carbon emissions by around **60%** by 2030	France has an interim target of reducing emissions by **40%** by 2030	Germany has an interim target of reducing emissions by **65%** by 2030

Note: Emission shares reflect carbon dioxide emissions only, attributed to the country in which they physically occur.

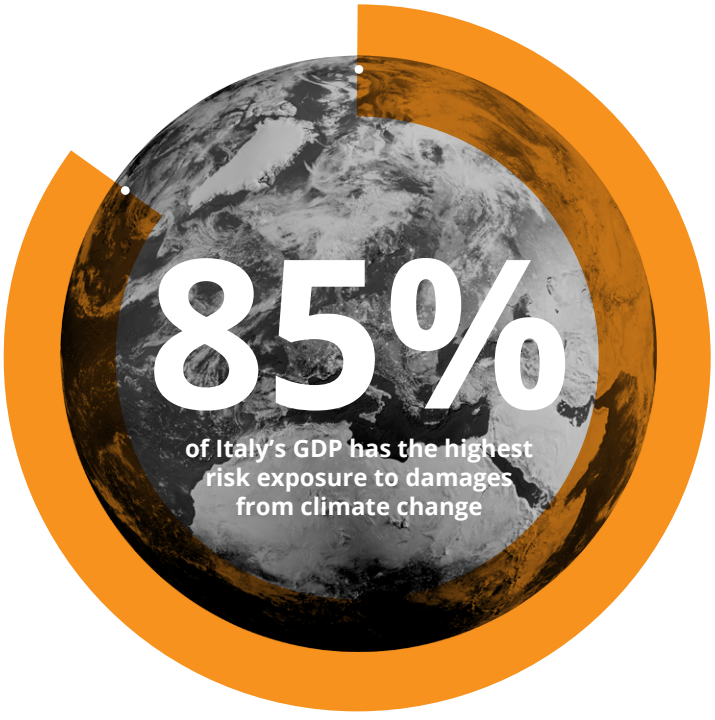
Source: Our World in Data and government announcements on emissions reduction targets[17]



The costs of climate inaction for Italy

The costs of climate inaction for Italy

If Europe and Italy—and the world—doesn't take significant action to mitigate climate change and global emissions continue to rise with economic growth, it could result in global average warming of around 3°C by the end of the century. This is the baseline and trend outlook for Italy, Europe, and the world.



Source: Deloitte Economics Institute

According to the D.CLIMATE model, global warming of 3°C could result in economic outcomes across six impact channels, namely: heat stress, capital damage, tourism expenditure flows, lost agricultural land due to sea level rise, agricultural yield changes, and tolls on human health.

Economic impact associated with climate change

Heat stress
Lost labour productivity from extreme heat

Sea level rise
Lost productive land, both agricultural and urban

Damaged capital
Stalling productivity and investment

Human health
Increased incidence of disease and mortality

Tourism loss
Disrupted flow of global currency

Agriculture loss
Reduced agricultural yields from changing climate patterns

Source: Deloitte Economics Institute.

In this climate-damaged world, warming could reduce Italy's economic potential. Productive capital and knowledge could be concentrated on repairing damages instead of investing in new, value-adding innovations and infrastructure. As climate change starts to affect human health, communities will become more focused on well-being than on participating in the workforce and achieving their best. Just as COVID-19 focused efforts—rightly—on mitigating the impact of the pandemic in 2020 and 2021, climate change also could divert efforts that otherwise would yield economic progress.

The economic cost of missing the turn

Unmitigated climate change could turn Italy's economic story into one of long-term decline with potential severe losses. The foundations of its prosperity—its people and natural capital—could be at risk, and along with them its standard of living, its prospects for future growth and the wellbeing of its people (Please refer to the Technical Appendix for detail).

Over the next 50 years, the analysis shows that climate-change-induced economic losses to Italy could total approximately €1.2 trillion in present value terms. For comparison, Italy's GDP was €1.8 trillion in 2020. The economic cost of unchecked climate change to Italy by 2070 would be almost equivalent to eliminating all output produced in an entire year.[18]

In this future of inaction, Italy loses 3.2% of GDP – or €115 billion – in 2070 alone compared to a world without climate change.

Italy's top five largest industries – the basis of the country's economic engine - have the strongest exposure to risks from climate change, due to their economic structures and their workforces. Together, the private and public services, manufacturing, retail trade and tourism, transport, and construct accounts for about 85% of current economic output.

The composition and quality of long-term growth could also change. Economic growth in a climate-damaged economy would be impeded by reduced productivity and a lack of new investment and innovation, which, in turn could lead to significant losses to standards of living. In this smaller future economy, there would also be fewer job opportunities, resulting in 21 million fewer jobs in Italy over the next 50 years – 420,000 job per year on average.[a] This data is similar to what has been experienced by Italy because of the pandemic (350,000 job lost in 2020). However, from around 2060 onwards, yearly employment losses exceed 700,000 jobs, more than doubling the impact COVID-19 had on the workforce.

a. Jobs are measured in full-time equivalent units (FTE).

Industry damage results

Industry	GDP impact 2020–2070 (€ billion, net present value)
Public and private service sectors	**-620**
Manufacturing	**-210**
Retail and tourism	**-180**
Construction	**-70**
Transportation	**-60**
Clean energy	**-30**
Conventional energy	**-20**
Agriculture	**-20**
Water and utilities	**-10**
Natural resources and mining	**-10**

Note: Net Present Value of deviation loss to GDP in Italy over the period to 2070 at a 2% discount rate. Refer to Technical Appendix for a discussion on the selection and application of the discount rate.

Source: Deloitte Economics Institute

Opportunities for Italy in a net-zero future

Opportunities for Italy in a net-zero future

A new economic climate

Although some degree of global temperature rise and climate impact is already 'locked-in' due to historical emissions, there is an opportunity to take bold action to enable economic prosperity and avert the impacts of an altered climate. Supported by the right economic framework, these actions can put Italy on a path to realizing strong, equitable, and shared growth.

If Italy chooses the path of decisive decarbonisation today, it could achieve in less than 30 years what has taken centuries of industrial evolution to accomplish and transform existing industries into a series of complex, interconnected, emissions-free systems.

After reaching its turning point in 2043, Italy could start to enjoy the net positive economic gains of a modern, productive, and emissions-free economy. This would be an incredible feat. In its first net zero decade, Italy could experience an increase in GDP. In 2070, Italy's net benefit of transition could grow to over 3.3% of GDP. It would be €115 billion better off in 2070 relative to a world of inaction and this benefit would grow with every subsequent year.

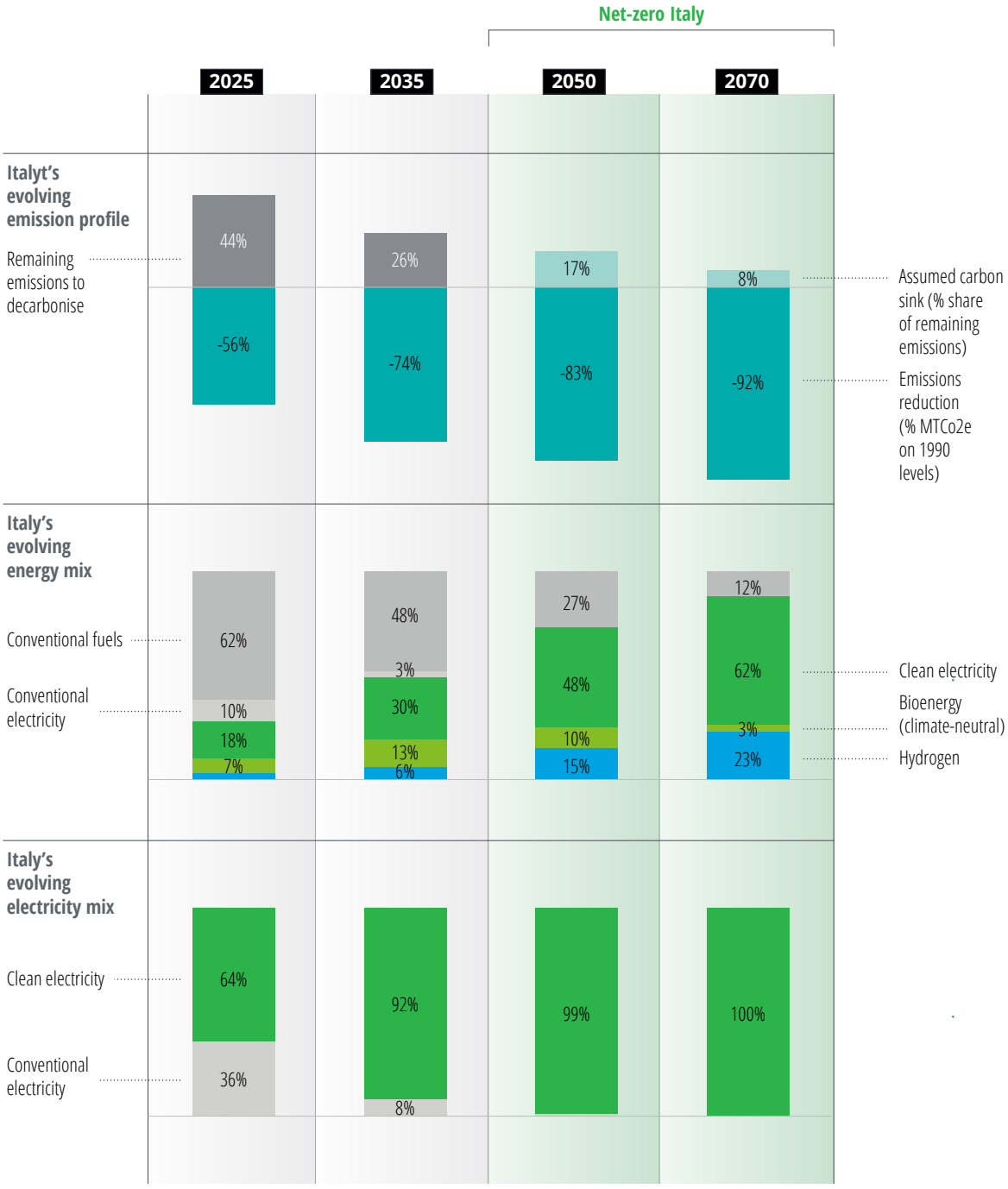
In a net zero economy of 2070, Italy could have 470,000 more workers than it would in a climate-damaged, emissions-intensive 3°C world. Job growth and new occupations could be created among the others by emerging clean energy, the growth of the hydrogen sector, and the expansion of modern manufacturing.

Italy is at the frontier of a new economic era. By making the right choices now, it could 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. In fact, to reach this turning point and boost economic growth, the next two decades of structural adjustment should reflect the lowest possible cost of change. Early and rapid investments in decarbonisation yield a dividend and reduce the costs of transition post-2035 until the turning point in 2043. The small economic cost from today to 2035 reflects the value of the economic effort that Italy has chosen adopt to lead the world – ensuring Italy's industries can both meet emerging global demand as they transform, and the most emission intensive industries are appropriately supported in transition.

After reaching its turning point in 2043, Italy could start to enjoy the net positive economic gains of a modern, productive, and emissions-free economy.

Italy's net-zero transformation



Pathway to a climate-neutral country

The transformation to a low emission economy is already underway in Italy. Its National Energy and Climate Plan is made up of two pillars: to increase renewable energy consumption to 30% of gross final energy consumption and improve energy efficiency by reducing energy consumption by 43% and 40% of primary and final energy consumption by 2030. The country is on track to meet 2030 objectives.[19]

The plan places a central emphasis on citizens and businesses (in particular SMEs) to become key players and beneficiaries of the energy transition and not just the financiers of climate initiatives. For Italy, this requires the promotion of self-consumption and renewable energy communities, but also the greatest possible degree of regulation and transparency of the electricity sales market, so that consumers, small business and families reap the benefits of a competitive market.[20]

Increasing renewable energy sources also enables Italy to reduce its dependence on energy imports and diversify sources of energy supply, with the manufacturing of photovoltaic technologies expected to play a key role to meet Italy's electricity targets.

While Italy's energy and climate plan does not contain a long-term strategy to achieve climate neutrality by 2050, the two pillars will lead to a 64% emission reduction by 2050.[21]

Levers of economic change for Europe

The D.CLIMATE model of a "close to 1.5°C world" incorporates a number of levers that could drive the transition. These are the underlying drivers of economic adjustment to decarbonisation in the modelled scenario. See the technical appendix for more details on the mechanisms that drive decarbonisation to reach Europe's turning point.

The drivers of economic change from decarbonisation in a 'close to 1.5°C world'

Change is valued

- Decarbonisation policies, investments and new technologies structurally change economies
- The coverage and the value of explicit and implicit carbon prices rise
- Estimates of future economic costs of climate change provide a market signal for action
- Consumer behaviour changes

Energy transforms

- Renewable and clean electricity transform Europe's energy system
- Renewables become cheaper compared to fossil fuels, increasing substitution in favour of renewables
- Overall energy use becomes significantly more efficient

Fuels switch

- Electrification and the use of new sources of low-emission fuel powers industry and households
- This transformation links energy-producing and energy-consuming sectors more closely
- Economies have cheaper and cleaner energy, and more productive economic output from it

Just transition

- No place or sector is left behind in transition
- Strategic economic policy meets the challenge and supports workers

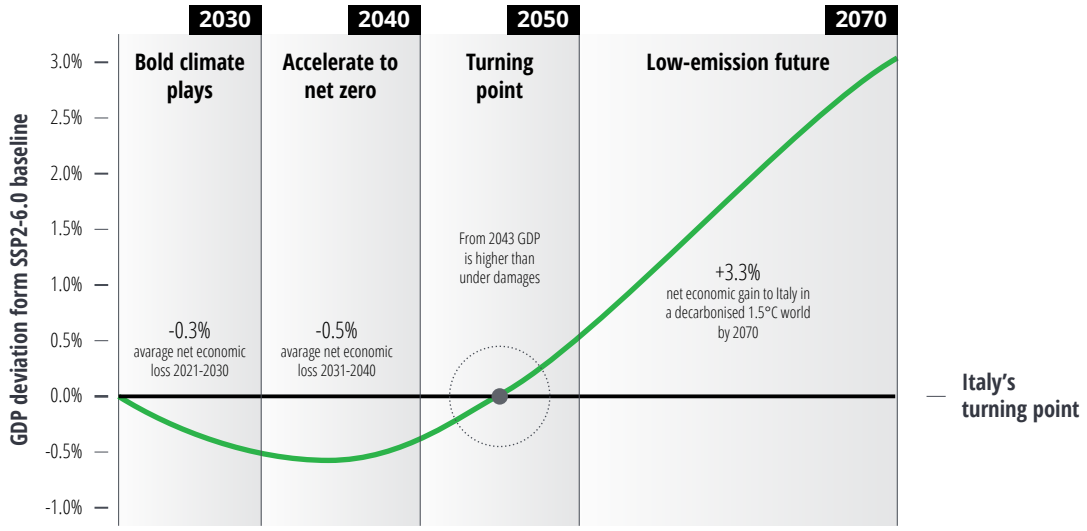
Source: Deloitte Economics Institute.

To aid the interpretation of the modelling results and to explain how Italy could achieve a low-carbon system transformation by 2043, the Deloitte Economics Institute has outlined four phases of structural economic change: bold climate plays, accelerate to zero, arriving at the turning point, and a low-emission future.

These four phases are narratives that synthesize the combined impacts of different actions and targets, taking place at different points in time. They include several core features spanning production systems, policy, finance, and consumer behaviour. The economic gains of decarbonisation occur in sectors and industries that will be the future of Italy's comparative advantage.

Phases of decarbonisation

Economic impact of Italy's decarbonisation pathway



Source: Deloitte Economics Institute.

Industry opportunity

	Industries that are better off under transition at the end of each phase, in level terms	
Bold climate plays 2021 – 2030	Clean energy sector Construction	Agriculture and forestry
Accelerate to zero 2031 – 2040	Clean energy sector Agriculture and forestry	Construction Water and utilities
Arriving at the turning point 2041 – 2050	Clean electricity Construction Retail trade and tourism	Public and private services sector Agriculture and forestry Water and utilities
Low emissions future beyond 2050 2051 – 2070	Clean electricity Retail and trade Manufacturing Water and utilities	Public and private services sector Construction Transport Agriculture and forestry

Bold climate plays: From 2021 to 2030

Italy's first phase of structural economic change begins now. Indeed, the next few years will be pivotal for accelerating technological innovation and creating the market conditions that can deliver decarbonisation at scale. In accelerating to achieve net zero emissions, it is not only the date at which net zero emissions is reached that matters. It is the cumulative amount of emissions produced along the way. Bold climate plays are required to 2030 to not only reduce the transition cost in the long term, but to increase the likelihood net zero emissions is achieved in a close to 1.5°C world by 2050.

In this phase, the decisions by government, regulators, business, industry, and consumers reinforce initial progress and create the market conditions to deliver decarbonisation at pace and scale. Accelerated innovation, investment, and R&D in the next decade will deploy the requisite technologies in sectors to achieve the harder reductions after 2030. The coverage of Europe's Emissions Trading Scheme likely expands, and carbon prices rise, making more of these projects attractive to private finance, prompting supply chains to transform and putting in place the foundation for a structural shift to limit global average warming to as close to 1.5°C.

Italy rethinks its current reliance on imported fossil fuels to power its industrial economy. This follows a long term trend, with oil and coal as a share of the total energy supply declining considerably since 1990, by 23 percentage points and 6 percentage points respectively.[22]

The Integrated National Energy and Climate Plan outlines its renewable energy growth targets required to meet 2030 objectives. Solar electricity is projected to contribute to 40% of Italy's renewable electricity supply, up from 21% in 2017.[23] To meet these targets, Italy has outlined a strategy to scale research and development of photovoltaic technologies and increase its global market share of photovoltaic manufacturing.[24]

The impact of this first decade of domestic, as well as global, climate change action is expected to have a considerable effect on Italy's economy. Structural change inevitably comes with a cost, but these bold climate plays are needed to minimise that cost and ensure future growth potential.

The electricity generation sector undergoes a rapid transformation, as Italy increases its energy security and reduce its reliance on imported sources to meet its 30% renewable energy target by 2030. Wind and solar energy leads the charge, at €25 billion higher in 2030, or 30% of the total change in output for that year. Bioenergy and hydrogen fuel follow suit, at €10 and €3 billion gains. On the other side of the energy sector, Italy's prominent oil refinery production (currently the second largest in Europe),[25] ends up €25 billion lower in 2030. Italy's manufacturing sector also faces disruption, where projected output is expected €55 billion lower in 2030.

While jobs in heavy manufacturing (which includes Italian steel and automobile manufacturing industries) are 170,000 lower in 2030, some of these jobs are created in more sustainable industries – 82,000 jobs in clean energy production by 2030.

In this first decade of the transition, the economic impact would be marginal by design: Coordinated and rapid transition prevents extreme disruption to the growth trajectory, with a reduction in Italy GDP of just 0.3% in 2030 as ambition and the pace of change picks up.

Accelerate to zero: From 2031 to 2040

This decade centres on the meeting of interim targets agreed to in the early 2020s. This is a decade where economies, business and industries begin to see the consequences of bold climate plays, with different industries transforming at different paces. As Italy approaches its turning point towards the end of this period, the hardest shifts in industrial policy, energy systems and consumer behaviour are well underway.

The decarbonisation adjustments in industry are almost made, the cost of new low-emission technologies is decreasing, and net economic gains are shared more widely.

From 2030 to 2050, Italy begins to capitalise on the disruption from transitioning to net zero. From late 2030s, Italy's transition costs fall with every year. The effects of coordinated and transition focused adjustment policy, such as the EU's Just Transition Mechanism, is smoothing negative impacts over time.[26]

Driving this change is clean energy production, as Italy strives for a 64% emission reduction target by 2050. Clean energy output increases at an average annual rate of 6% from 2031 to 2050. By 2050, output is €80 billion higher than the baseline – eight times the second highest industry, the private and public services sector, at €10 billion. Clean energy employment continues to climb at a rate above other industries, reaching 170,000 jobs by 2050.

The construction industry also experiences positive employment compared to baseline during this period. This occurs both due to the infrastructure required to generate the required electricity output, but also the electrification of the residential and commercial building stock.

Meanwhile, manufacturing output begins to increase after 2045. Light manufacturing – such as Italy's petrochemical, synthetic rubber, fertilizer manufacturing industries – particularly benefits from the reduced costs of production driven by declining renewable energy costs, and output begins to trend upwards.

While manufacturing begins to recover from the initial transition shock, fossil fuel production continues to decline. By 2050, the decline in petroleum and coking processes surpasses the decline of manufacturing, where output in both industries is around €35 billion lower compared to a 3°C world.

Italy is one of the most negatively affected regions in Europe under a future of inaction on climate change. As a result, it stands to gain the most from this transition in avoiding these impacts. Because this would be the decade of hard structural changes, growth would be affected by pressures on particular sectors. The economy would still be growing, but Italy would have a reduction in GDP of just 0.1% in 2040 as it works through the transition.

Turning point:
From 2041 to 2050

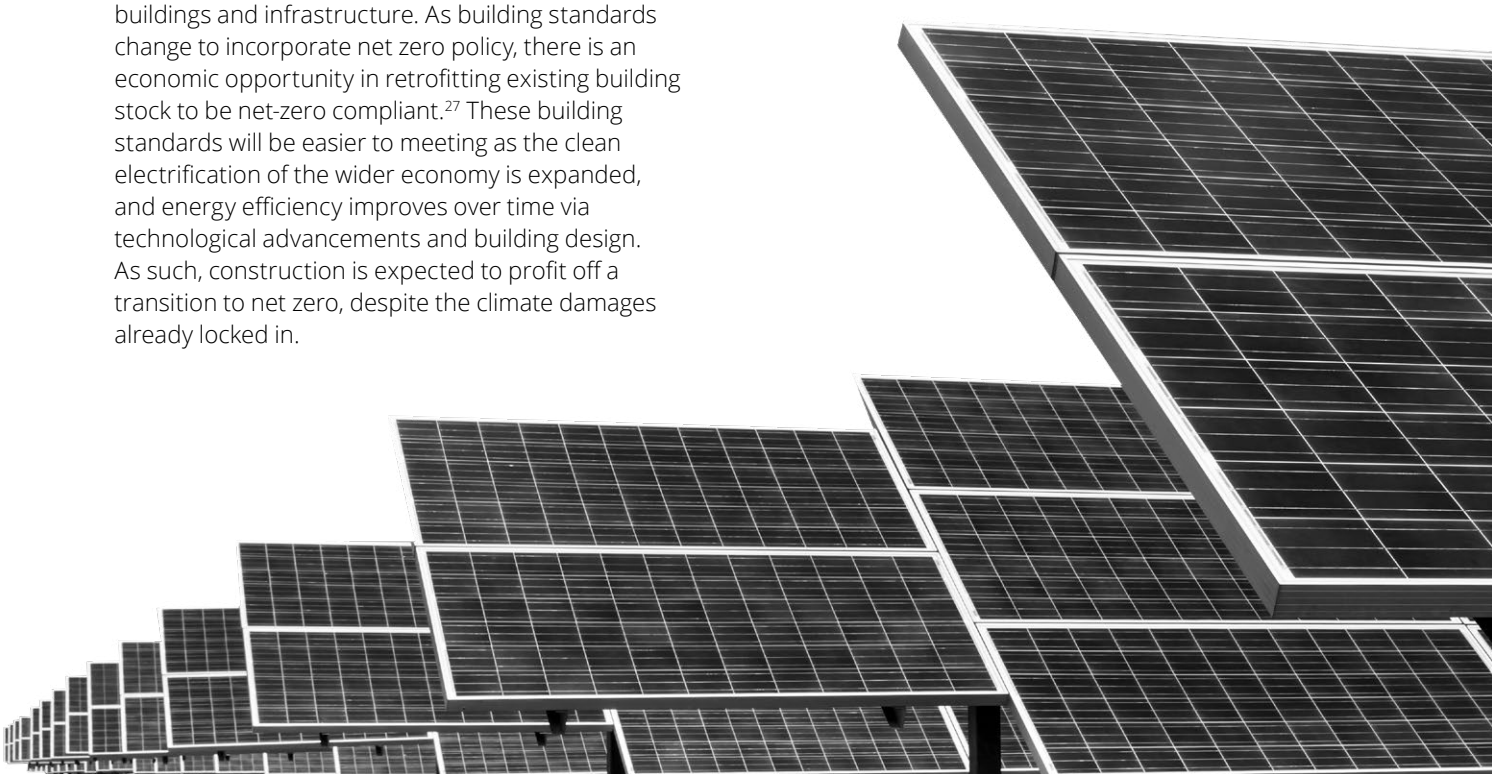
This is the phase when the hard work could start to pay off. As it approaches the mid-century mark, Italy could reach its turning point in 2043, avoiding the worst effects of a 3°C world and realising the economic dividends of systems-level transformations. At this point, the decarbonisation of Italy's industries would be almost complete, the cost of low-emission technologies would be decreasing, and net economic gains would be shared more widely. These efforts would also ensure that global warming remains on a path as close to 1.5°C – and well below 2°C.

From 2050, the economic benefits from transition are in full swing. **For the first time, Italy experiences a net benefit from transition during 2043– seven years before the European average in 2050.**

Construction had previously been slowed by significant transition costs, but output sees positive gains during the final years of this period. This is combined with the future need to decarbonise buildings and infrastructure. As building standards change to incorporate net zero policy, there is an economic opportunity in retrofitting existing building stock to be net-zero compliant.[27] These building standards will be easier to meeting as the clean electrification of the wider economy is expanded, and energy efficiency improves over time via technological advancements and building design. As such, construction is expected to profit off a transition to net zero, despite the climate damages already locked in.

Whilst Italy had previously seen many industries with declining employment, this period now sees many industries reach their turning point as employment switches from having smaller labour forces, to larger labour forces under a net zero scenario. Retail and tourism had previously been burdened by significant transition costs, but employment begins to see positive gains in this phase. In 2050, public and private services have 100,000 more workers compared to a 3°C world.

By taking early and coordinated action to reduce emissions and transform its economy in earlier phases, Italy contributes to limiting global warming to close to 1.5°C. It reaches its turning point in 2043 and its GDP is 0.9% higher than it would have been in a 3°C world.



A low emissions future beyond 2050: From 2051-2070

From 2050 onward, the economies of Italy and the world could be at net zero emissions, making it possible to limit global average warming close to 1.5°C by the end of the century. By this time, Italy's economic structures could be radically transformed, underpinned by a series of interconnected, low-emission systems spanning energy, mobility, manufacturing, agriculture, food, and land use. The EU Green Deal should have supported a decoupling of economic growth not only from emissions, but from resource consumption more broadly through a focus on a circular economy that recycles more and reduces waste.[b][28]

The energy mix in Italy is dominated by low- or zero-emission sources across every market, with clean energy sources and negative emissions solutions, both natural and technological, playing prominent roles. Notably, Italy is now rapidly gaining economic dividends from global decarbonisation. A low-emission future is benefitting almost all sectors in Italy and offers the world new sources of economic growth.

From 2050, economic benefits to other sectors beyond clean energy well and truly set in. Labour-intensive service sectors that are less energy-intensive continue to grow rapidly. These sectors, such as public and private services, retail trade and tourism become an increased share of Italy's economic output. In a low emissions future, job growth other in these sectors surpass clean energy. For example, private and public services and are estimated to have 625,000 more jobs than a 3°C world, and jobs in retail trade and tourism increase to 215,000 above a 3°C world by 2070.

The global transition to net zero has the potential to reduce severe weather occurrences, causing less disruption to global economies beyond 2050. Italy has much to gain from the reduced disruption, with one of the highest costs to its economy from climate change because of its coastal geography. Sea level rise already threatens one of Italy's most renowned tourist destination – Venice – which accumulates €2 billion worth of tourism revenue each year (pre-COVID-19).[29] The possible submersion of Venice not only threatens jobs and livelihoods, but the priceless historical artefacts which may seize to exist.

In a net zero scenario beyond 2050, the speed of recovery for service industries such as tourism reflects the volume of avoided economic damages from a rapidly warming world. In 2070, GDP is more than 3.3% higher than in a world without climate action. By 2070, employment is 470,000 net jobs higher compared to a 3°C world.

Italy has an opportunity: not only to ensure the sustainability of its thriving tourism industry, but to ensure the perseverance of all sectors by playing its part in the global race towards net zero.

b. The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

Concluding thoughts

Climate change is taking place, and those changes in our physical environment will have an increasingly directly impact on our lives. The disruption that one powerful storm causes today could become the norm for storm damage in a climate-changed future, where these types of events will be more intensive and will occur more frequently. This damage will interrupt business operations, put strain on local and regional governments and harm human life. All that comes at a significant cost.

Because uncontrolled global warming is dangerous for our economies and societies, we must work together to prevent it. Unfortunately, the conversation we are about to have at COP26 does not leave a lot of room to manoeuvre. At this late stage, we now have to solve for 50 years of postponed action.

These first steps will be the hardest ones.

Across Europe, across industries and across the globe, there will be major changes taking place to how people get around, what kinds of jobs they can do and how the businesses where they work create value. In some regions, entire industries are at risk. There may be years when the unavoidable effects of our already changed climate will make some question whether what we're doing is even working. There may be those who will say that the price is just too high.

Yes, there is a real cost to change. Whether we are building clean energy sources, developing a carbon trading scheme or funding the transformation of emissions-intensive industries, these economic investments will take time to yield measurable growth. But the benefits will likely accrue on a local level immediately. Construction workers could feel the impact of the new jobs building offshore wind farms. Public service workers would be actively managing the system change. Former fossil fuel workers could find use for their skills in new industries. Capital markets could support the transformation of the energy industry, driving the benefits throughout the economy. This is to say, like all good investments, the hard work pays off.

Yet even if Italy takes bold and collective action, it needs to be responsive to what's going on in other parts of the world. That's because the builtin assumptions about the outcomes of Italy's decarbonisation depend on the efforts of all the regions of the world.

COP26 is the start of that conversation. If we act with purpose in the next decade, we can turn the course of economic history.

Yes, there is a real cost to change. But, like all good investments, the hard work pays off.

Appendix: Modelling climate change impacts in Italy

To quantify its conclusions, the Deloitte Economics Institute modelled the economic impacts of a changing climate on long-term economic growth using the following process:

1. The model projects economic output (as measured by GDP) with emissions reflecting a combined Shared Socioeconomic Pathway (SSP)-Representative Concentration Pathway (RCP) scenario, SSP2-6.0, to the year 2100.[c] The socioeconomic pathway, SSP2, is the "middle of the road" among five broad narratives of future socioeconomic development that are conventional in climate change modelling. The climate scenario, RCP6.0, is an emissions pathway without significant additional mitigation efforts (a baseline scenario).[30] This results in a projected emissions-intensive global economy.[d]
2. Increased atmospheric GHGs cause average global surface temperatures to continue rising above pre-industrial levels. In the SSP2-6.0 baseline scenario, global average temperatures increase more than 3°C above pre-industrial levels by the end of the century according to the Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC).[e] (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 D.CLIMATE model includes six types of economic damage, regionalised to the climate, industry, and workforce structure of each modelled region. These damages capture the trend or chronic impacts of global mean surface temperature increases. The approach does not explicitly model individual acute economic shocks driven by extreme climatic events, such as specific natural disasters, although these are implicitly captured in an increasing trend of climate change damage.
4. The damage to the factors of production is distributed across the economy, impacting GDP. Any change in emissions (and, correspondingly, temperatures) over time results in a change 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 temperatures, 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 current SSP2-6.0 baseline view.

This modelling framework involves significant research on region-specific climate and economic impacts across Italy, Europe and the world, which are used as inputs for the D.CLIMATE model (refer to the technical appendix for more detail).

c. IPCC-adopted emission scenarios vary widely, depending on socioeconomic development and climate mitigation policy settings. SSP2-6.0 is chosen as one of the most frequently used 'baseline' scenarios in the literature. It describes an intermediate baseline scenario as it carries historical social, economic and technological trends forward and includes no specific or significant climate mitigation policy effort, making it an appropriate baseline for reference. For more detailed description of SSP2-6.0 and rationale for its adoption, see Technical Appendix.

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

e. The associated climate data (like annual temperature increases and atmospheric concentrations) are estimated using MAGICC as described in Meinshausen et al. (2011) and Meinshausen et al. (2020) and configured by Nicholls et al (2021). See the Technical Appendix for further detail.

Sector groupings

Sector name	Sub-components
Agriculture	Agriculture and fishing
	Forestry
Natural resources and mining	Coal
	Oil
	Gas
	Other mining
Manufacturing	Food manufacturing
	Light manufacturing
	Heavy manufacturing
Conventional energy	Coal
	Gas
	Oil
	Other emissions-intensive energy
	Gas manufacture, distribution
	Electricity: Transmission and distribution
Clean and new energy	Nuclear
	Wind
	Hydro
	Solar
	Hydrogen
	Bio-energy (carbon-neutral)
Water and utilities	Water and utilities
Construction	Construction
Retail and tourism	Retail trade
	Accommodation, food and service activities
Transportation	Land transport
	Water transport
	Air transport
	Warehousing and support activities
Public and private services	Communication
	Financial services
	Insurance
	Real estate activities
	Business services
	Recreational and other services
	Dwellings
	Public Administration and defense
	Education
	Human health and social work activities

Source: Deloitte Economics Institute.

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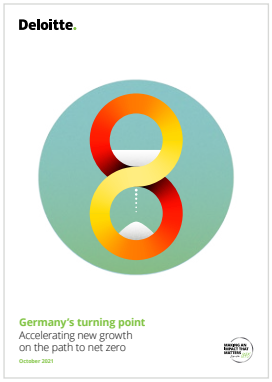

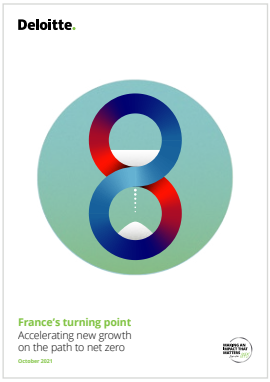

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