EPFL MIDDLE EAST

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Innovation Program :	**Energy**
PhD Candidate:	**Ralf Dyllick-Brenzinger**
Thesis Direction:	Professor Hans-Björn Püttgen (supervisor)
	Professor Matthias Finger (co-supervisor)
Main Laboratory:	Energy Center (http://energycenter.epfl.ch)
Project Time Line:	February 2010 – End of 2012
Research Project:	**Economic energy policy in MENA using a technology-driven approach**

Abstract

Demand for energy, being a prerequisite and enabler of economic growth, has been growing at a tremendous rate in the United Arab Emirates (UAE) as well as in the wider Middle East & North Africa (MENA) region. Demand being primarily driven by the region's economic momentum, the rapid industrialization as well as by the energy-intensive living standard of fast growing populations increasingly concentrating in urban centers contribute significantly, too.

Today, the region meets its energy demand all but exclusively by fossil fuels (see exhibit 1). What sounds like an intuitive choice in a region abundantly endowed with hydrocarbons, this strategy poses significant challenges:

- The growing domestic energy hunger eats into hydrocarbon exports throwing national budgets in disarray,
- The preservation of the national hydrocarbon reserves is an imperative of intergenerational equity,
- The carbon intensity of today's energy systems contributes to world climate change and is a potential competitive disadvantage under a global CO2 regime.

MENA countries have made some high-profile steps towards the exploitation of the region's vast renewable resources. Those projects, however, have so far had no significant impact on energy supply. That a more sustainable energy strategy is viable has been clearly shown by another oil-rich country: Norway produces nearly all its electricity by its abundant renewable resources (see exhibit 2); fossil fuel use is restricted to the transport sector and industry – sectors in which there's no competitive alternative to fossil fuels.

Even though growth momentum has slowed down recently, projections predict a continuation of the growth path and of the energy demand surge in tandem. As a consequence, massive energy-related investments will be made in the mid-term future. This research projects aims at delivering important background information supporting the policy making process and delivering recommendations for focused energy policy setting drawing on an assessment of various technology options and a systematic energy-economy model.

Exhibit 1: Fossil fuels dominate MENA energy supply

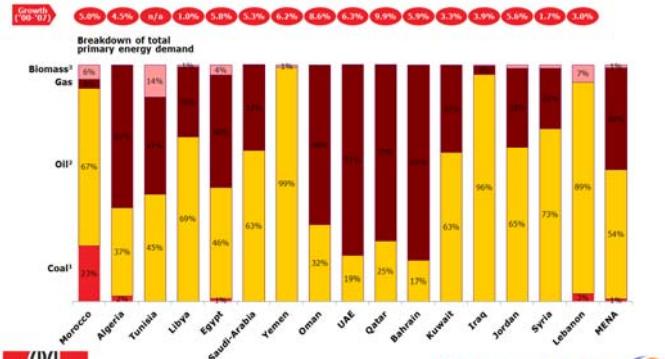
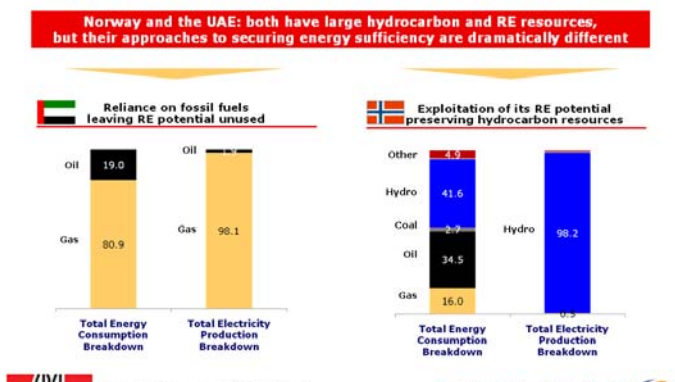


Exhibit 2: UAE – Norway comparison



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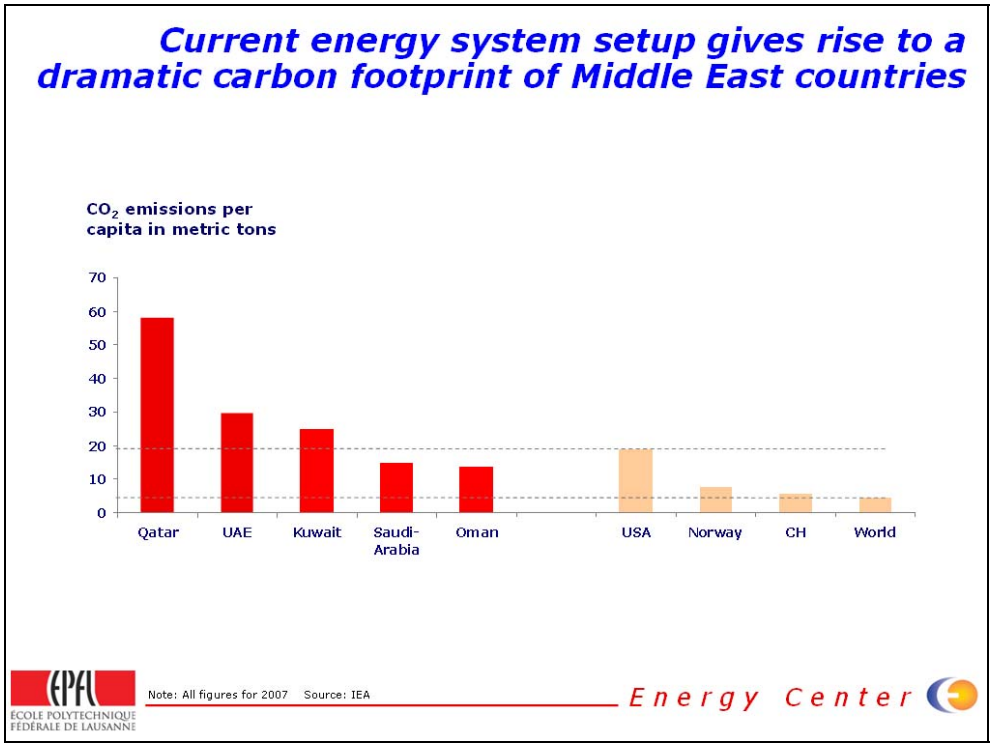
Motivation for the research project:



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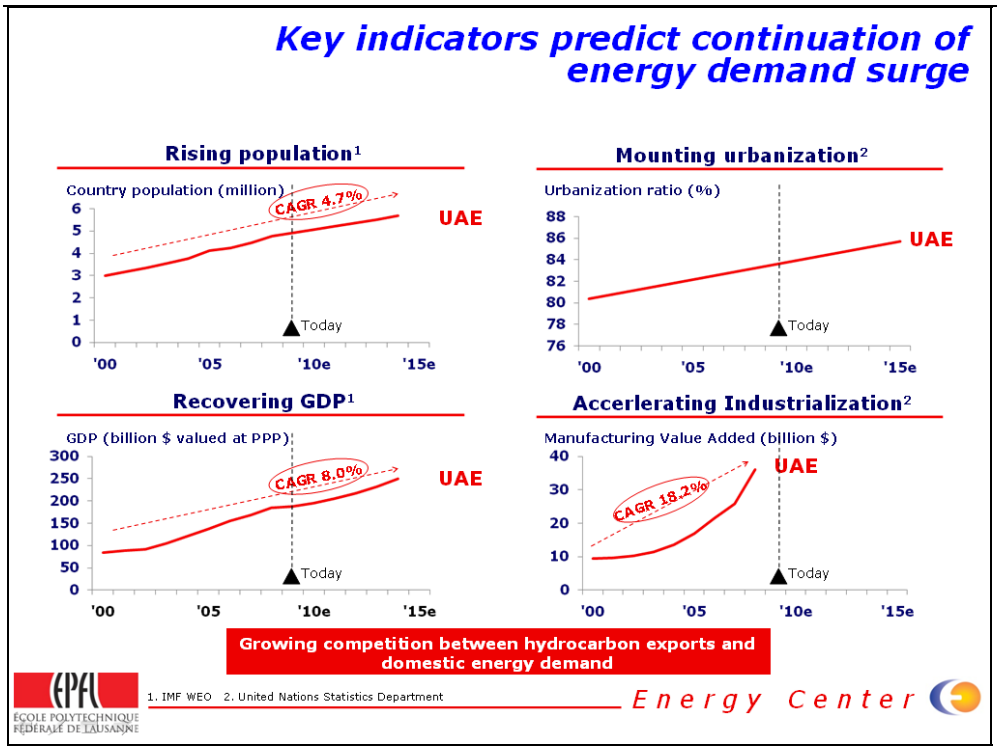

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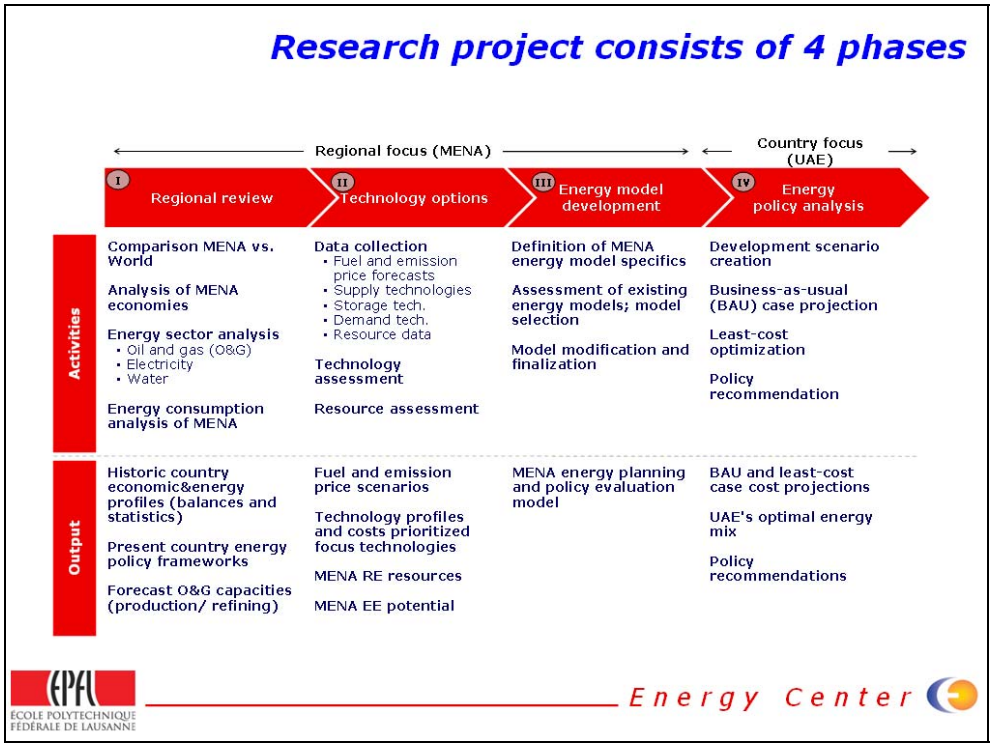
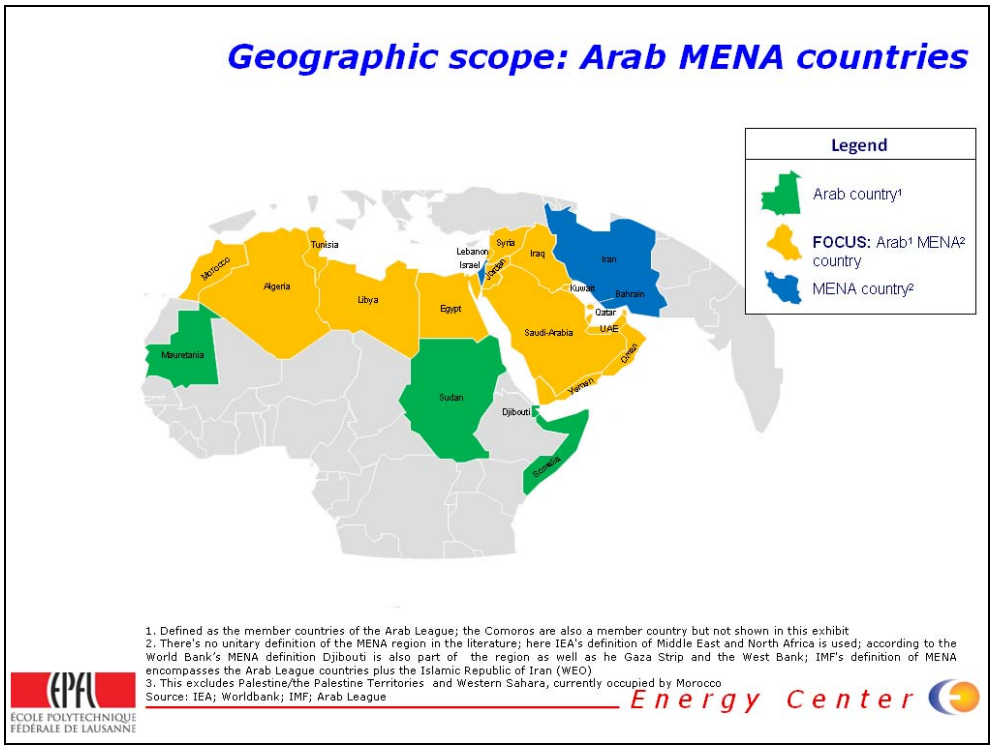
Research approach / methodology:





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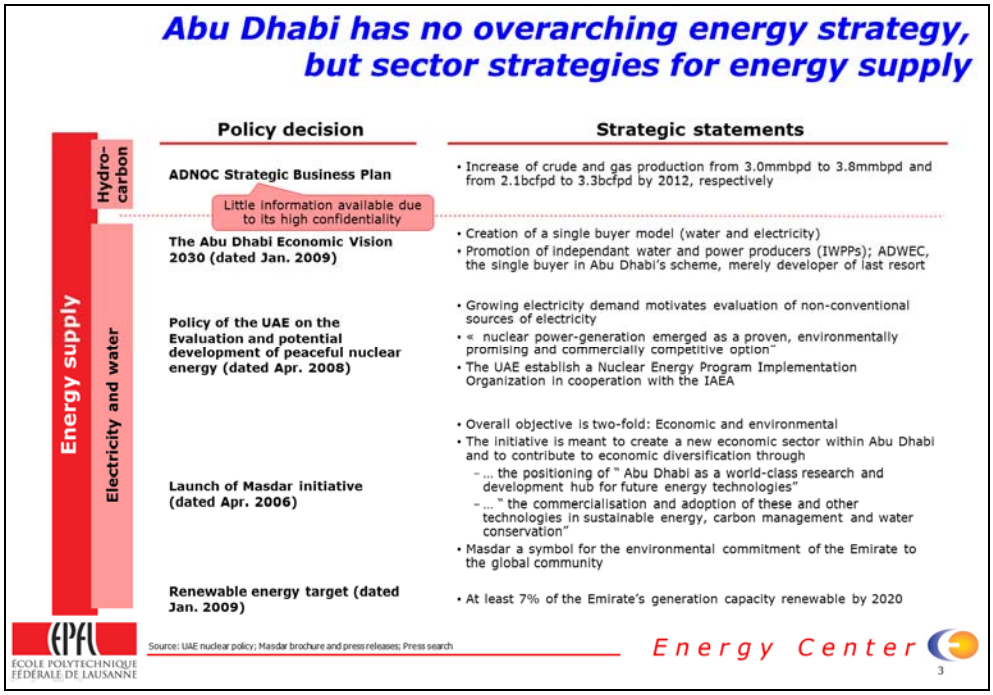
Current status of the project (September 2010):

- *Phase 1 - Regional review:* Developed and populated macro-economic and energy-supply related database for MENA countries; supply-side energy system analysis of the UAE completed; demand-side analysis in progress
- *Phase 2 – Technology options:* First renewable resource assessments (wind, solar, geothermal) collected
- *Phase 3 – Energy model development:* Completed and validated specification of MENA energy modeling specifics; started evaluation of existing energy model frameworks (energy-economy models as well as energy sector models)
- *Phase 4 – Energy policy analysis:* Phase not yet started

Exemplary results:



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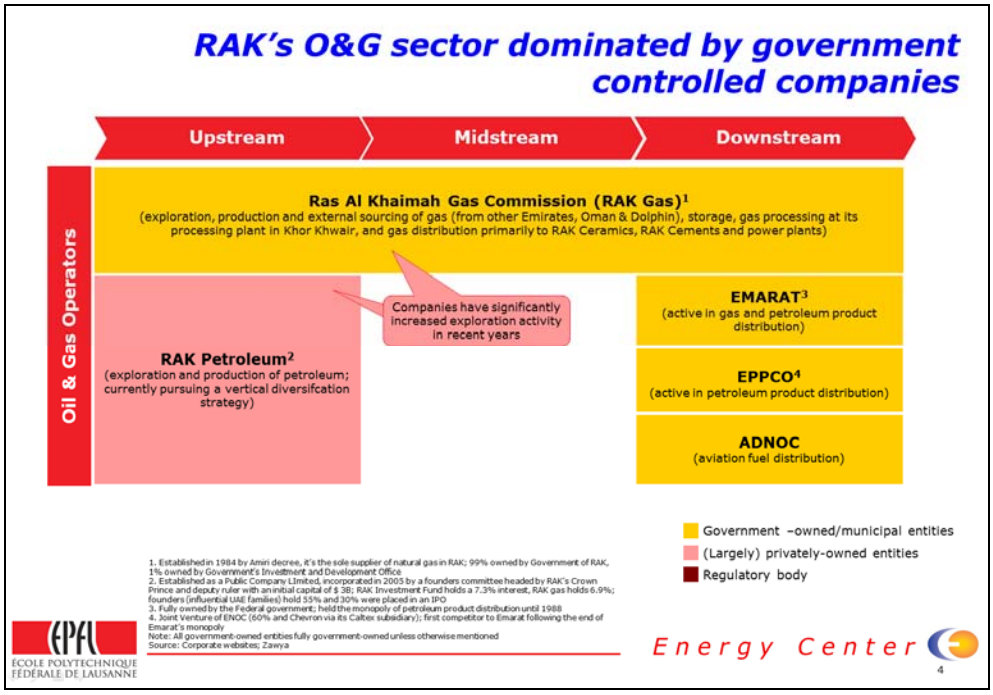

Next steps (September 2010):

- Country analysis of focus countries Morocco, Tunisia, Egypt, Qatar, Saudi-Arabia
- Demand-side analysis UAE
- Continuation evaluation available energy model frameworks for energy and energy-economy modeling in MENA – objective: paper on advantages and disadvantages of the various modeling frameworks for energy modeling in MENA by the beginning of 2011