IEF-IRENA RIYADH, KSA
L. Chevalier 20th Feb 2020
ENERGY OUTLOOK 2040
Total presents two scenarios: Momentum and Rupture

**Momentum**

Energy demand based on

- Announced policies and regulations
- EV: 50% of sales, 32% of total fleet by 2040
- Adopting state of the art technologies
- Energy intensity falls by 2.2 % pa

**Rupture**

Anticipating technological breakthroughs and strong shift in public policies

- Mass electricity storage
- Massive switch to renewable power generation
- Faster electrification in all sectors
- Steeper decrease of energy intensity, ending with same energy demand level in 2040 as in 2015

LC Total IEF-IRENA Seminar Riyadh Feb 20th 2020
**RUPTURE SCENARIO**
Technological breakthroughs and strong shift in public policies

<table>
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<th>Drivers</th>
<th>Impacts</th>
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<tr>
<td>• Huge energy intensity improvements (&gt; 3%/yr) or</td>
<td>• 2040 energy consumption similar to 2015</td>
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<td>• Reduced economic growth</td>
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<td>• Industry, transport and building: faster electrification with mass electricity storage</td>
<td>• Power demand to double by 2040</td>
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<td>• EV share in light vehicles fleet &gt; 60% in 2040</td>
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<td>• Power generation: massive switch to renewables</td>
<td>• Coal demand divided by more than 3 by 2040, substituted by renewables</td>
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<td>• Carbon storage large scale development</td>
<td>• 2.5 GtCO₂/yr stored in 2040</td>
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Integrating climate into strategy
Taking into account anticipated market trends

Global energy demand
Mboe/d

- **Renewables**
- **Nuclear**
- **Coal**
- **Oil**
- **Natural gas**

2017
2040
2040
2040

Momentum* Rupture* IEA < 2°C

- **Focusing on oil projects** with low breakeven
- **Expanding along the gas value chain**
- **Developing profitable & sizeable low carbon electricity**
- **Investing in carbon neutrality businesses**

* Scenarios Total Energy Outlook (Feb. 2019)
** IEA 2018 Sustainable Development Scenario (SDS)
A rupture scenario requires:
- Strong shift in public policies
- Technological breakthroughs

For significant energy consumption changes:
- Massive energy efficiency improvements
- Much faster electrification
- Big shift in the Power generation mix
- Significant carbon capture
EXAMPLE OF SUPPORT POLICIES AND THEIR IMPACT ON YEARLY ADDITIONS (PV)

USA
The Investment Tax Credit (ITC) created in 2005 is extended

Germany / Italy
FIT’s reduced

China
Severe FIT’s reduction announced


Yearly capacity additions in GW

- Consistent growth after ITC implementation
- Rush before cut announced in 2016
- PV additions are severely cut by 8
- Rush in anticipation: PV additions doubled

Changes in regulation and support policies are game changers with significant impacts on the market.
Forecasting is therefore highly dependant from the assessment of the support policies and their effects.
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