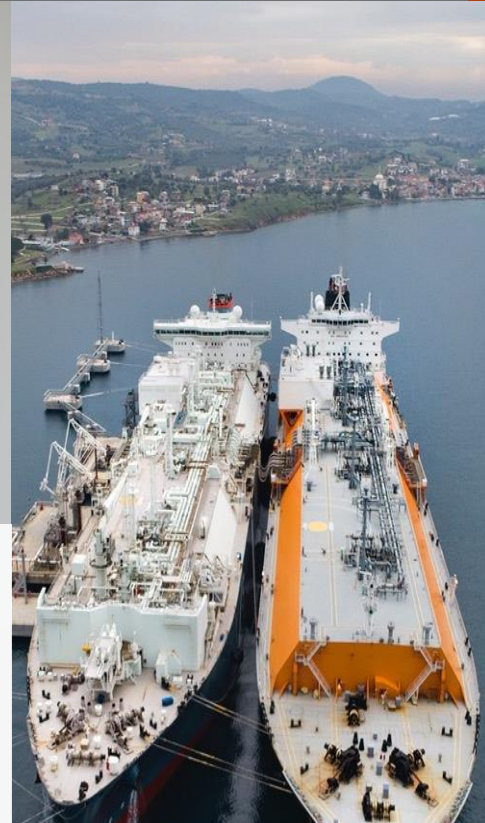


IEF-IRENA RIYADH, KSA

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

RUPTURE SCENARIO

Technological breakthroughs and strong shift in public policies **policies**

Drivers

- Huge **energy intensity improvements** (> 3%/yr) or
- **Reduced economic growth**

- Industry, transport and building: **faster electrification** with mass electricity storage

- Power generation: massive switch to **renewables**

- **Carbon storage** large scale development

Impacts

- **2040 energy consumption** similar to 2015

- **Power demand to double** by 2040
- **EV share in light vehicles fleet > 60%** in 2040

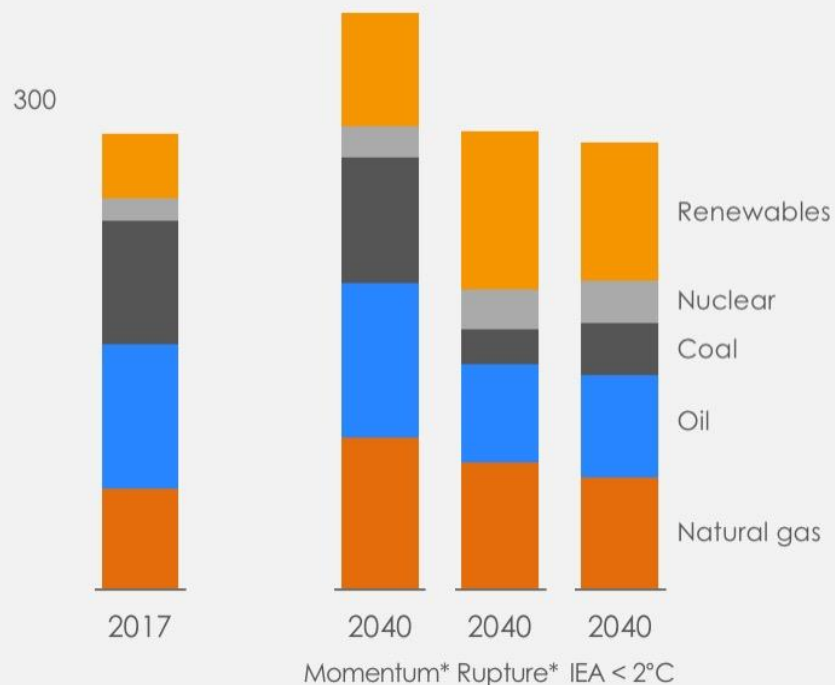
- **Coal demand divided by more than 3** by 2040, substituted by renewables

- **2.5 GtCO₂/yr** stored in 2040

Integrating climate into strategy

Taking into account anticipated market trends

Global energy demand
Mboe/d



* Scenarios Total Energy Outlook (Feb. 2019)

** IEA 2018 Sustainable Development Scenario (SDS)

Focusing on
oil projects
with low
breakeven



Expanding
along the
**gas value
chain**

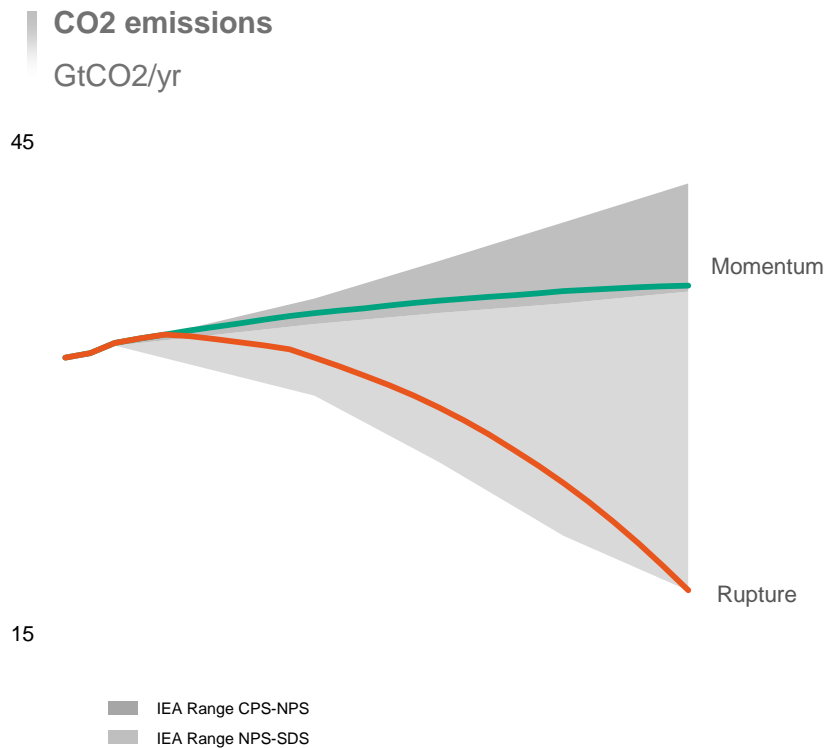


Developing
profitable &
sizeable
**low carbon
electricity**



Investing in
**carbon
neutrality**
businesses





A rupture scenario requires:

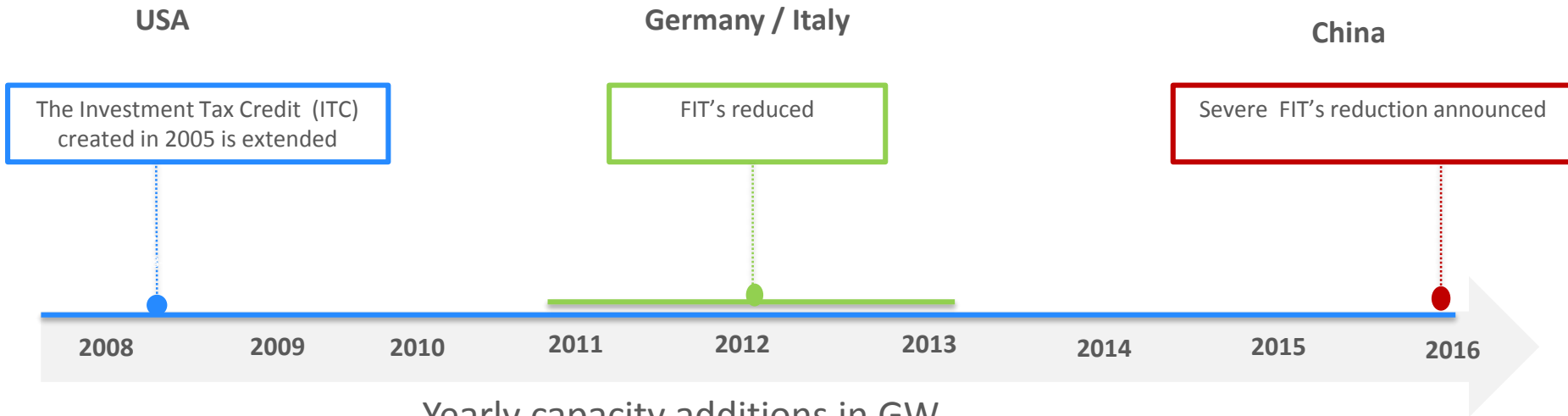
- Strong shift in public policies
- Technological breakthroughs

For significant energy consumption changes:

- Massive energy efficiency improvements
- Much faster electrification
- Big shift in the Power generation mix
- Significant carbon capture

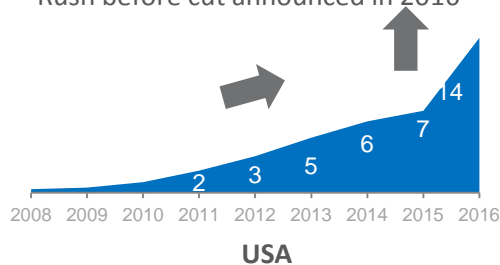


EXAMPLE OF SUPPORT POLICIES AND THEIR IMPACT ON YEARLY ADDITIONS (PV)

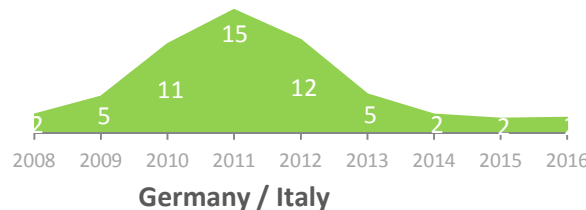


Yearly capacity additions in GW

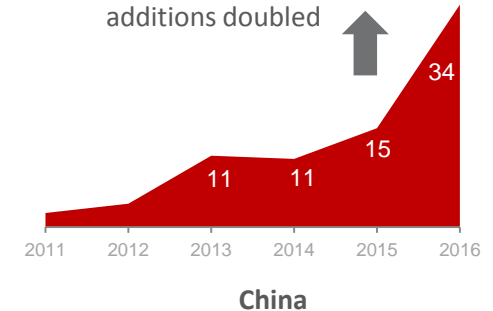
- Consistent growth after ITC implementation
- Rush before cut announced in 2016



- ↓ 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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