Challenges to a smooth energy transition

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Dr. CHARLES ELLINAS
Atlantic Council / CEO e-CNHC
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Overview

- Challenges in achieving Paris
- Need orderly, stable and affordable energy transition
- NDC-based policies will not achieve 2degC
- Need acceleration and full implementation
- Affordable energy is key
- Renewable energy technologies paving the way
- But fossil fuel industry is becoming more competitive
- 2017 was a rude awakening
Transition without unexpected consequences
Mission impossible?

High emissions leading to dangerous warming

Country pledges (NDCs) for 2030 exceed the warming limit of the Paris Agreement

Decreasing emissions compatible with a well below 2°C warming limit

Global energy demand

- Fossil fuels provide 85% of global primary energy, with only 3% by renewables
- By 2040 global primary energy will increase by 35% in line with 1.7 billion population growth and rising prosperity
- This will increase carbon emissions by 14%
- World will need to move into even faster transition
- In this, by 2040 renewables account for a third of global primary energy, but with 50% fossil fuels
- Without accelerated policies carbon budget will be exhausted in less than 20 year
Global energy & carbon emissions

2040

ster transition (EFT)
Global energy & carbon emissions

- TPES increases 40% by 2050 under current and planned policies.
- Accelerated deployment of renewables and energy efficiency result in 30% decline in TPES.

Total primary energy supply (EJ/yr):

- 2015: 15% Renewable, 85% Non-renewable
- 2050 Reference Case: 27% Renewable, 73% Non-renewable
- 2050 REmap Case: 66% Renewable, 34% Non-renewable
Challenges

- So far variable success with Paris Agreement
- Need for drastic carbon emission reduction, enforceable, with immediate implementation
- Is the world ready to accept new drastic policies?
- Investment in low carbon strong but so far not sufficient
- There is no cheap option
- How can we get to the 2050/2100 goals?
- How can energy transition be achieved in an orderly manner?
Energy transition

- Climate protection: would you trust Trump or Merkel?
- Reality is that US reduced power generation carbon emissions by 25% between 2005-2017
- Germany has been strong on words but poor on delivery
- Integrated technology and policy approach needed
- One success is increasing adoption of carbon pricing – UK
- Power generation well on the way to be decarbonised due to low renewables costs
- But other sectors lack behind
- Various scenarios proposed to achieve 2degC energy transition
Climate protection: paving the way or standing in the way?
Shell’s SKY scenario

- Shell claims its SKY scenario will get us to Paris
- It requires combination of mutually reinforcing drivers being rapidly accelerated by society, markets, governments
- It begins with current structure
- Followed by 10 years of aggressive policy commitments
- After that it becomes progressively driven by ambition to achieve 2degC, while adopting evolving technology
- Allows for realistic transition
- Satisfies main requirements: ‘to enable society’s orderly, stable, affordable transition to low carbon global economy, without major disruption and unexpected consequences’
Shell’s SKY scenario – impact on global temperature rise
Shell’s SKY scenario – impact on global carbon emissions
Shell’s SKY scenario – impact on global energy sources
Illustration of Shell’s SKY scenario by 2050

Net emissions:
- 1.8 Gt from biofuel use
- 0.1 Gt from photosynthesis
- 3.3 Gt
- 1.7 Gt
Concluding remarks

- Need pragmatic and achievable approaches
- Can country pledges be relied upon?
- Dealing with complex societal problems
- Just saying ‘increased ambition is greatly needed and must be accelerated’ is not sufficient. It must also be realistic.
- Shell’s SKY scenario offers such a pathway
- Biggest challenges in Asia and Africa, but also our region
- Solutions need to be commercially competitive, help reduce energy costs, contribute to a better quality of life
- Reduction of carbon emissions will then be the outcome – it will not be the cause of change.
Main sources of power in the ME

<table>
<thead>
<tr>
<th>Country</th>
<th>Main Source of Power</th>
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<tbody>
<tr>
<td>SAUDI ARABIA</td>
<td>60% Oil</td>
</tr>
<tr>
<td>UAE</td>
<td>98% LNG</td>
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<tr>
<td>EGYPT</td>
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<td>100% LNG</td>
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<td>OMAN</td>
<td>97.5% LNG</td>
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<td>LEBANON</td>
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Sources: IEA and IRENA
Power generation by source in the ME

2035 TOTAL: 483 GW

- 9 Nuclear
- 16 Hydropower
- 63 Solar
- 0.68 Other Renewables
- 11 Wind

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