ENERGY TRANSITIONS COMMISSION

Better Energy, Greater Prosperity

Achievable pathways to low-carbon energy systems

***The Better Energy, Greater Prosperity* report presents ambitious but realistic pathways to halve carbon emissions by 2040 and limit global warming to well below 2°C, while growing economies and ensuring affordable, reliable and sustainable access to energy for all. But decision-makers must act immediately to accelerate and extend clean electrification across the economy, drive energy productivity and decarbonize the hard-to-electrify sectors within industry and transport.**

Removing the technical, economic and policy barriers to achieving this and meeting the Paris objective, however challenging, is within our reach. The transition to low-carbon energy systems would deliver important social benefits – with for instance dramatically improved air quality leading to longer and healthier lives – and economic opportunities related to the development of technologies and innovative business models.

"Ambitious but realistic"

Cutting carbon emissions from 36 Gt today to 20 Gt per annum by 2040 is technically and economically feasible, but we must achieve faster progress. Simultaneously, it is possible to ensure universal access to 80-100 GJ of affordable, reliable, clean energy per person per annum – the threshold required for an acceptable standard of living.

Key conclusions of the report include:

- **Falling costs of renewables and batteries make cost-effective, clean electricity unstoppable** and essential to the transition to a low-carbon, energy-abundant world.
- **There is still untapped potential to improve energy productivity** – how much GDP is created for each unit of energy input. Growth of 3% per annum could be achieved with the right policies and implementation.
- **Rapid progress is now required on other technologies, including bioenergy, hydrogen and all forms of carbon capture and sequestration, to drive complete decarbonization.** But even with large scale CCS deployment, which is currently wayoff track, fossil fuels use must fall 30% by 2040, with rapid decline of unabated coal.

57% fall

in carbon emissions by 2040 compared to BAU

3%

energy productivity improvement p.a.

Near 100%

renewables power grid cost-competitive by 2035

OUR COMMISSIONERS

Poppy Allonby
Managing Director, Natural Resources, BlackRock

Laurent Auguste
Senior Executive Vice-President, Innovation and Markets, Veolia

Tony Cudmore
Head of Sustainability and Public Policy, BHP Billiton

Bernard David
Chairman, The Global CO_2 Initiative

Pierre-André de Chalendar
CEO, Saint-Gobain

Al Gore
Chairman, Generation Investment

Stuart Gulliver
Group Chief Executive, HSBC

Chad Holliday
Chairman, Royal Dutch Shell

Jules Kortenhorst
CEO, Rocky Mountain Institute

Rachel Kyte
Special Representative to the UN Secretary-General; CEO, Sustainable Energy For All

Alex Laskey
President and Founder, OPower

Auke Lont
President and CEO, Statnett

Ajay Mathur
Director General, The Energy and Resources Institute

Philip New
CEO, Catapult Energy Systems

Riccardo Puliti
Senior Director, Energy and Extractives Global Practice, World Bank

Mukund Rajan
Chairman, Tata Global Sustainability Council

Purna Saggurti
Chairman, Global Corporate and Investment Banking, Bank of America Merrill Lynch

Lorenzo Simonelli
CEO, General Electric Oil & Gas

Andrew Steer
President and CEO, World Resources Institute

Nicholas Stern
Professor, London School of Economics

Peter Terium
CEO, innogy

Laurence Tubiana
CEO, European Climate Foundation

Nigel Topping
CEO, We Mean Business

Adair Turner
Chair, Energy Transitions Commission

Jean-Pascal Tricoire
Chairman and CEO, Schneider Electric

Timothy Wirth
Vice Chair, United Nations Foundation

Kandeh Yumkella
Former CEO, Sustainable Energy For All

Changwen Zhao
Director General, Department of Industrial Economy, Development Research Center of the State Council of China

Cathy Zoi
President, Odyssey Energy

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CHANGE LEADERS: URGING AMBITIOUS AND APPROPRIATE ACTION FOR EFFECTIVE TRANSITION

The ETC brings together fossil-fuels, power and industrial companies, together with investors, environmental NGOs and researchers, from the developing and developed worlds.

The diverse members of the ETC, who together have produced this report, are agreed on the vital importance of cutting carbon emissions to meet the Paris objectives, as well as on how that transition can be achieved, while fostering social and economic progress.

From challenges to opportunities

The ETC describes four interdependent transitions which together would halve emissions by 2040 while delivering universal access to affordable and reliable energy. Each country must develop its own pathway to low-carbon energy systems that provide affordable and reliable energy for all.

4 PATHWAYS TO LOW-CARBON ENERGY SYSTEMS

Accelerate clean electrification

By 2040, half of required carbon emissions reductions compared to a business as usual scenario could come from the combination of the decarbonization of power generation and the electrification of a wider set of activities in the transport and buildings sectors.

- The cost of renewables is falling and by 2035, it will be possible to run a near 100% renewable power system at an all-in cost of less than $7c per kWh.
- Expanding clean electricity into transport, buildings (especially heat) and some key industrial processes will both drive cost-effective decarbonization and increase the flexibility of the power system.

Decarbonize beyond power

Cutting carbon emissions from activities that cannot be electrified cost-effectively in transport and industry is essential and will become increasingly important as the potential for additional clean electrification is exhausted.

- Multiple solutions exist to decarbonize transport modes and industrial activities that cannot be electrified cost-effectively; these include bioenergy, hydrogen, carbon capture and sequestration, including both storage and the potential conversion of CO_2 into products
- Significant R&D and deployment support is needed to develop these solutions at scale and trigger cost reductions.

Improve energy productivity

A revolution in the pace of energy productivity improvement could deliver a third of required carbon emissions reductions by 2040.

- Achieving 3% (versus around 1.5% today) energy productivity improvement per annum globally is technically possible.
- Structural economic changes towards a more service-based, digital and circular models, combined improved urban design would be needed to deliver the 3% improvement target.

Optimize remaining fossil fuels use

These transitions could result in a 30% decrease in fossil fuels use by 2040, but fossil fuels would still represent 50% of the energy mix.

- Switching from coal to gas, managing methane leakages and stopping routine flaring are essential to concentrate fossil fuels use in applications with the highest value.
- The world needs a ramp-up in all forms of carbon capture and sequestration (conversion into CO_2-based products, underground storage and natural carbon sinks) and a rapid decrease in fossil fuels use to meet climate objectives.

2 KEY ENABLERS

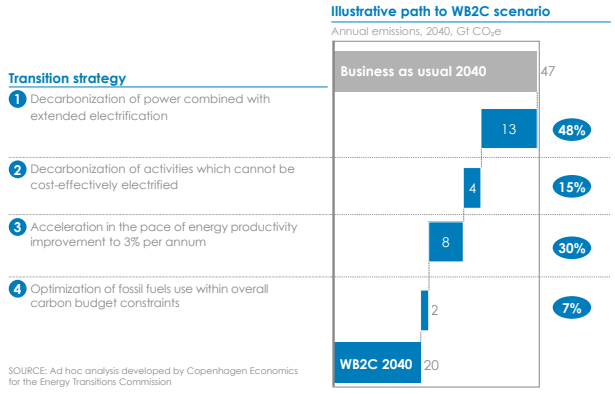
Ramp up investments

- The investment required for this transition – an additional $300-600 billion annually – does not pose a major macroeconomic challenge where global savings and investment reach $20 trillion annually.
- A major shift in the mix of investments is needed in the energy system from fossil fuels (-$3.7 trillion) to low-carbon technologies (+$6 trillion) and energy-efficient equipment and infrastructure (+$9 trillion) over 2015-2030.

Step up public policy

- Countries must put in place coherent and predictable national policies to drive the required energy transitions. The revision of INDCs represents a crucial opportunity to focus policies on key priorities and the step up the pace of change.
- Carbon pricing and phase-out of fossil fuels subsidies are essential drivers of the energy transitions, but additional policy levers, including R&D, industrial policies, market design, performance standards and infrastructure investments, are equally important. These levers need to be brought together into integrated policy packages to drive and accelerate progress.

4 transition strategies need to be pursued simultaneously to achieve a well below 2°C scenario



The report is available on **www.energy-transitions.org**
For further information, please contact
info@energy-transitions.org