

20 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080



Shell Scenarios

Sky

Meeting the Goals of the Paris Agreement

WARNING: uncertainties ahead

This presentation contains data and analysis from Shell's new Sky scenario. Unlike Shell's previously published Mountains and Oceans exploratory scenarios, the Sky scenario is based on the assumption that society reaches the Paris Agreement's goal of holding the rise in global average temperatures this century to well below two degrees Celsius (2°C) above pre-industrial levels. Unlike Shell's Mountains and Oceans scenarios, which unfolded in an open-ended way based upon plausible assumptions and quantifications, the Sky scenario was specifically designed to reach the Paris Agreement's goal in a technically possible manner. These scenarios are a part of an ongoing process used in Shell for over 40 years to challenge executives' perspectives on the future business environment. They are designed to stretch management to consider even events that may only be remotely possible. Scenarios, therefore, are not intended to be predictions of likely future events or outcomes and investors should not rely on them when making an investment decision with regard to Royal Dutch Shell plc securities.

Additionally, it is important to note that Shell's existing portfolio has been decades in development. While we believe our portfolio is resilient under a wide range of outlooks, including the IEA's 450 Scenario (World Energy Outlook 2016), it includes assets across a spectrum of energy intensities, including some with above-average intensity. While we seek to enhance our operations' average energy intensity through both the development of new projects and divestments, we have no immediate plans to move to a net-zero emissions portfolio over our investment horizon of 10-20 years. Although we have no immediate plans to move to a net-zero emissions portfolio, in November of 2017, we announced our ambition to reduce our Net Carbon Footprint in step with society's progress toward the Paris Agreement's goal of holding global average temperature to well below 2°C above pre-industrial levels. Accordingly, assuming society aligns itself with the Paris Agreement's goals, we aim to reduce our Net Carbon Footprint, which includes not only our direct and indirect carbon emissions associated with producing the energy products which we sell, but also our customers' emissions from their use of the energy products that we sell, by around 20% in 2035 and by around 50% in 2050. The use of the term Shell's "Net Carbon Footprint" is for convenience only and not intended to suggest these emissions are those of Shell or its subsidiaries.

Also, in this presentation we may refer to Shell's "Net Carbon Footprint", which includes Shell's carbon emissions from the production of our energy products, our suppliers' carbon emissions in supplying energy for that production and our customers' carbon emissions associated with their use of the energy products we sell. Shell only controls its own emissions. But, to support society in achieving the Paris Agreement goals, we aim to help such suppliers and consumers to likewise lower their emissions. The use of the term Shell's "Net Carbon Footprint" is for convenience only and not intended to suggest these emissions are those of Shell or its subsidiaries.

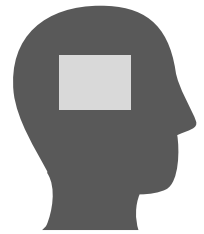
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This presentation contains forward-looking statements (within the meaning of the U.S. Private Securities Litigation Reform Act of 1995) concerning the financial condition, results of operations and businesses of Royal Dutch Shell. All statements other than statements of historical fact are, or may be deemed to be, forward-looking statements. Forward-looking statements are statements of future expectations that are based on management's current expectations and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in these statements. Forward-looking statements include, among other things, statements concerning the potential exposure of Royal Dutch Shell to market risks and statements expressing management's expectations, beliefs, estimates, forecasts, projections and assumptions. These forward-looking statements are identified by their use of terms and phrases such as "aim", "ambition", "anticipate", "believe", "could", "estimate", "expect", "goals", "intend", "may", "objectives", "outlook", "plan", "probably", "project", "risks", "schedule", "seek", "should", "target", "will" and similar terms and phrases. There are a number of factors that could affect the future operations of Royal Dutch Shell and could cause those results to differ materially from those expressed in the forward-looking statements included in this presentation, including (without limitation): (a) price fluctuations in crude oil and natural gas; (b) changes in demand for Shell's products; (c) currency fluctuations; (d) drilling and production results; (e) reserves estimates; (f) loss of market share and industry competition; (g) environmental and physical risks; (h) risks associated with the identification of suitable potential acquisition properties and targets, and successful negotiation and completion of such transactions; (i) the risk of doing business in developing countries and countries subject to international sanctions; (j) legislative, fiscal and regulatory developments including regulatory measures addressing climate change; (k) economic and financial market conditions in various countries and regions; (l) political risks, including the risks of expropriation and renegotiation of the terms of contracts with governmental entities, delays or advancements in the approval of projects and delays in the reimbursement for shared costs; and (m) changes in trading conditions. No assurance is provided that future dividend payments will match or exceed previous dividend payments. All forward-looking statements contained in this presentation are expressly qualified in their entirety by the cautionary statements contained or referred to in this section. Readers should not place undue reliance on forward-looking statements. Additional risk factors that may affect future results are contained in Royal Dutch Shell's Form 20-F for the year ended December 31, 2018 (available at www.shell.com/investor and www.sec.gov). These risk factors also expressly qualify all forward-looking statements contained in this presentation and should be considered by the reader. Each forward-looking statement speaks only as of the date of this presentation, **September 2019**. Neither Royal Dutch Shell plc nor any of its subsidiaries undertake any obligation to publicly update or revise any forward-looking statement as a result of new information, future events or other information. In light of these risks, results could differ materially from those stated, implied or inferred from the forward-looking statements contained in this presentation.

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Scenarios for the pathway ahead

Scenarios are not predictions or forecasts, they are a way of exploring alternative futures



The Present

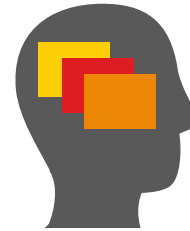


FORECAST

The Path



The Future



The Present



SCENARIOS

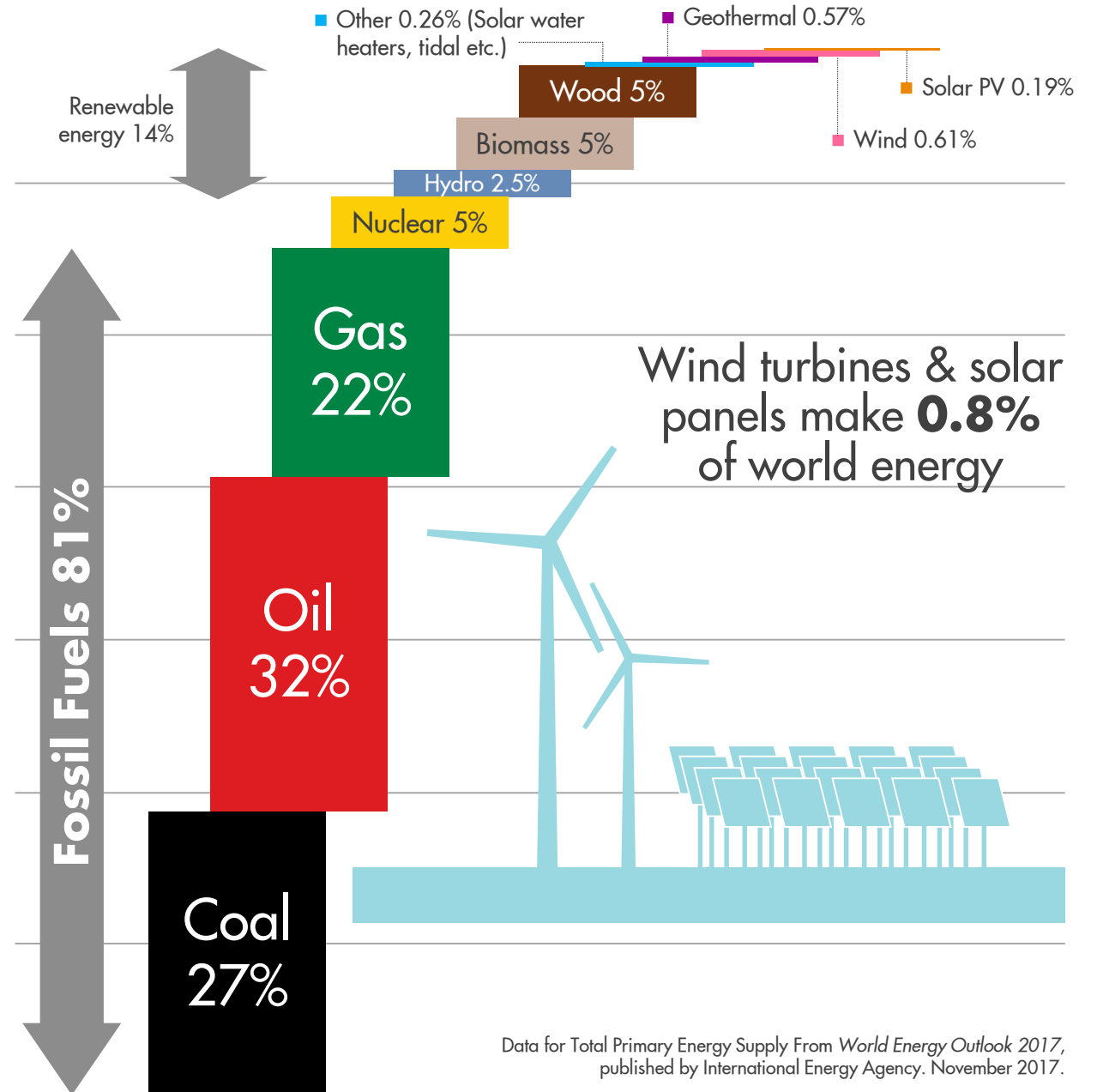
The Path



The Future

The energy system today

- Primarily fossil fuels
- Final energy is less than 20% electricity; so more than 80% of the energy we use is not electricity
- Continuing to grow as population increases and economies expand
- Current energy system has been evolving over the last 150 years
- A person from London or New York in 1920 visiting today would recognise much of what they see (in the energy system)



The goals of the Paris Agreement



...aim to reach global peaking of greenhouse gas emissions as soon as possible;

Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels

and 3 critical United Nations Sustainable Development Goals

1 NO POVERTY



7 AFFORDABLE AND CLEAN ENERGY



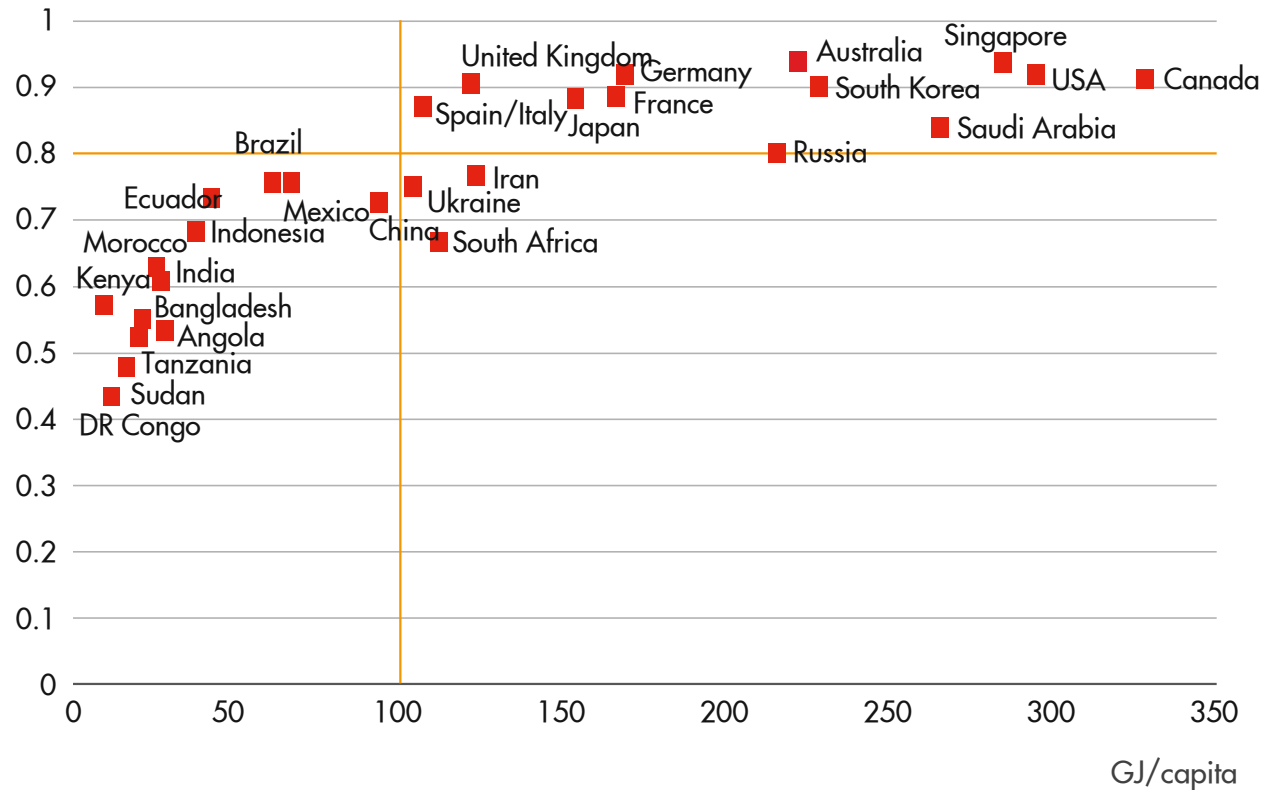
13 CLIMATE ACTION



...achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.

Challenges for the 21st century: Development and decarbonisation

Human Development Index: energy supports a better life



Source: Shell analysis, UN Human Development Index 2016

Decarbonisation: sector-specific perspective is key



Source: Shell analysis, World Energy Model

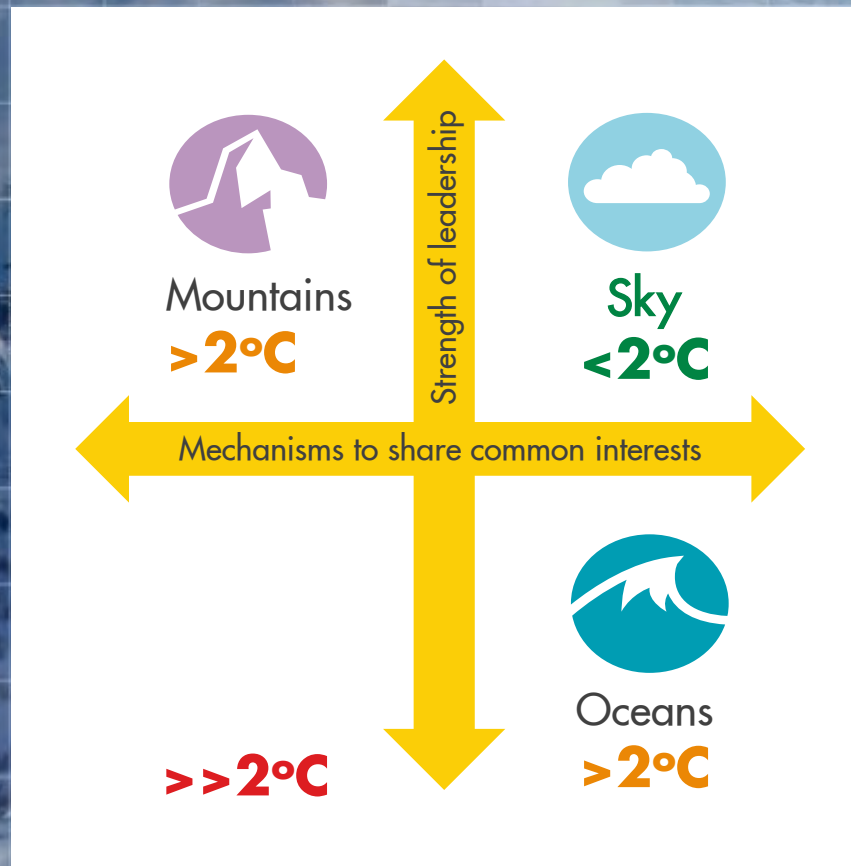
- Less difficult to decarbonise
- ...
- More difficult to decarbonise

From "A Better Life with a Healthy Planet: Pathways to Net-zero Emissions" a Shell *New Lens Scenarios* supplement (2016)

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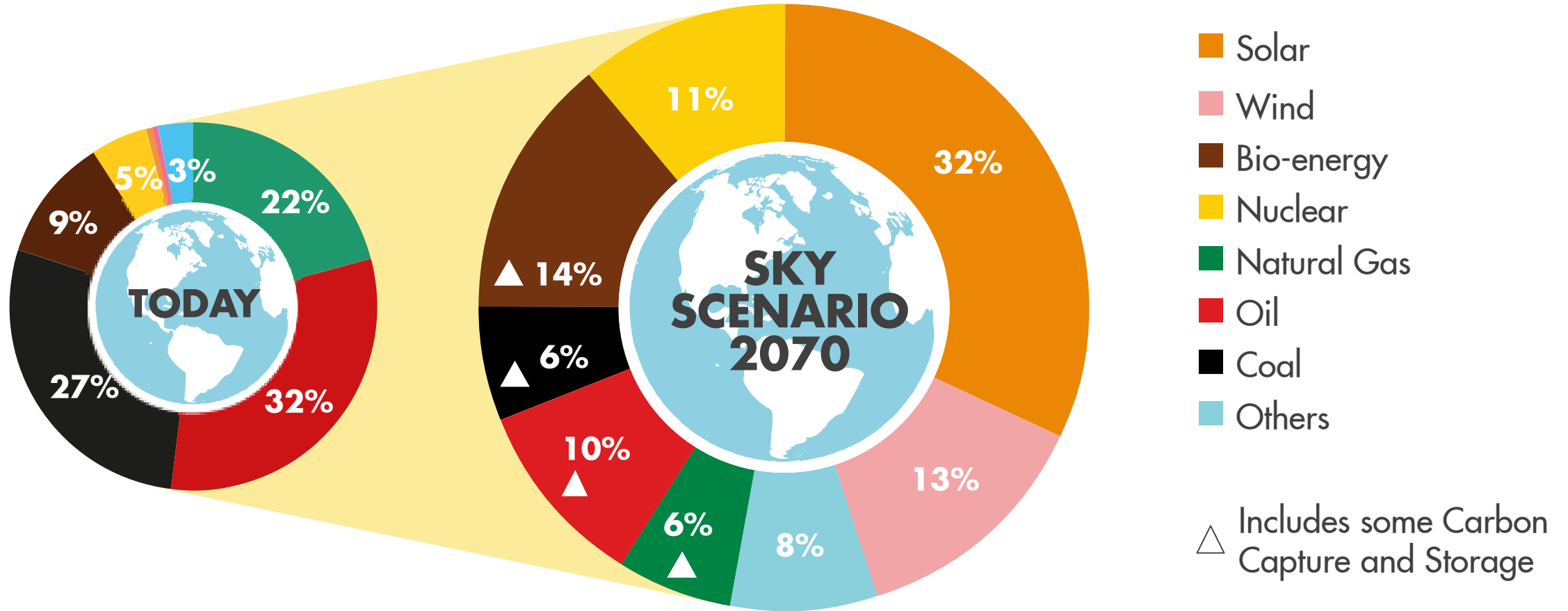
The New Lens Scenarios Family

Looking beyond Mountains and Oceans...



...to Sky

Sky Scenario: A possible primary energy mix for a net-zero emissions world



The size of the pie chart indicates growth of the energy system

Sky Scenario: Navigating 21st century turbulence



Demand growth

Difficult sectors

Stalled technologies

Abundant coal

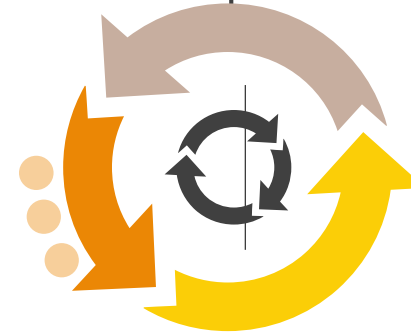
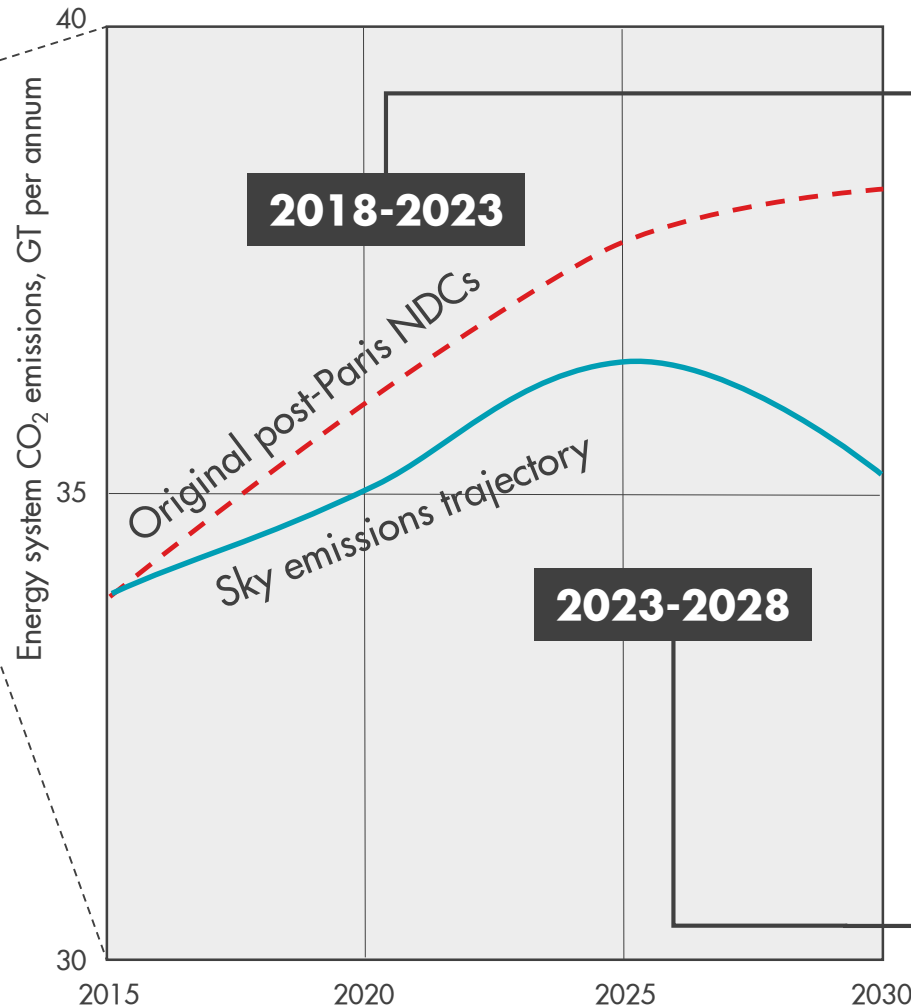
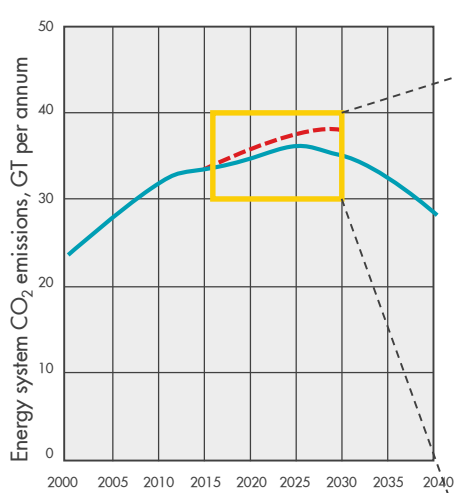
Efficiency rebound

Time



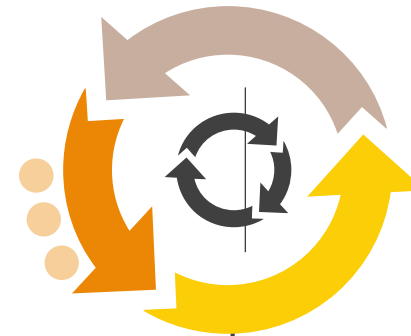
"A Better Life with a Healthy Planet"

Sky begins in today's economic & policy realities, ratchets up action, then goal-seeks within techno-economic possibilities



2018-2023

- Wide resubmission of NDCs before 2023 stocktake
- China shifts to a falling emissions pledge



2023-2028

- All NDCs reviewed and resubmitted by 2028 stocktake
- India indicates 2030s emissions plateau

Sky Scenario: Seven essential elements



Electrification of final energy

Grow new energy systems

Energy efficiency

Carbon pricing

Carbon capture and storage

End deforestation

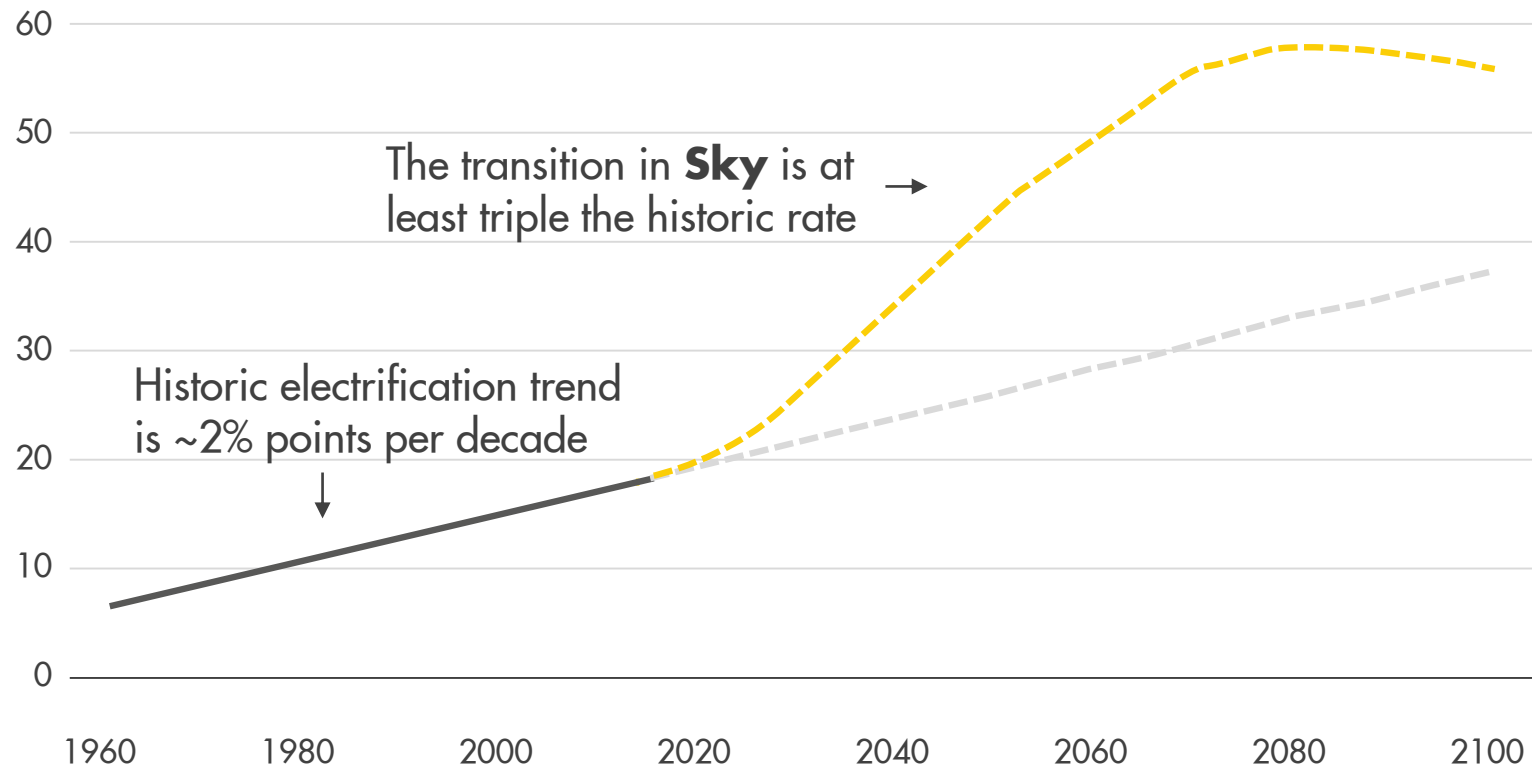


Underpinned by changing consumer mind-set

Sky Scenario: A major ramp-up in electrification

Current trends are not sufficient

Electricity as a % of final energy use



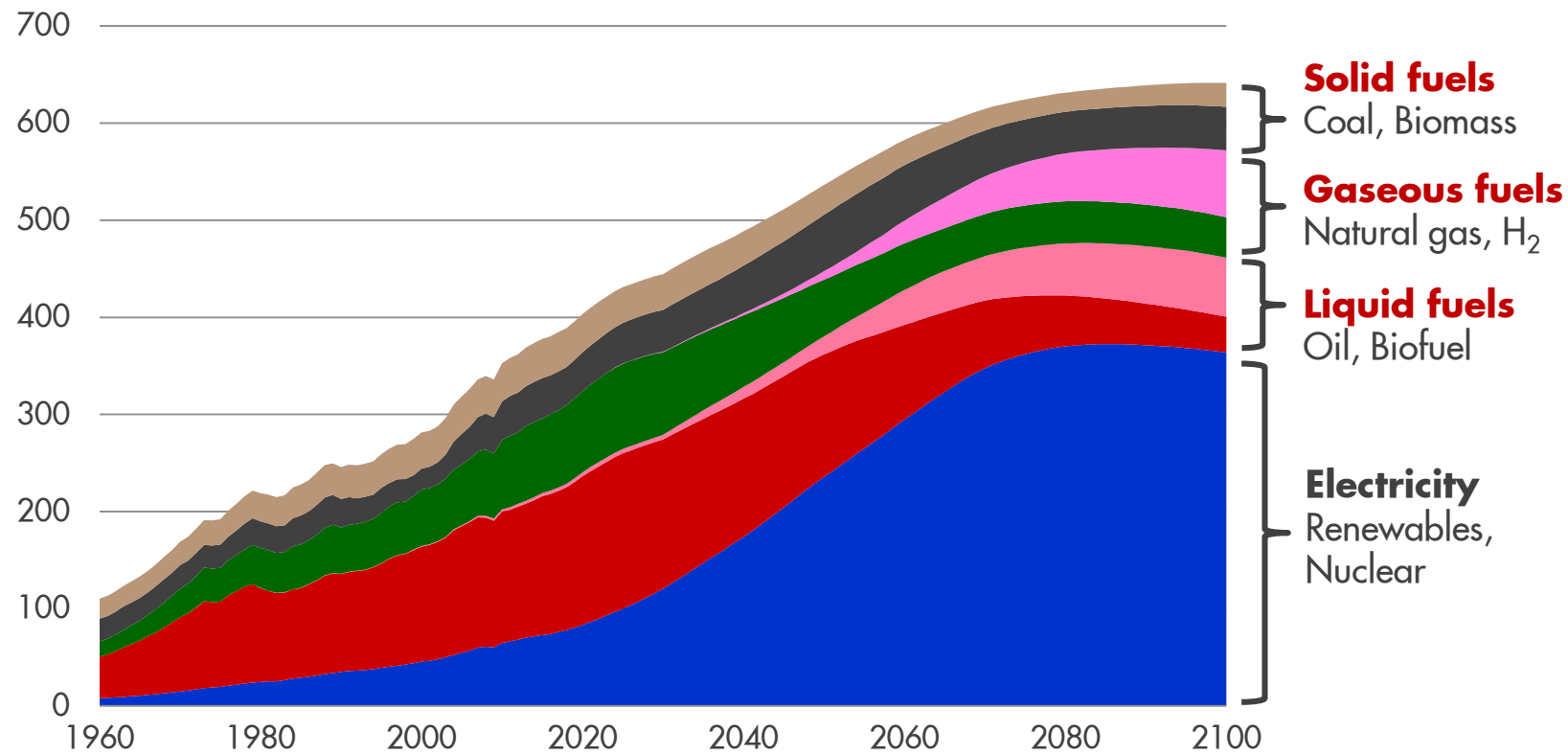
Source: Shell analysis, Sky scenario
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Sky Scenario: Deep electrification

But molecules remain important

World total final energy consumption, EJ/year



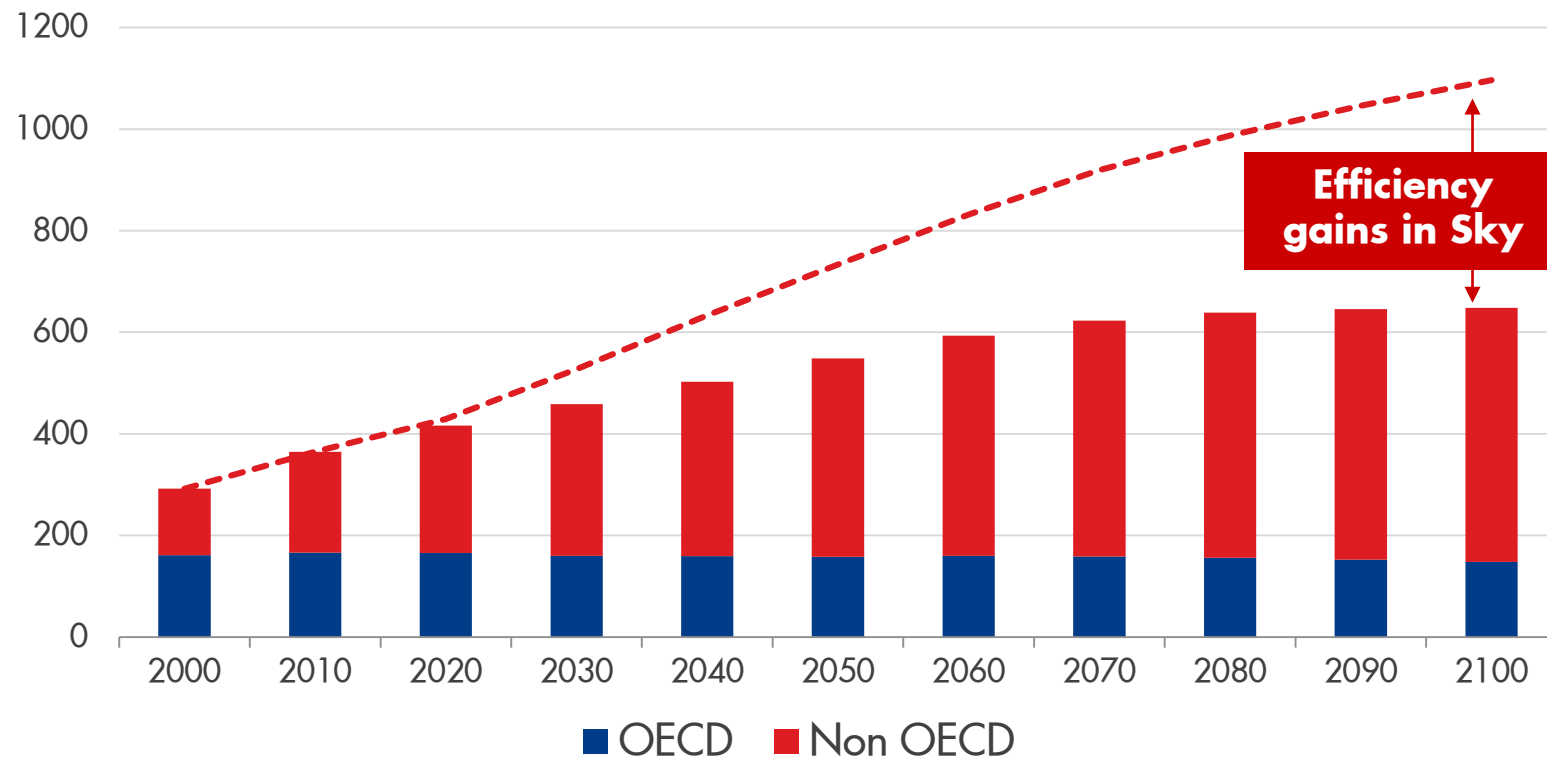
Source: Shell analysis, Sky scenario
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Sky Scenario: Energy efficiency is key

Step-change leads to gains above historical trends

World total final energy consumption, EJ/year



Source: Shell analysis, Sky scenario
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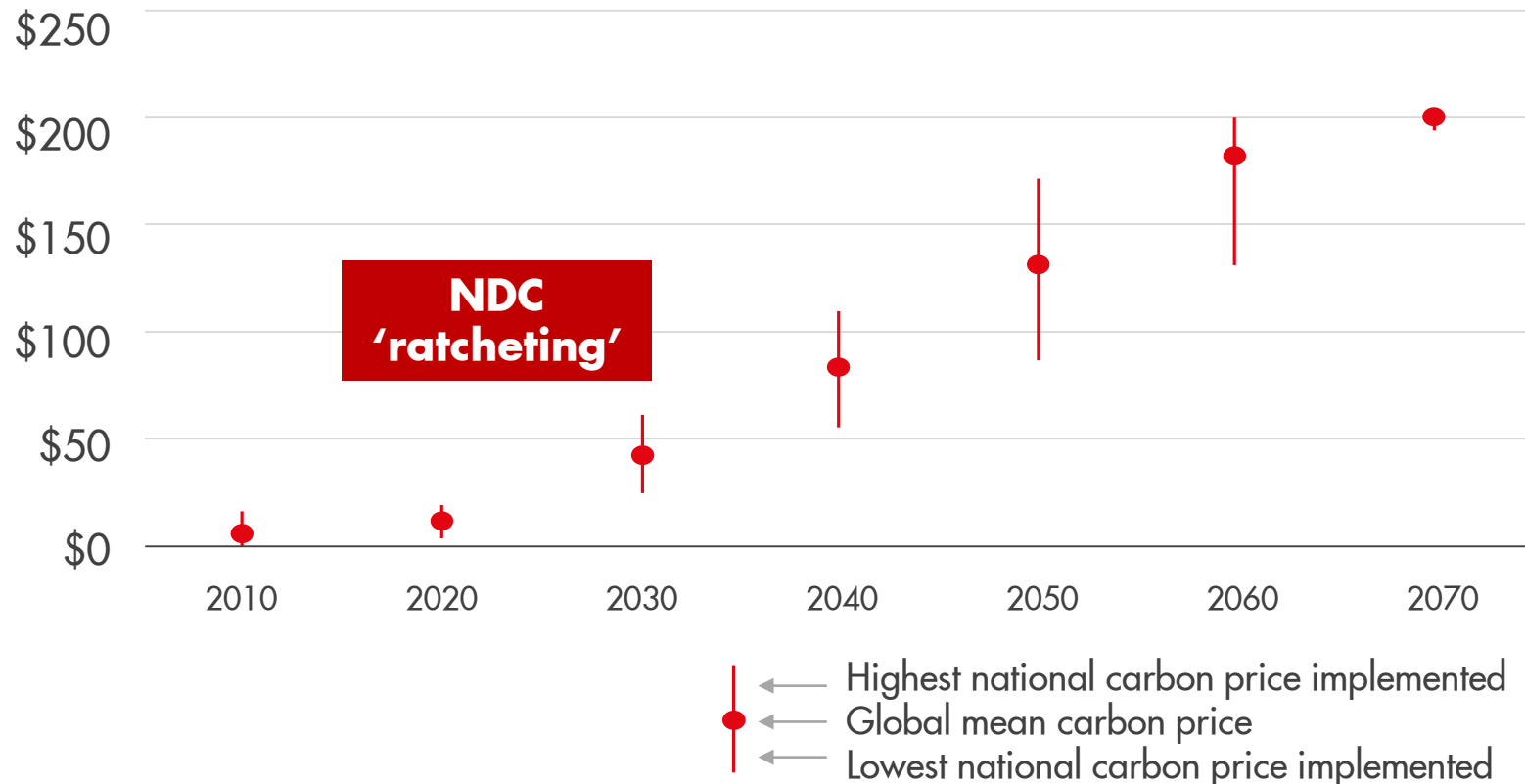


- Rising incomes in developing regions drive global energy demand
- This is moderated by significant energy efficiency improvements

Sky Scenario: Essential policies are established

Governments rapidly adopt carbon-pricing mechanisms

Carbon equivalent price, \$/tonne CO₂



Source: Shell analysis, Sky scenario
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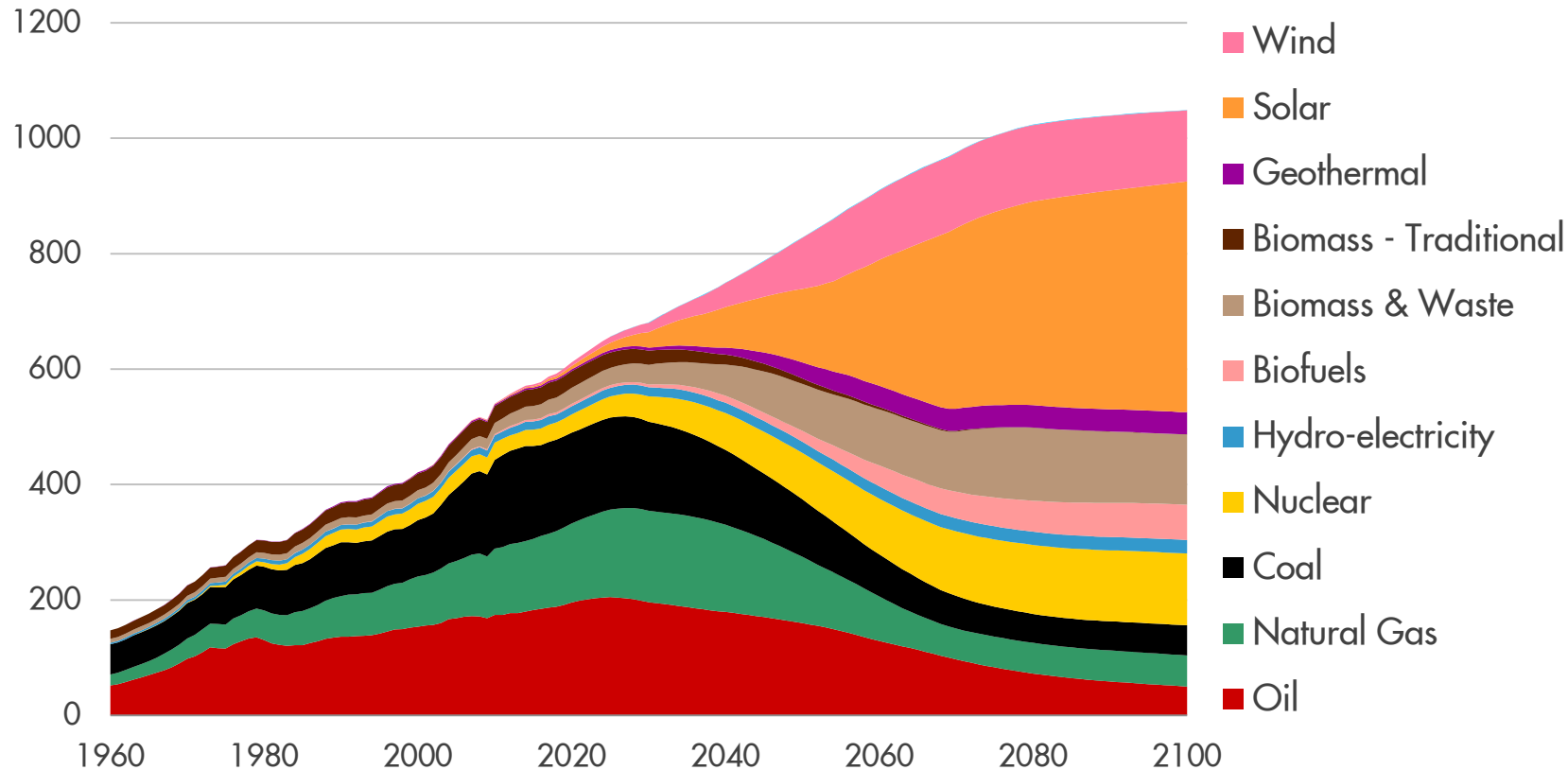
Unwavering acceleration and coordination:

- Market & fiscal mechanisms
- Standards & mandates
- Investments in infrastructure & technology

Sky Scenario: Major shifts in primary energy

By mid-century, renewables dominate

World total primary energy by source, EJ/year



Source: Shell analysis, Sky scenario
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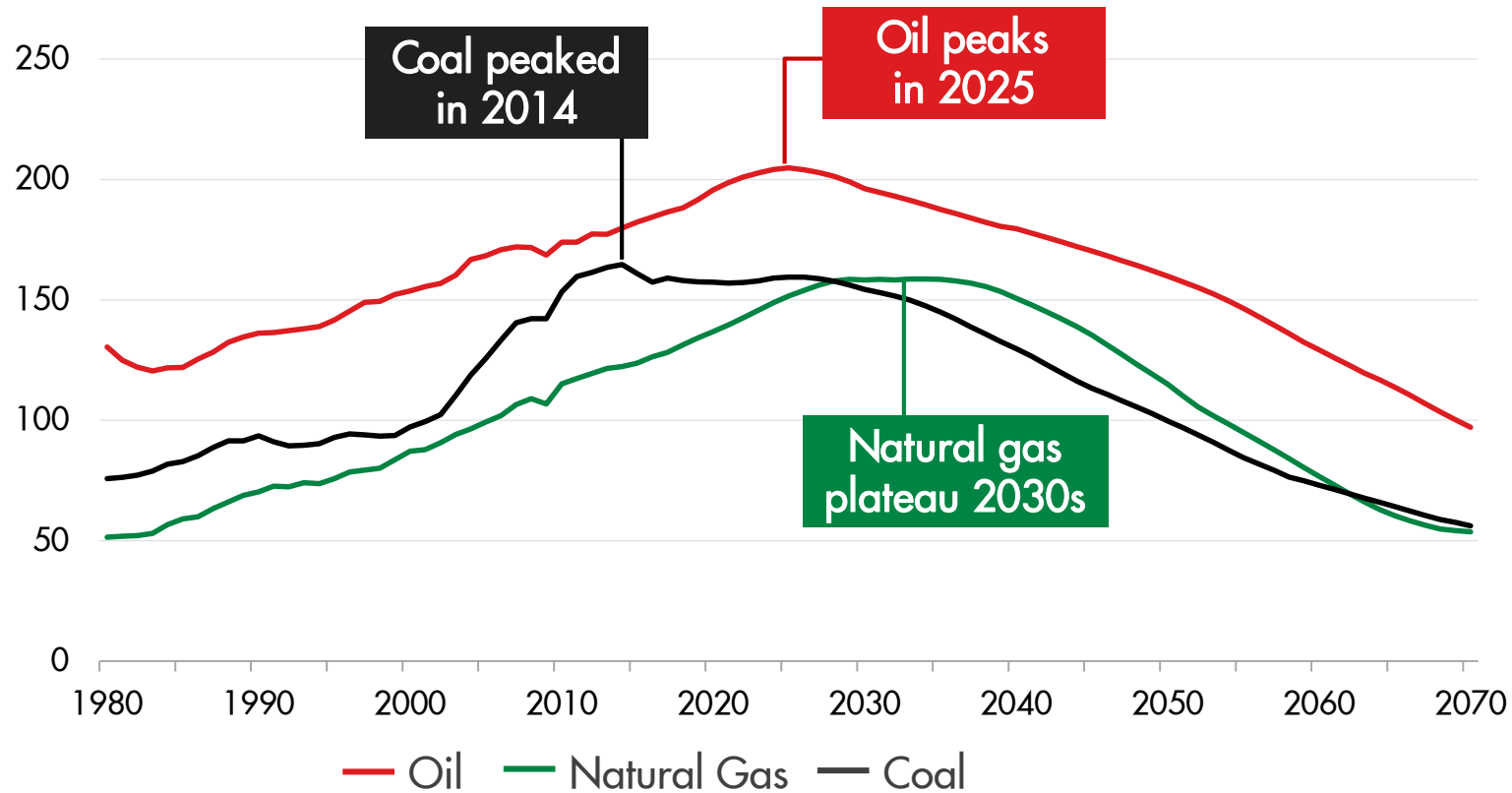


- Natural gas is a transition fuel as wind and solar deployment ramps-up
- Solar PV passes oil as the largest energy source in the 2050s

Sky Scenario: Fossil fuel demand peaks

Needs continue where substitution is difficult

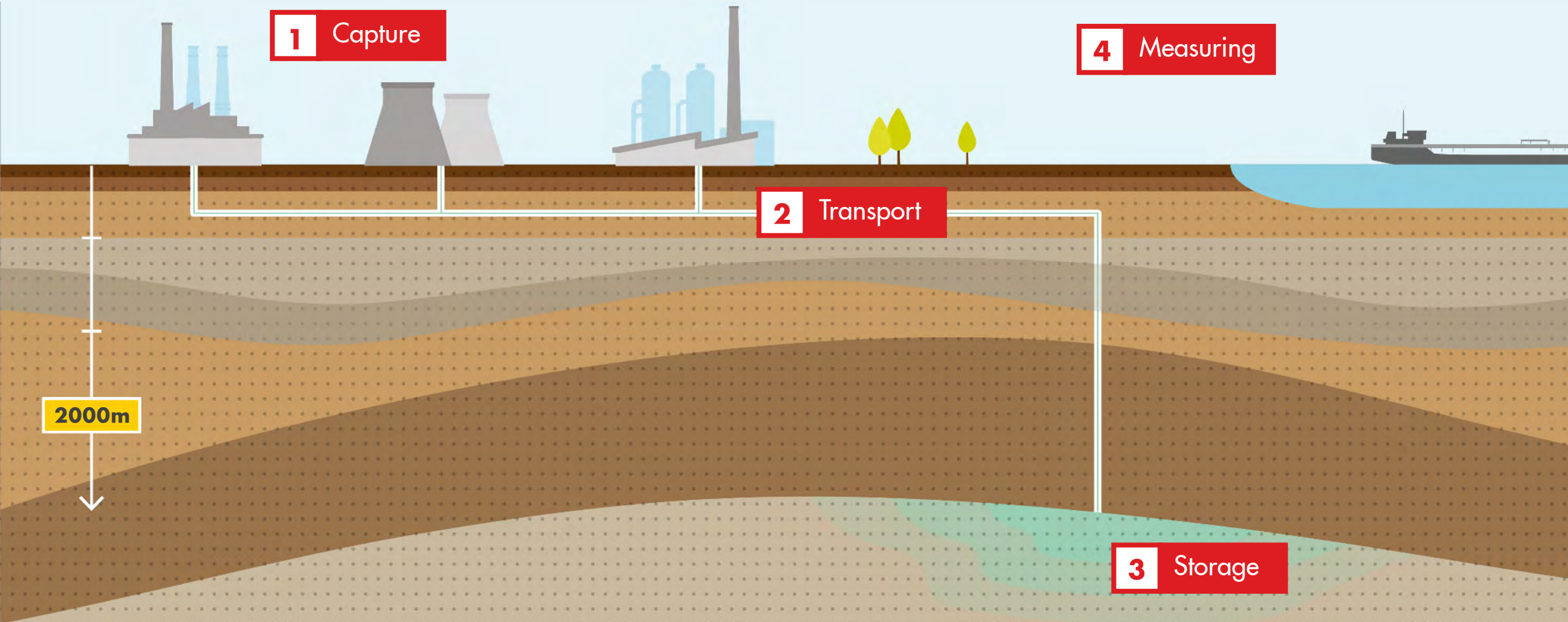
World total primary energy, EJ/year



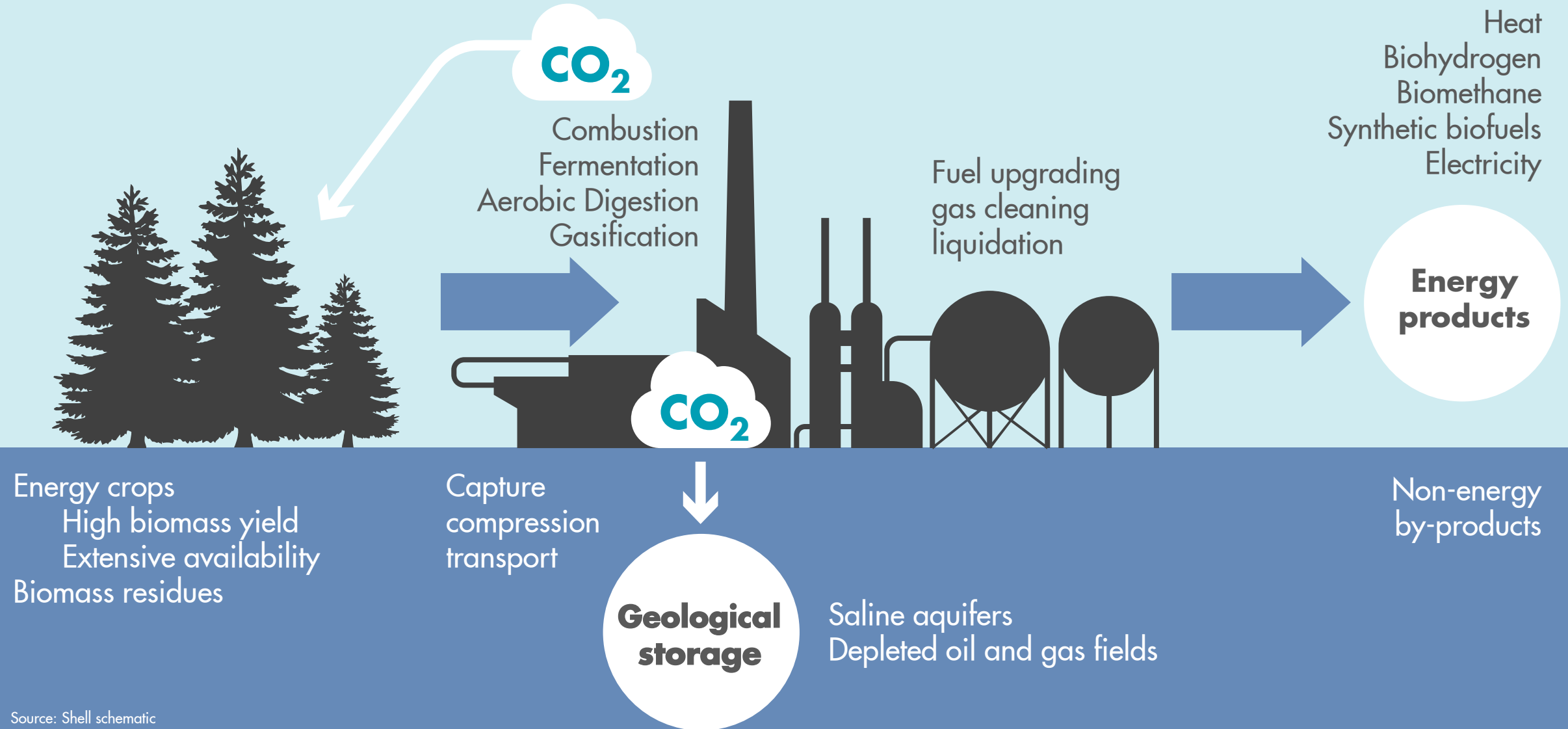
Source: Shell analysis, Sky scenario
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Sky Scenario: Carbon capture and storage (CCS) as a man-made sink

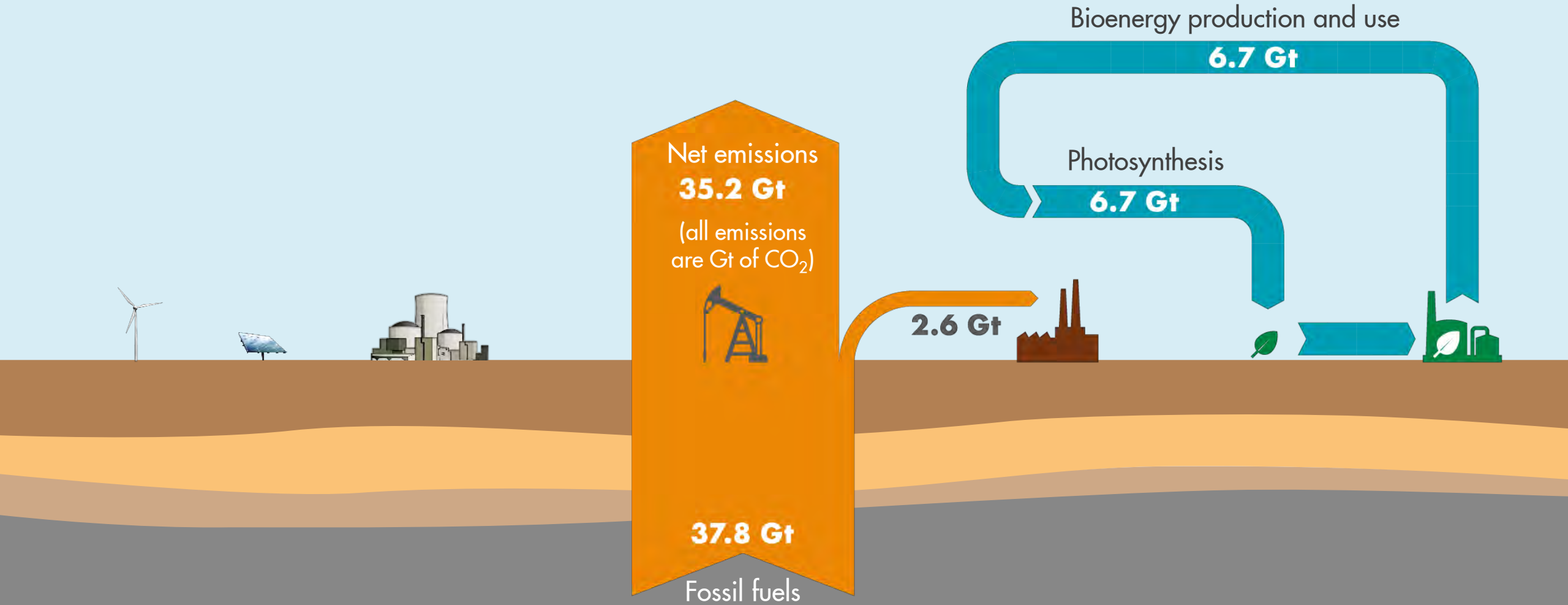


Sky Scenario: Bioenergy with CCS has an important role to play



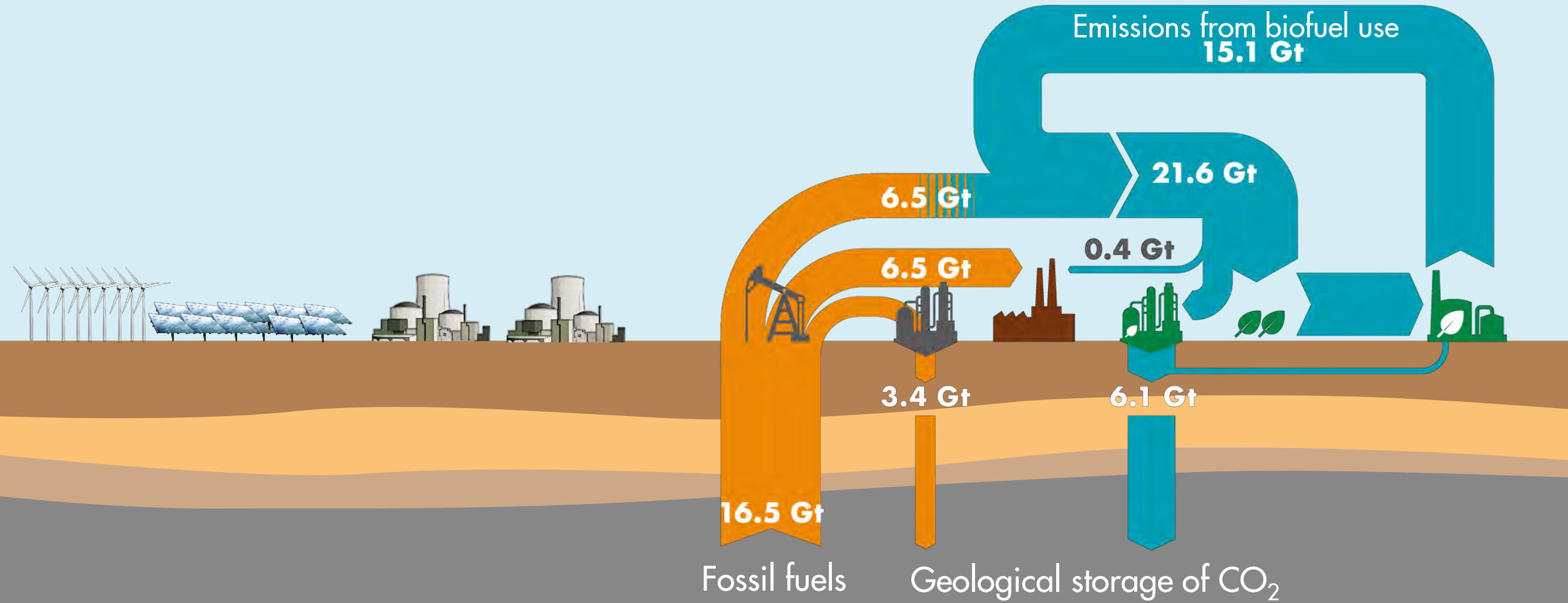
2020

Sky Scenario: Achieving the balance



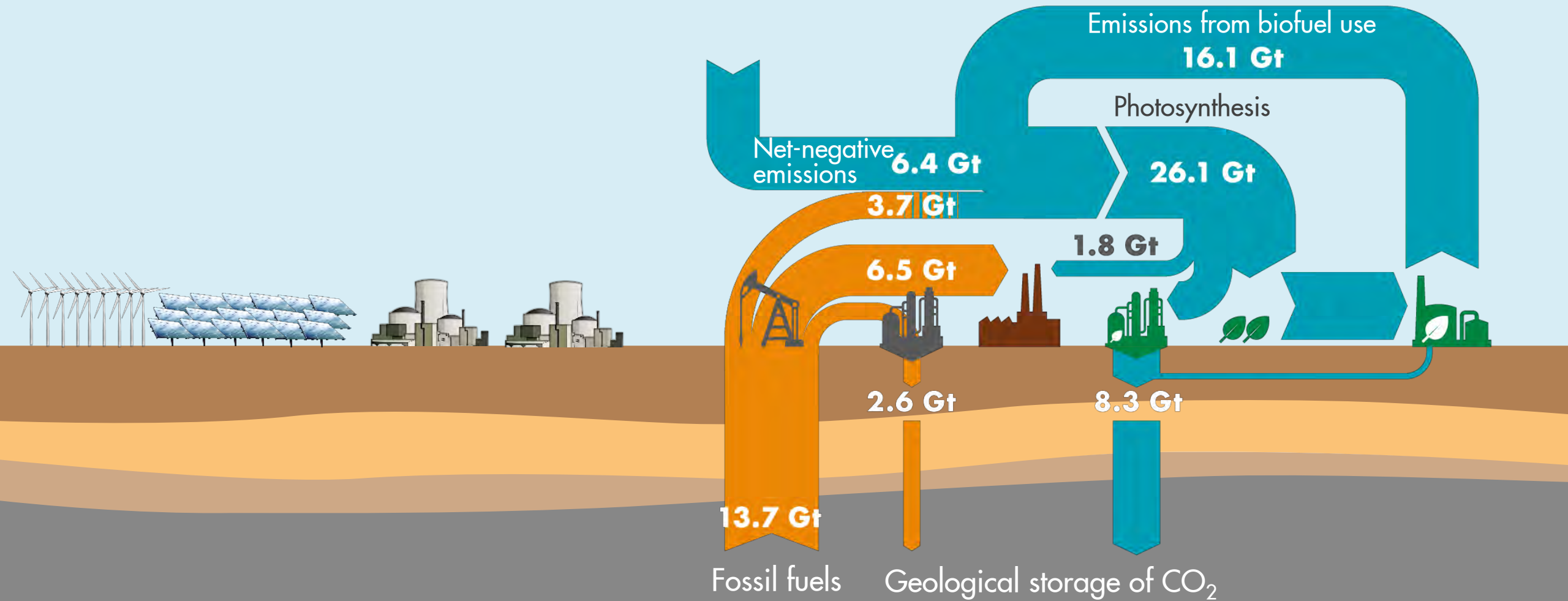
2070

Sky Scenario: Achieving the balance



2100

Sky Scenario: Achieving the balance



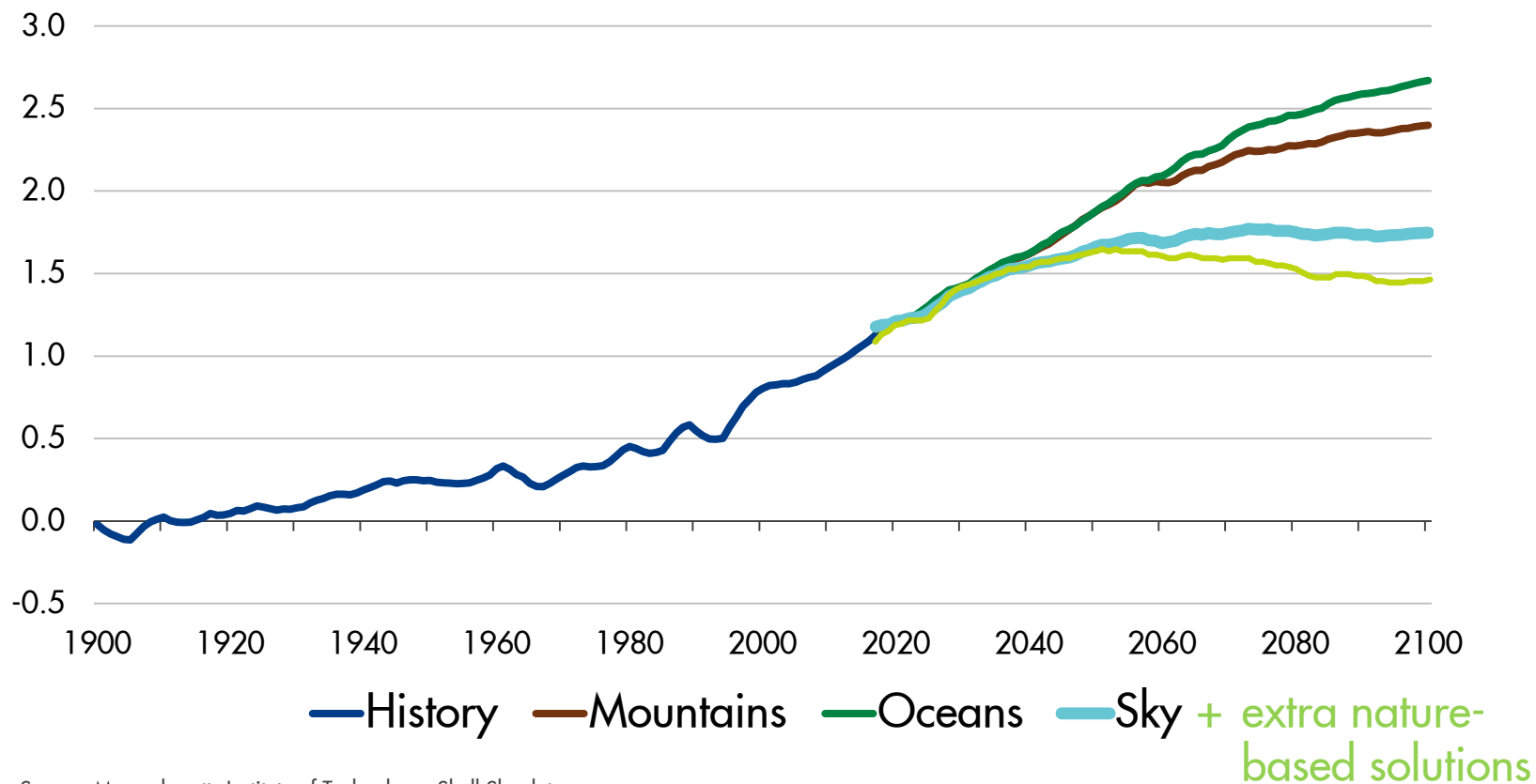
Sky Scenario: An end to deforestation by 2070



Sky Scenario: Meeting the Paris goal

MIT assessment of climate impact

Average global surface temperature rise (°C)



Source: Massachusetts Institute of Technology, Shell Sky data
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In addition, increasing global forest coverage by an area the size of Brazil offers potential to deliver the stretched 1.5°C ambition of the Paris Agreement

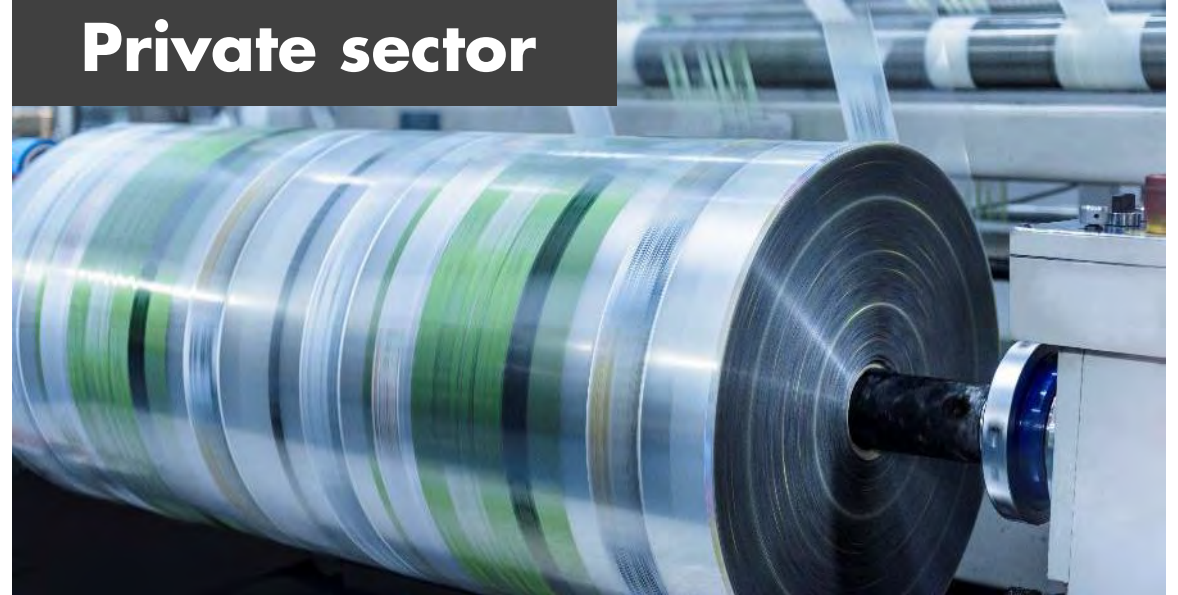
Meeting the Paris ambition = re-wiring the global economy in 50 years

Governments



- Promoting critical new pre-commercial technologies
- Developing key infrastructures
- Framing new market structures

Private sector



- The engine for commercial innovation and scaling
- Mass-deployment and integration of new technologies
- Providing customers with new possibilities

Acceleration is achieved through policy and technology uptake, and unprecedented degrees of cross-boundary collaboration

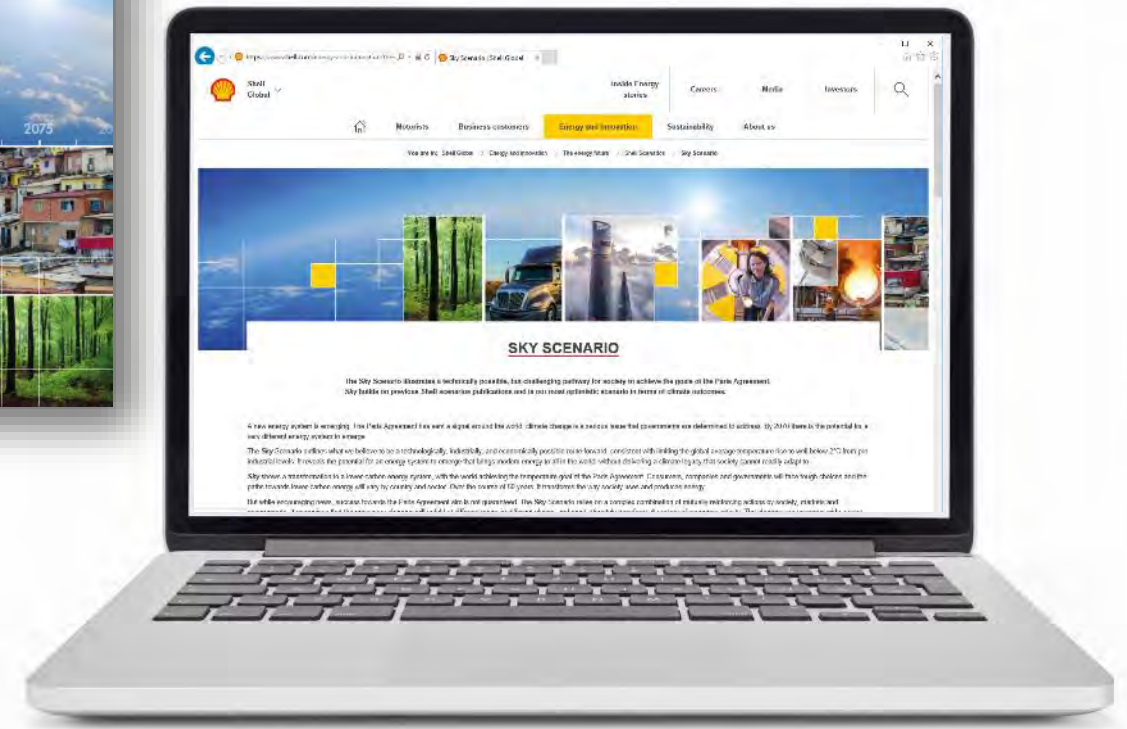
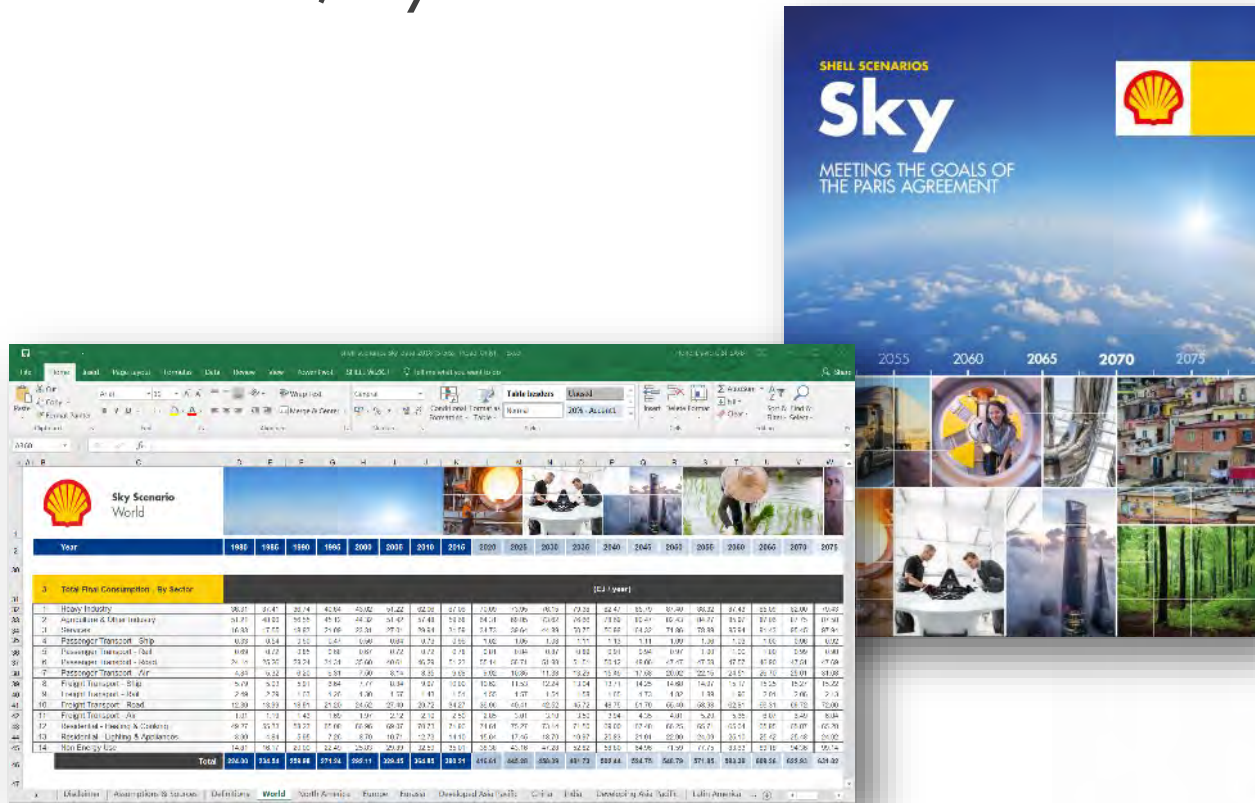


**“The future depends on
what we do in the present”**

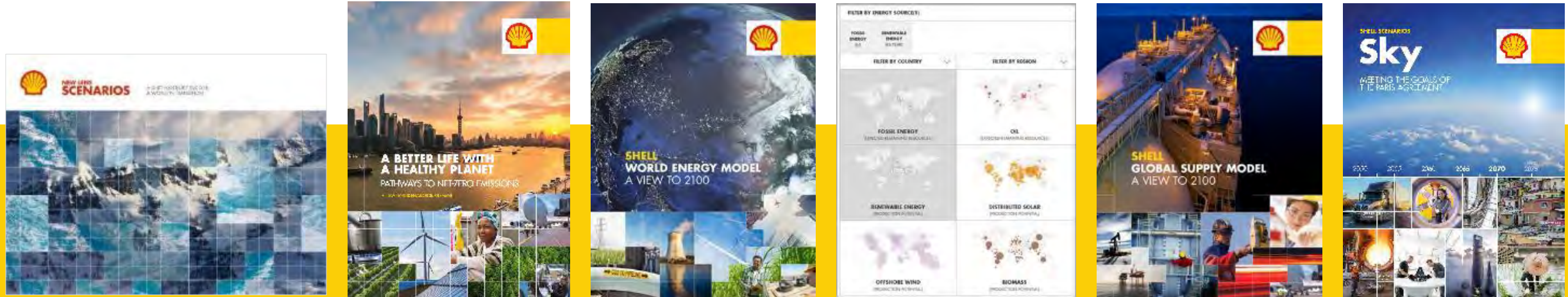
Mahatma Gandhi

Read more about Sky and download the data-set

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Q&A



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