

The geopolitics of global energy trends; new perspectives

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A new perspective

- Historically almost all attention given to the geopolitics of fossil fuels
- Recently more focus on the geopolitics of a low carbon future
- Workshop Berlin
 - Indra Overland, David Sandalow, Meghan O'Sullivan (lead authors): "Geopolitics of Renewable Energy" Working Paper NUPI, Harvard, Columbia (2017)

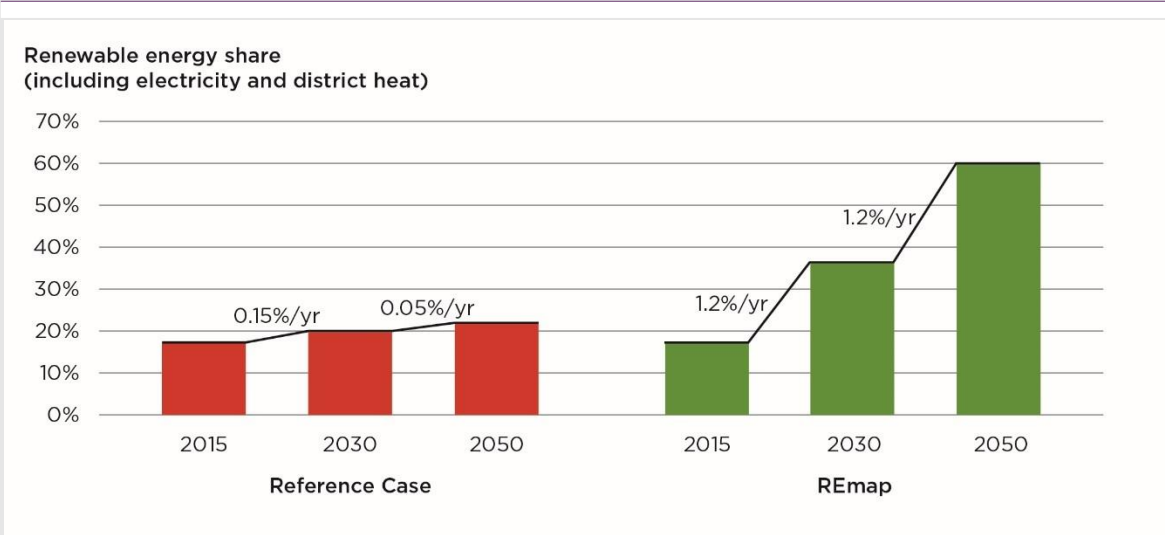
Why geopolitics of renewables?

- What if the energy transition succeeds?
 - Who wins/loses?
 - What are the sources for conflict/cooperation?
 - What are the new «levers of power»?
- Better understand the dynamics of climate negotiations
- More knowledge will facilitate the green transformation process

Methodological choices

- «Backcasting scenarios»
- Concentrates on share of renewables
 - Not on energy efficiency/electrification/CCS
- Concentrates on final state (2050) , less on how to get there

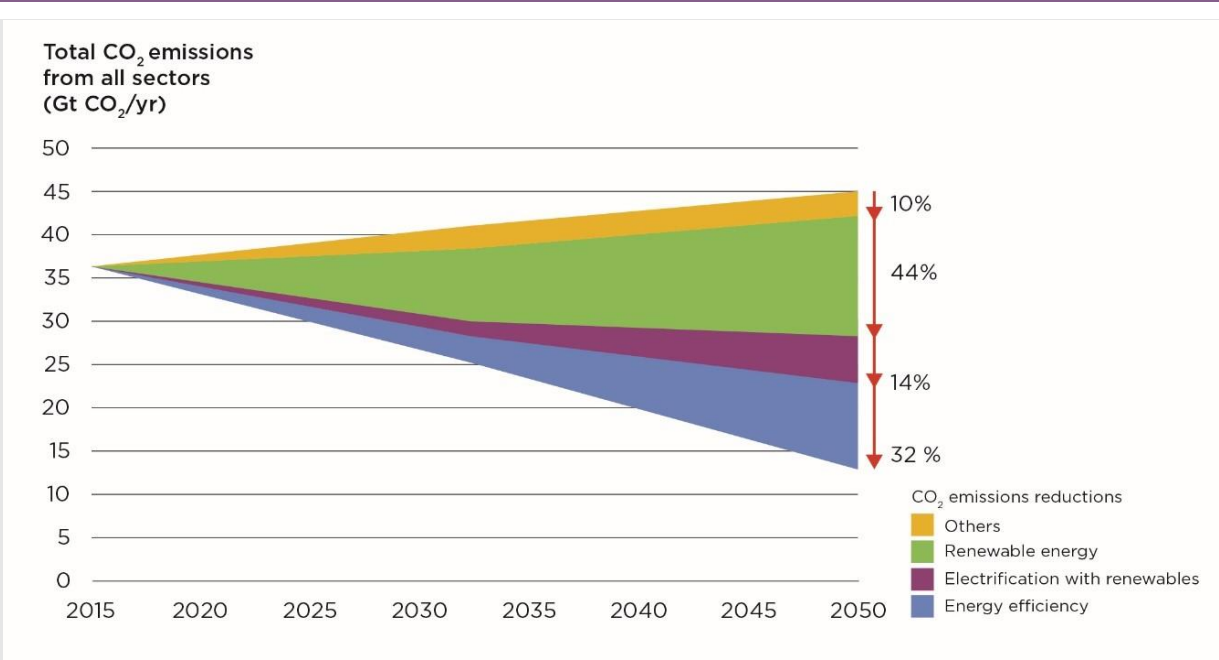
Renewable energy share of global total final energy consumption (2050)



Note: TWh = terawatt-hours; CCS = carbon capture and storage.

Source: IEA/IRENA

Do not forget Energy Efficiency and Electrification.....



Factor 1: Critical Materials Supply Chains

- Rare Earth elements» (dysprosium, neodymium, terbium m.fl) Critical components of renewable energy hardware, especially wind
 - Rare earth elements not rare; found in many countries
 - Two countries (Russia and China) hold 57% of global reserves
 - Next on the list (Australia) holds 2,4% of remaining reserves
 - Most mining, production and processing of Rare Earths is in China
- Lithium (EV batteries); Australia, Chile, China and Argentina
- Cobalt (EV); DR Congo
- Indium (Solar PV); Brazil, Chile

Critical Materials Supply Chains: Common challenges

- Political stability of producing countries
- Ability and willingness to create cartels
- Reserves vs resources
- Technological change and long term substitubility

«No energy transition without raw materials»

Dutch MFA Raw Material Conference 2017

Factor 2: A new form for «resource curse»?

- Traditional «resource curse» tied to large amounts of rents combined with weak institutions
- Possible to envisage cartel behaviour that will give producing countries of «rare earth» and other strategic commodities large amounts of rent
- Rents from hydropower in principle like rent from fossile fuels

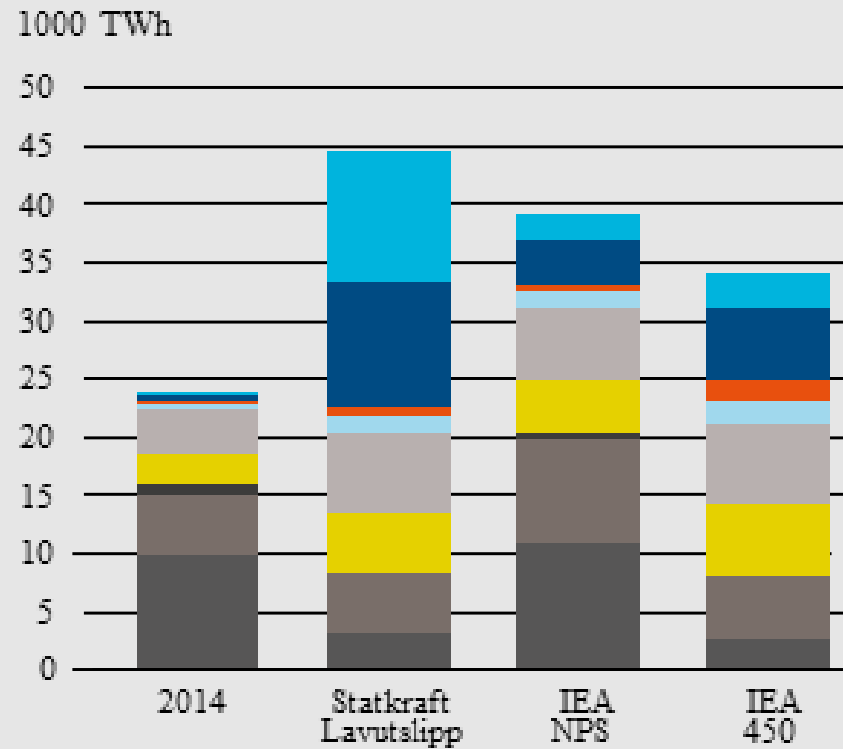
Factor 3: The decline of the traditional fossile fuel producing states

- Expected dramatic decline in fossile fuels production; stranded assets
- Will have serious social and politcal consequences for fragile states in Middle East and Africa
- Middle East will not be shielded from this development, despite their low cost reserves
- Positive geopolitical effects for importing countries; less exposure to external supply dislocations

Factor 4: Increased vulnerability of electric grids and cyber risks

- The future is electric and increasingly digitized
- Large scale transmission systems («supergrids») to be expanded
- In parallel with micro grids and off-grid solutions
- Cyber risks; vulnerable Supervisory Control and Data Acquisition Systems (SCADA) in critical infrastructure
 - P.t. at the center of great policy discussions in Western countries
 - But a continuous process of finding defence mechanisms...

Highest case: Future global electricity demand will increase by 86%(2040)



Source: Statkraft

Factor 5: Control over technology and finance

- The low carbon world: From resource rents to technological rents
- The ability to exploit renewable energy depends critically on access to technology and finance
- Will give potential advantages to countries with strong innovation cultures and access to capital.
- Which entities end up controlling the new supply chains?
 - The majors (Google, Microsoft, Statoil 2.0 or Total 2.0)VS
 - The billions of decentralized prosumersOR
 - A combination