

## The global energy context today

- Global demand for energy continues to rise  
*- as the world economy continues to grow*
- Fuel mix changes significantly  
*- coal losing, renewables gaining, and oil and gas combined holding steady*
- Growth rate of carbon emissions slows  
*- but not enough without further policy changes*

*There is **no single story** about the future of global energy; policies and/or events(?) will determine where to go from here*

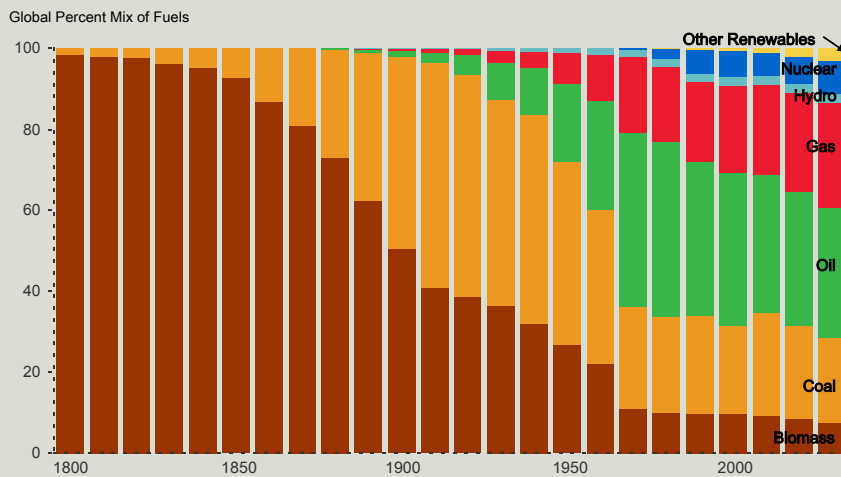
From: 2016 BP Outlook/IEA

## Many global issues increase uncertainty...

- Economic growth in key economies (China, Brazil, Russia, a.o.)
- Implementation and strength of climate policies
- Technology improvement rates (both supply and demand)
- Unrest in oil producing countries
- OPEC production
- Future of nuclear generating capacity

EIA, 2016

## Long wavelength energy transitions

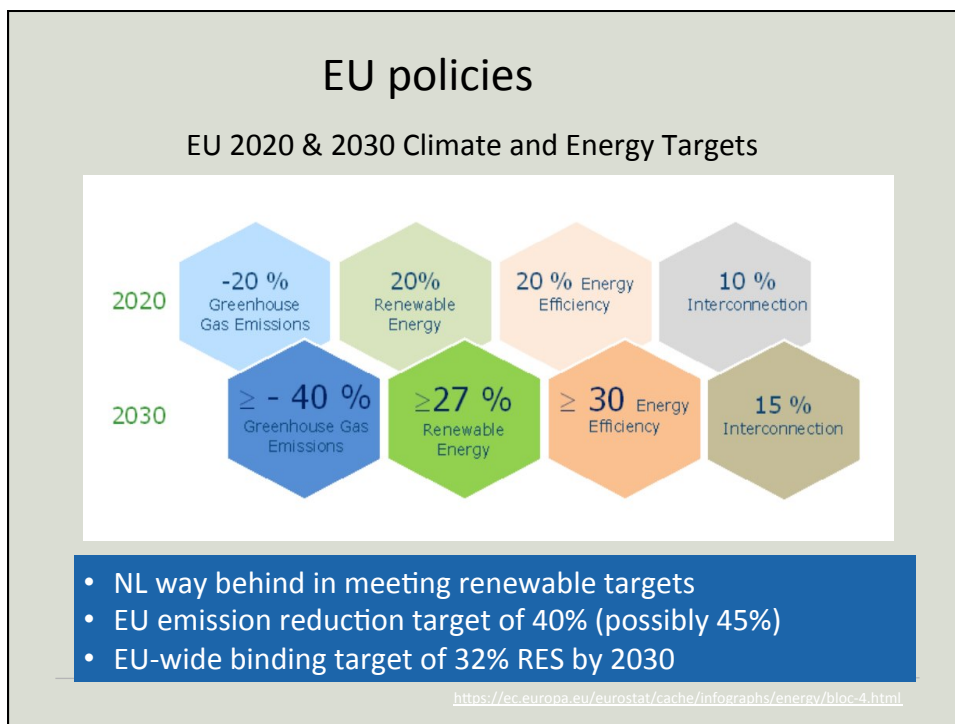
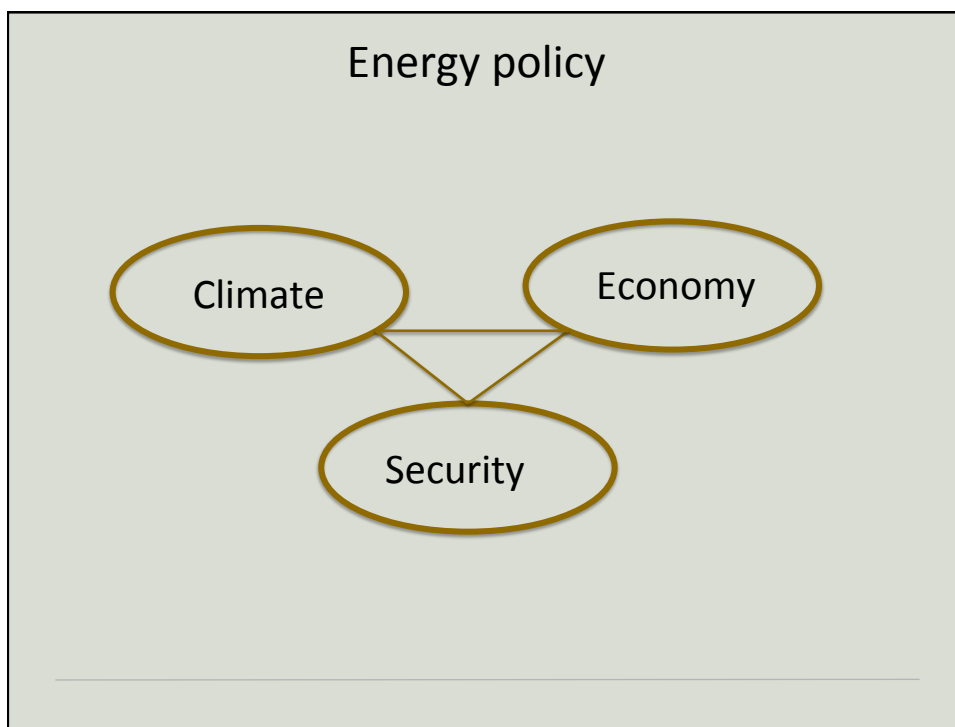


Source: Smil, *Energy Transitions*

Energy transitions are unpredictable and take time

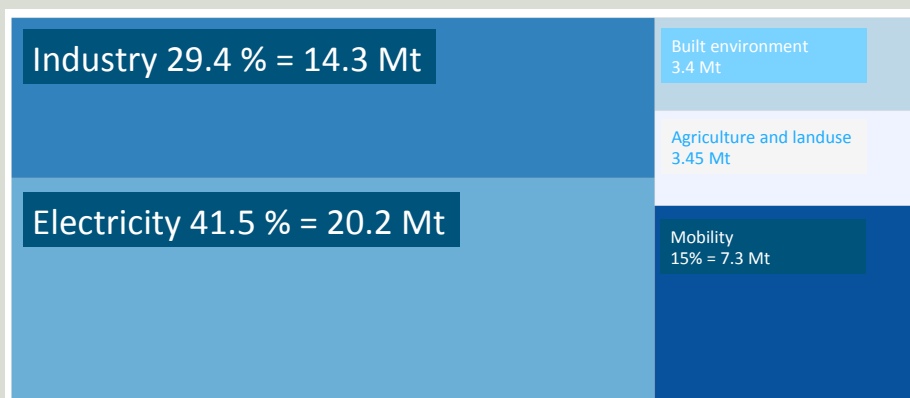
International energy transition, no 'one size fit all'; various speed of change

*Wind and solar energy are growing rapidly. Yet the world's reliance on fossil fuels isn't changing any time soon.*



## 2018: Dutch Climate Accord

2030: 49% CO<sub>2</sub> Emission Reduction = 48,7 Mt



Source: NL Klimaatakkoord, 2018

## Dutch energy and climate policies

### Groningen Gas Field:

*March 2018 Dutch government decision phase out production by 2030 to reduce the safety risks caused by earthquakes induced by gas production*

Last year the Netherlands became *a net gas importer* for the first time and this trend will continue, as the government orders permanent and steeper cuts at Groningen

### Policy measures:

- No new gas infrastructure
- Carbon Capture and Storage
- Geothermal energy
- Electrification
- Hydrogen

Source: Energie agenda MinEZ, 2016

## System Integration

Opportunities for system integration to accelerate the energy transition:

- production of *green hydrogen* on existing platforms and transport through existing pipelines
  - *storage* of green hydrogen in existing fields and pipelines
  - *CO2 transport and storage* in existing fields
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