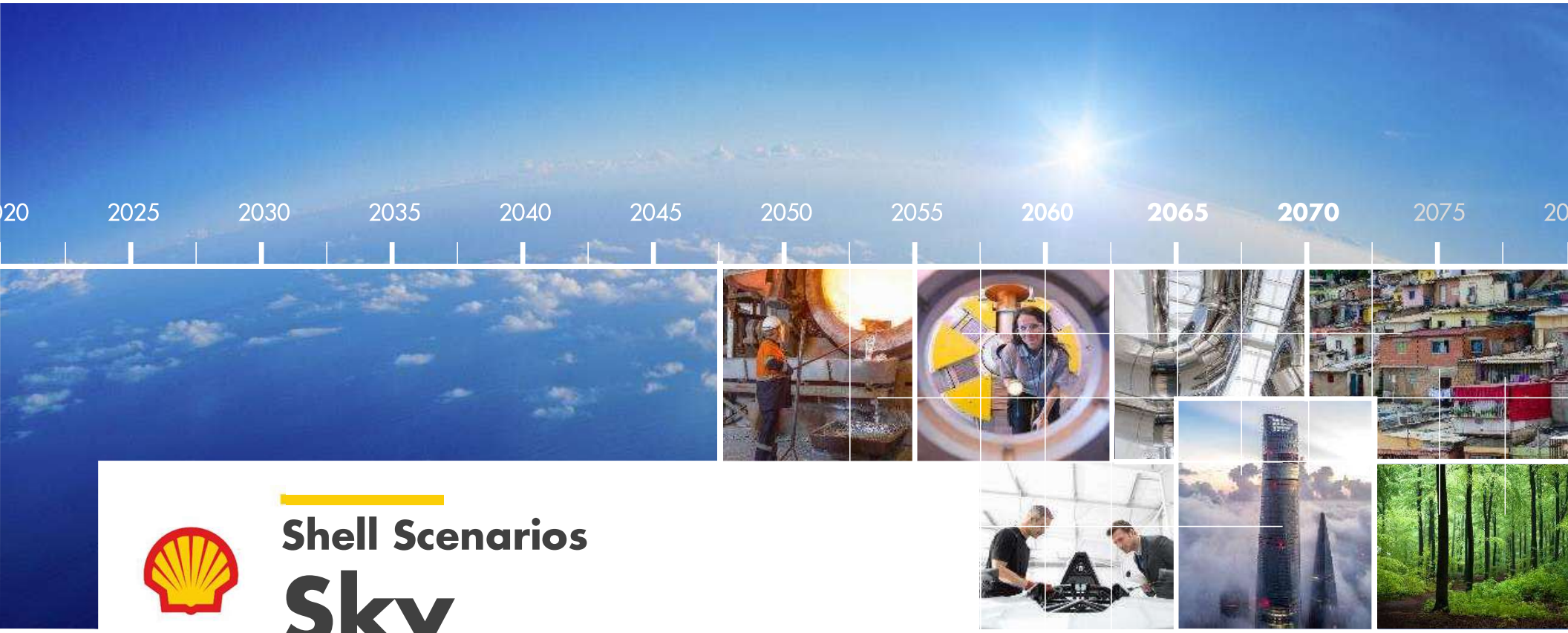

Shell Scenarios
Sky
Meeting the Goals of the Paris Agreement

Jason Klein
VP US Energy Transition Strategy

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October 2019

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.

The companies in which Royal Dutch Shell plc directly and indirectly owns investments are separate legal entities. In this presentation "Shell", "Shell Group" and "Royal Dutch Shell" are sometimes used for convenience where references are made to Royal Dutch Shell plc and its subsidiaries in general. Likewise, the words "we", "us" and "our" are also used to refer to Royal Dutch Shell plc and its subsidiaries in general or to those who work for them. These terms are also used where no useful purpose is served by identifying the particular entity or entities. ''Subsidiaries'', "Shell subsidiaries" and "Shell companies" as used in this presentation refer to entities over which Royal Dutch Shell plc either directly or indirectly has control. Entities and unincorporated arrangements over which Shell has joint control are generally referred to as "joint ventures" and "joint operations", respectively. Entities over which Shell has significant influence but neither control nor joint control are referred to as "associates". The term "Shell interest" is used for convenience to indicate the direct and/or indirect ownership interest held by Shell in an entity or unincorporated joint arrangement, after exclusion of all third-party interest.

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, **October 15, 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.

We may have used certain terms, such as resources, in this presentation that the United States Securities and Exchange Commission (SEC) strictly prohibits us from including in our filings with the SEC. U.S. investors are urged to consider closely the disclosure in our Form 20-F, File No 1-32575, available on the SEC website www.sec.gov.

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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 **The Path** **The Future**

The Present **The Path** **The Future**

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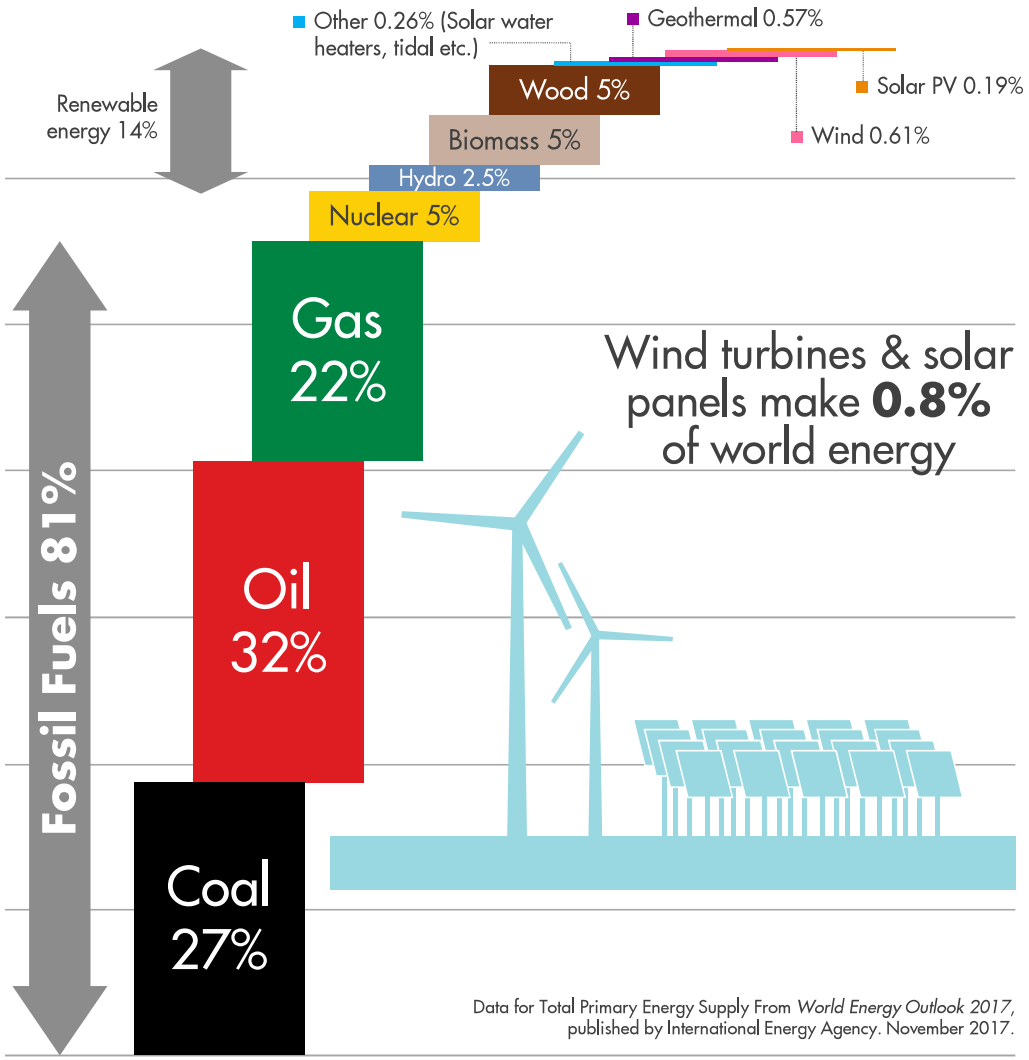
The energy system today

- 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)



Data for Total Primary Energy Supply From *World Energy Outlook 2017*, published by International Energy Agency. November 2017.

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The goals of the Paris Agreement

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

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

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

and 3 critical United Nations Sustainable Development Goals

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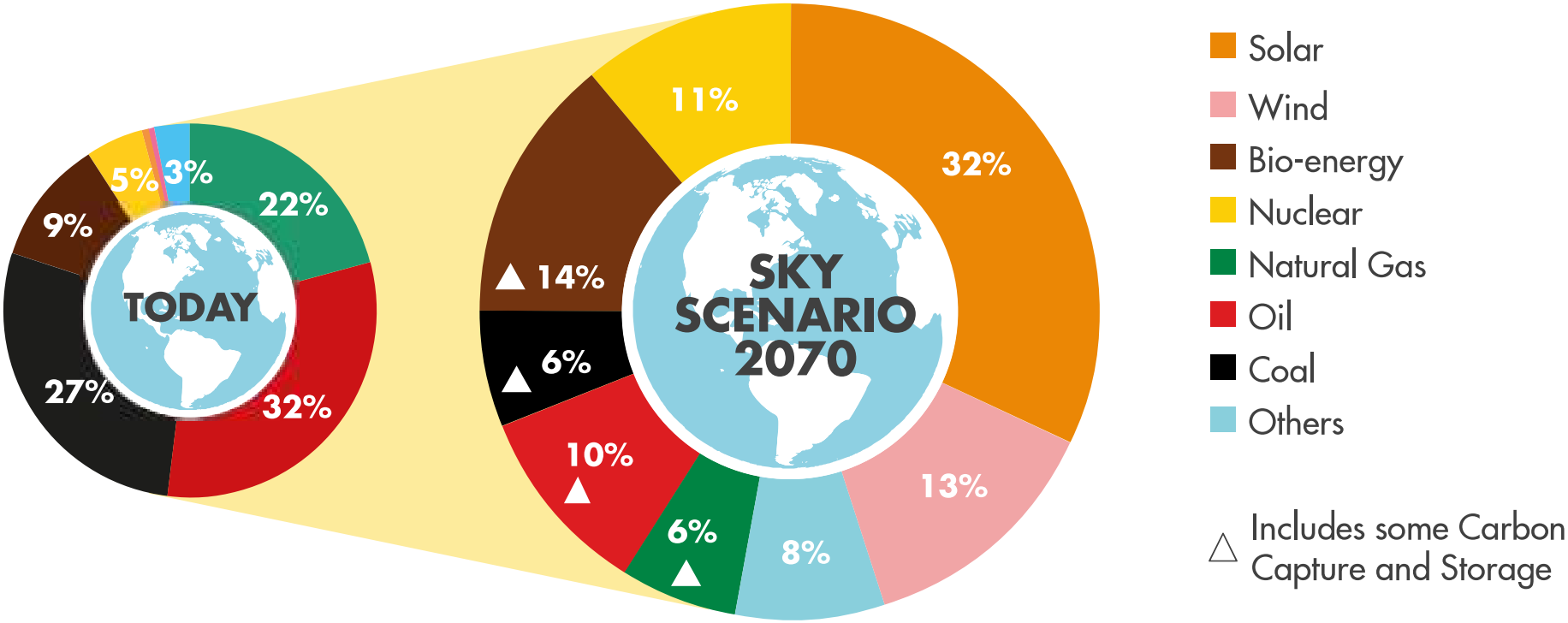
Sky Scenario: A possible primary energy mix for a net-zero emissions world



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

Source: Shell analysis, Sky scenario

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Sky Scenario: Navigating 21st century turbulence

Demand growth

Efficiency rebound

Abundant coal

Difficult sectors

Time

Stalled technologies

"A Better Life with a Healthy Planet"

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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

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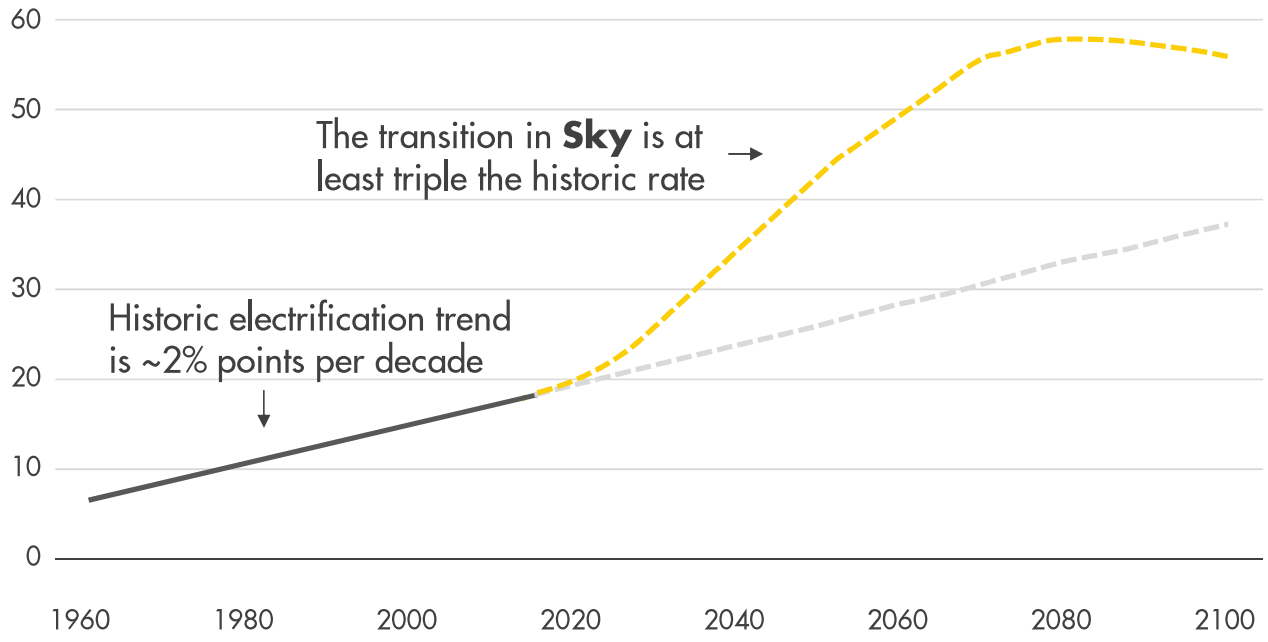
Sky Scenario: A major ramp-up in electrification

Current trends are not sufficient

Electricity as a % of final energy use



Source: Shell analysis, Sky scenario

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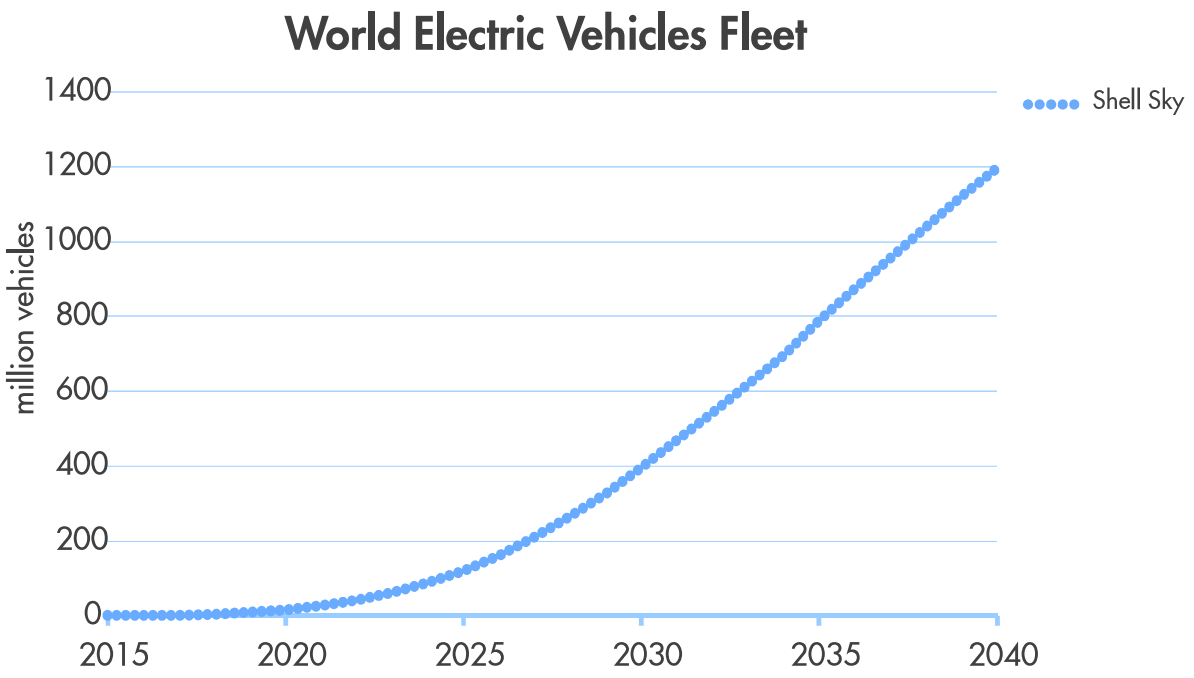
EV uptake in Sky is astronomical



- Sky assumes EVs being 100% of new sales by 2030 in leading economies
- Sky assumes all new passenger car sales are EV by 2050.

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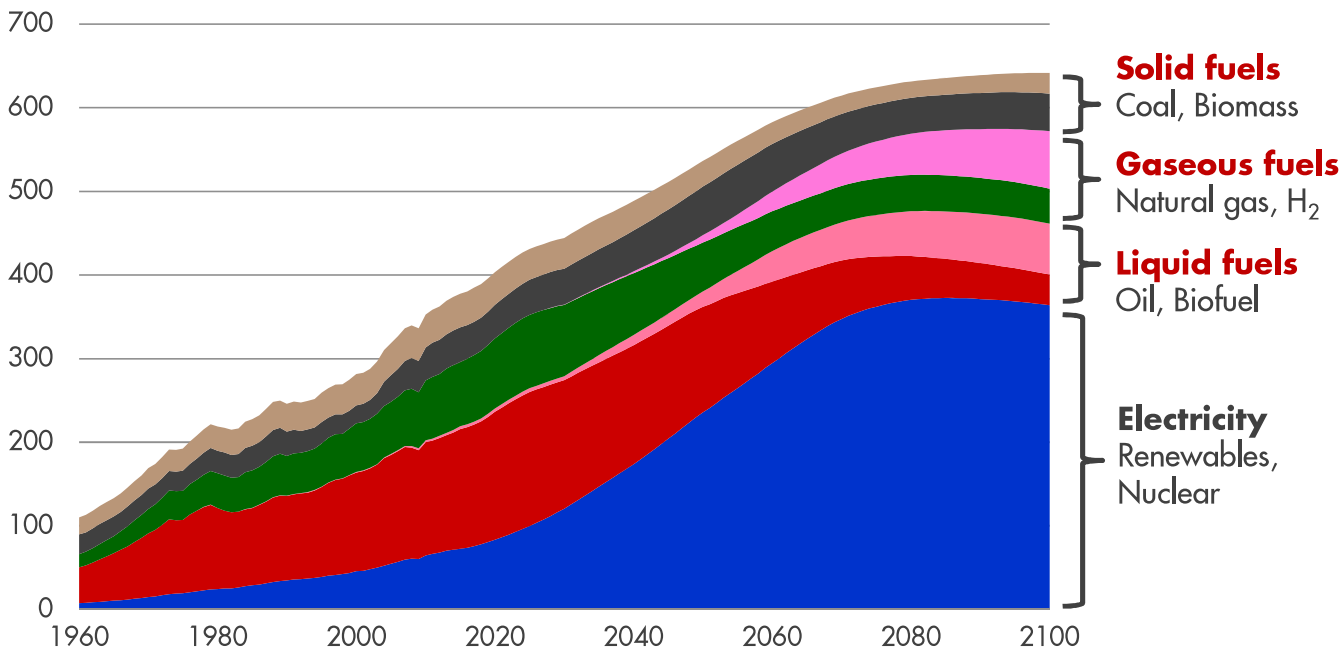
Sky Scenario: Deep electrification

But molecules remain important

World total final energy consumption, EJ/year



Source: Shell analysis, Sky scenario

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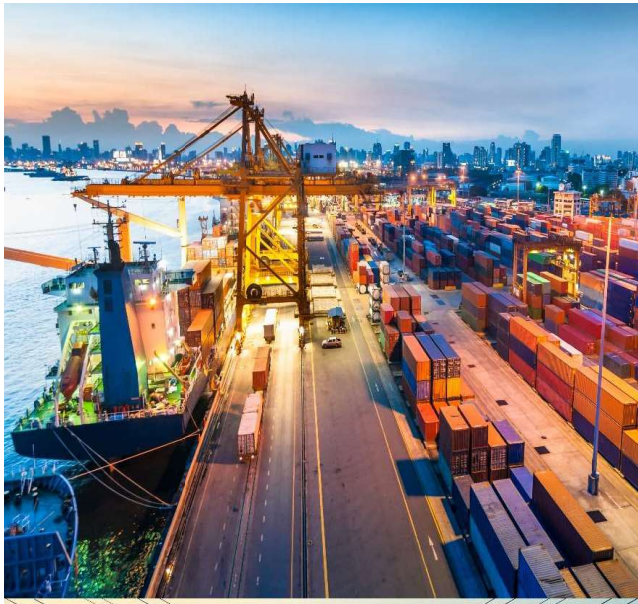
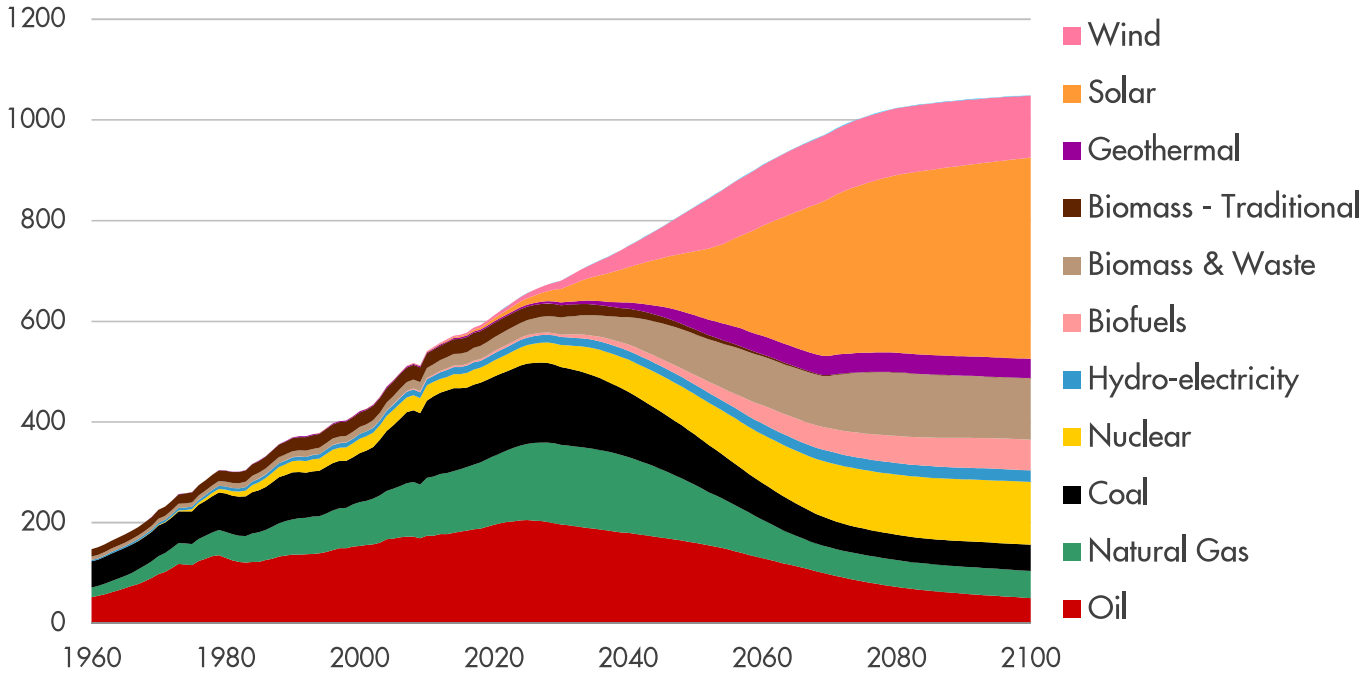


Sky Scenario: Major shifts in primary energy

By mid-century, renewables dominate

World total primary energy by source, EJ/year



Source: Shell analysis, Sky scenario

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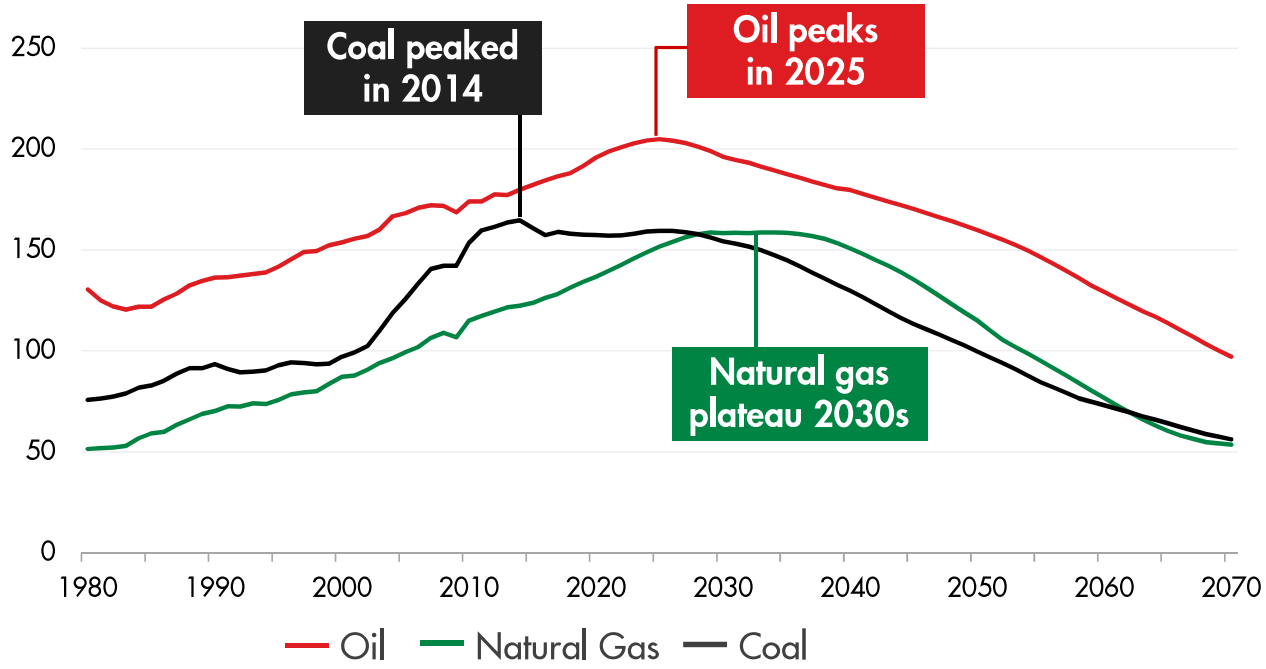
- Natural gas is a transition fuel as wind and solar deployment ramps-up
- Solar PV passes oil as the largest energy source in the 2050s

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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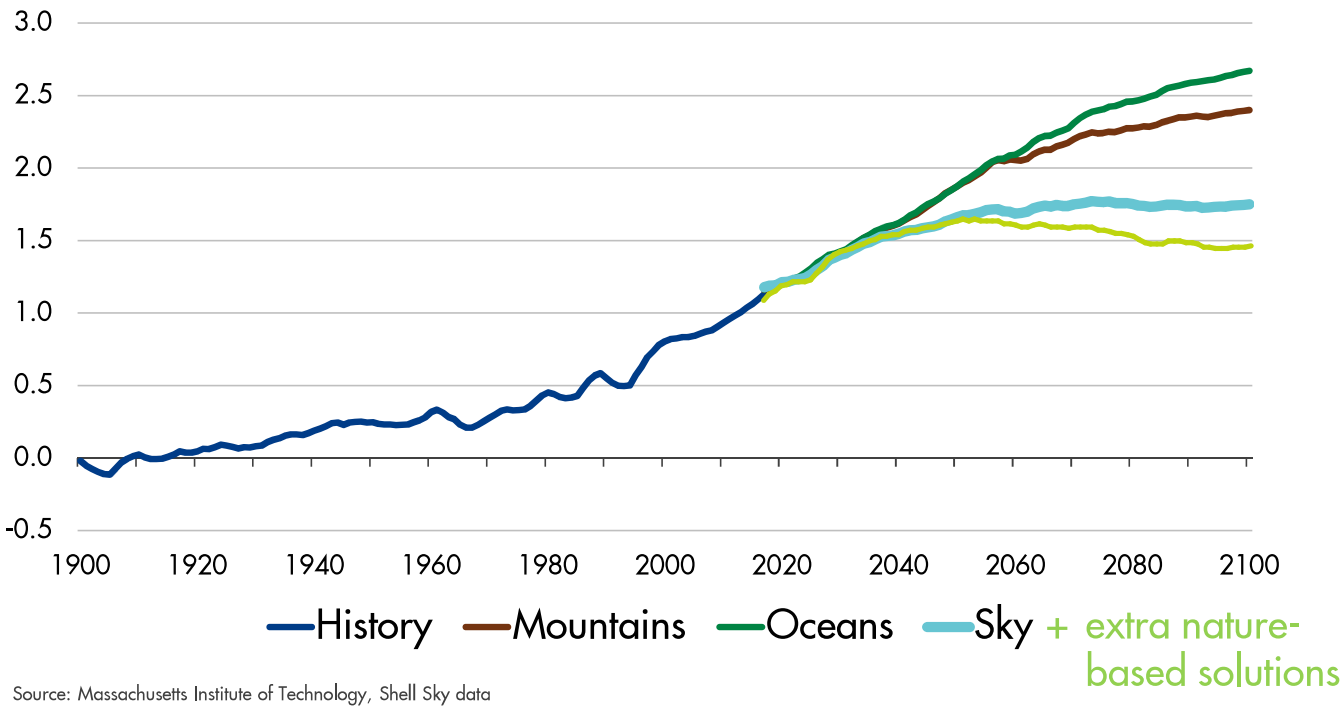
Sky Scenario: Meeting the Paris goal

MIT assessment of climate impact

Average global surface temperature rise (°C)



Source: Massachusetts Institute of Technology, Shell Sky data

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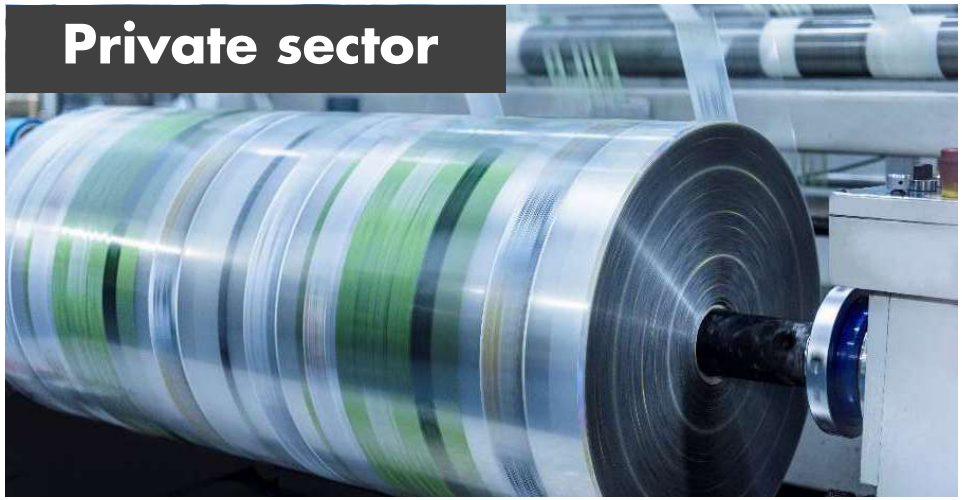
In addition, increasing global forest coverage by an area the size of Brazil offers potential to deliver the stretched 1.5°C ambition of the Paris Agreement

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

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Shell New Energies

Investments, Acquisitions and Ventures

2016 SHELL NEW ENERGIES ESTABLISHED

- Blauwwind, Netherlands
- Sense Home Monitor, USA
- Kite Power Systems, UK

2017

- NewMotion, NL (HQ)
- Hydrogen Stations, UK & California
- SBI BioEnergy, Canada
- IH2, India
- First Utility, UK (HQ)
- SolarNow*, Uganda (base)
- SteamaCo*, UK (base)
- Sunseap, Singapore (HQ)
- Innowatts, USA
- Greentown Labs, USA
- Fare Pilot**, UK (HQ)
- Connected Freight**, Philippines

2018

- Silicon Ranch*, USA
- Cleantech Solar*, Singapore
- Moerdijk, Netherlands
- Atlantic Shores Offshore Wind*, USA
- Mayflower Wind Energy*,USA
- TetraSpar*, Norway
- Light and heavy duty hydrogen stations, USA (California)
- Junction City biogas plant, USA (Oregon)
- GI Energy, USA
- Rheinland Hydrogen Electrolyser, Germany
- Shell Energy Inside**, USA
- Husk Power*, India (base)
- SunFunder*, Kenya (base)
- HyET, NL
- Axiom Exergy, USA
- Ample, USA
- WonderBill**, UK

2019

- Greenlots, USA
- W2C, Netherlands
- Makani, Norway
- TetraSpar*, Norway
- sonnen, Germany
- Limejump, UK
- EcoSmart Solutions, USA
- Convergent Energy storage at Shell facilities, Canada
- Aurora, USA
- AutoGrid, USA
- Nordsol, Netherlands
- Sense Photonics, USA
- LO3 Energy, USA
- Maniv Moblity, Israel
- Corvus Energy, Norway
- Asperitas, Netherlands
- Ravin.ai, UK and Israel
- Nature-based Solutions, Australia, Malaysia, Netherlands and Spain
- Orb Energy, India

KEY

- Energy Solutions
- Digital Businesses
- Energy Access
- Wind
- Solar
- New Fuels
- Shell Ventures
- Nature-based Solutions
- * Minority investment, JV or consortium
- ** Product launch date

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Addressing logistics

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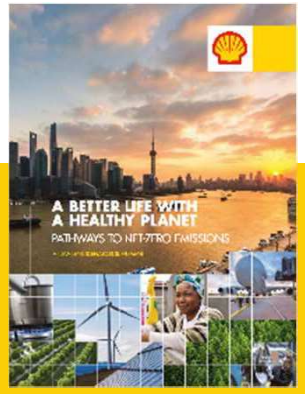
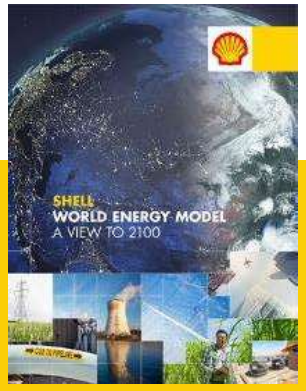
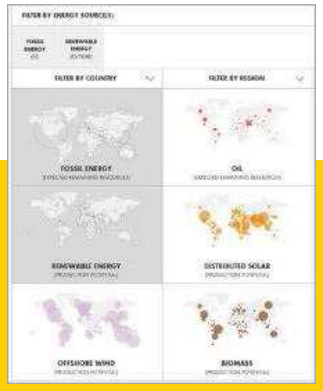
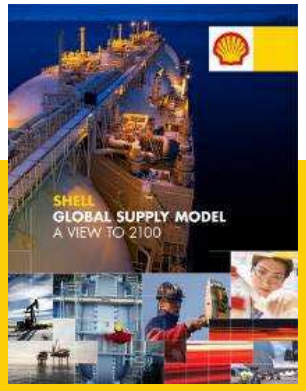
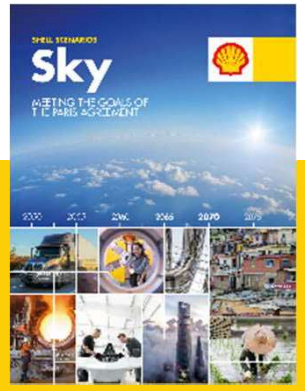
Q&A











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