

Talents – Trends – Technology 2013: Energy Transition – Vision or Illusion?

Spreitenbach, April 25th 2013

“A Global Energy Architecture in Transition – Implications for Switzerland”

Espen Mehlum

Agenda

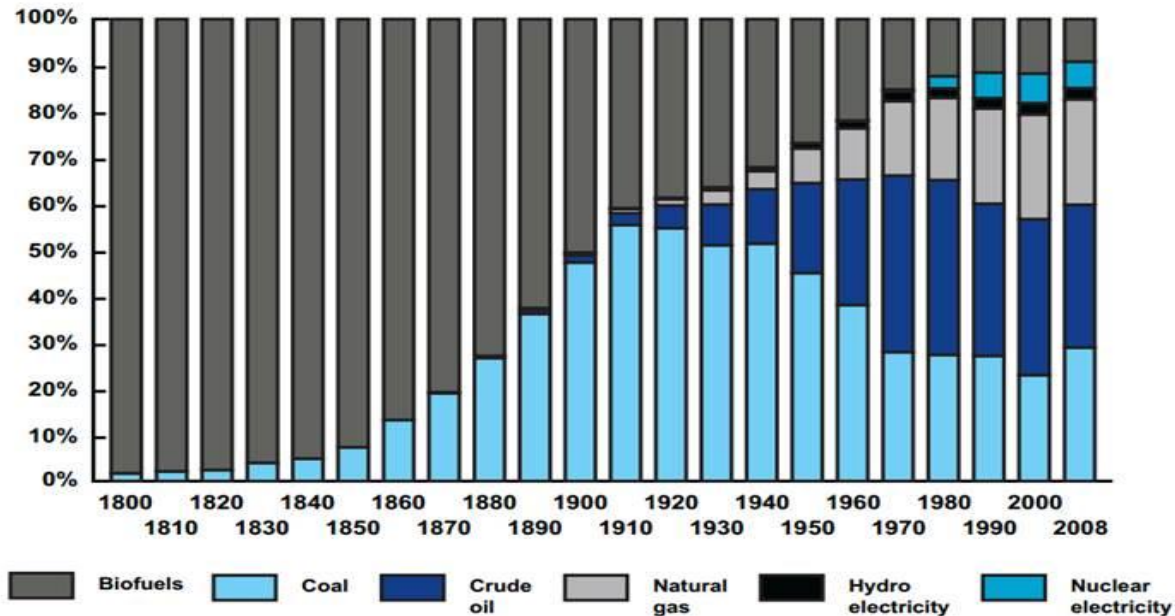
- 1. Changes in the global energy architecture and developments to watch**
- 2. Insights from the Energy Architecture Performance Index**
- 3. Implications for Switzerland**
- 4. Concluding remarks**

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We are witnessing a historic transformation towards a more diverse energy future – but change takes time

Share of Fuels in Energy Mix, 1800–2008

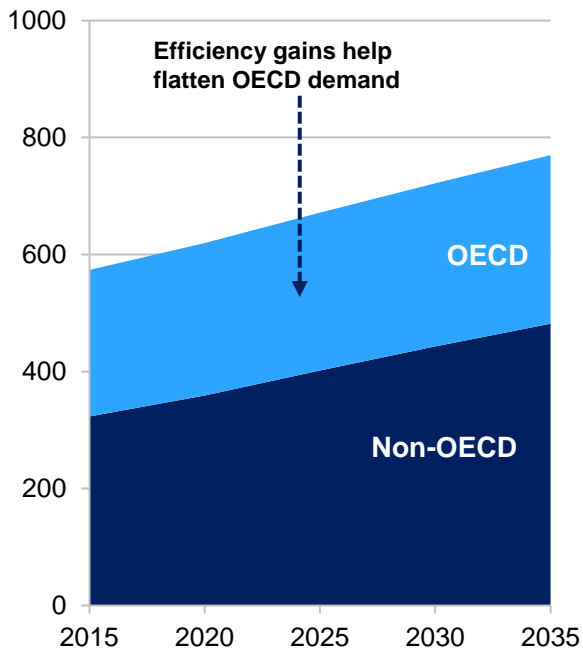


Source: *Energy Transitions: History, Requirements, Prospects*, Vaclav Smil, 2010. 21215-1

Changing dynamics in the energy sector are putting current energy architecture under pressure...

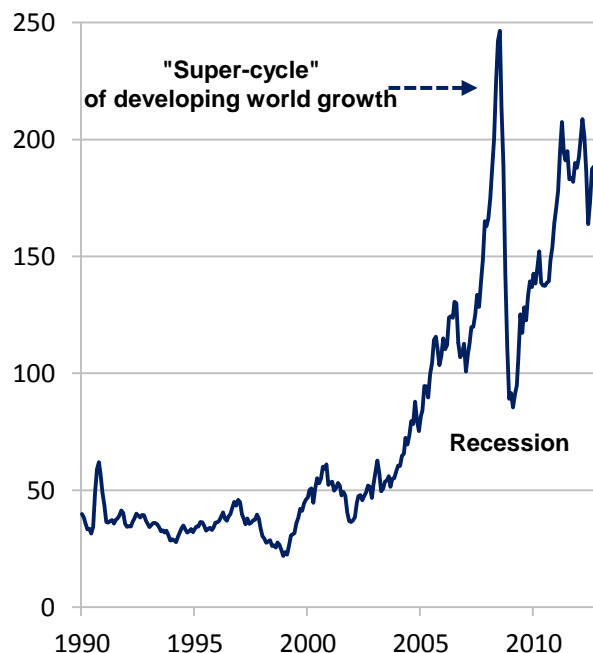
Global Energy Demand

(Quadrillion Btu)



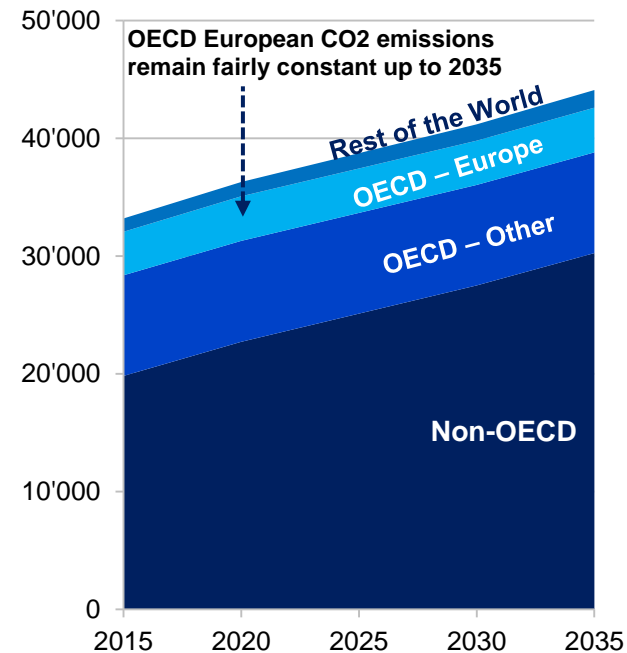
World Bank Energy Price Index

Nominal US Dollars, 2005=100



Energy-related CO2 emissions

Mt CO2 – current policies scenarios



The future is uncertain and several factors can make a difference

Some developments to watch

1. Unconventional gas and oil – from resource scarcity to abundance?
2. China
3. Global Climate deal?
4. Public opinion and the energy consumer
5. Energy Innovation – what's around the corner?

Technology advances are happening across the energy value chain and innovation create new opportunities: some examples

PRODUCTION	DELIVERY	CONSUMPTION
 <p><i>Shale gas & tight oil</i></p>	 <p><i>Smart grids</i></p>	 <p><i>LEDs</i></p>
 <p><i>Ultra deepwater</i></p>	 <p><i>Energy storage</i></p>	 <p><i>Improved building techniques</i></p>
 <p><i>Concentrated solar power</i></p>	 <p><i>New electricity transmission solutions</i></p>	 <p><i>Electro-chromatic windows</i></p>
 <p><i>More Efficient and cleaner power technologies</i></p>	 <p><i>District heating</i></p>	 <p><i>EVs & PHEVs</i></p>
 <p><i>Solar fuels (e.g. algae)</i></p>	 <p><i>Intelligent urban infrastructure</i></p>	 <p><i>Nanostructured steel</i></p>
 <p><i>Nanotech & synthetic biology</i></p>	 <p><i>Pumped storage</i></p>	 <p><i>Shifting mobility modes</i></p>

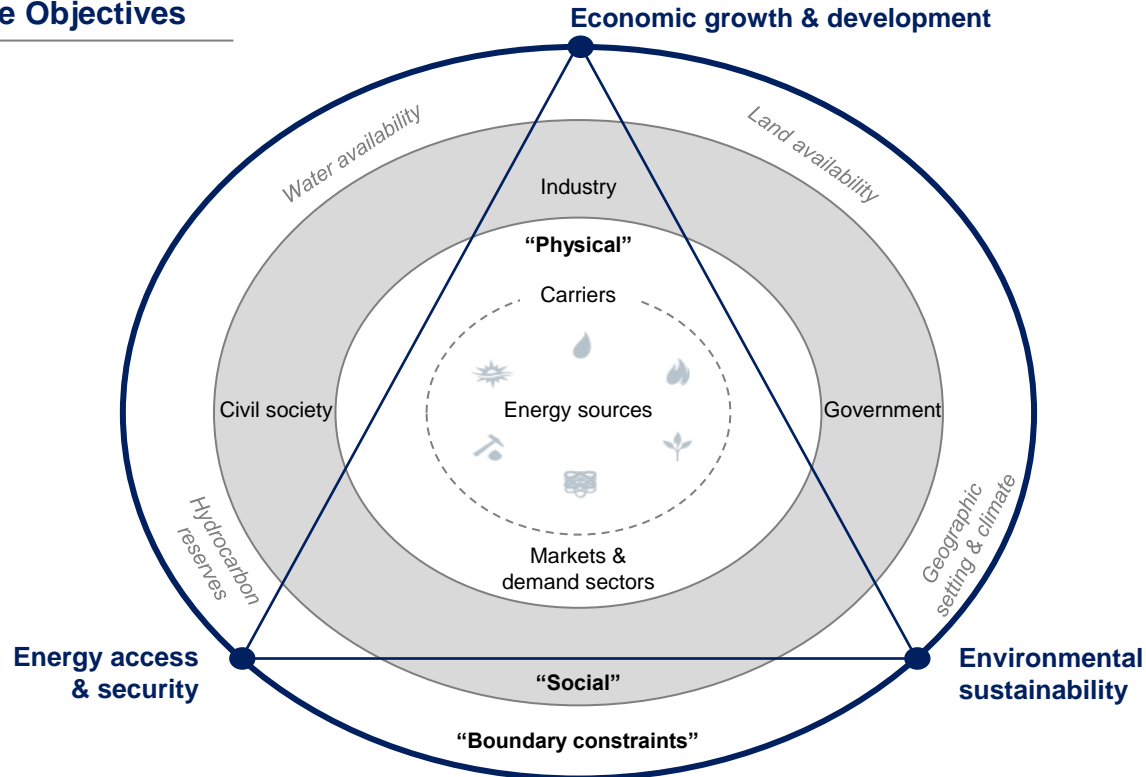
Advances in ITTC, Materials, Bio-and Nano-technologies etc open up new opportunities at unprecedented speed

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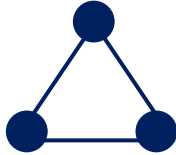
Creating effective transitions require taking an energy system approach against three universal energy-system imperatives

Energy Architecture Objectives



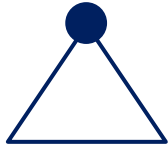
The EAPI is a tool for decision makers to monitor the performance of energy systems and a basis for assessing areas to improve

ENERGY ARCHITECTURE
PERFORMANCE INDEX



Key Question: How successfully does [the] country's energy system perform in terms of promoting economic growth and development, whilst being environmentally sustainable, secure and allowing universal access to consumers?

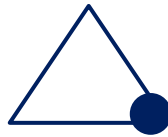
QUANTITATIVE



ECONOMIC GROWTH &
DEVELOPMENT

MEASURES:

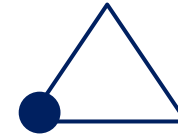
- Efficiency
- Affordability / Lack of price distortion
- Supports / detracts from growth



ENVIRONMENTAL
SUSTAINABILITY

MEASURES:

- Emissions impact
- Ratio of low carbon fuels in the energy mix



ENERGY ACCESS &
SECURITY

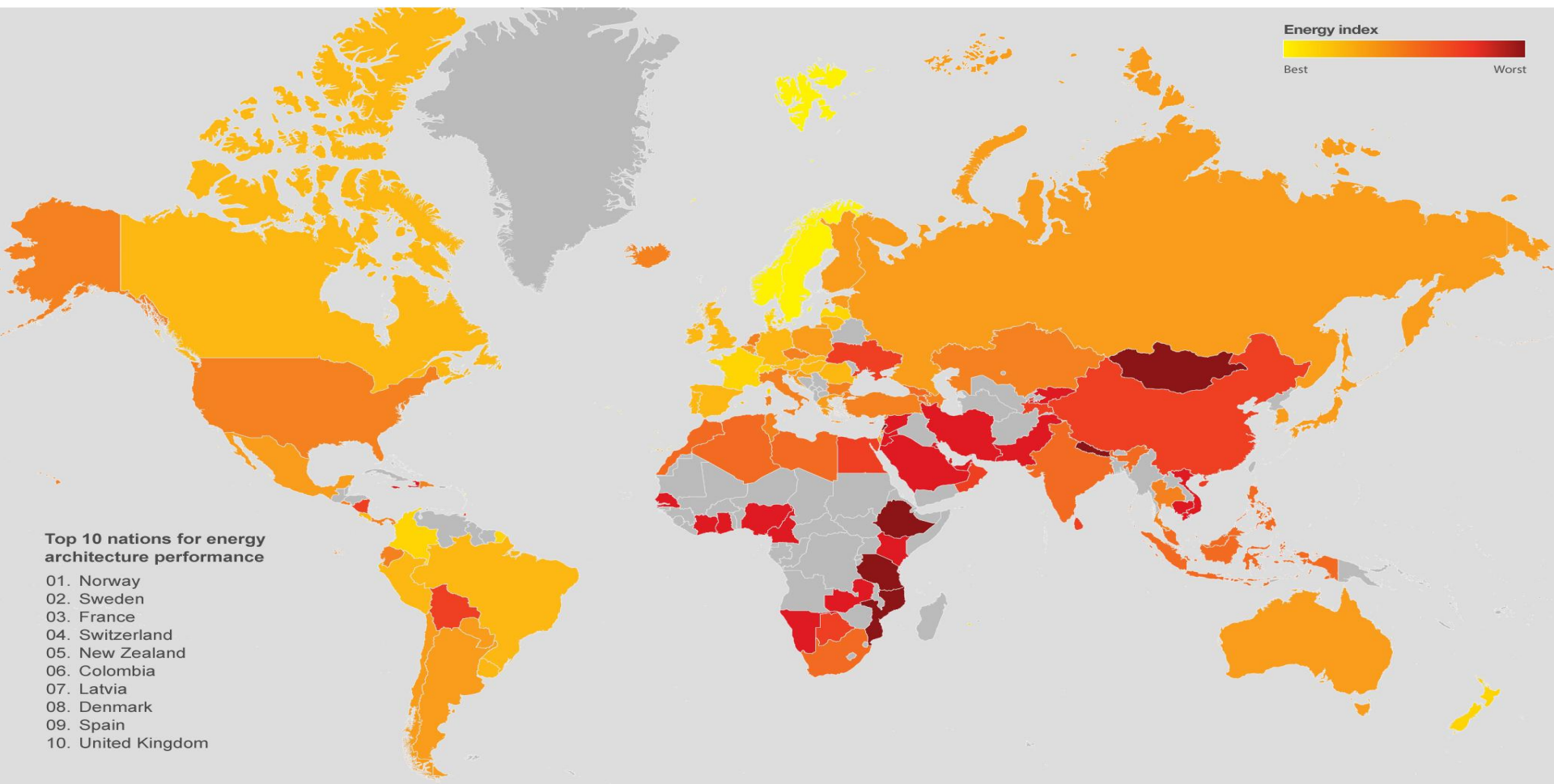
MEASURES:

- Diversity of supply
- Level and quality of access
- Self-sufficiency

Energy Architecture Performance Index

How well national energy systems promote economic growth, development, environmental sustainability as well as energy security and access.

Explore the report:
wef.ch/energyindex



Energy index



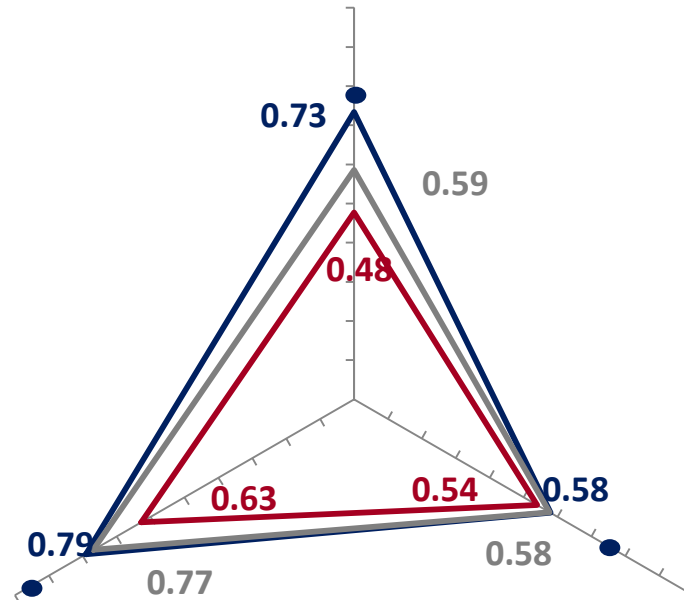
Top 10 nations for energy architecture performance

01. Norway
02. Sweden
03. France
04. Switzerland
05. New Zealand
06. Colombia
07. Latvia
08. Denmark
09. Spain
10. United Kingdom

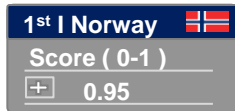
Switzerland's energy architecture has an overall score of 0.70 and ranks 4th on the 2013 index

Switzerland's performance on the index 2013

Economic growth & development



- Switzerland
- Average EAPI
- EU 15



Energy access & security

Environmental sustainability

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Vision, investments, collaboration and people are keys to Switzerland's energy transformation

- Combine vision, enabling incentives and flexibility for a long term transition in a changing energy landscape
- Effective transition requires a holistic energy system approach, balancing the energy triangle and securing public support
- Europe's choices matter – and so does Regional collaboration and infrastructure
- Learn from best practice examples
- Transition involves business opportunities – and risks

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Thank you!

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