

**CENTRO EURO-MEDITERRANEO
PER I CAMBIAMENTI CLIMATICI**



**FONDAZIONE ENI
ENRICO MATTEI**

Hot Spots. Projections and Impacts of Climate Change in the Mediterranean and Caribbean Areas

Centro Euro-Mediterraneo per i cambiamenti climatici - CMCC
Caribbean Community Climate Change Center - CCCCC

Side Event - COP 15 - Copenhagen Climate Change Conference 2009

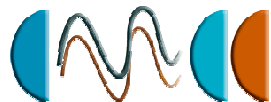
Mitigation in the Mediterranean Basin: A Focus on Europe and the MENA Region

Emanuele Massetti, FEEM and CMCC

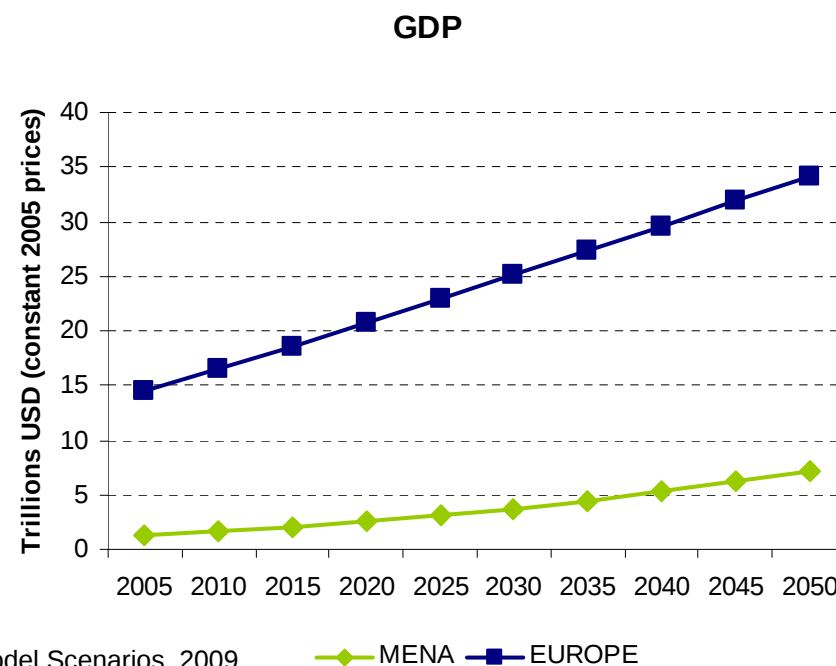
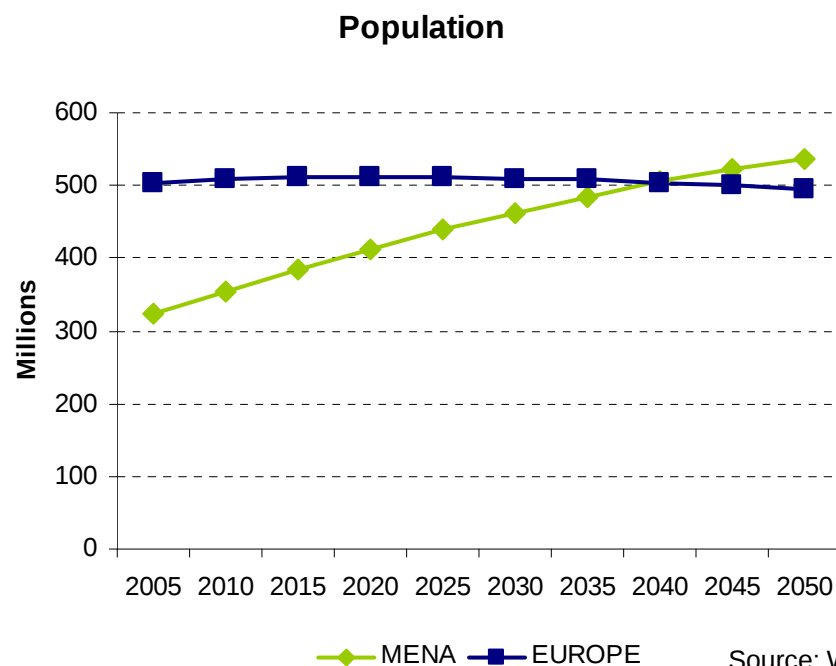
Copenhagen, 14 December 2009

Introduction

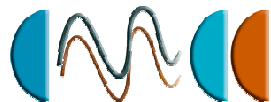
- Understanding major challenges of mitigation for Euro-Mediterranean Area, including Arab countries:
 - Europe (EU 27) and MENA (Middle East and Northern Africa)
- Insights derived from scenarios produced by the WITCH model developed at FEEM: www.witchmodel.org
- Scenarios, not forecasts...



The Underlying Trends

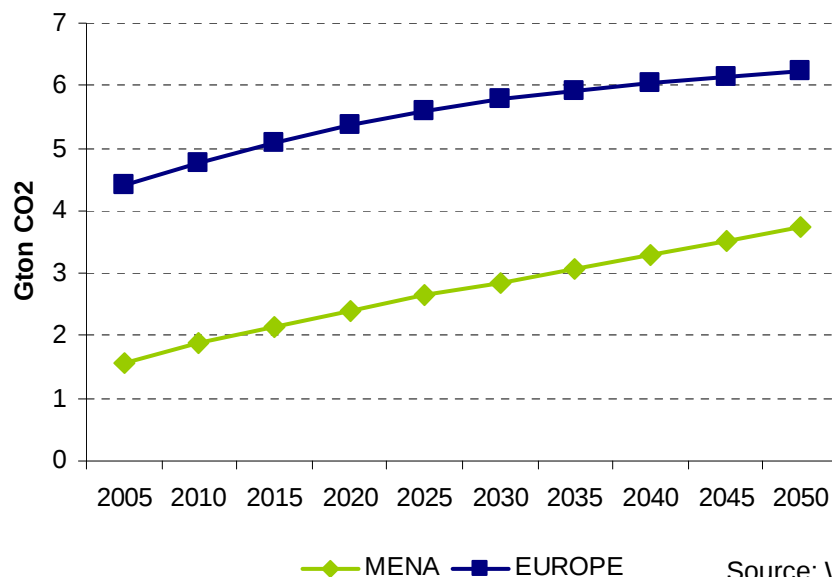


- High population growth in MENA
- Faster growth, but income gap remains

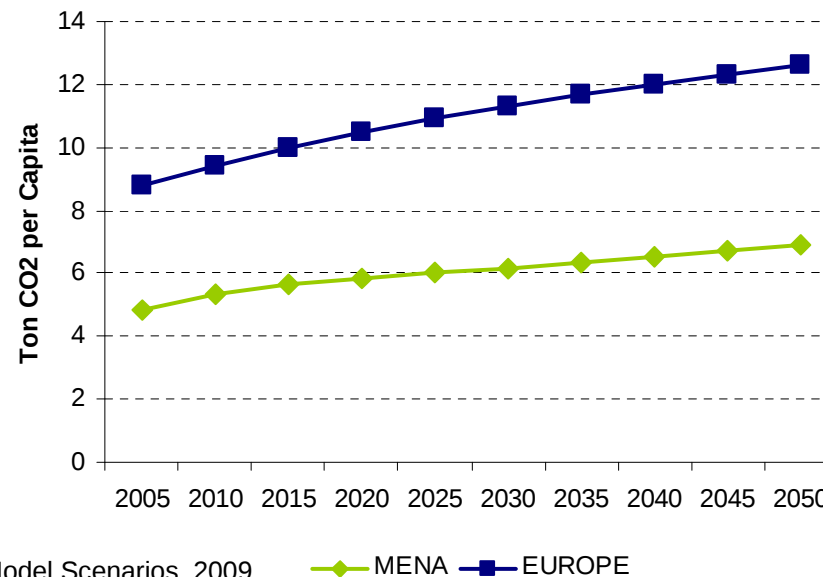


CO₂ Emissions (no climate policy)

CO2 Emissions

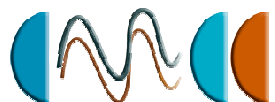


CO2 Emissions Per Capita



Source: WITCH Model Scenarios, 2009.

- Steady growth of emissions, especially in MENA
- Emissions per capita remain higher in Europe



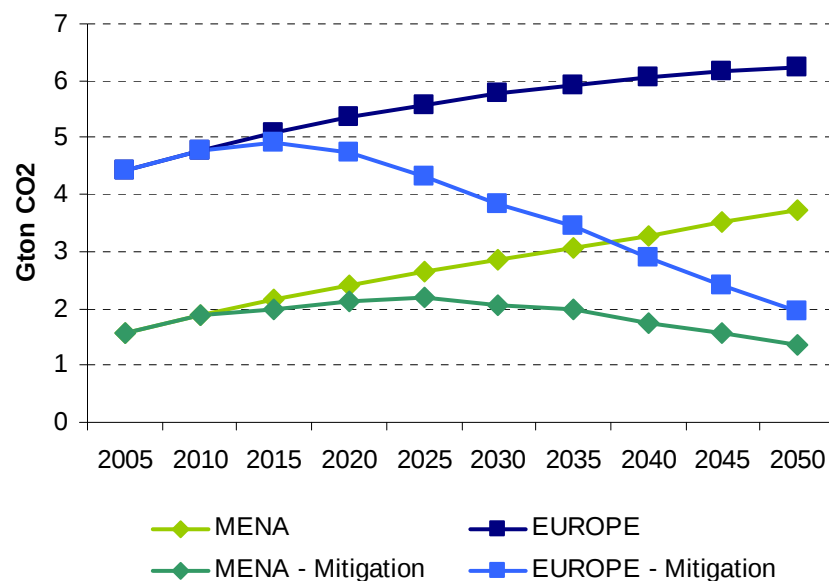
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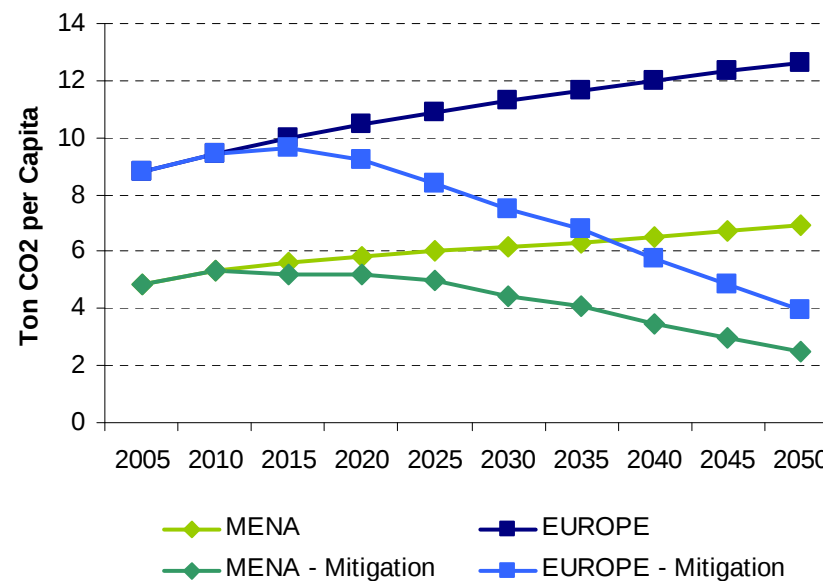
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Emissions (535 ppm CO₂-eq at 2100)

CO₂ Emissions

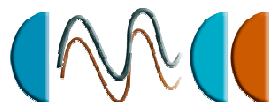


CO₂ Emissions Per Capita



Source: WITCH Model Scenarios, 2009.

- Sharp contraction of emissions in EUROPE
- Emissions of MENA peak in 2025



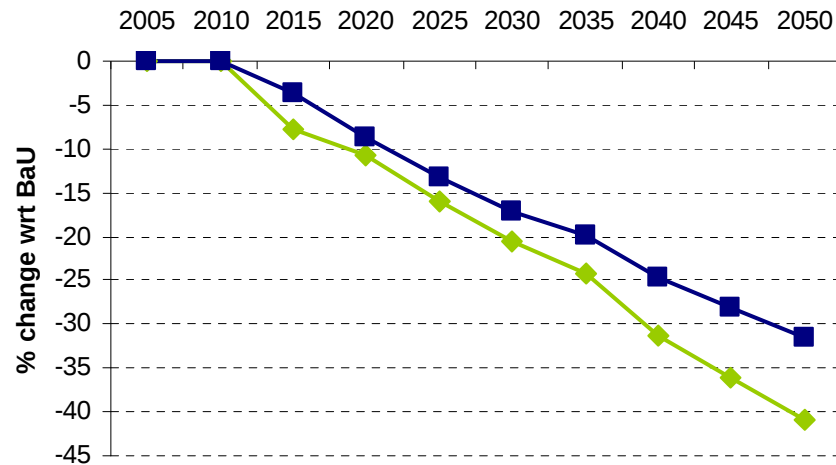
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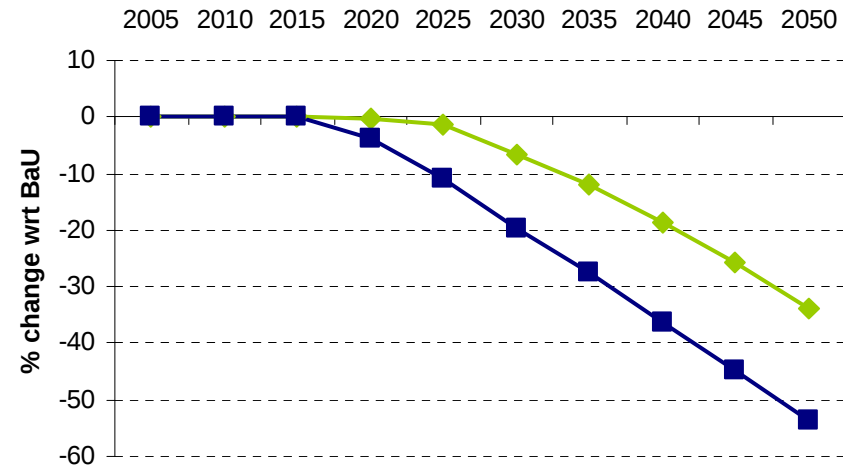
Europe: Decarbonizing Energy

Energy Intensity of Output
% change wrt BaU



—◆— MENA —■— EUROPE

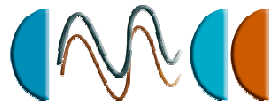
Carbon Intensity of Energy
% change wrt BaU



—◆— MENA —■— EUROPE

Source: WITCH Model Scenarios, 2009.

- MENA: increases energy efficiency
- Europe: reduces carbon intensity of energy



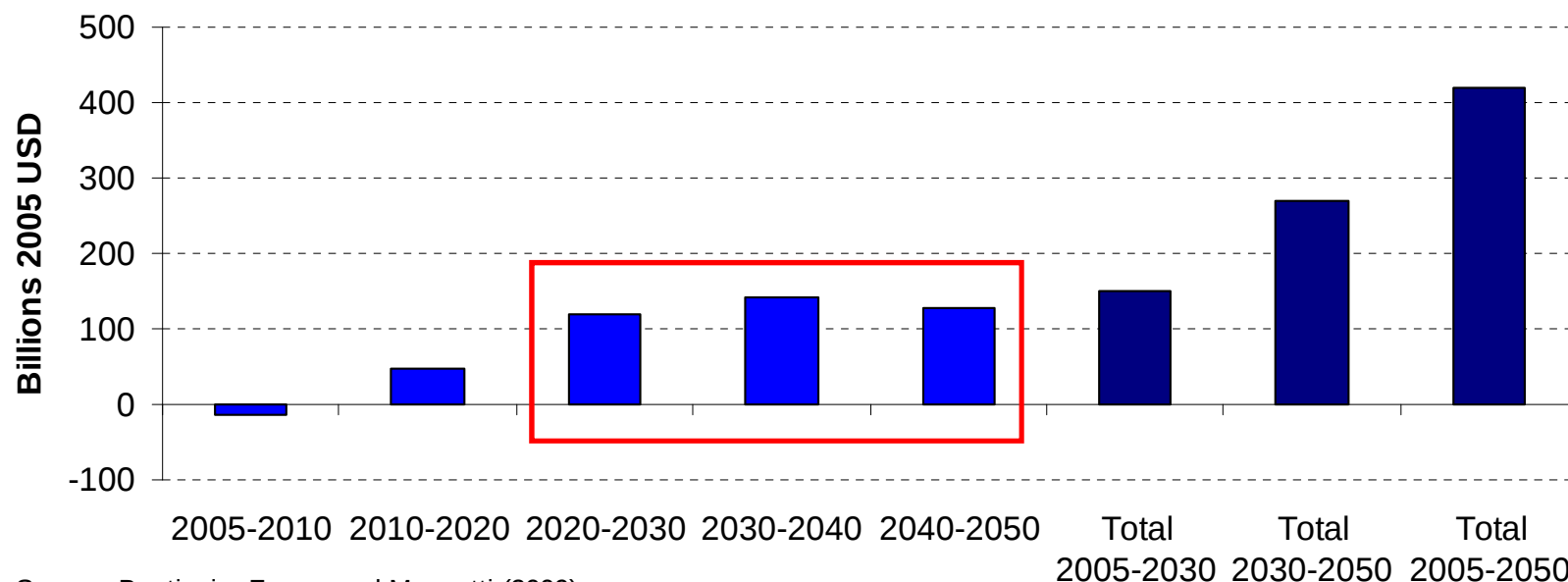
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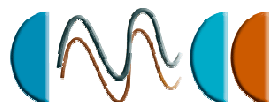
Europe: Financing Decarbonization

Incremental Investments in the Power Sector - Europe



Source: Bastianin, Favero and Massetti (2009)

- Higher investments in power sector from 2020 onward
- Financially affordable, but riskier investments
- Problematic technologies: renewables, CCS, nuclear



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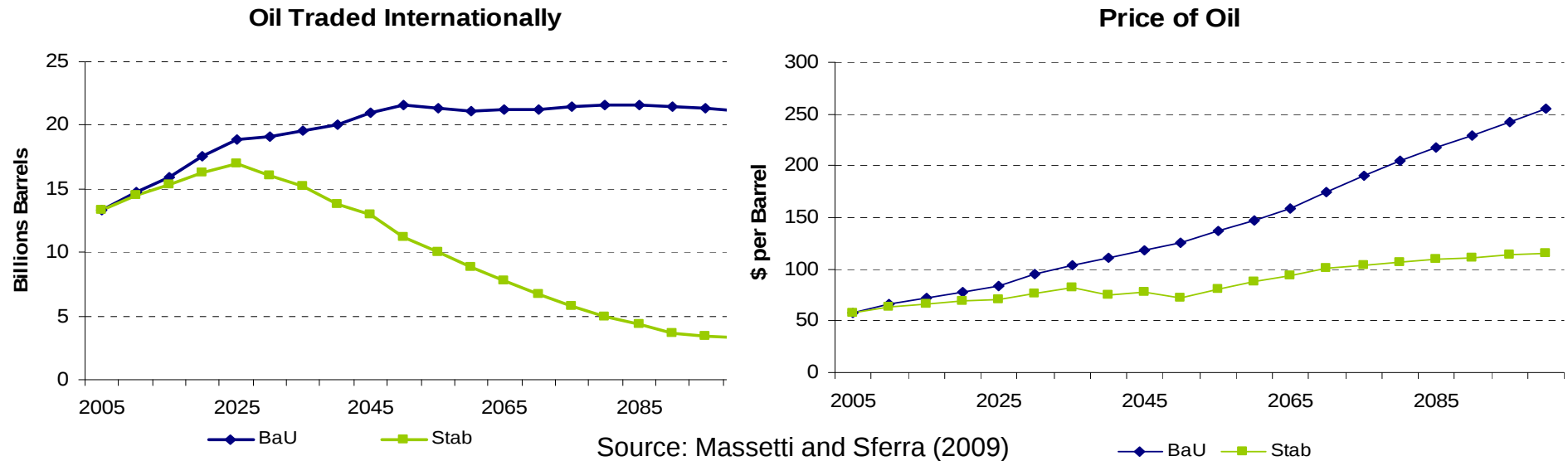
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What Lessons for COP15?

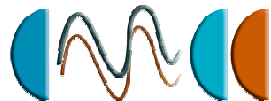
- Technological innovation is necessary for both energy efficiency and decarbonization:
 - adoption of already existing technologies
 - R&D to invent desperately needed breakthrough technologies
- Necessary to introduce stable, credible, long-term price signals
- A minimal, long term carbon tax would give the right signal to investors and households
- Cap-and-Trade can be built on the carbon tax and enhance efficiency and effectiveness of climate policy

See Oil Special Issue on Copenhagen...

MENA: No More Oil Exports...

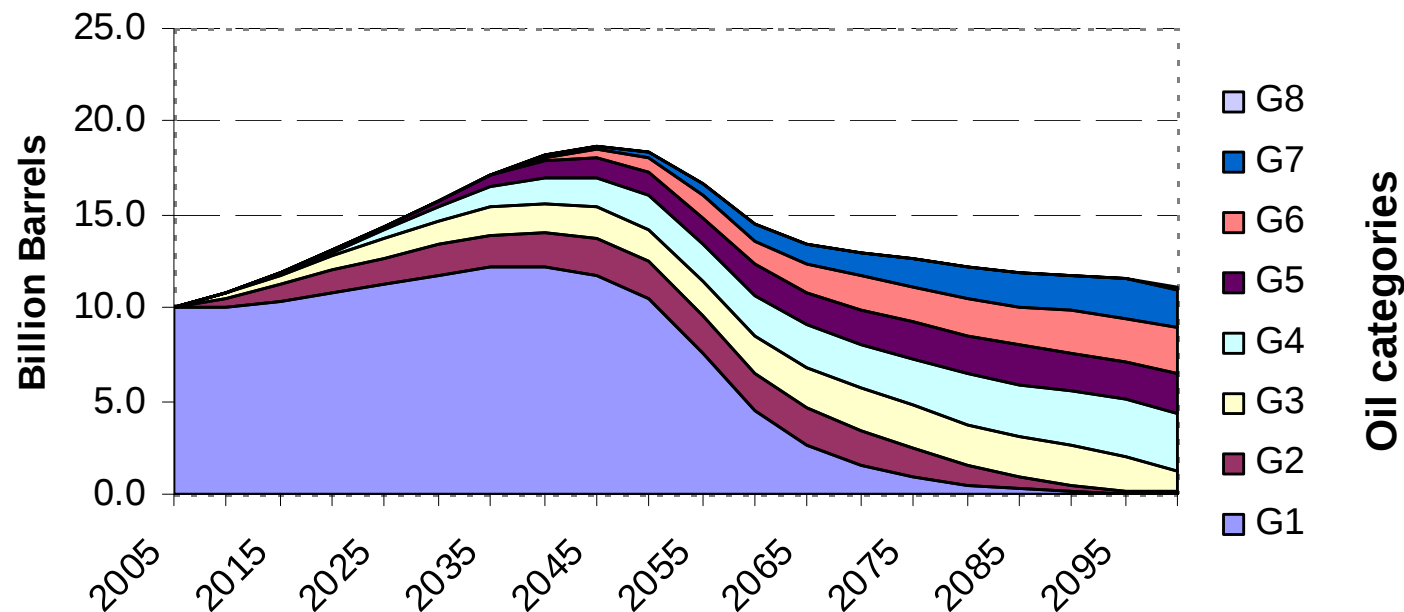


- In a 550 ppm CO₂-eq stabilization scenario the international oil market is doomed to collapse
- Strong contraction of the oil price



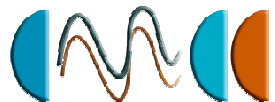
...No More Oil Production in MENA

Oil production - MENA



- Peak in 2045-2050 (but not world peak)
- Wide resources of cheap oil (category G1)

Source: Massetti and Sferra (2009)



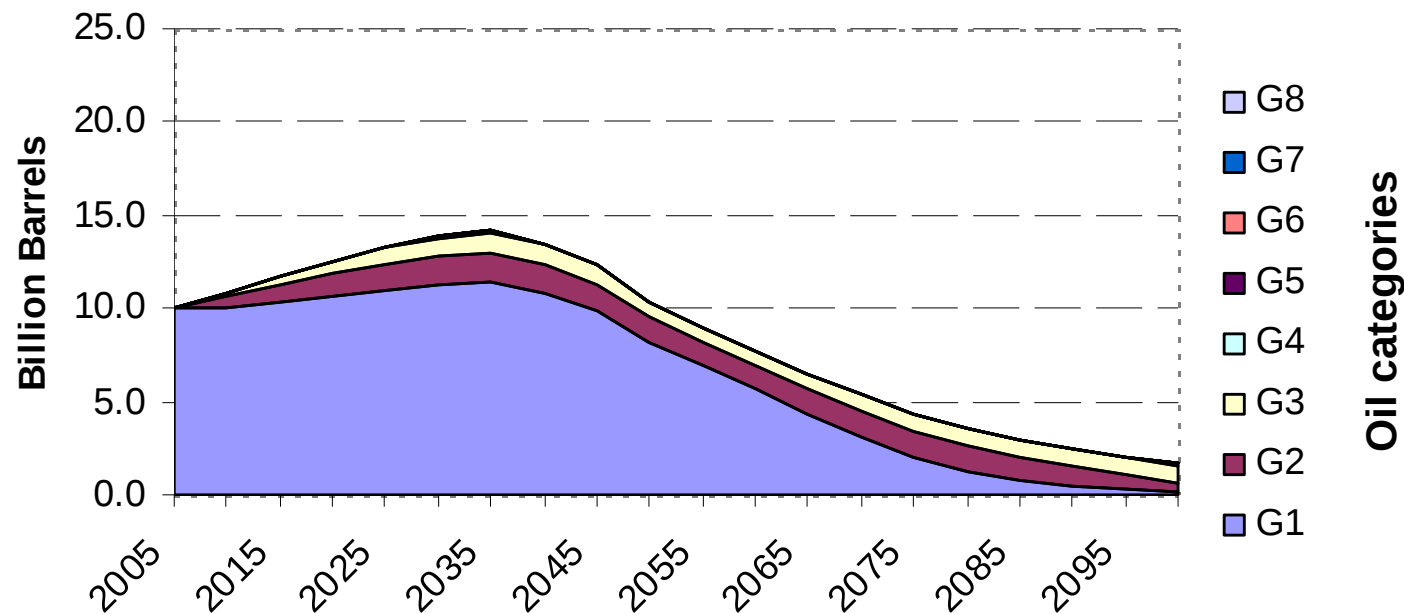
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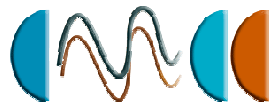
...No More Oil Production in MENA

Oil production - MENA



Source: Massetti and Sferra (2009)

- No big changes until 2035
- Collapse of oil production after 2035
- Need to restructure economies in all MENA region



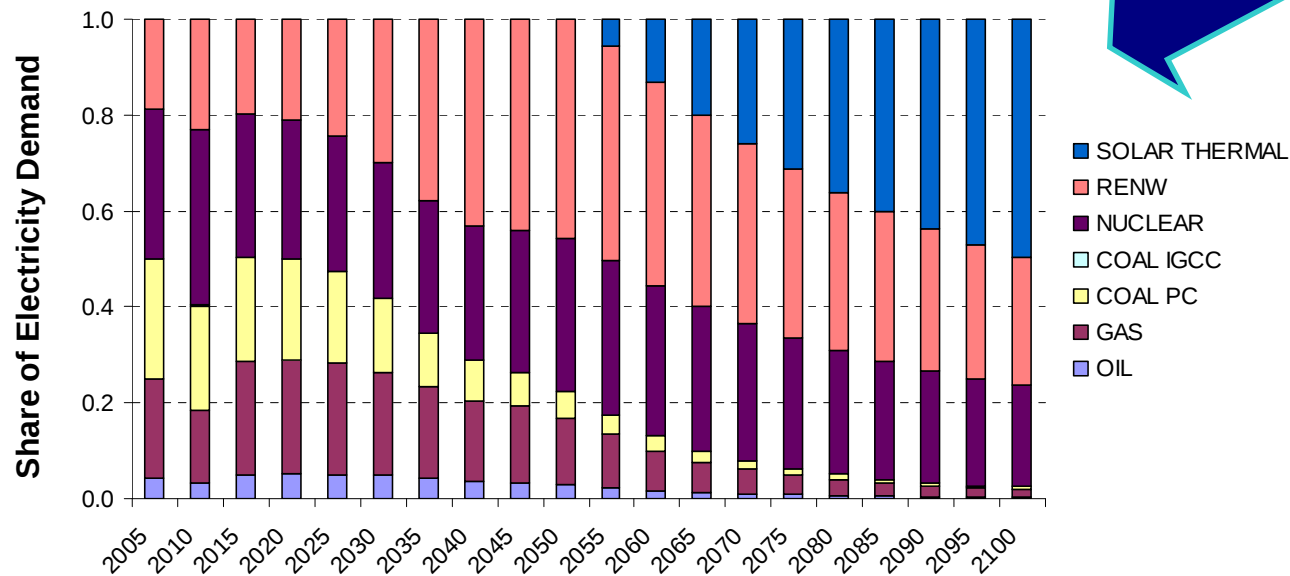
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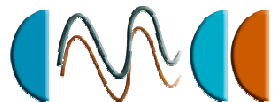
MENA: Electricity to EU?

Western Europe Electricity Consumption - Stab- Constrained with Grid



Source: Massetti and Ricci (2009)

- Solar Thermodynamic: potentially important if either nuclear or ccs (or both) are not an option
- Only from second half of the century



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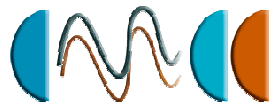
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Conclusions

- Challenges:

- Decarbonization of Energy Supply in Europe
 - technological and managerial problem, not necessarily financial problem
- Energy efficiency in MENA
- Collapse of oil trade and oil price from 2035 onward

- How can we bring MENA in a climate agreement?

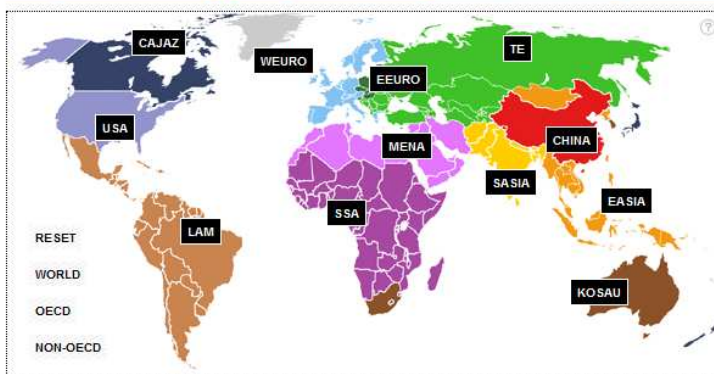


WITCH Policy Simulator

Compare scenarios

Compare variables

Compare regions



Stabilisation target at 2100

☒ BaU

☐ 535 ppm CO₂-eq

Policy framework

Scenario

Variables

▼ Economy

► Socio-economic variables

► Investments

► Technological progress

► Energy system

► Climate policy

▼ Climate

▼ Total emissions

☒ ALL GHG EMISSIONS [Gton CO₂EQ]

☐ ALL GHG EMISSIONS PER CAPITA [T CO₂EQ PER CAPITA]

► CO₂ emissions

► Other GHG emissions

► Concentrations and temperature

From

2005

To

2100

Chart type

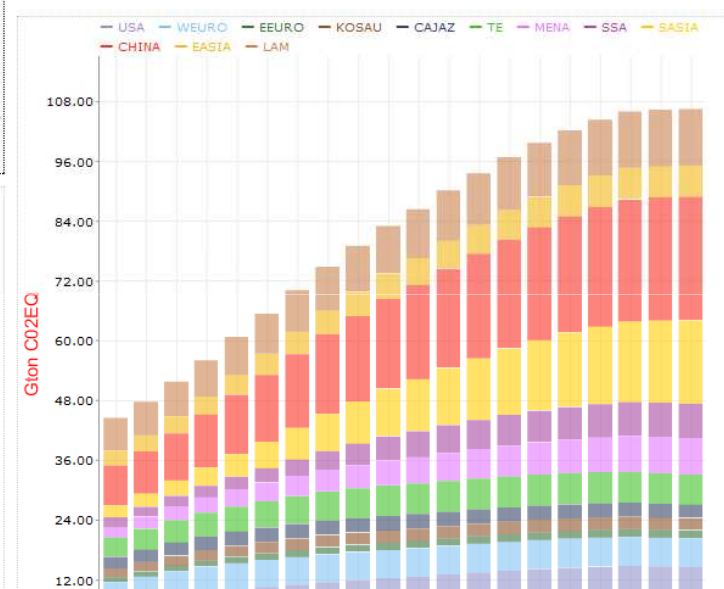
Bar chart

Update results

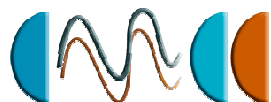
You can save the results as an [excel spreadsheet](#), a [detailed report](#) or download the chart as an [image](#)

Business as Usual

ALL GHG EMISSIONS [Gton CO₂EQ]



- WITCH policy simulator
- Soon online at www.witchmodel.org



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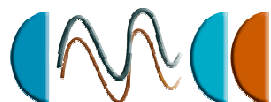
www.cmcc.it

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www.witchmodel.org

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