MEDITERRANEAN ENERGY PERSPECTIVES 2015

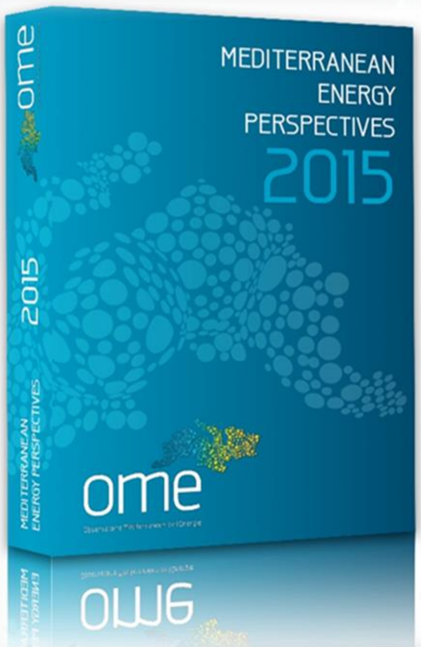
ome

Observatoire Méditerranéen de l'Energie

CLUB ESPAÑOL DE LA ENERGIA

Madrid, 18 April 2016

MEDITERRANEAN ENERGY PERSPECTIVES 2015



- ✓ Published in December 2015.
- ✓ Fifth opus in the MEP series.
- ✓ Covers 25 countries.
- ✓ Perspectives for supply and demand by sector, by fuel to 2040.
- ✓ Two energy demand scenarios:
  Conservative and Proactive.

THE CONSERVATIVE SCENARIO (CS)

The Conservative Scenario is a Reference Scenario (BAU):

- **It prolongs the current and past trends**
- **It takes into account past trends and current policies and measures and undergoing projects**
- **However it is cautious regarding announced measures and projects**
- **The CS does not include in full large scale deployment of renewables in the South**
- **This Scenario does not foresee specific and strong measures to enforce large scale energy savings in the South**
- **It takes into account the plans announced by the countries but at a more moderate rate of deployment (mirroring current trends)**
- **It assumes that all electricity needs will be met by current used fuels and, to a lesser degree, by alternative fuels. For instance, for nuclear it assumes a later date of operation than that announced based on observed delays on these kind of projects**

THE PROACTIVE SCENARIO (PS)

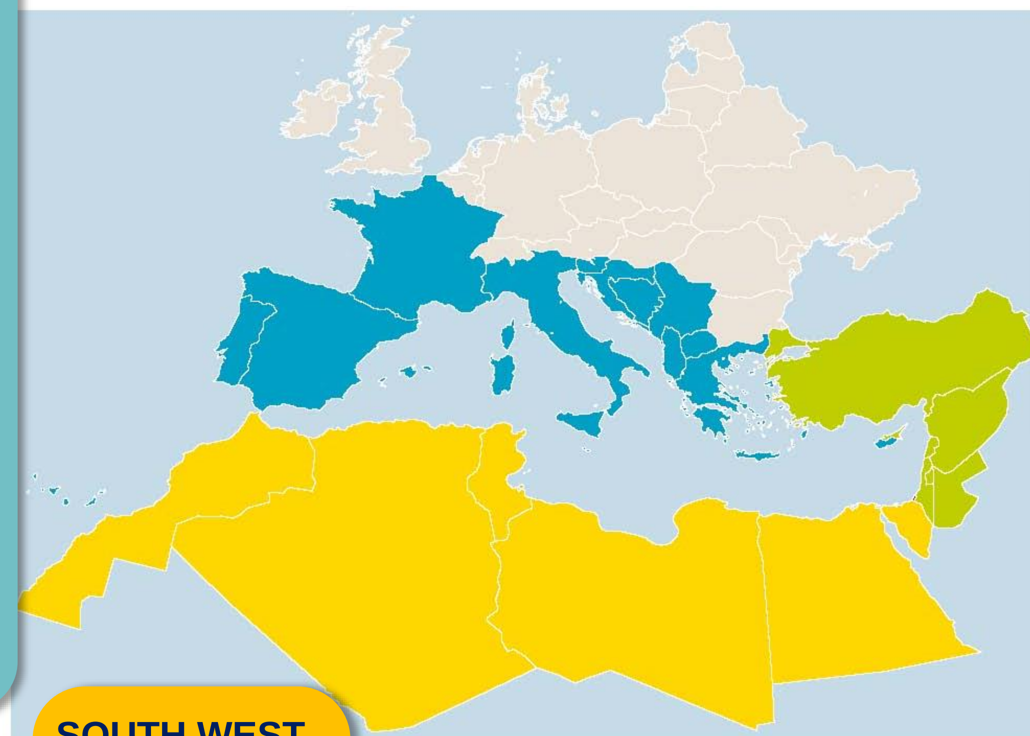
The MEP 2015 Proactive Scenario emphasizes energy security and environmental concerns through:

- **the implementation of strong energy efficiency programmes and increased diversification in the energy supply mix.**
    - **This includes more renewable energy sources in all end-use sectors and in the electricity sector**
    - **and the introduction of nuclear power for some South Mediterranean countries.**
- **It assumes a decline in oil input to electricity generation capacity**
- **and favours clean energy fuels and technologies**

MEP 2015 GEOGRAPHIC COVERAGE

NORTH

Cyprus
France
Greece
Italy
Malta
Portugal
Slovenia
Spain
Other North
- Albania
- Bosnia H.
- Croatia
- Macedonia
- Montenegro
- Serbia



SOUTH EAST

- Israel
- Jordan
- Lebanon
- Palestine
- Syria
- Turkey

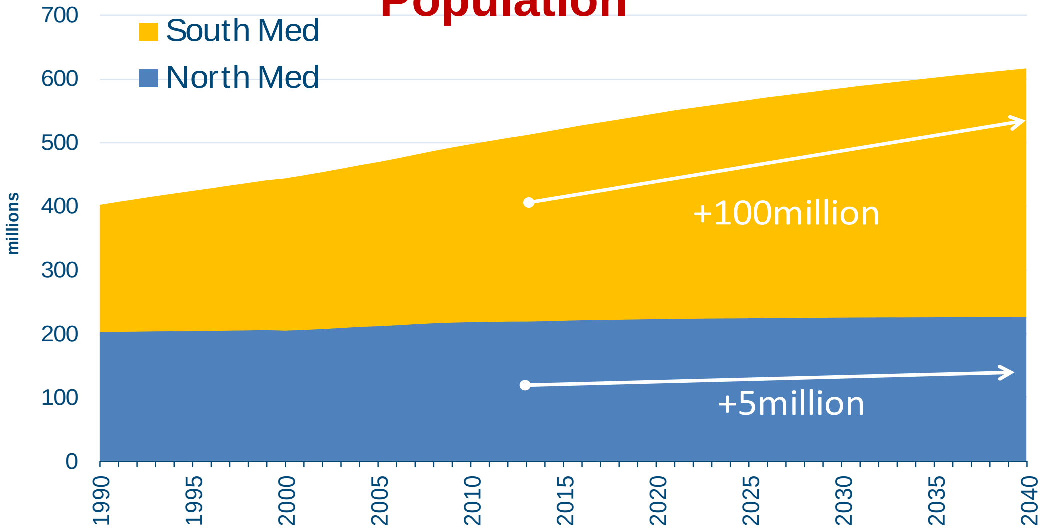
SOUTH WEST

- Algeria
- Egypt
- Libya
- Morocco
- Tunisia

25 countries covered
19 individual country models

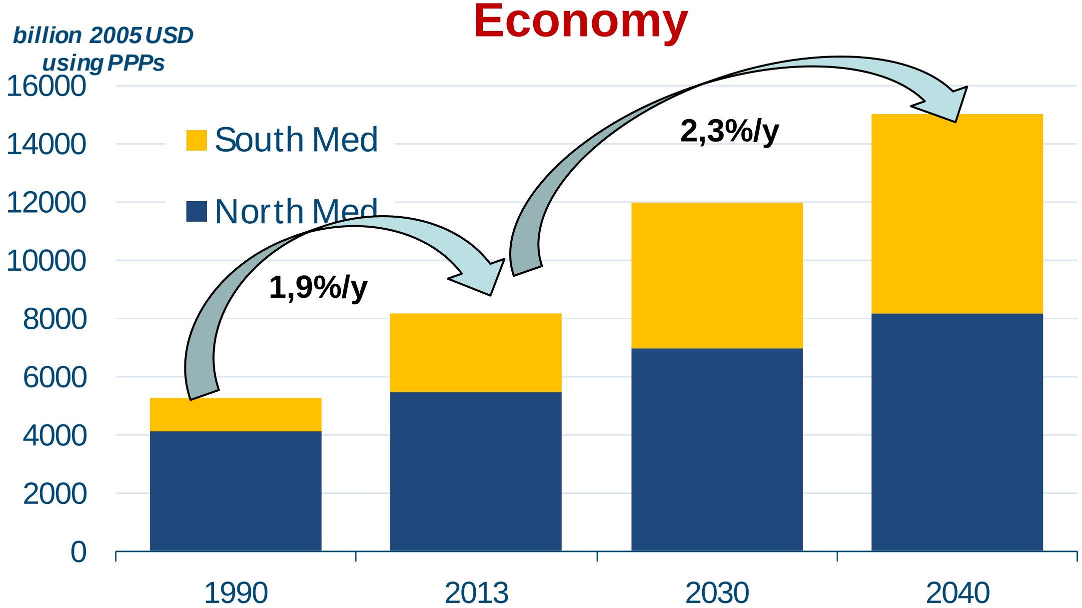
Mediterranean Region

Population



Share of S. Med 57% → 63%

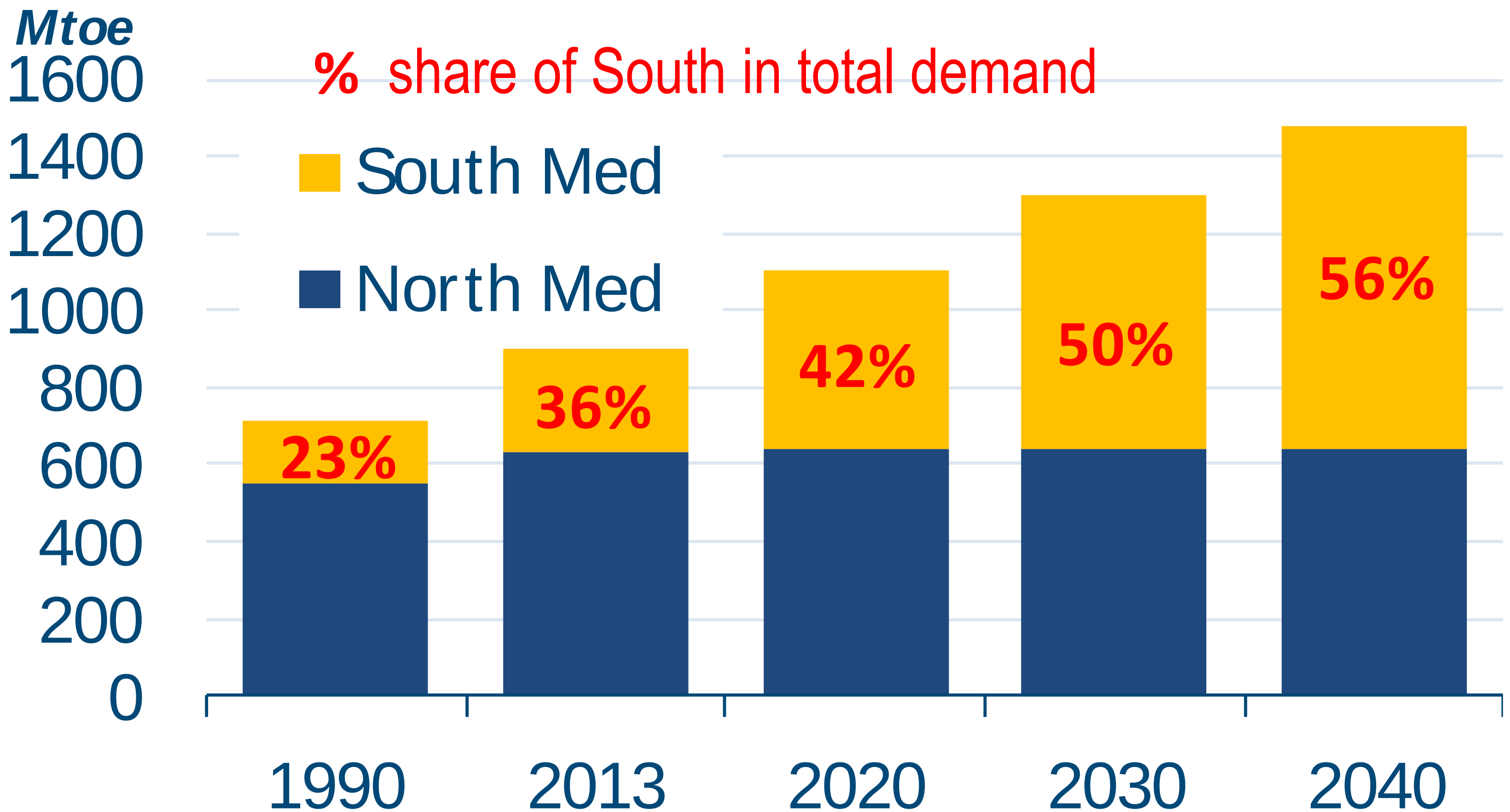
Economy



Share of S. Med 33% → 47%

GDP/cap ~doubles in the South

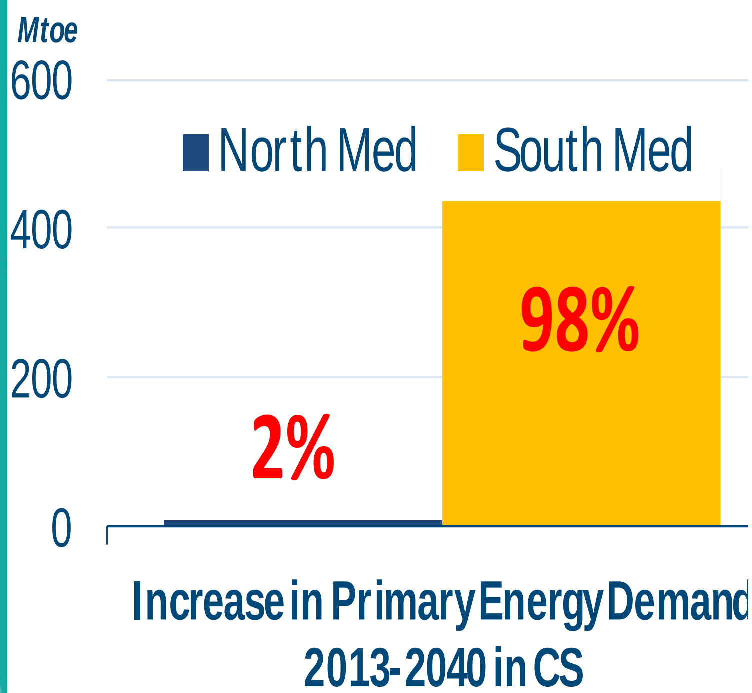
ENERGY DEMAND BY REGION (CS)

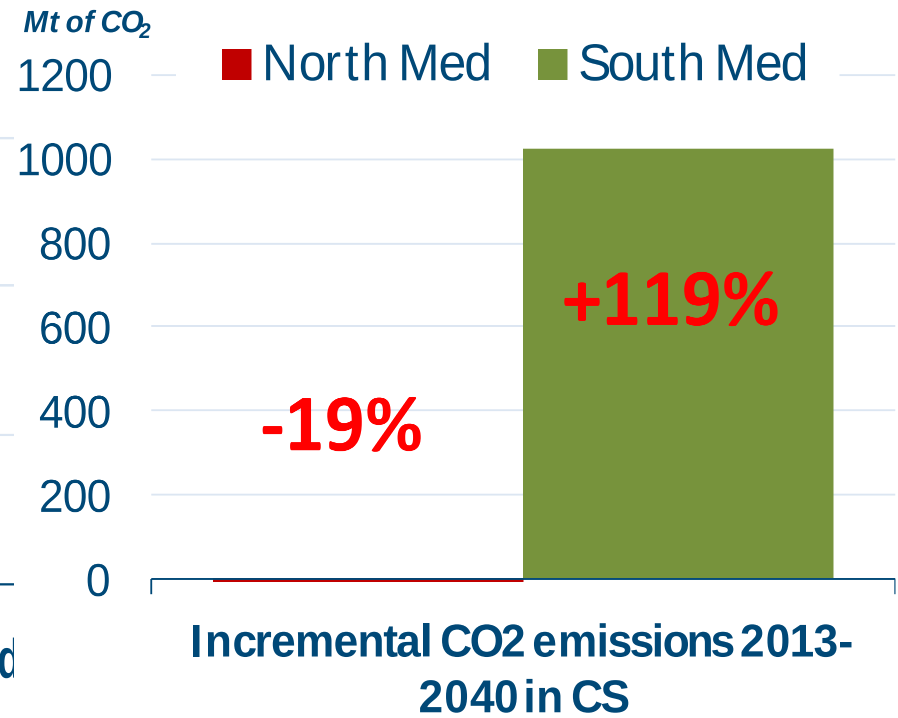


As a result of population and economic growth, energy demand will increase by more than 50% to 2040.

More than half the increase to stem from Egypt and Turkey

ENERGY DEMAND & CO_2 EMISSIONS



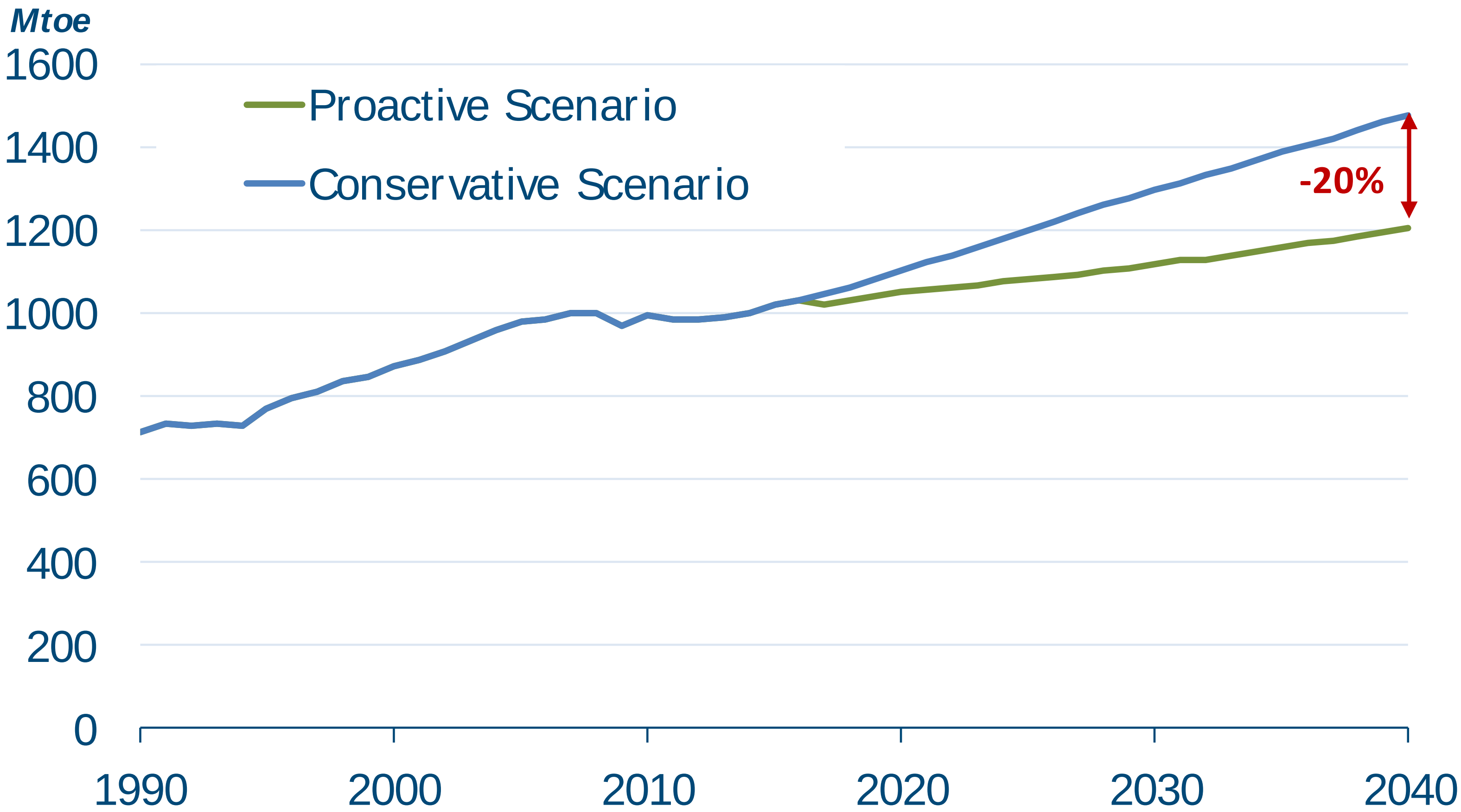


+45% increase in CO_2 emissions – in 2040, 86% more than the 1990 level

CS is unsustainable

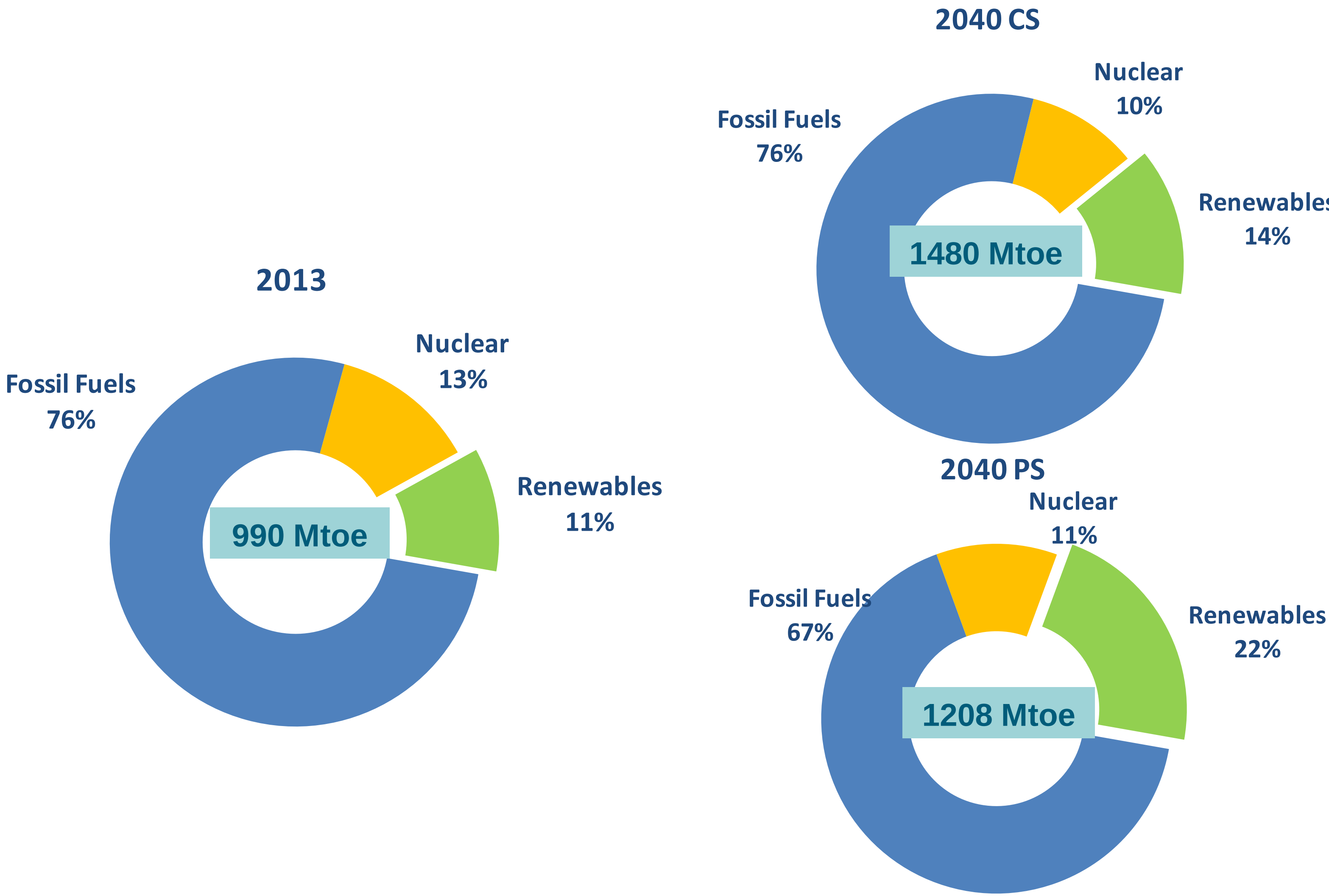
MOVING TOWARDS A GREENER AND ENERGY EFFICIENT FUTURE

MEDITERRANEAN ENERGY DEMAND



Energy demand would be 20% lower in 2040 in the PS reaching 1200Mtoe – 22% increase from 2013 instead of 50%

MEDITERRANEAN ENERGY MIX



remains fossil fuel based but in PS
share of fossil fuels drops substantially, RES increase to 22%

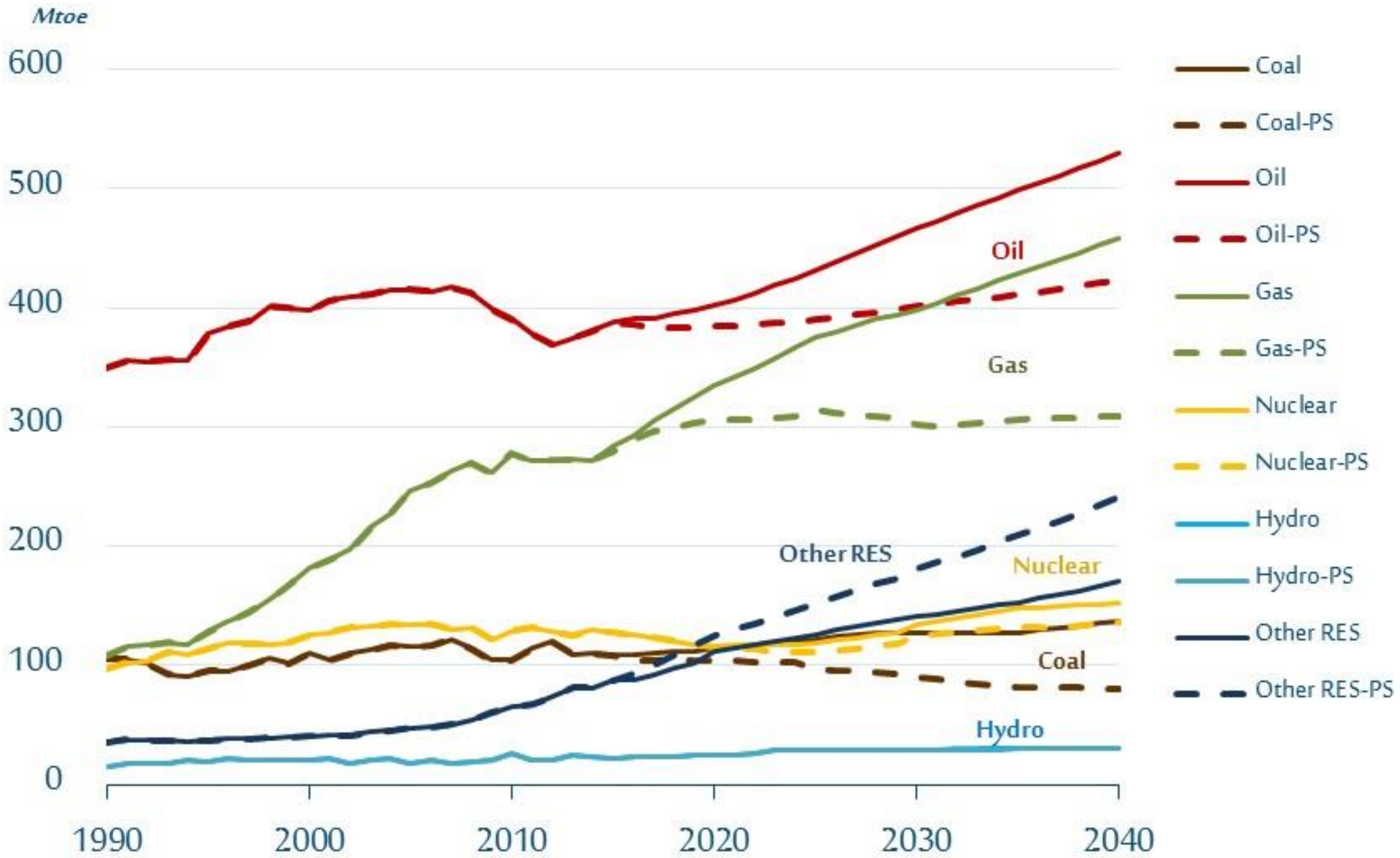
THE PROACTIVE SCENARIO: KEY FIGURES

improved energy efficiency and increased use of renewables lead to :

- ✓ **20% savings for primary energy demand in 2040.**
- ✓ **27% decrease in CO_2 emissions.**
- ✓ **Nearly halving net fossil fuel imports by 2040.**

The electricity sector strengthens regional cooperation through increase use of renewable technologies and enhanced interconnections.

MED Energy Demand by Fuel, by Scenario

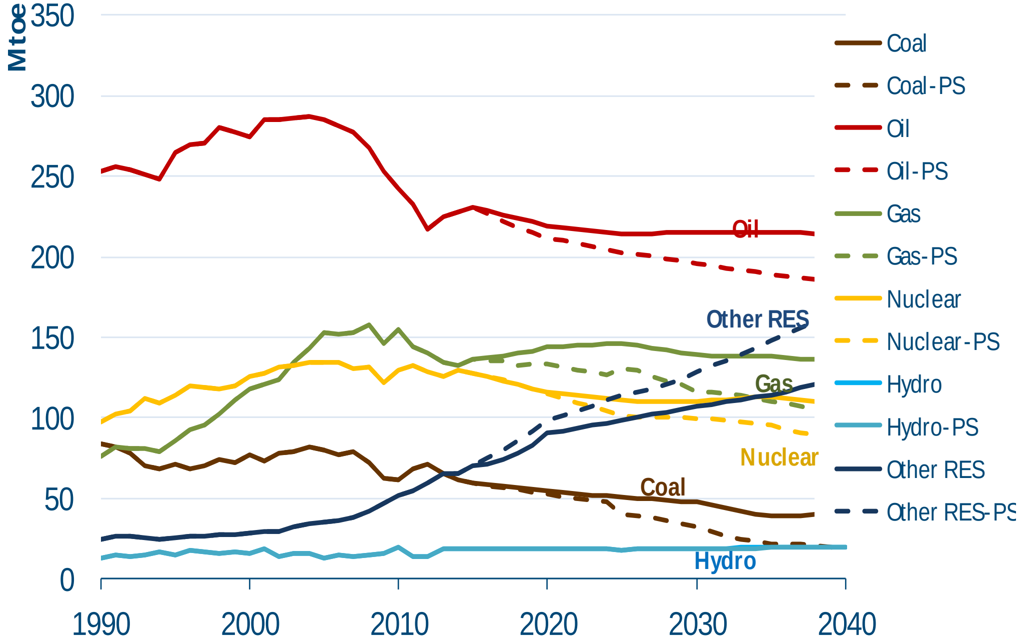


But contrasted results by region.

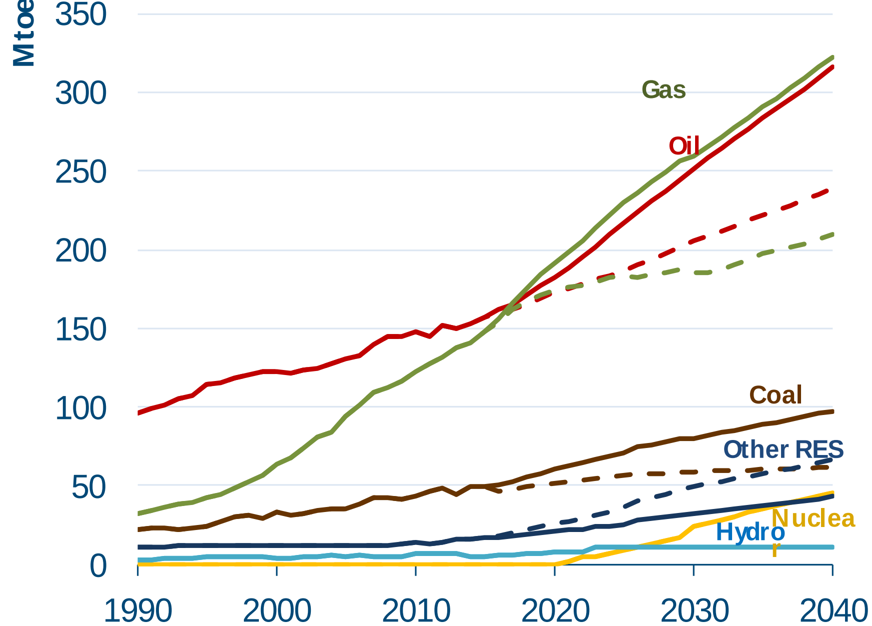
PRIMARY ENERGY DEMAND BY FUEL

by Scenario & Region

North Med.



South Med.

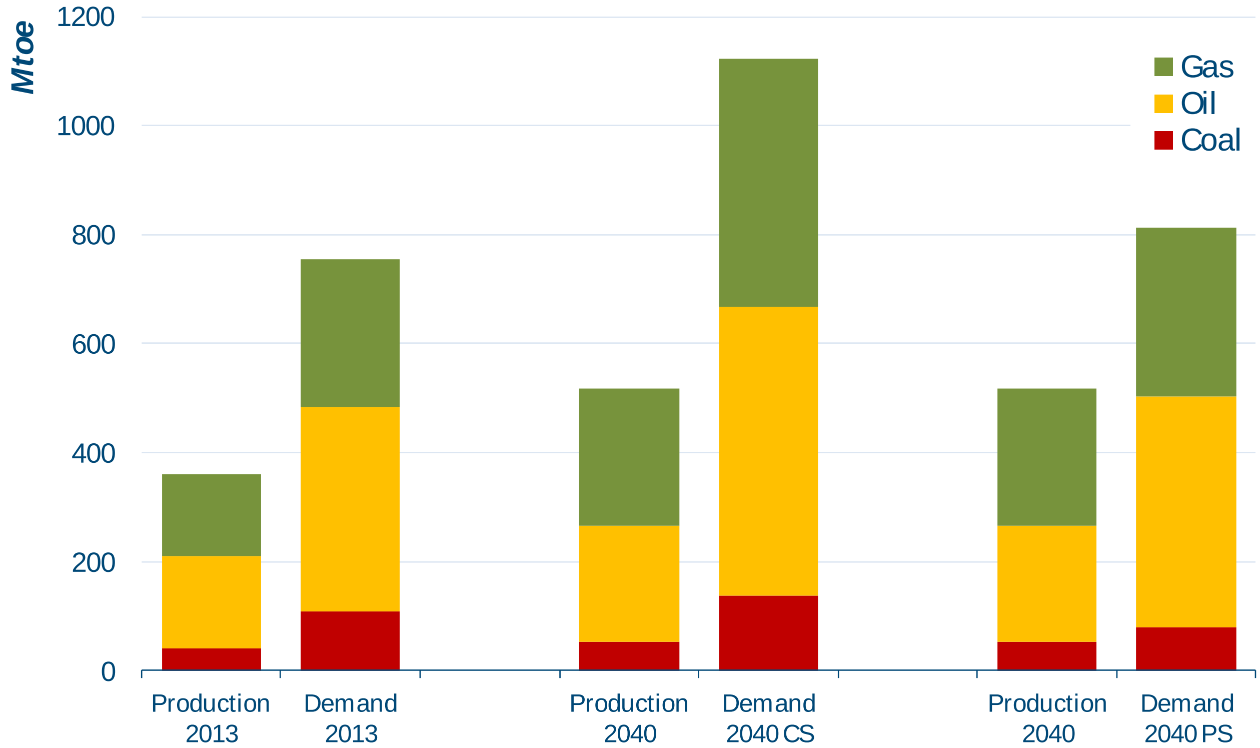


Trajectories are very different between the two shores. In the North, RES will become the second largest fuel after oil, and before gas in the PS by 2040.

The South oil and gas demand will remain substantially higher than any other fuel, even in the PS

ENERGY TRENDS
BY
PRIMARY ENERGY SOURCE

FOSSIL FUELS PRODUCTION & DEMAND



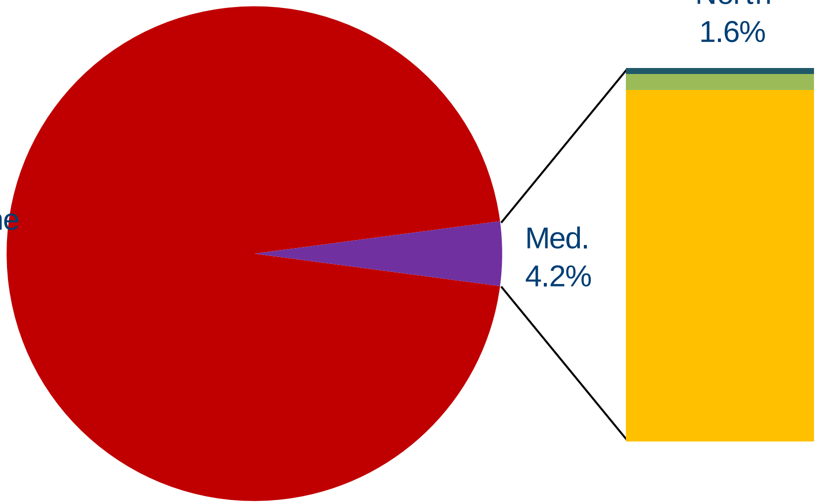
Med. oil production will increase by about 1 mb/d between 2013-2040

Med. gas production will increase by more than 70% by 2040

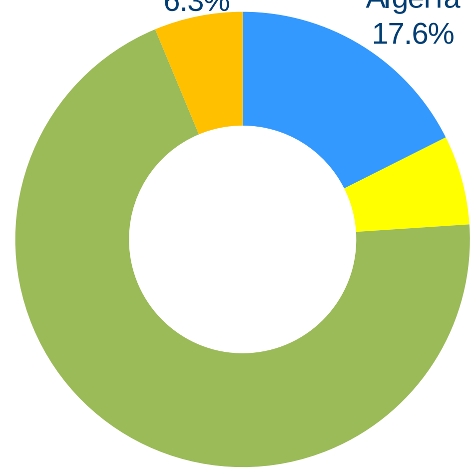
Already more gas is consumed in the South Med. than in the North

Mediterranean oil reserves in the World

World oil reserves: 1656 Gb



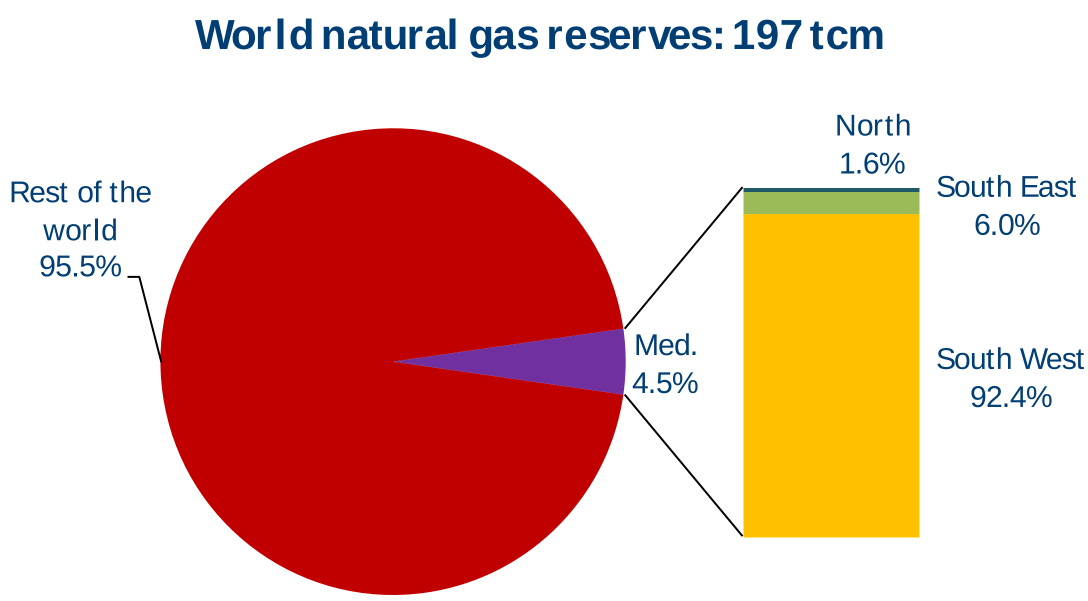
Mediterranean oil reserves: 69.3 Gb

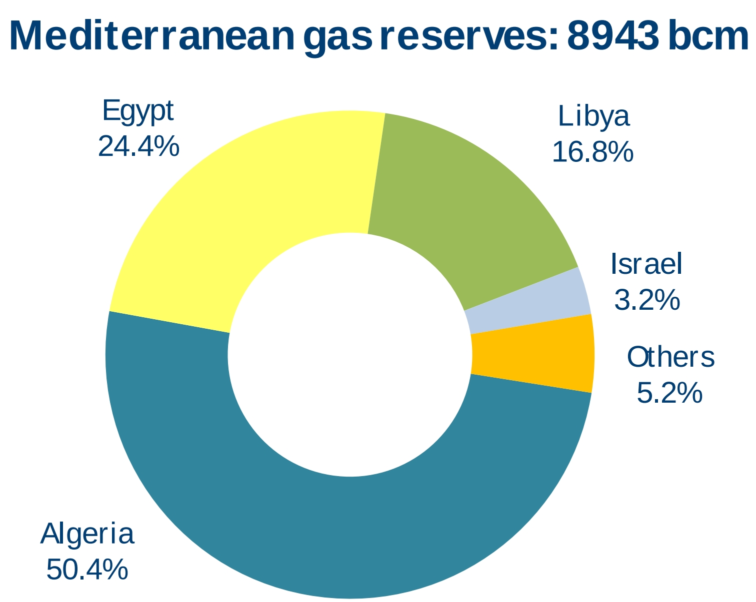


Source: OME, MEP 2015.

Libya alone holds more than two thirds of Mediterranean proven oil reserves

Mediterranean gas reserves in the World





Source: OME, MEP 2015.

Algeria alone holds half of Mediterranean proven gas reserves

Unconventional Oil & Gas Potential

Table 2. Top 10 countries with technically recoverable shale oil resources

Rank	Country	Shale oil (billion barrels)	
1	Russia	75	
2	U.S.[1]	58	(48)
3	China	32	
4	Argentina	27	
5	Libya	26	
6	Australia	18	
7	Venezuela	13	
8	Mexico	13	
9	Pakistan	9	
10	Canada	9	
	World Total	345	(335)

[1] EIA estimates used for ranking order. ARI estimates in parentheses.

Table 3. Top 10 countries with technically recoverable shale gas resources

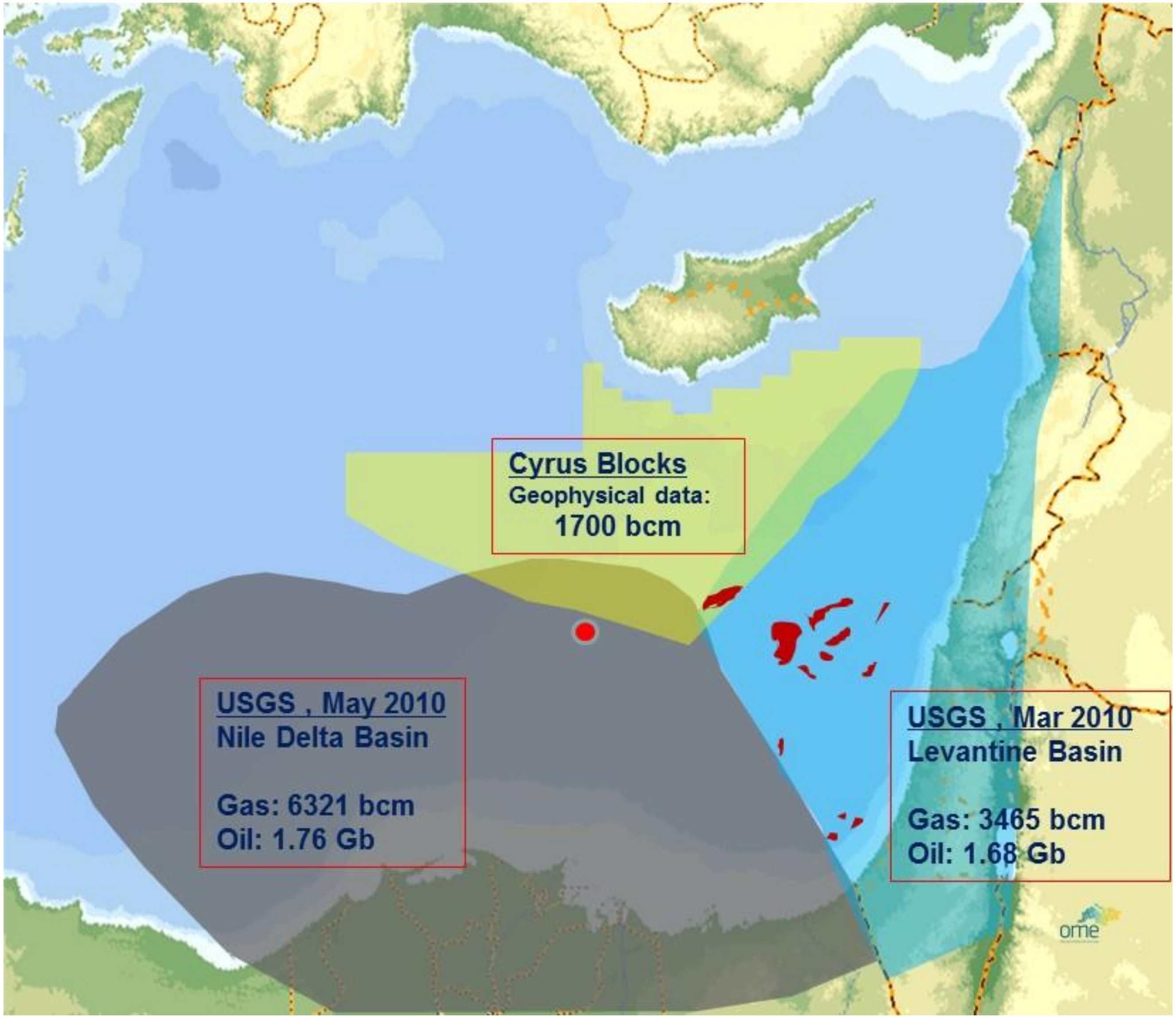
Rank	Country	Shale gas (trillion cubic feet)	
1	China	1,115	
2	Argentina	802	
3	Algeria	707	
4	U.S.[1]	665	(1,161)
5	Canada	573	
6	Mexico	545	
7	Australia	437	
8	South Africa	390	
9	Russia	285	
10	Brazil	245	
	World Total	7,299	(7,795)

[1] EIA estimates used for ranking order. ARI estimates in parentheses.

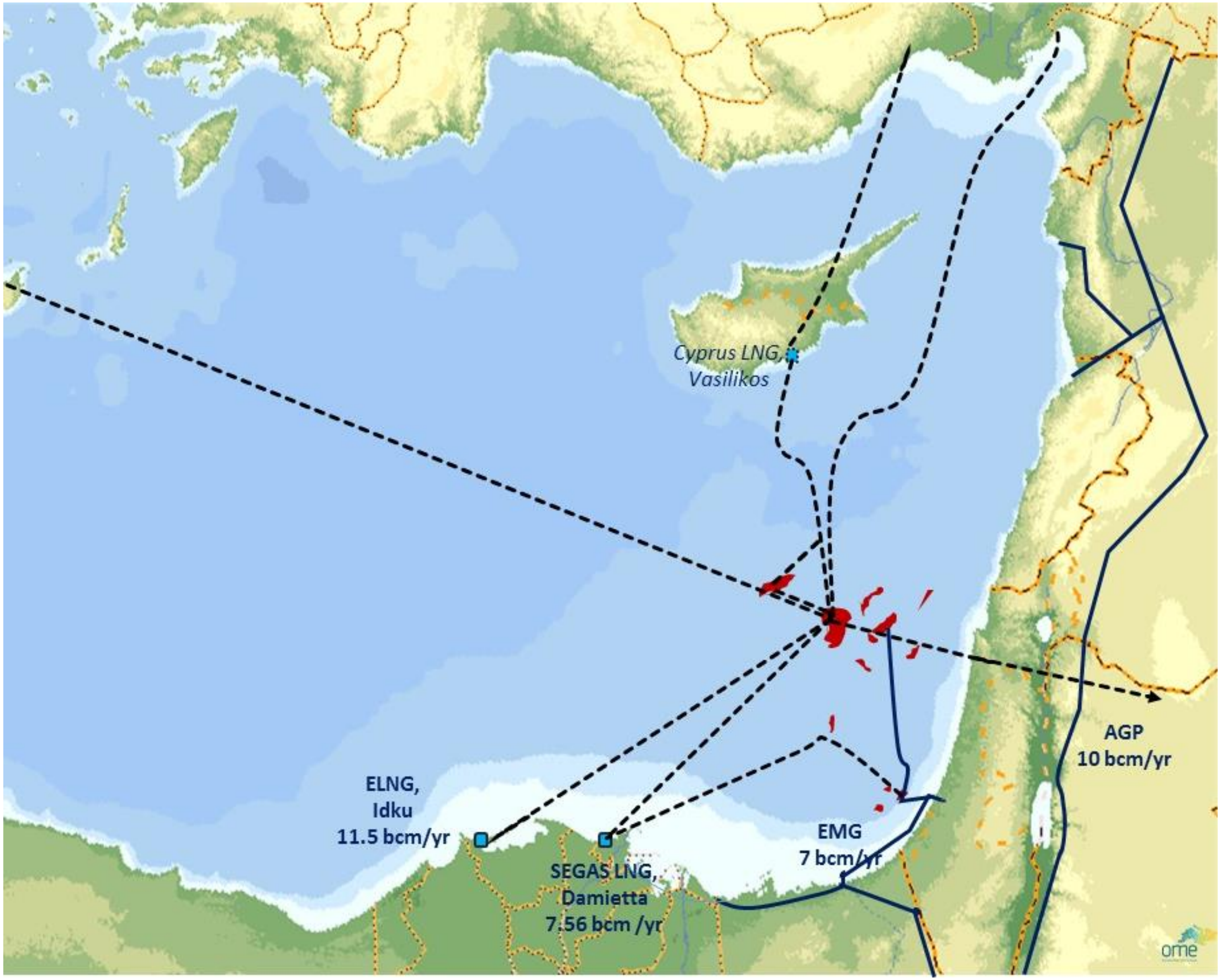
Algeria and Libya are amongst the world's top-10 unconventional oil and gas resource holders…

…but plenty of obstacles

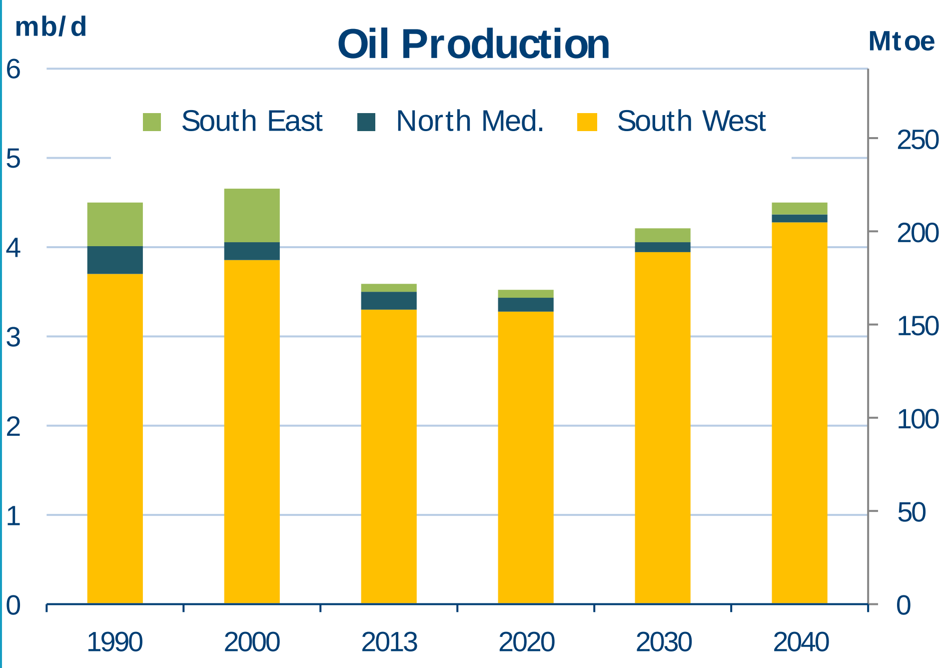
A new North Sea is emerging ?



A new North Sea is emerging ?

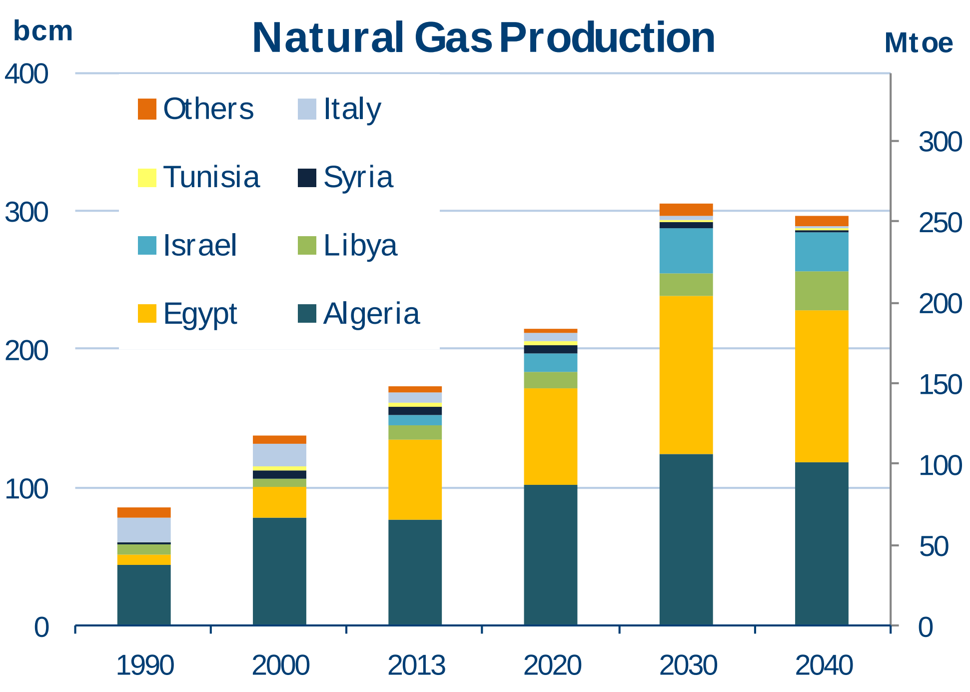


MEDITERRANEAN OIL AND GAS PRODUCTION OUTLOOK

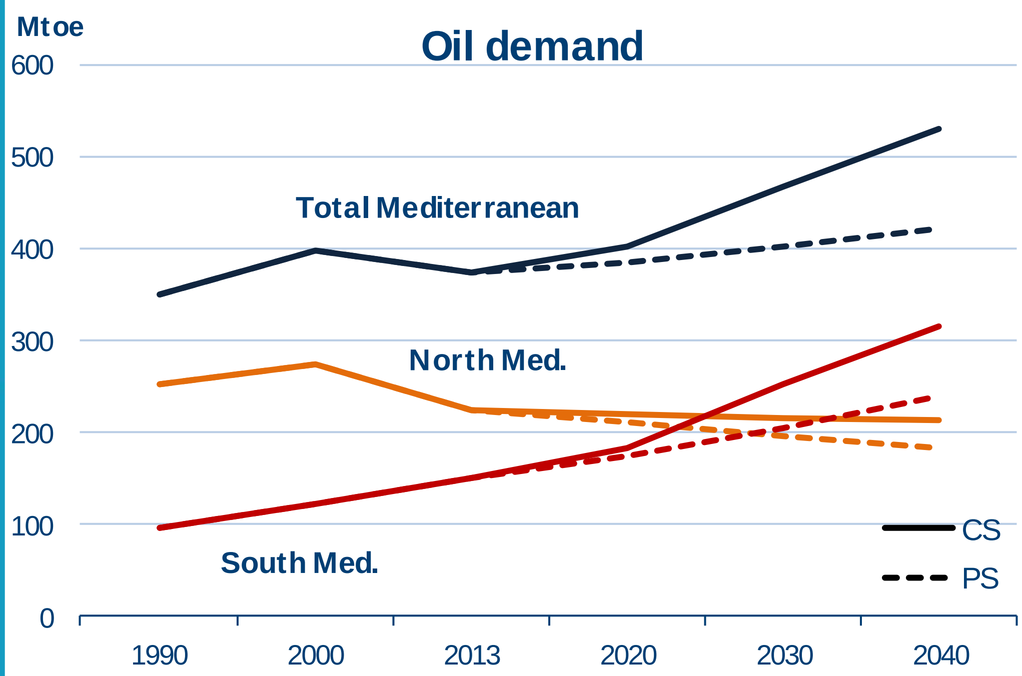


Med. oil production will increase by about 1 mb/d between 2013-2040

Med. gas production will increase by more than 70% by 2040

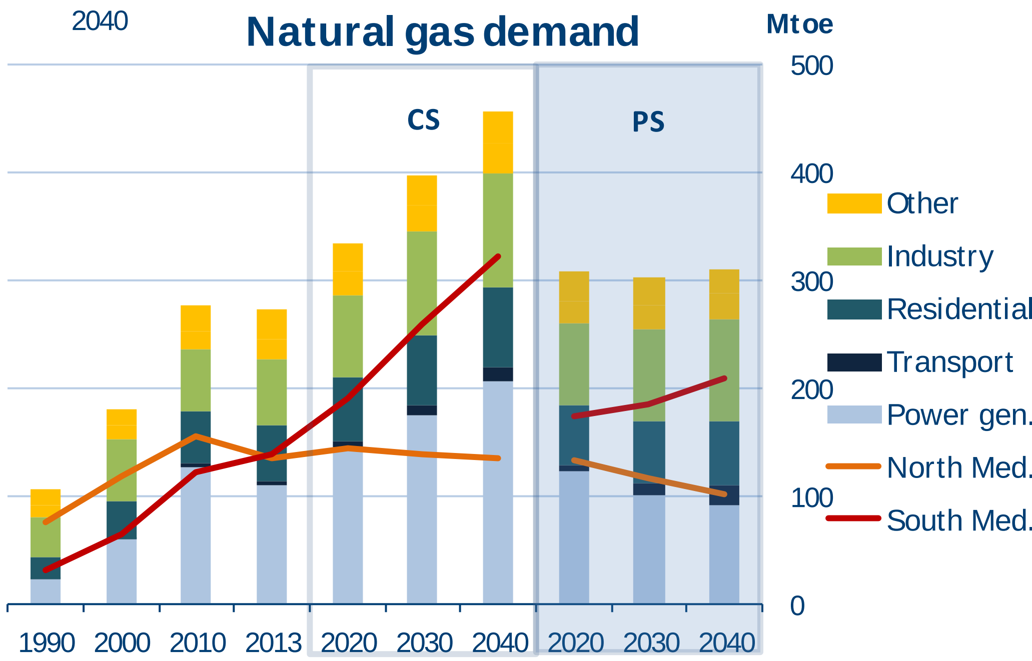


MEDITERRANEAN OIL AND GAS DEMAND OUTLOOK

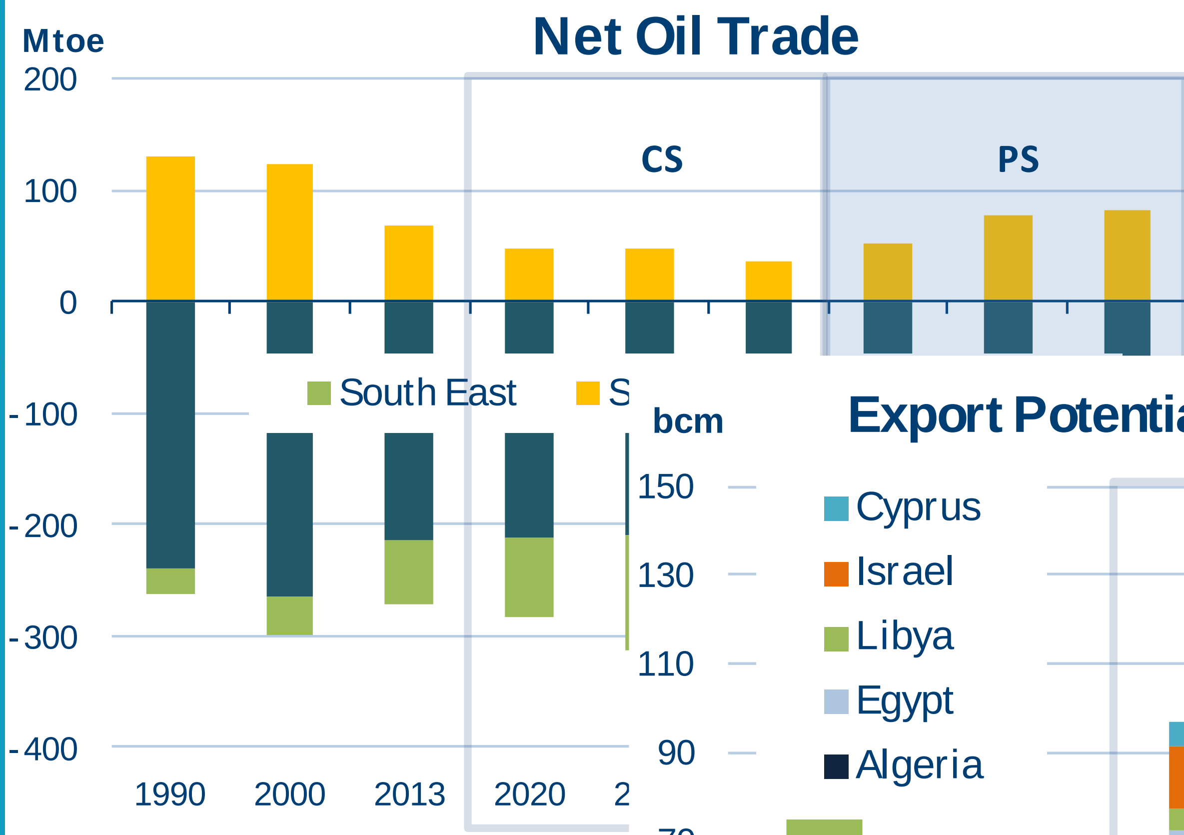


Med. oil demand expected to increase between 13% (PS) and 42% (CS). More oil will be consumed in the South than in the North

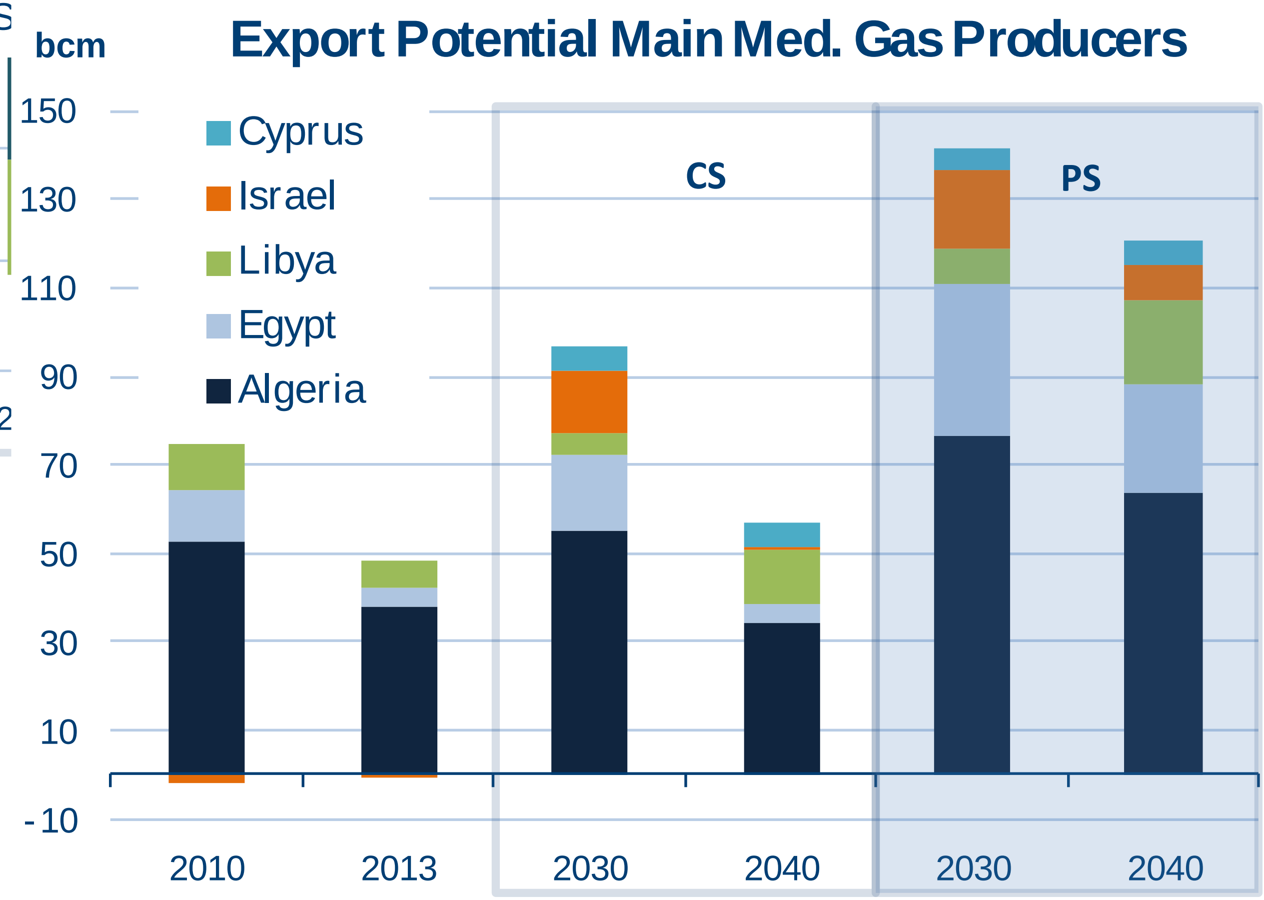
Already more gas is consumed in the South Med. than in the North



MEDITERRANEAN OIL AND GAS TRADE POTENTIAL OUTLOOK

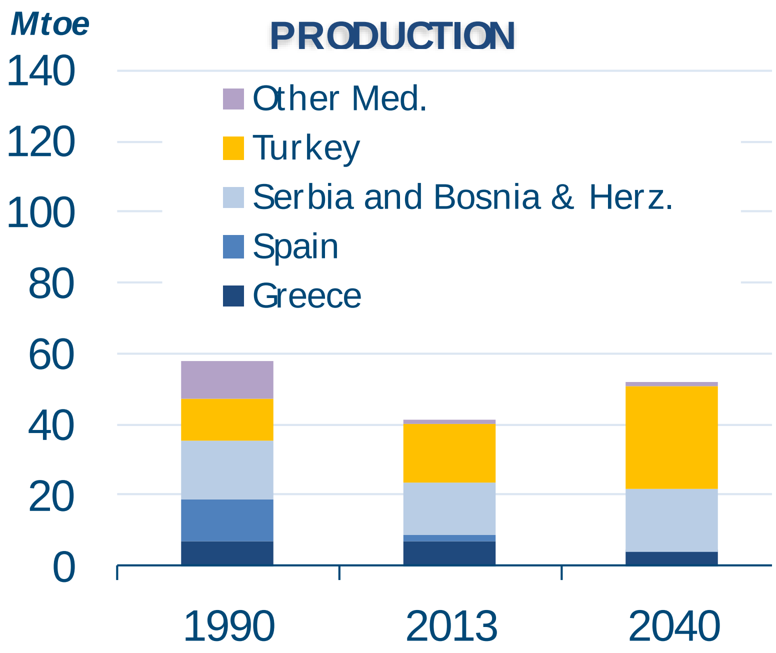


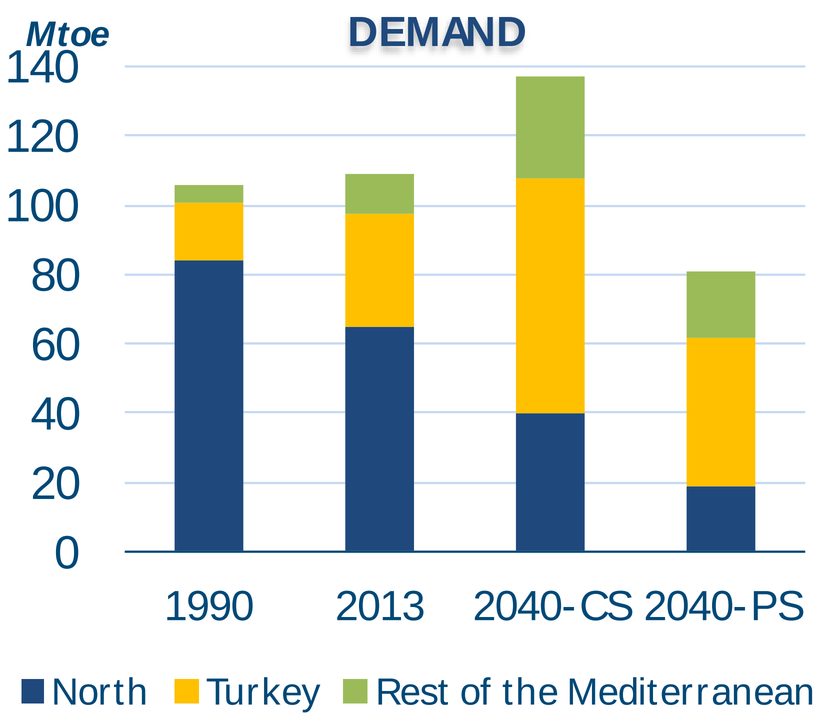
The region will import more oil to satisfy its demand



By 2040, 5 countries could export some 60bcm in CS. But double that amount in PS

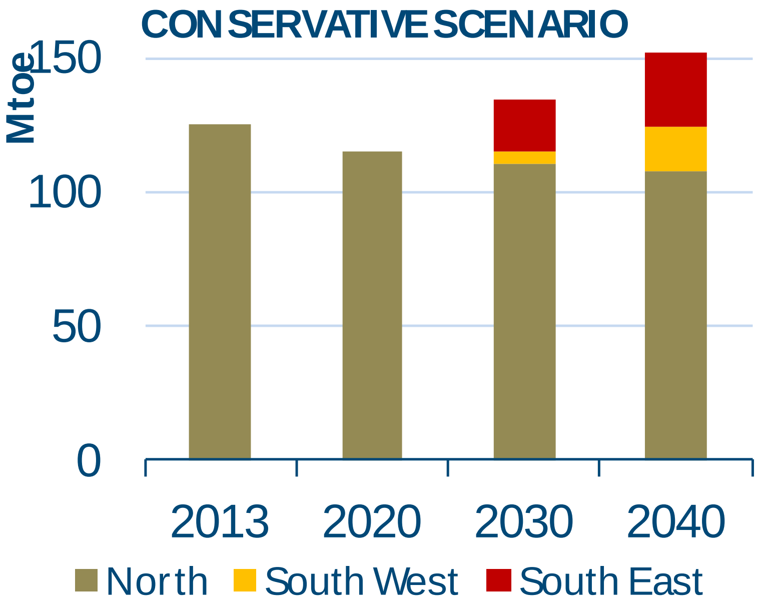
COAL PRODUCTION AND DEMAND

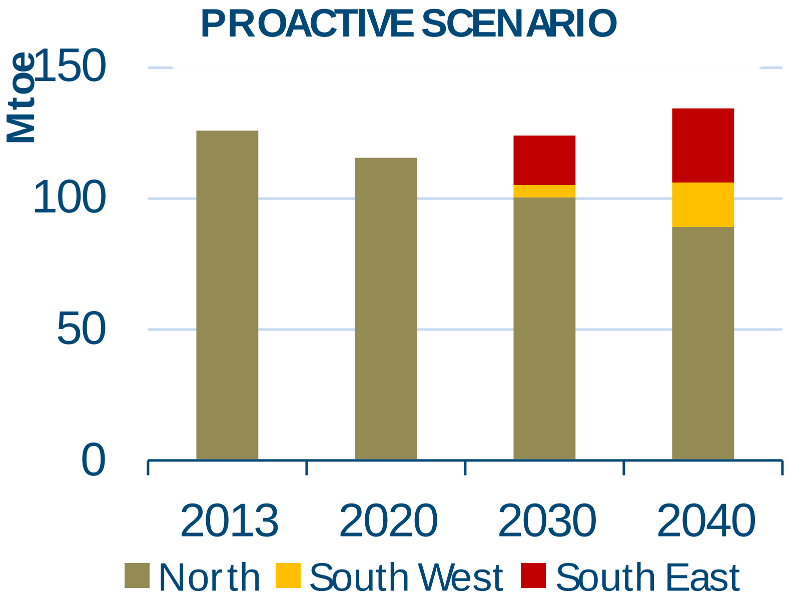




Coal is not a major fuel in the energy mix of the Med. (11%) but it is a pivotal fuel for some countries, especially Turkey – as a diversification option.

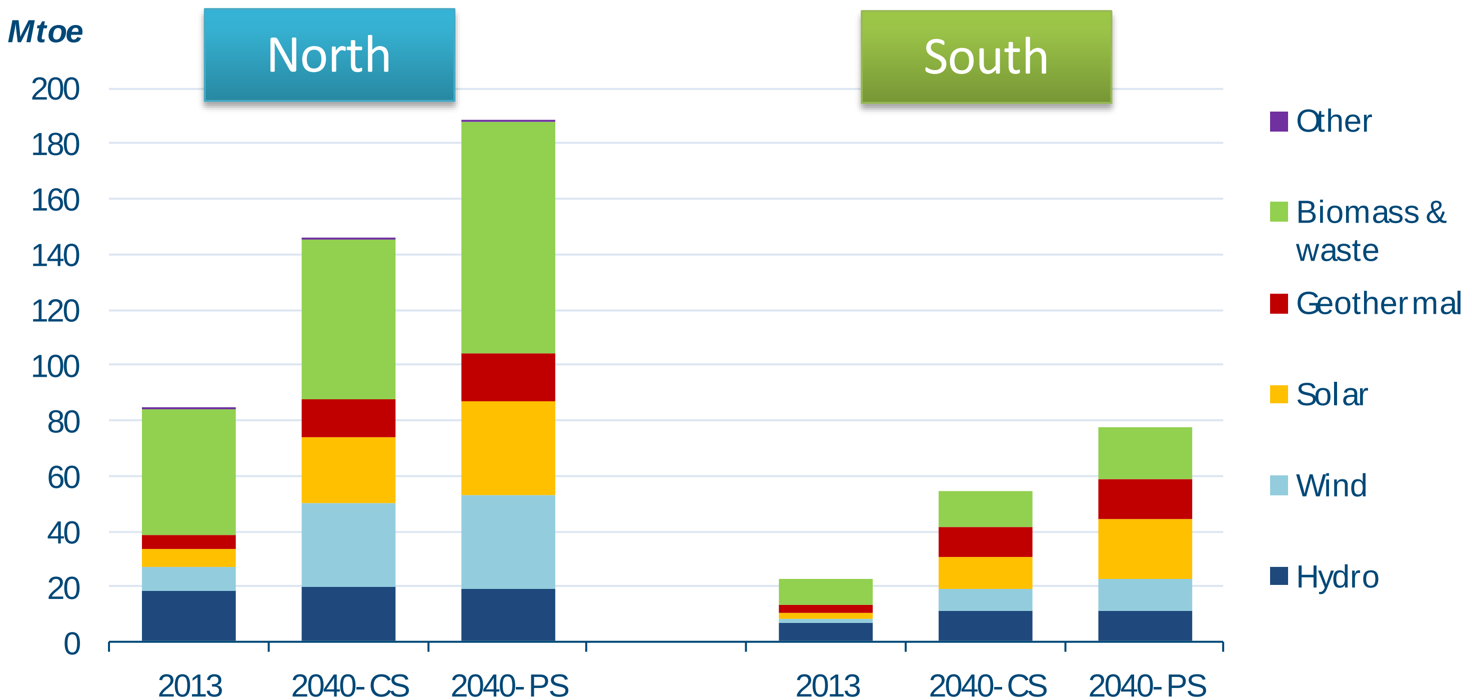
NUCLEAR





decline in the North is offset by new nuclear plants in the South after 2030 (Egypt, Turkey, Morocco and Jordan).

RENEWABLES

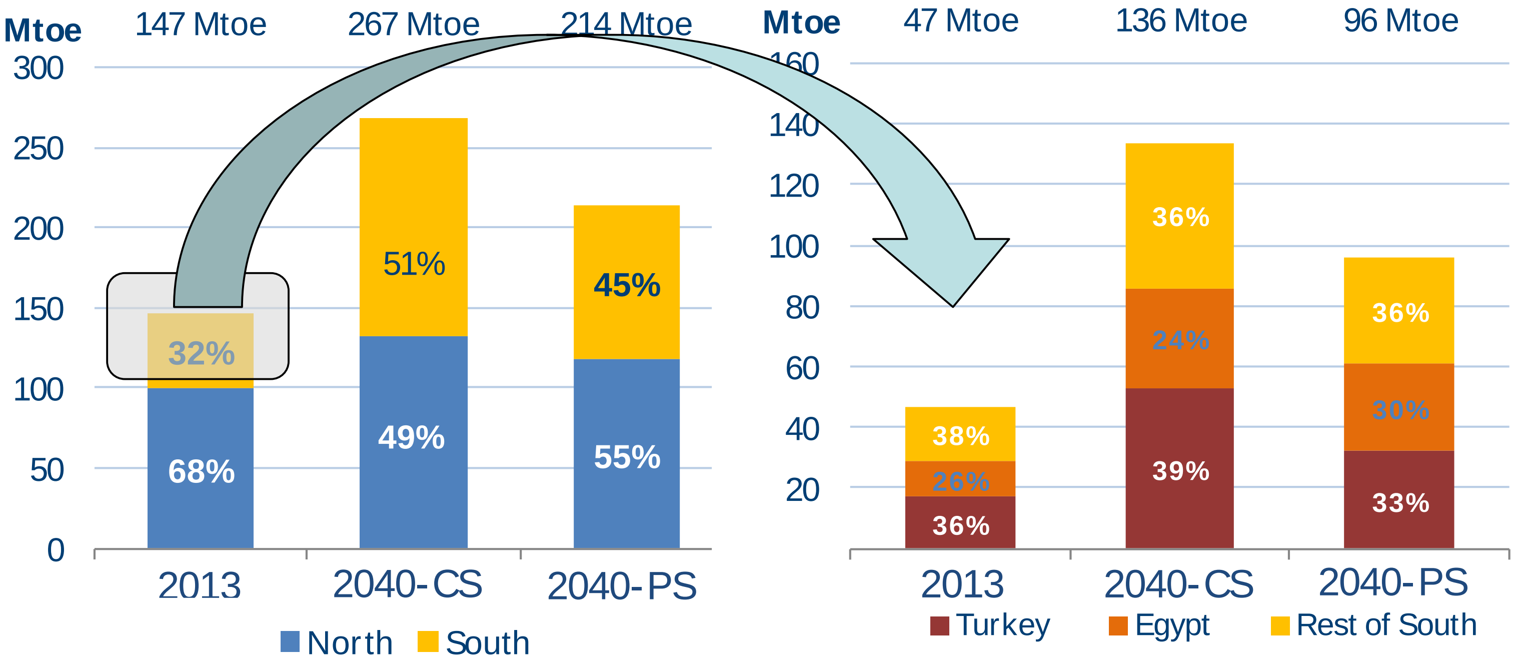


Outstanding increase in RES production in both scenarios.

ELECTRICITY

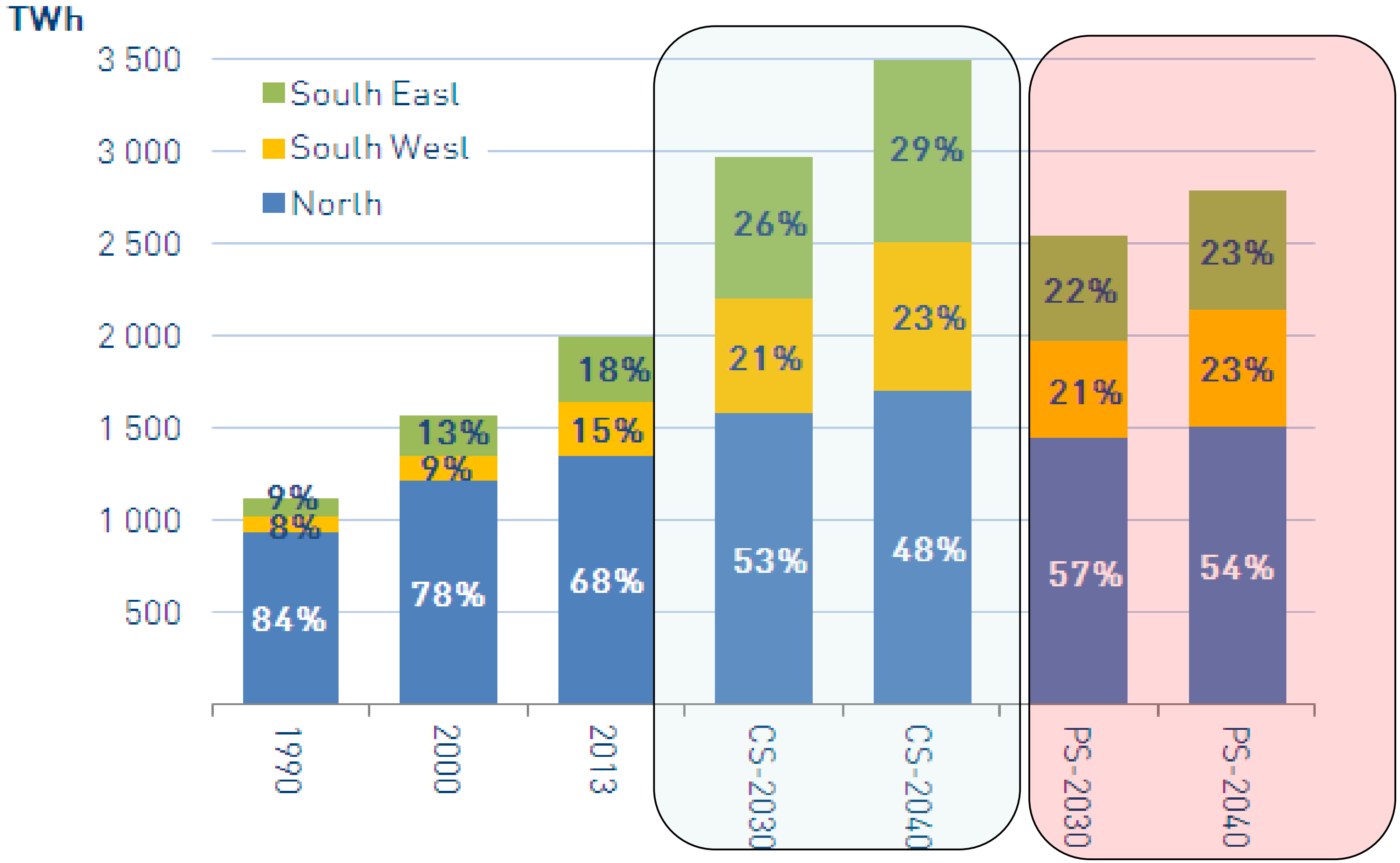
Demand, Generation, and Installed Capacity

ELECTRICITY CONSUMPTION



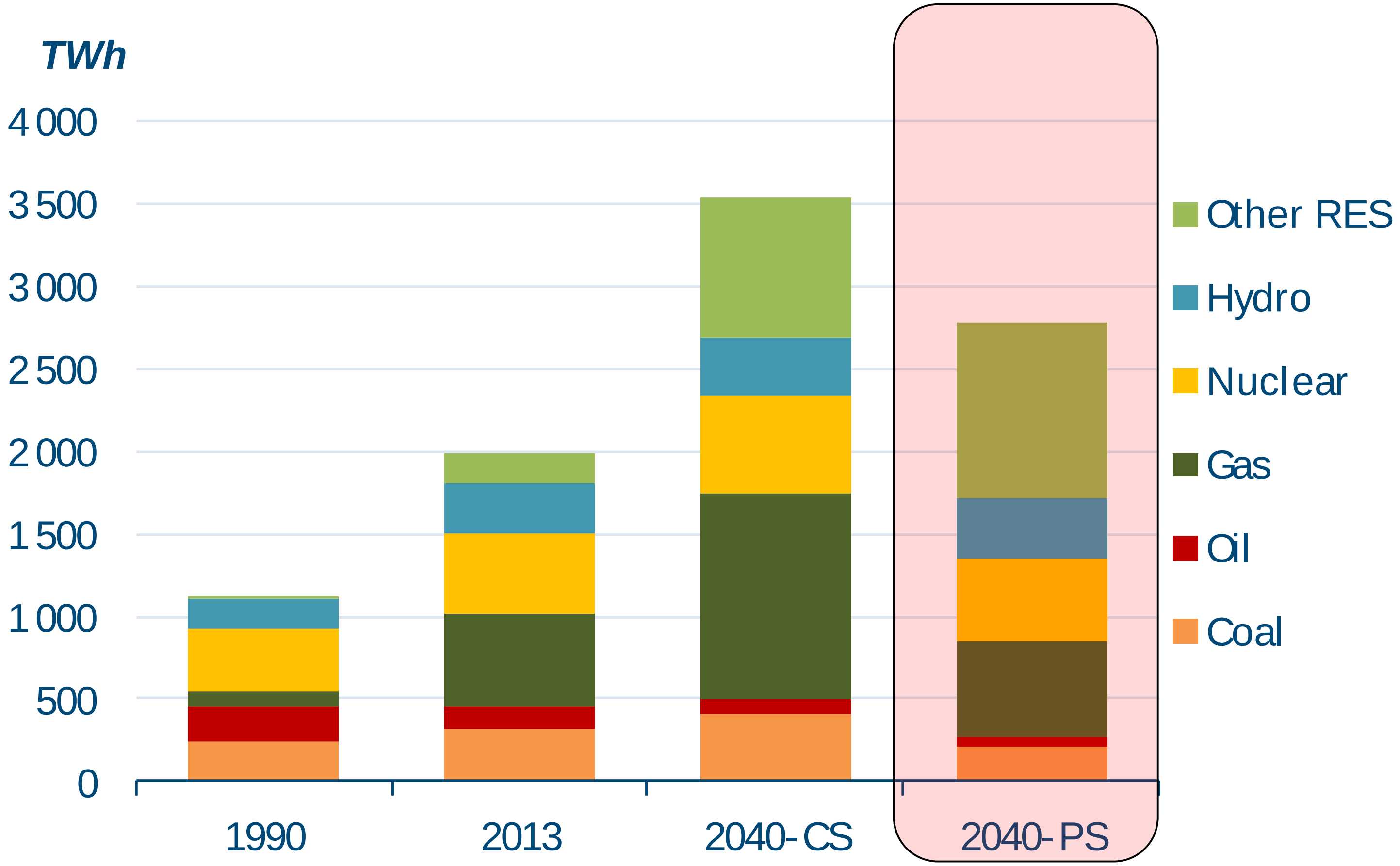
will ~triple by 2040 in South Med, important efficiency measures are needed to smooth such a boom in CS.

MEDITERRANEAN ELECTRICITY GENERATION



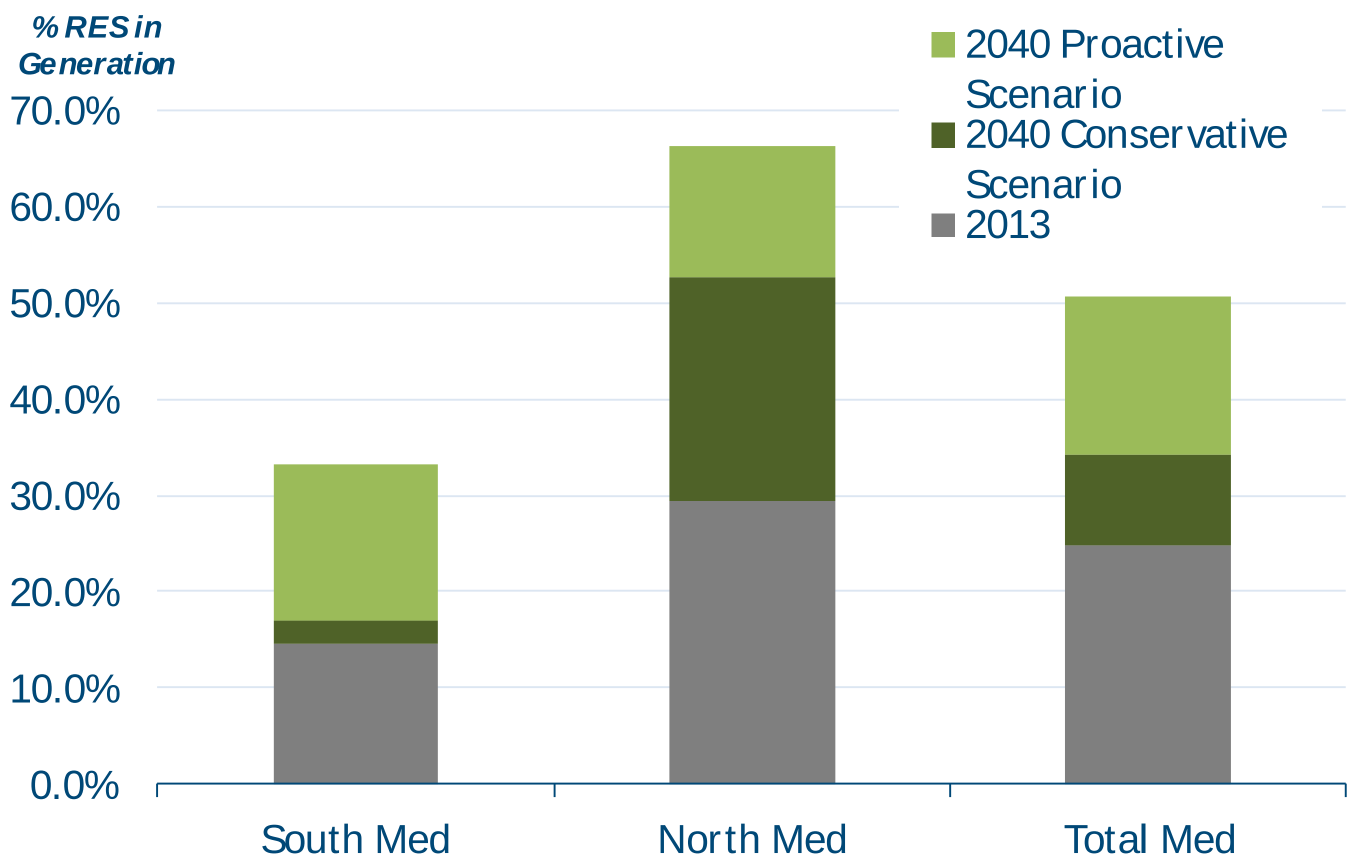
The share of North Med will decline

MED ELECTRICITY GENERATION BY FUEL



Electricity generation boom would boost fossil fuel use – especially gas- in the CS, whereas in the PS, renewables play a bigger role

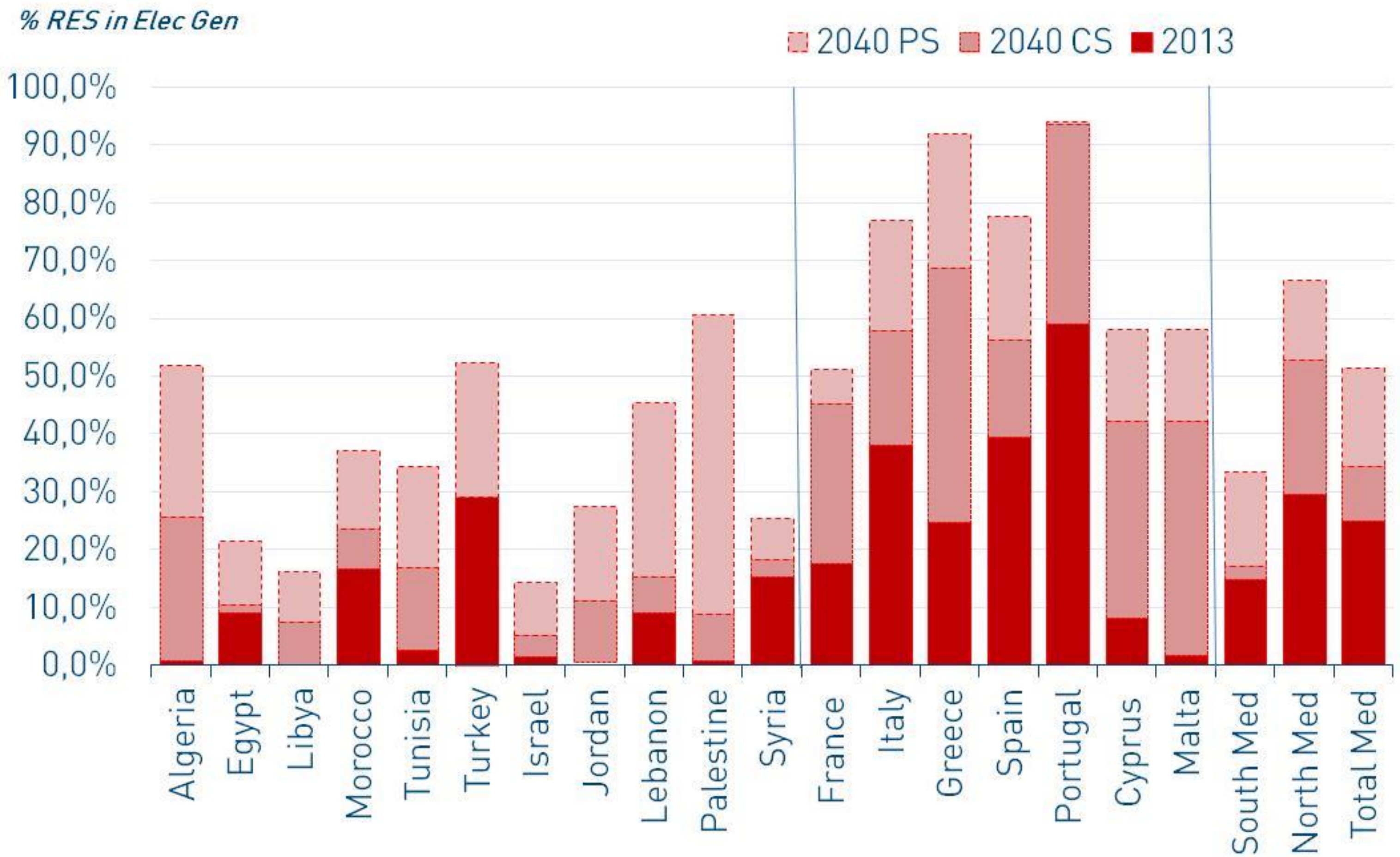
SHARE OF RES IN ELECTRICITY GENERATION



In CS, RES share in elec gen would be 34% by 2040 (53% in the North and 17% in the South)

More than 50% in PS (66% in the North and 33% in the South)

SHARE OF RES IN ELECTRICITY GENERATION BY COUNTRY

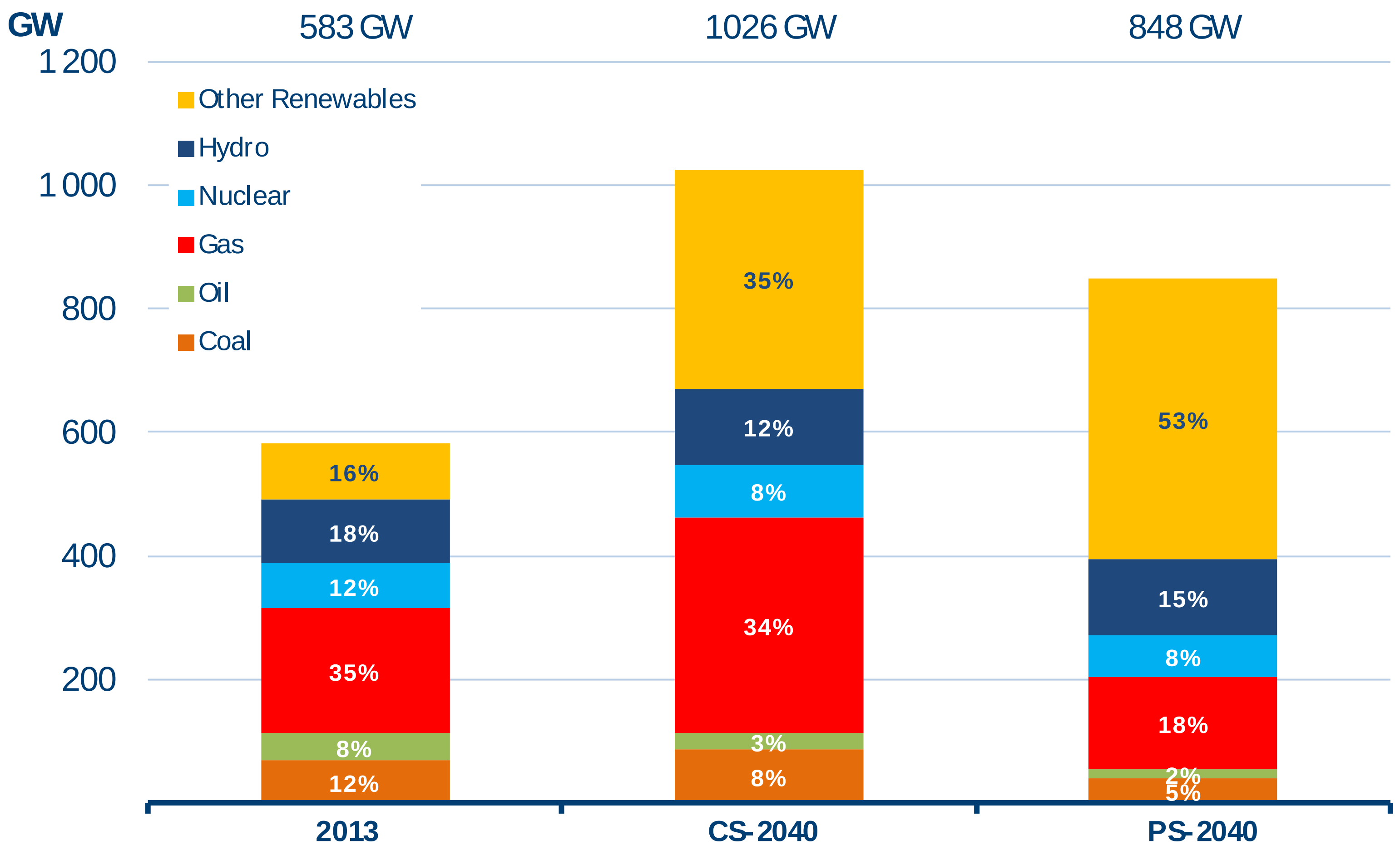


Sources: North Med, IEA; South Med, OME

In CS, RES share in elec gen would be 34% by 2040 (53% in the North and 17% in the South)

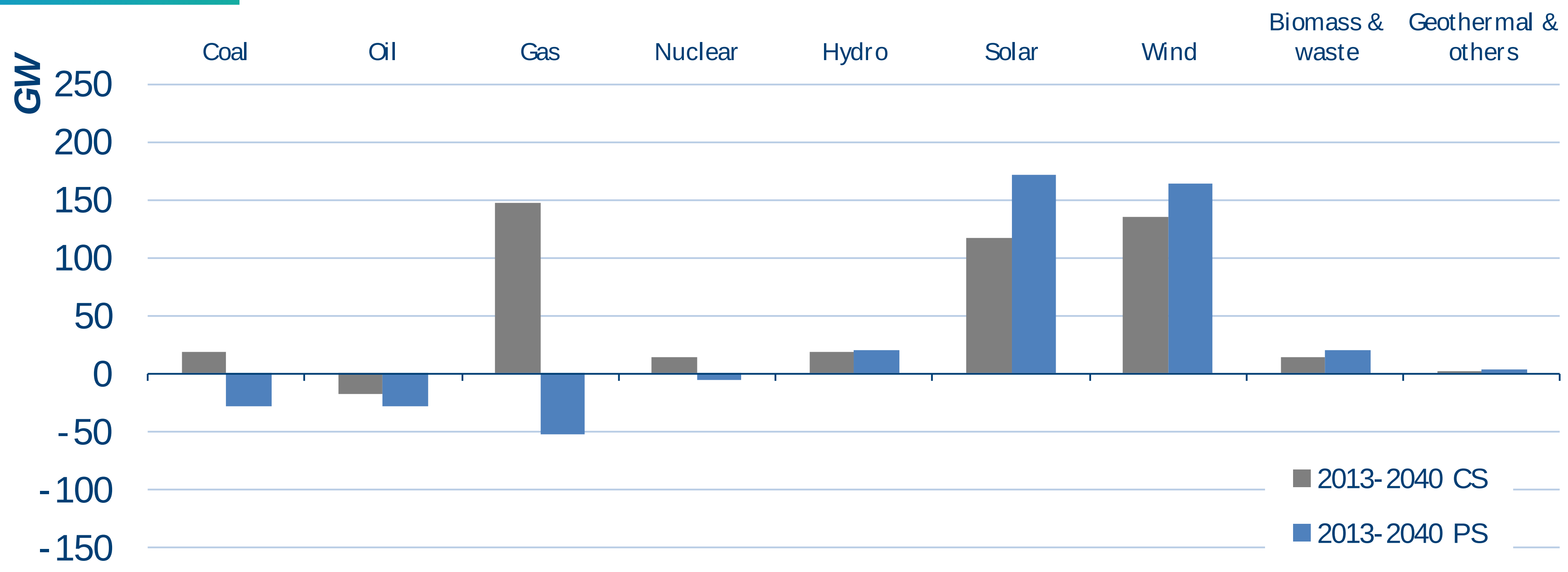
More than 50% in PS (66% in the North and 33% in the South)

INSTALLED GENERATION CAPACITY



Over 440 GW will need to be added to meet electricity demand.
Less than 270 GW in PS.
Renewables will have a leading role

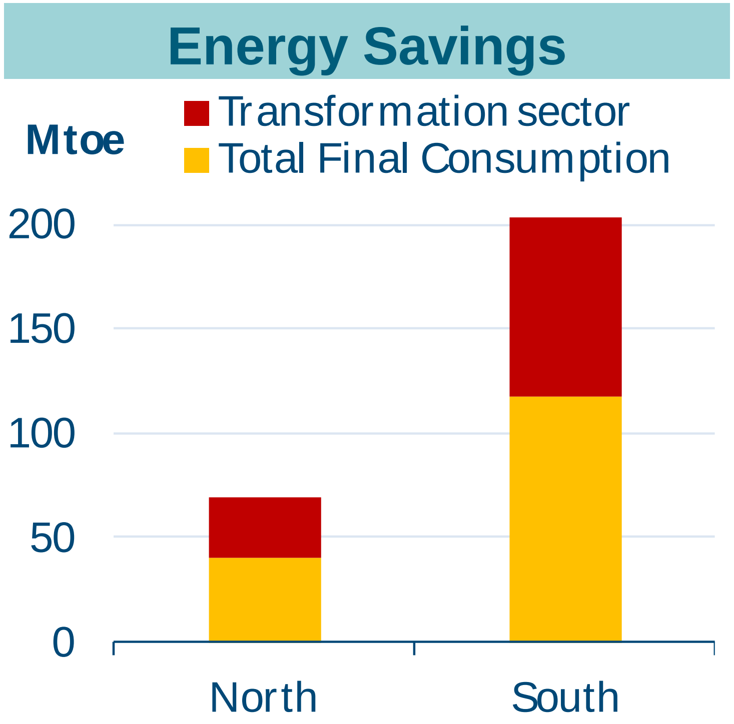
ELECTRICITY CAPACITY ADDITIONS

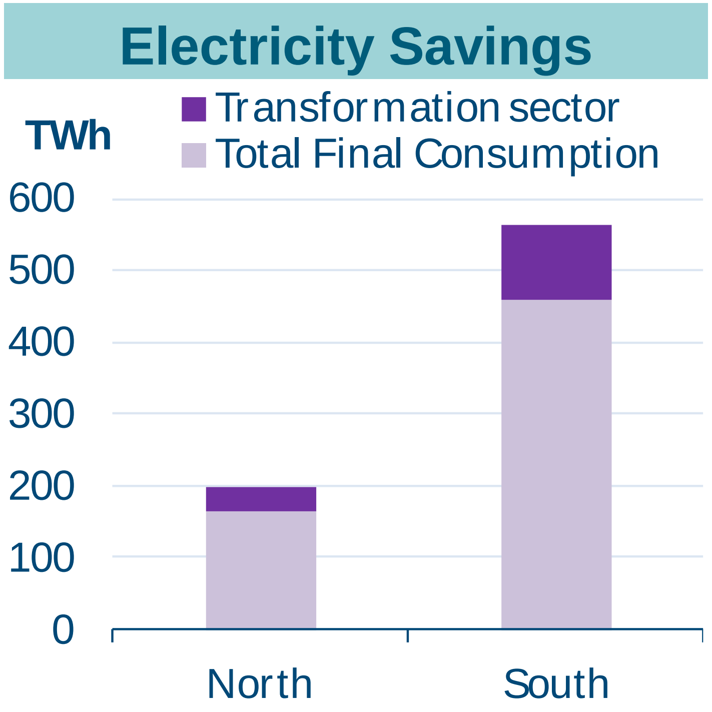


Most additions are from solar and wind
drop of gas (and fossil fuels in general) in the PS.

ENERGY EFFICIENCY

ENERGY & ELECTRICITY SAVINGS



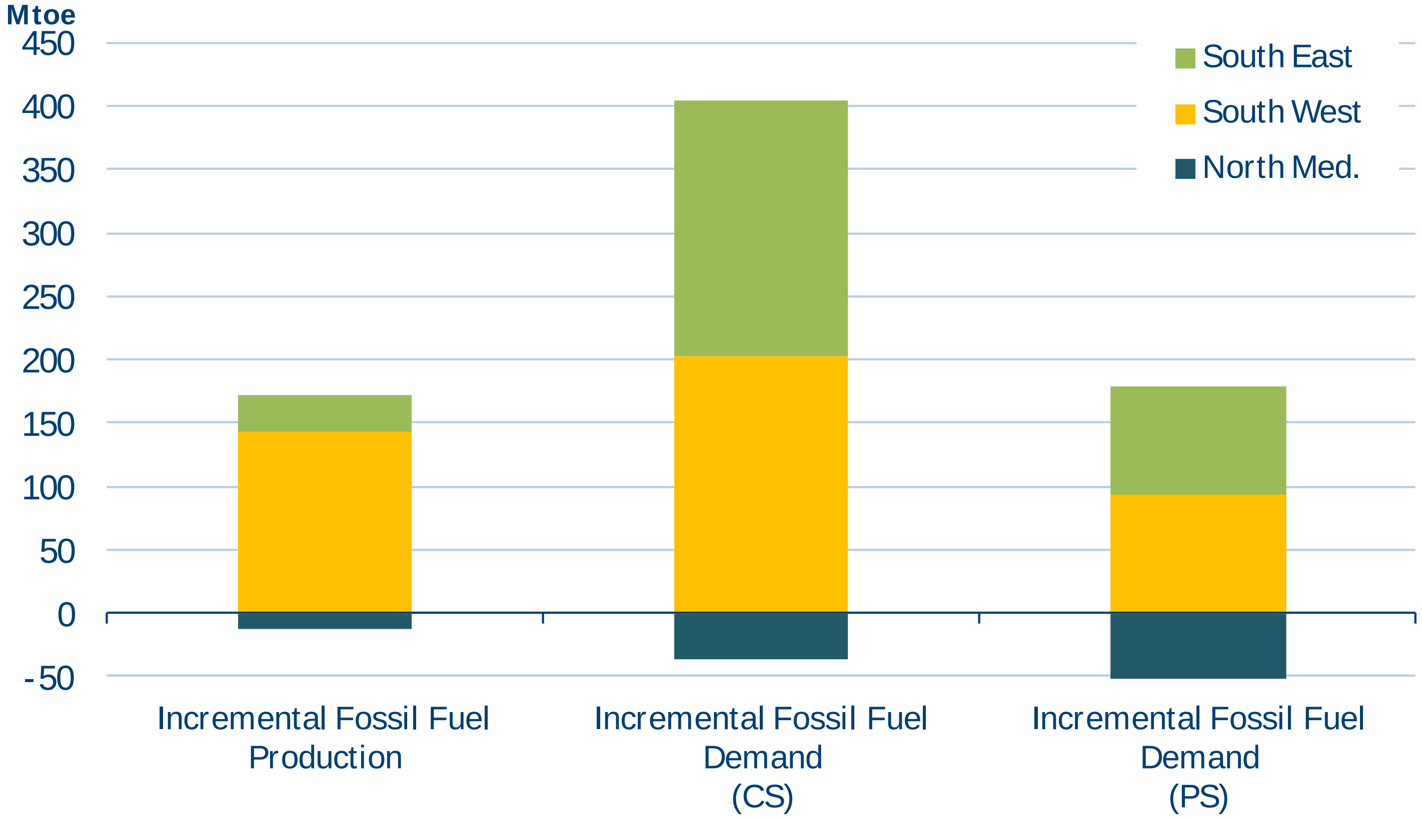


Savings in the PS could amount to 270Mtoe,
(~ 20% less than the CS), 157 Mtoe of which for TFC alone.

Electricity Savings in the PS could amount to 760 TWh,
(~ 21% less than the CS), 625TWh of which for TFC alone.

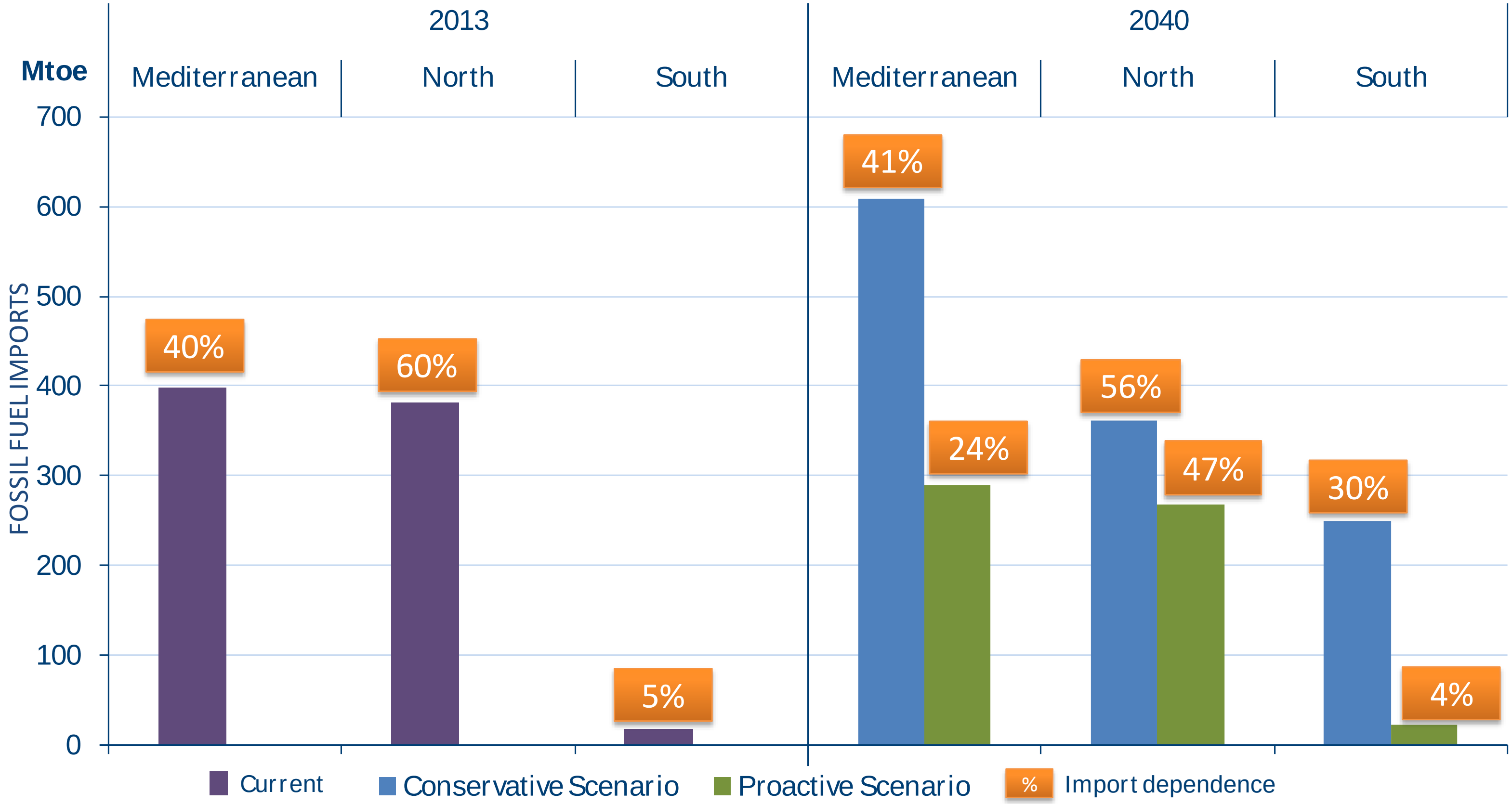
ENERGY SECURITY

INCREMENTAL FOSSIL FUEL DEMAND & PRODUCTION



Fossil fuel demand exceeds production but incremental demand could be considerably lowered in the PS leading to a drastic reduction of net imports.

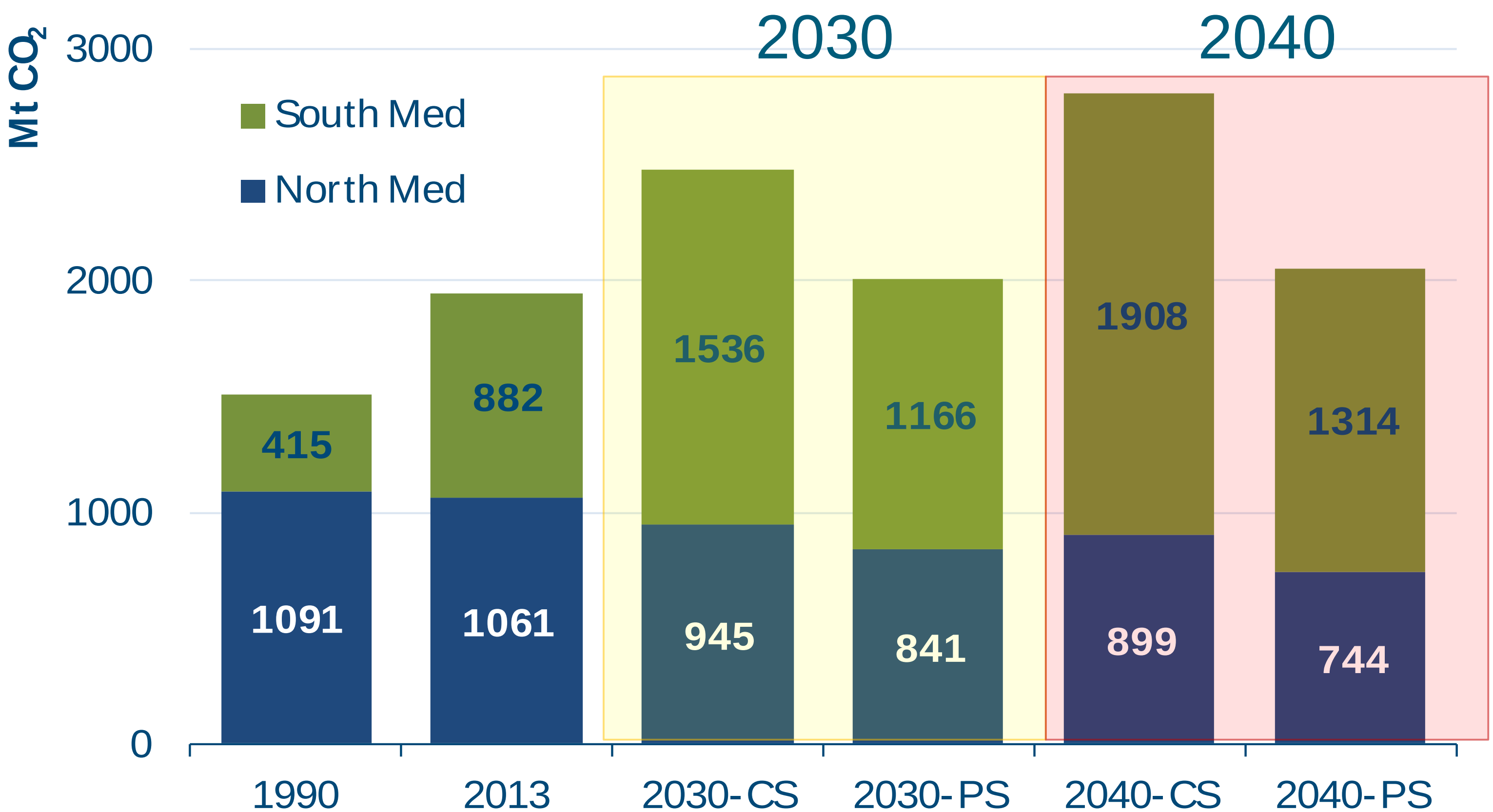
ENERGY IMPORT DEPENDENCE



Import dependence to increase in CS especially in the South.
Fossil fuel net imports to be halved in the PS for the Med

CO_2 EMISSIONS

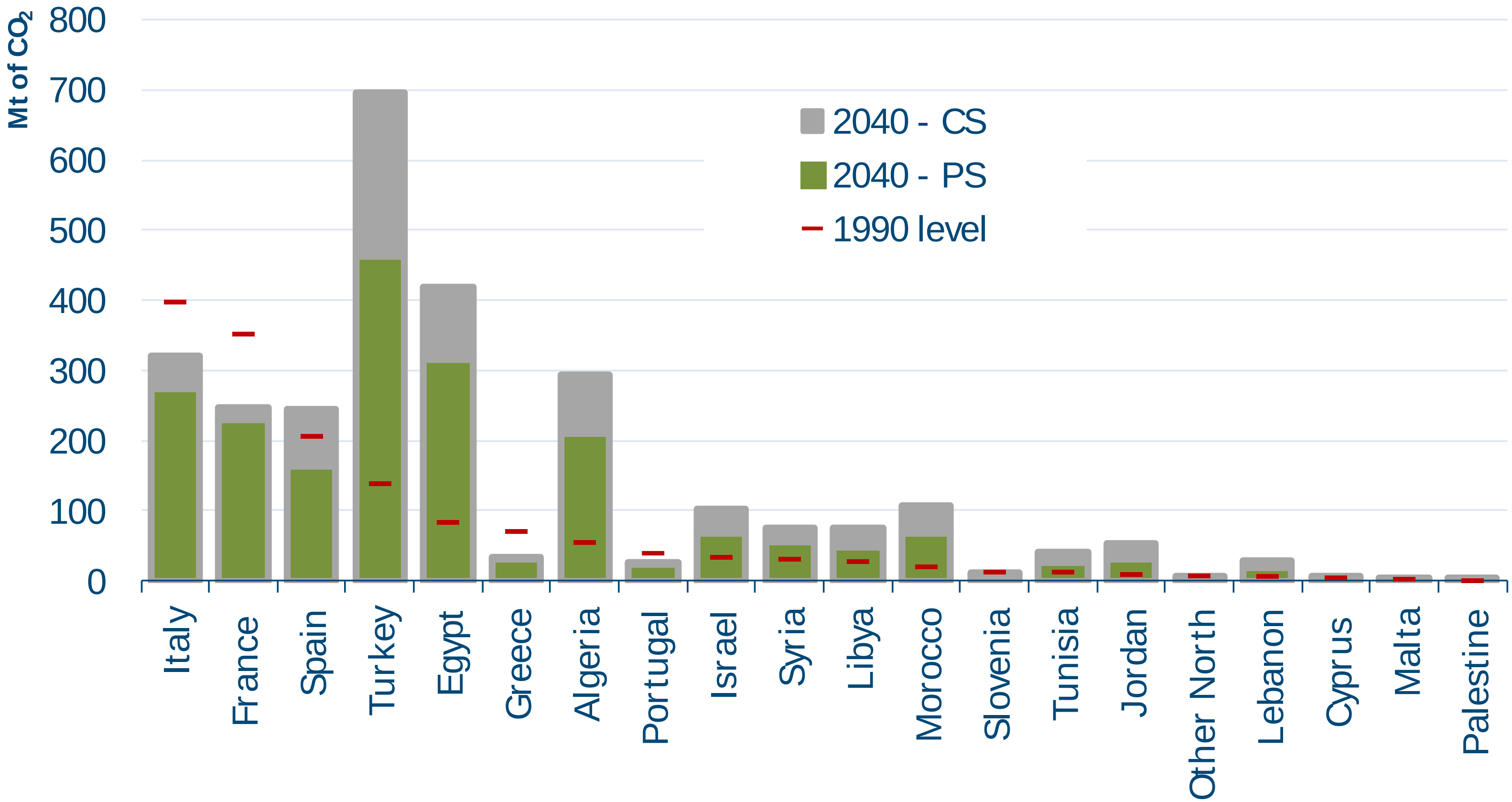
CO_2 EMISSIONS BY REGION



As a result, in PS, more moderate increase of CO_2 emissions (+6% from 2013 and +37% from 1990).

600Mt avoided in the South in 2040 and decrease in the North (-32% below 1990 levels)

CO_2 EMISSIONS BY COUNTRY



Turkey and Egypt to become the biggest CO_2 emitters of the region regardless of the scenario. All EU countries to be below their 1990 levels in the PS.

SOME MAIN MESSAGES

- Expected trajectories for energy demand are contrasted accross the 2 shores
- A fossil energy future with increasing role of RES
- PS is the no regret option
- Sunny and windy electricity future
- Energy efficiency is key
- In addition to O&G, RES and EE emerge as strong drivers for reinforcing fruitful regional cooperation and partnership

ome

Observatoire Méditerranéen de l'Energie

32 bis boulevard Haussmann
75009 Paris - France
Tel.: + 33 (0) 170 169 120
Fax: + 33 (0) 170 169 119
Email: ome@ome.org
www.ome.org

Thank you.