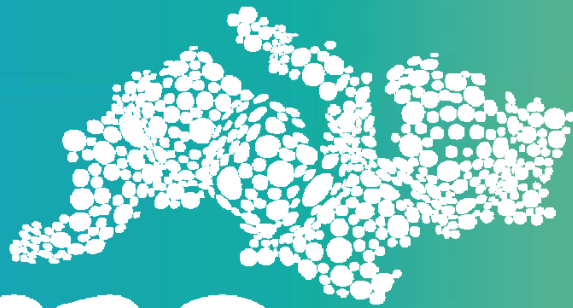


# MEDITERRANEAN ENERGY PERSPECTIVES

## 2015



ome

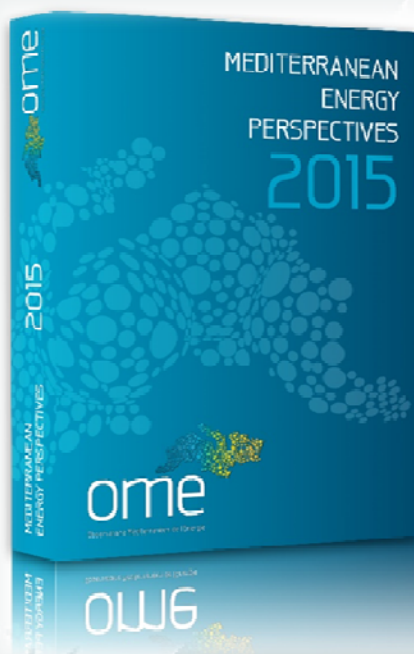
Observatoire Méditerranéen de l'Énergie

CLUB ESPAÑOL DE LA ENERGIA

Madrid, 18 April 2016

# MEDITERRANEAN ENERGY PERSPECTIVES 2015

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- ✓ **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)

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**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)

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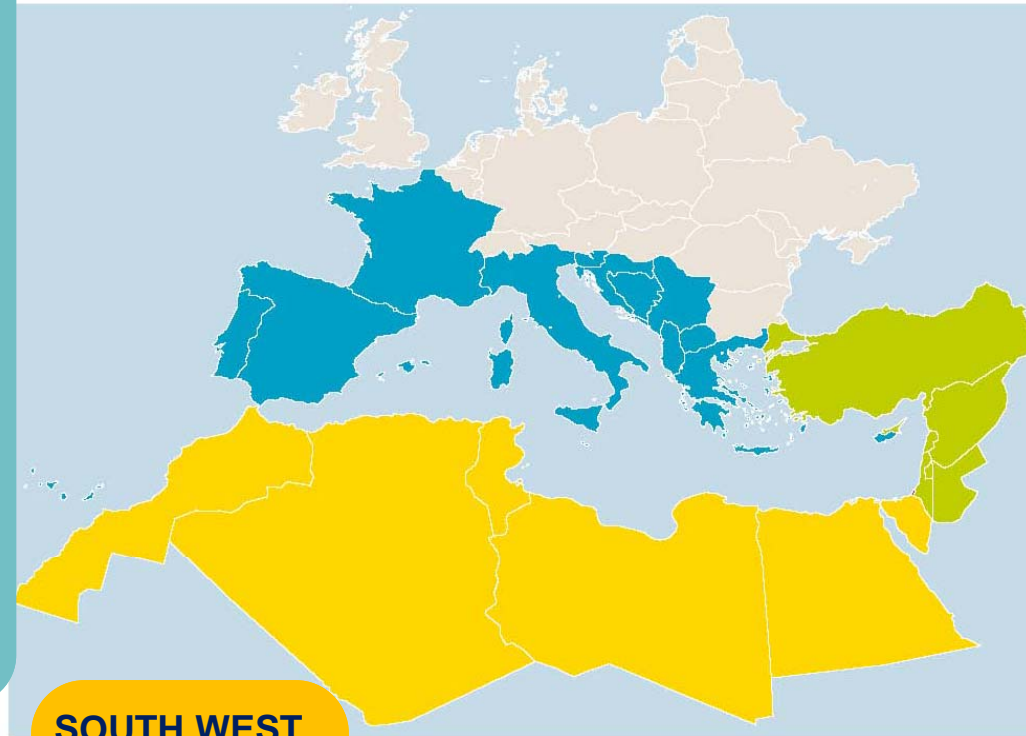
The MEP 2015 Proactive Scenario emphasizes energy security and environmental concerns through:

- 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

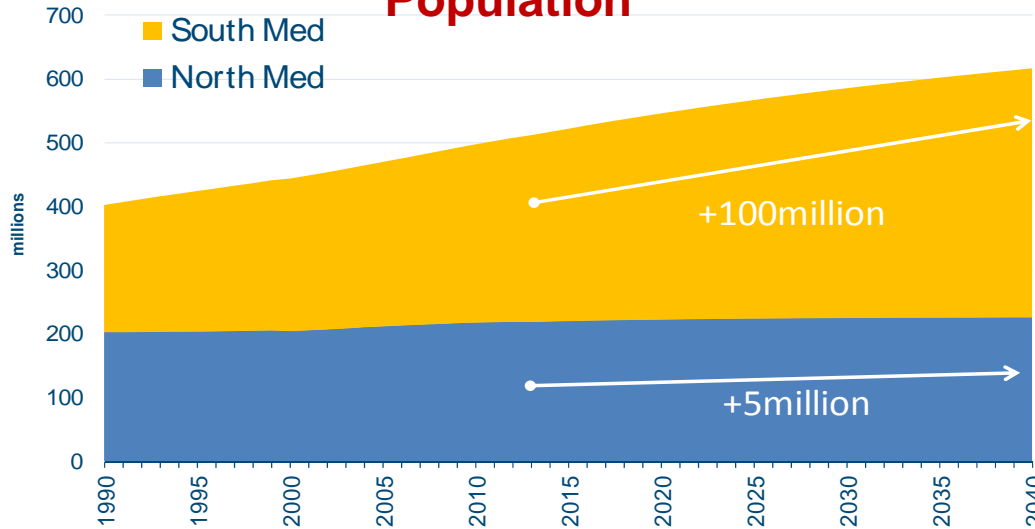
## SOUTH WEST

Algeria  
Egypt  
Libya  
Morocco  
Tunisia

***25 countries covered***  
***19 individual country models***

# Mediterranean Region

## Population

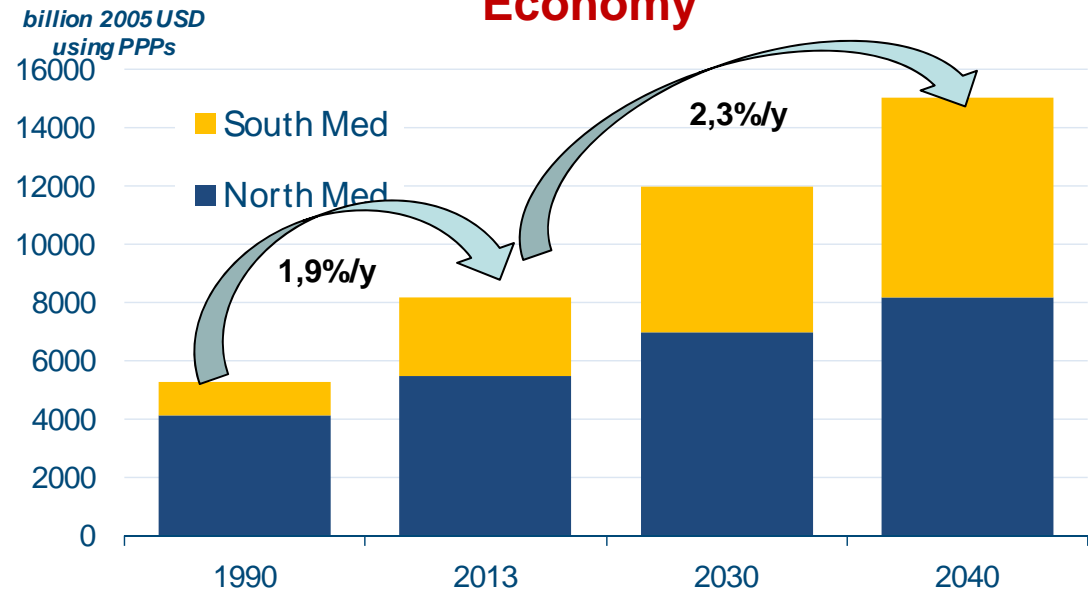


*Share of S. Med 57% → 63%*

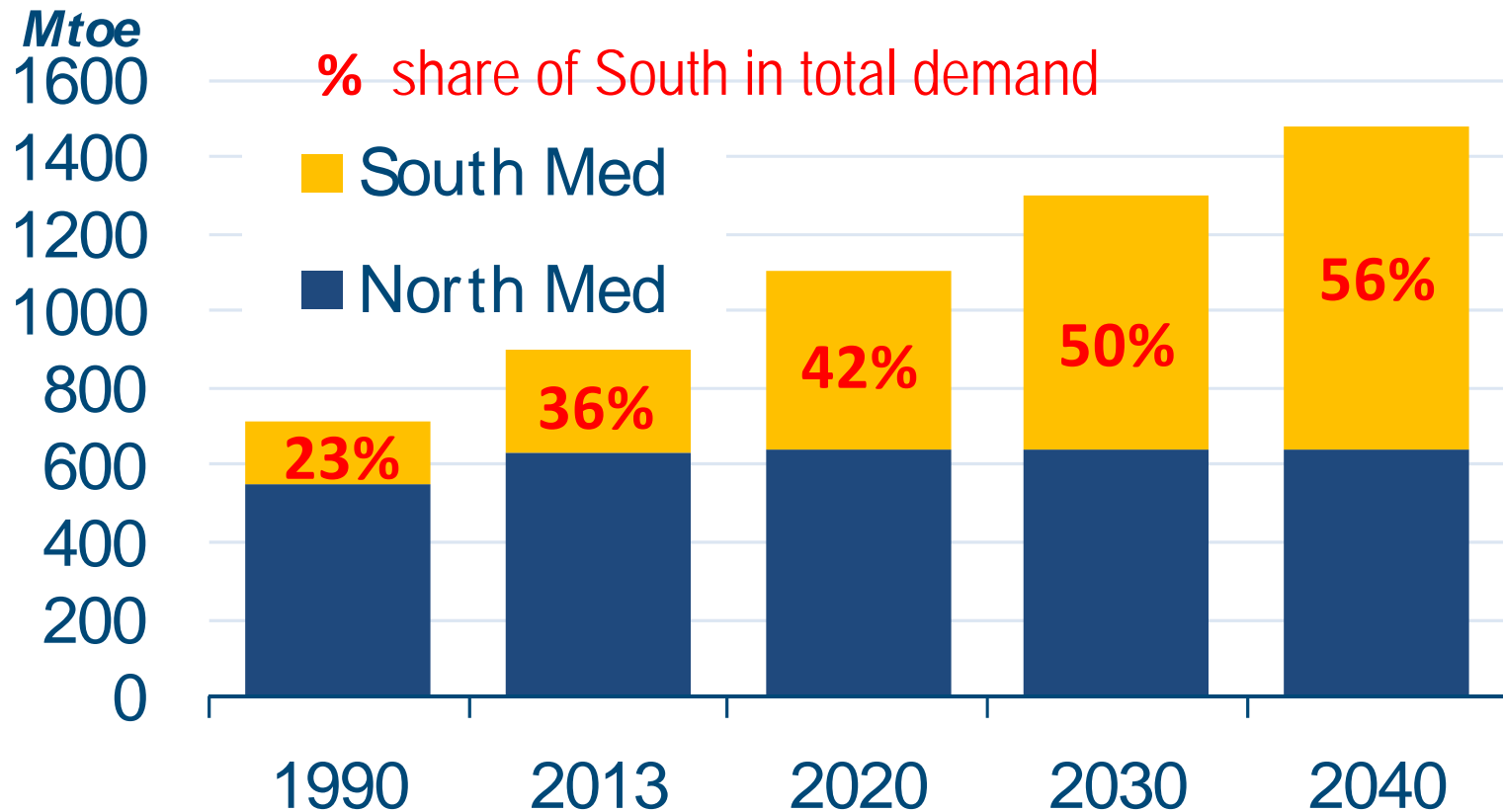
*Share of S. Med  
33% → 47%*

*GDP/cap  
~doubles in the  
South*

## Economy



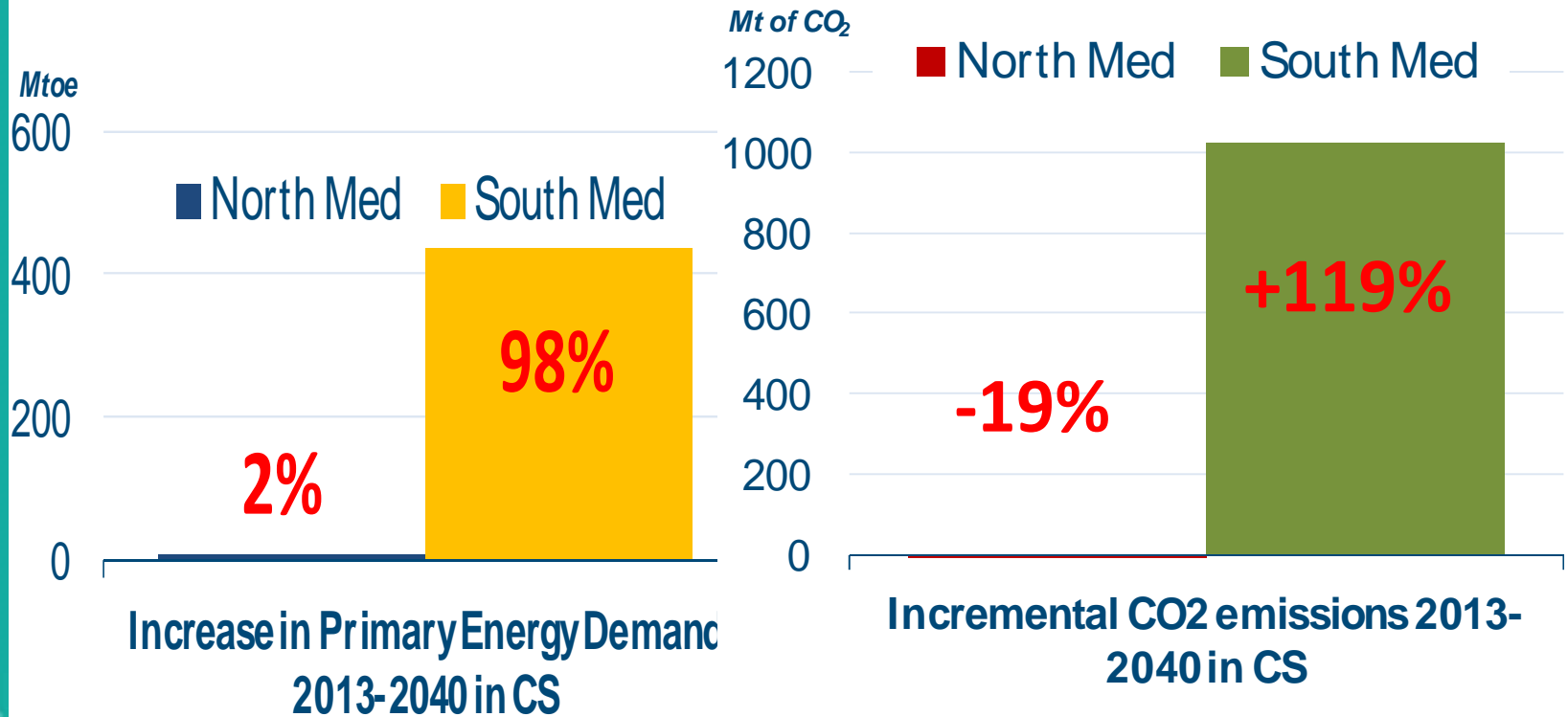
# ENERGY DEMAND BY REGION (CS)



***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<sub>2</sub> EMISSIONS



**+45% increase in CO<sub>2</sub> emissions – in 2040, 86% more than the 1990 level**

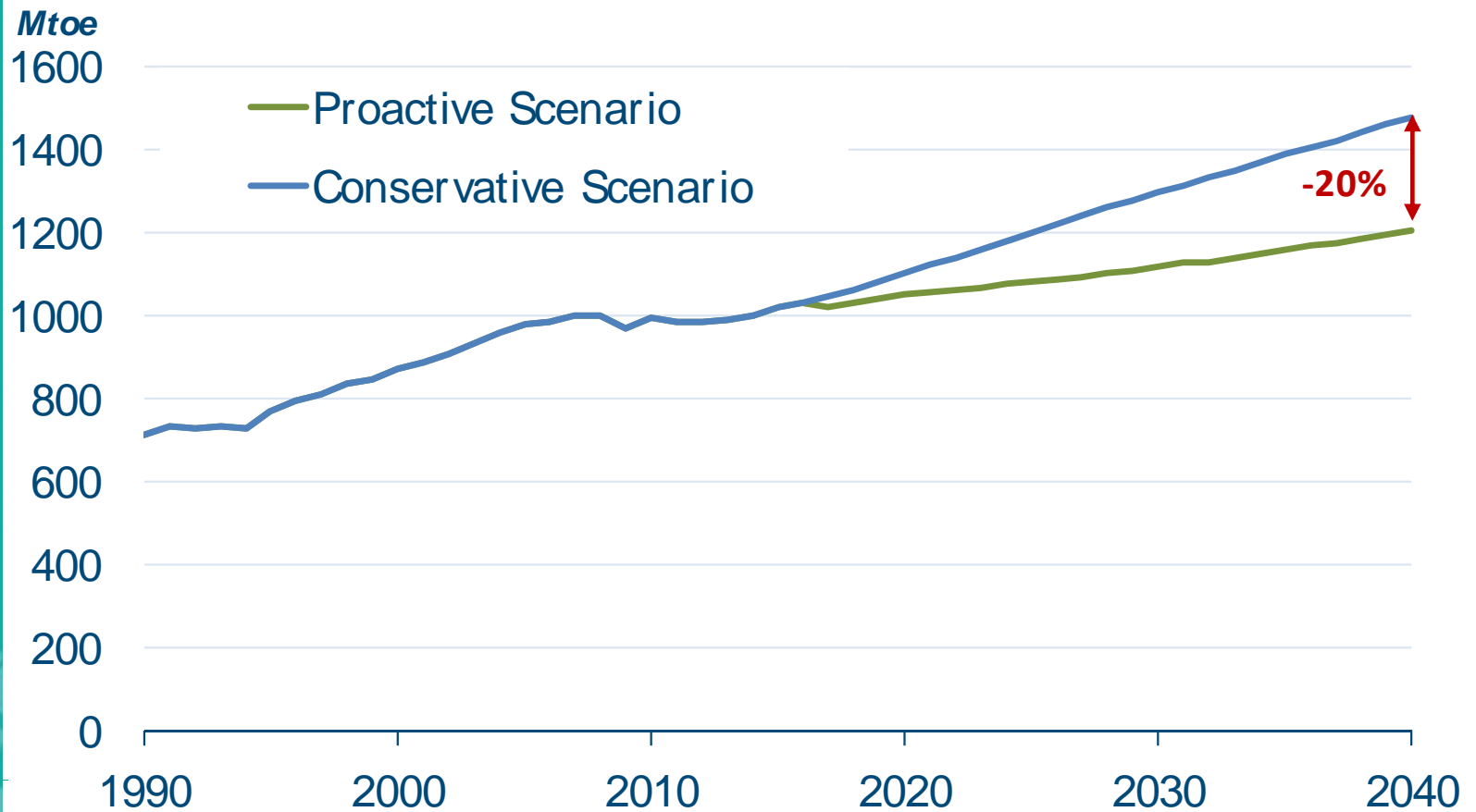
**CS is unsustainable**





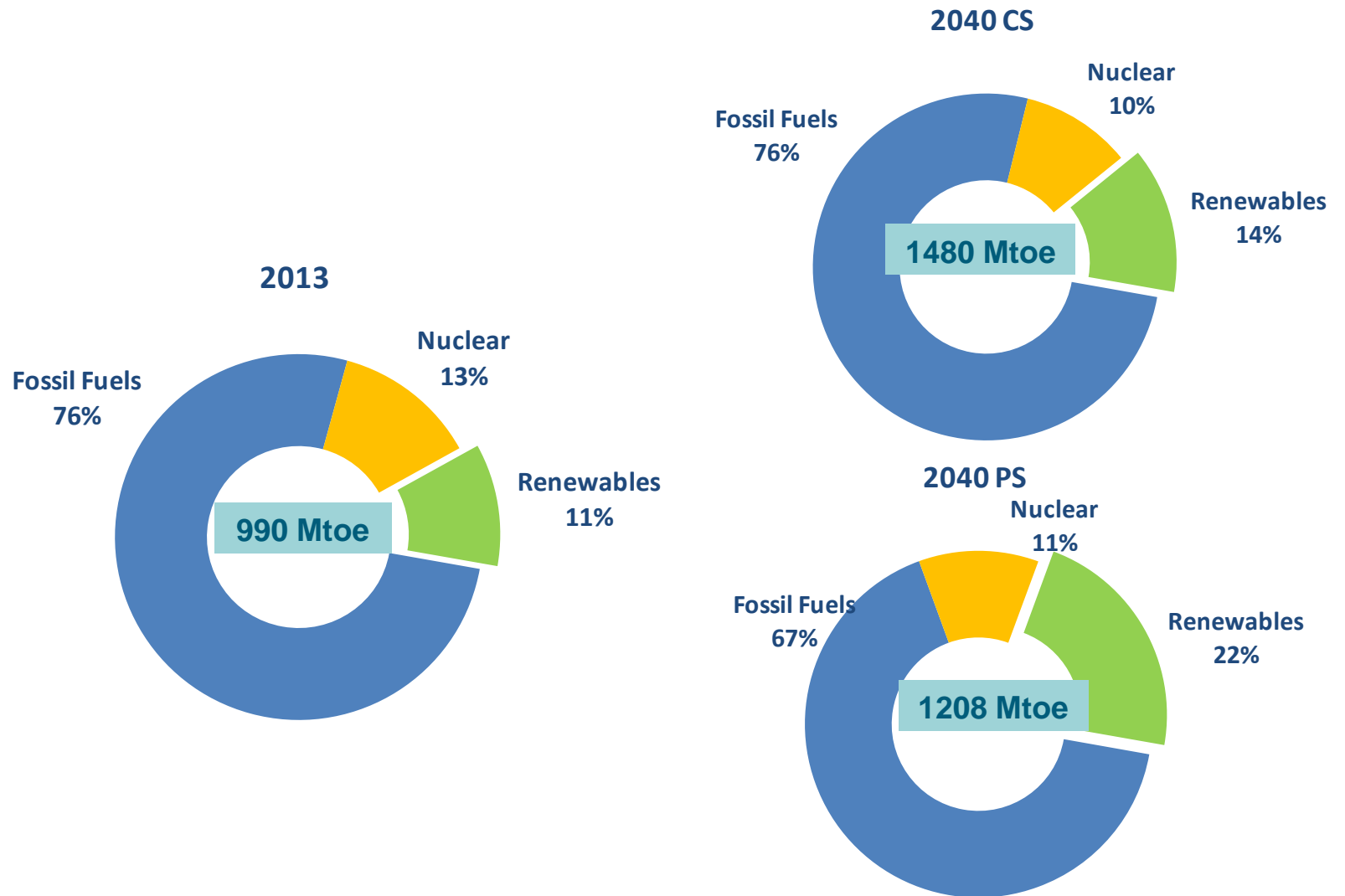
# **MOVING TOWARDS A GREENER AND ENERGY EFFICIENT FUTURE**

# 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

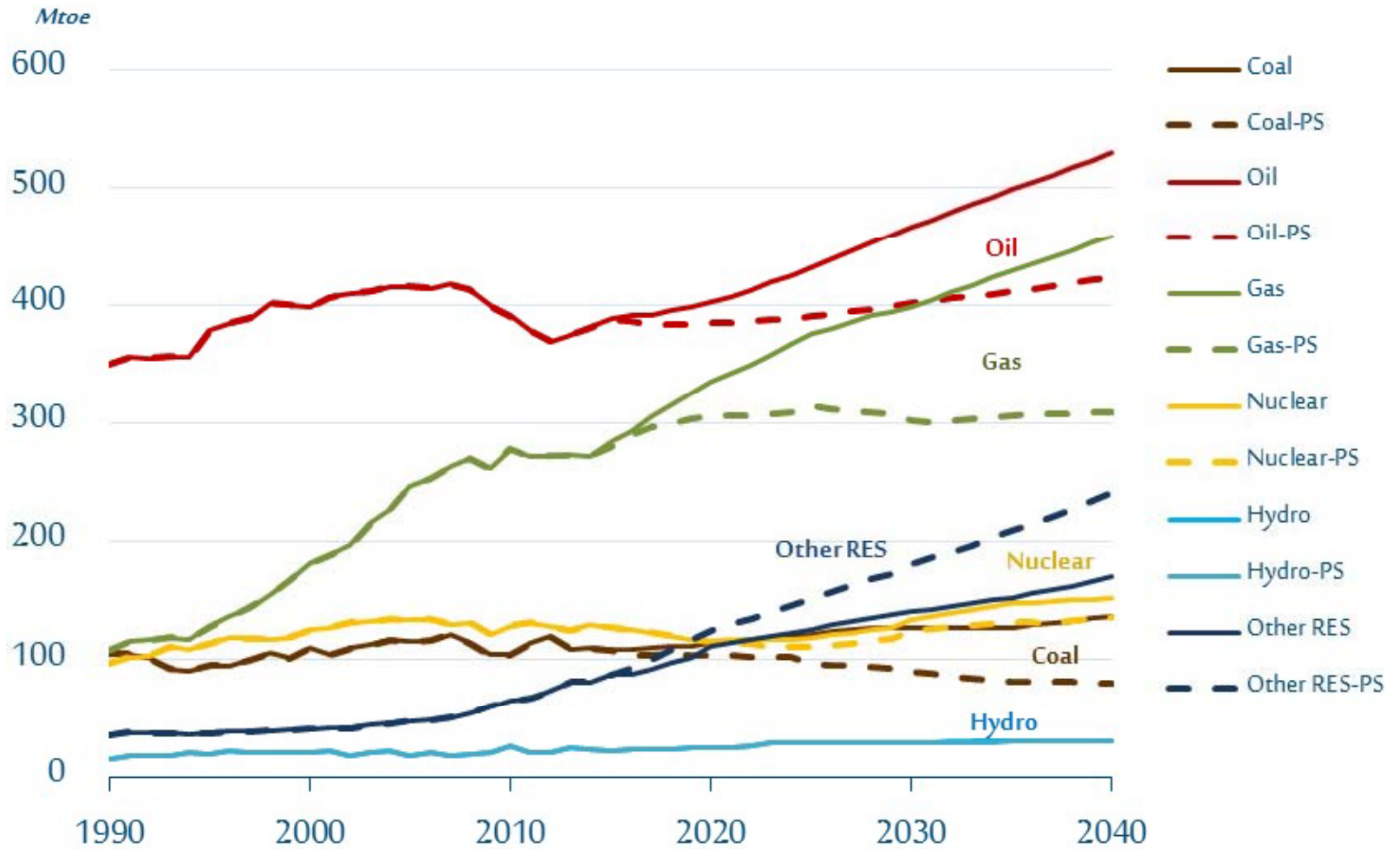
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improved energy efficiency and increased use of renewables lead to :

- ✓ 20% savings for primary energy demand in 2040.
- ✓ 27% decrease in CO<sub>2</sub> 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

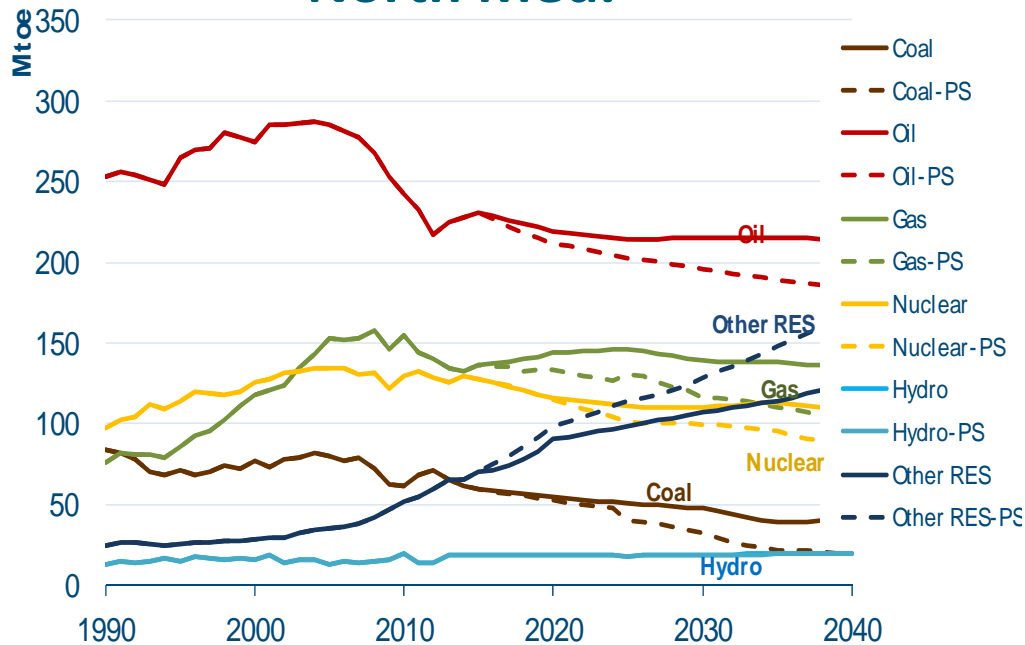


*But contrasted results by region.*

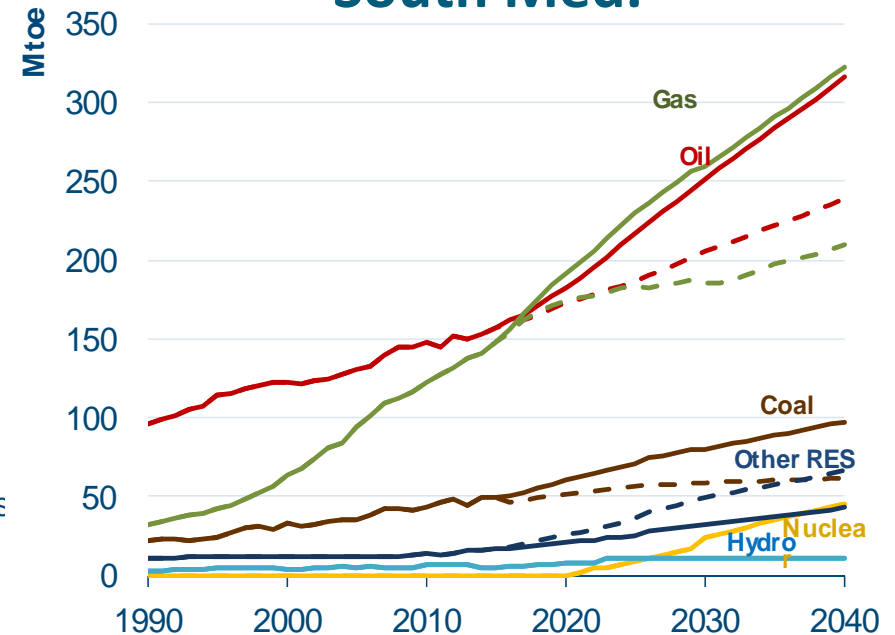
# PRIMARY ENERGY DEMAND BY FUEL

## by Scenario & Region

### North Med.



### South Med.

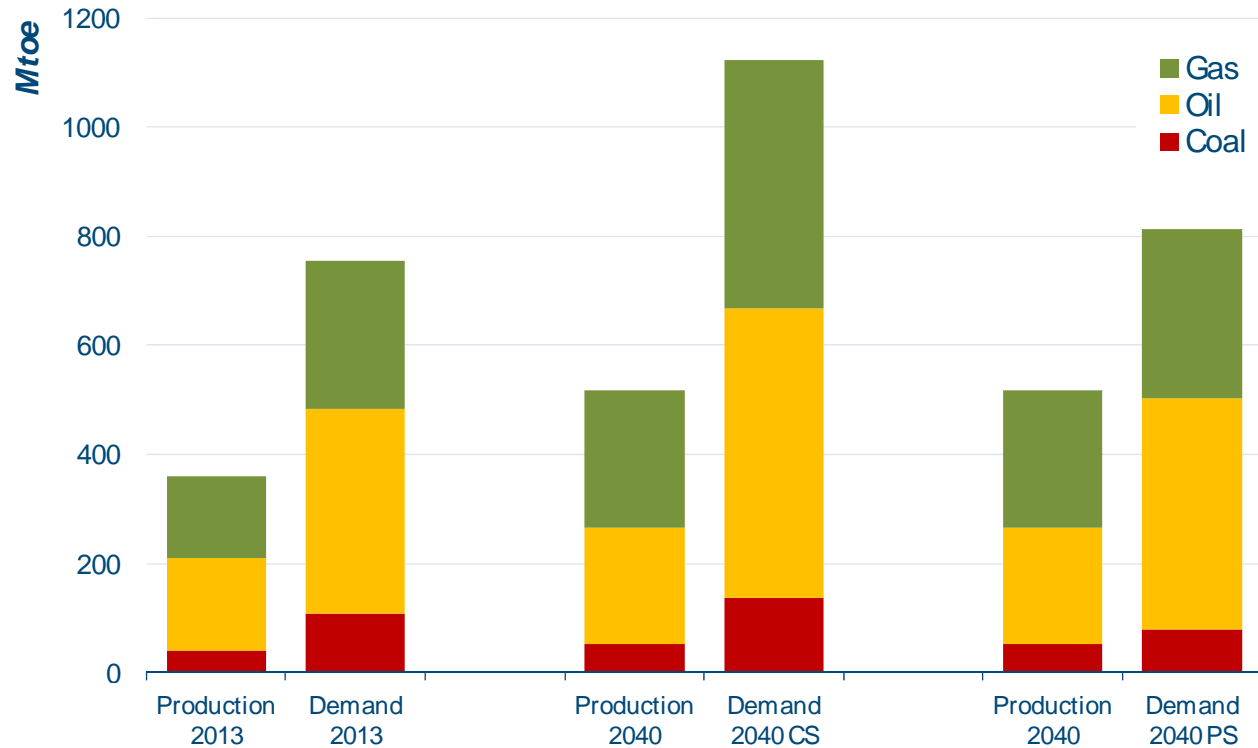


***Trajectories are very different between the two shores. In the North, RES will become the second largest fuel after oil, and before gas in the PS by 2040.***

***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***

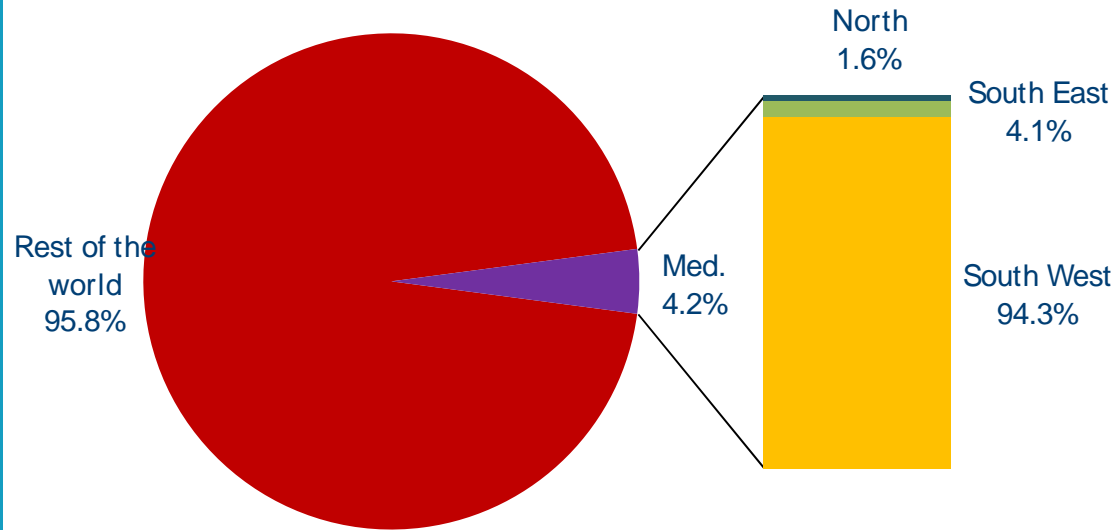
***Med. gas production will increase by more than 70% by 2040***

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

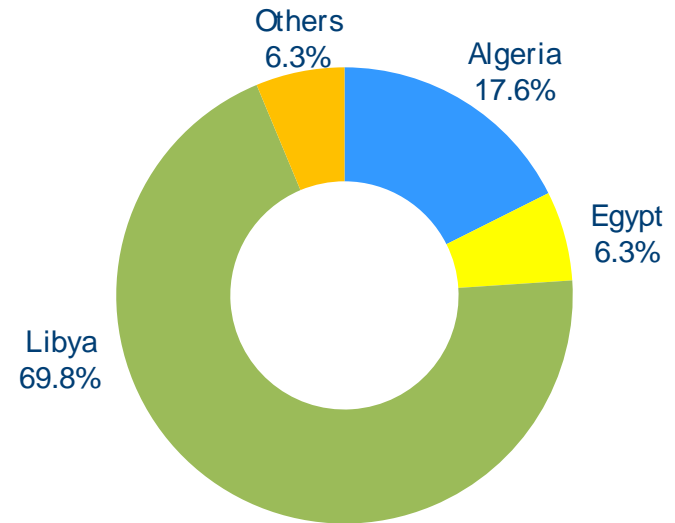


# Mediterranean oil reserves in the World

World oil reserves: 1656 Gb



Mediterranean oil reserves: 69.3 Gb

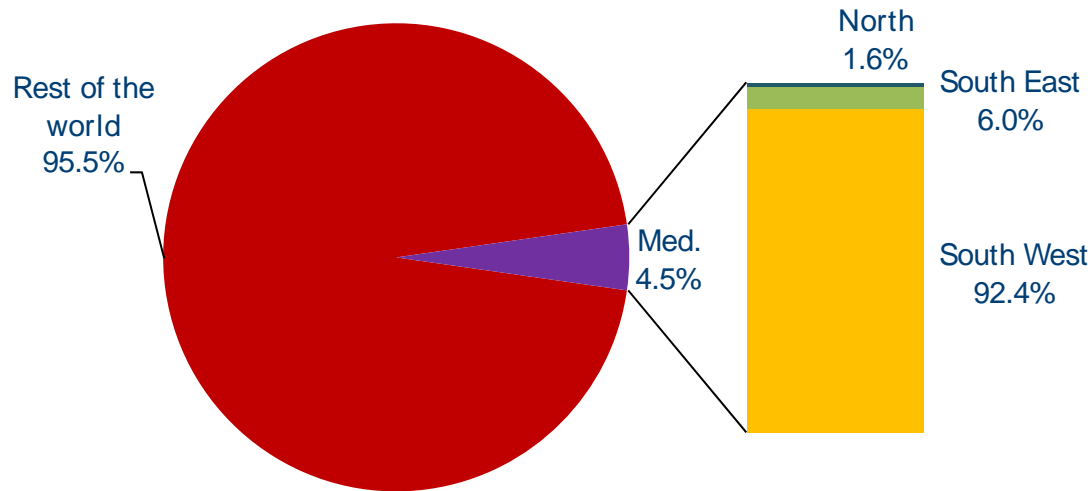


Source: OME, MEP 2015.

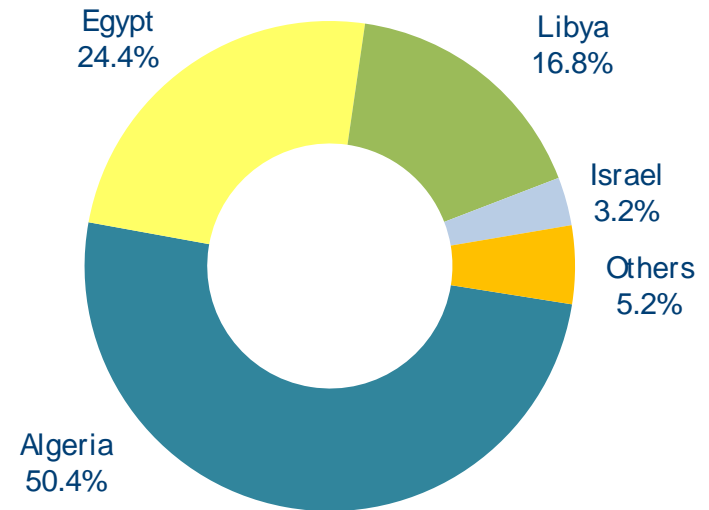
Libya alone holds more than two thirds of Mediterranean proven oil reserves

# Mediterranean gas reserves in the World

World natural gas reserves: 197 tcm



Mediterranean gas reserves: 8943 bcm



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. <sup>1</sup>	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	
<b>World Total</b>		<b>345</b>	<b>(335)</b>

<sup>1</sup> 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. <sup>1</sup>	665	(1,161)
5	Canada	573	
6	Mexico	545	
7	Australia	437	
8	South Africa	390	
9	Russia	285	
10	Brazil	245	
<b>World Total</b>		<b>7,299</b>	<b>(7,795)</b>

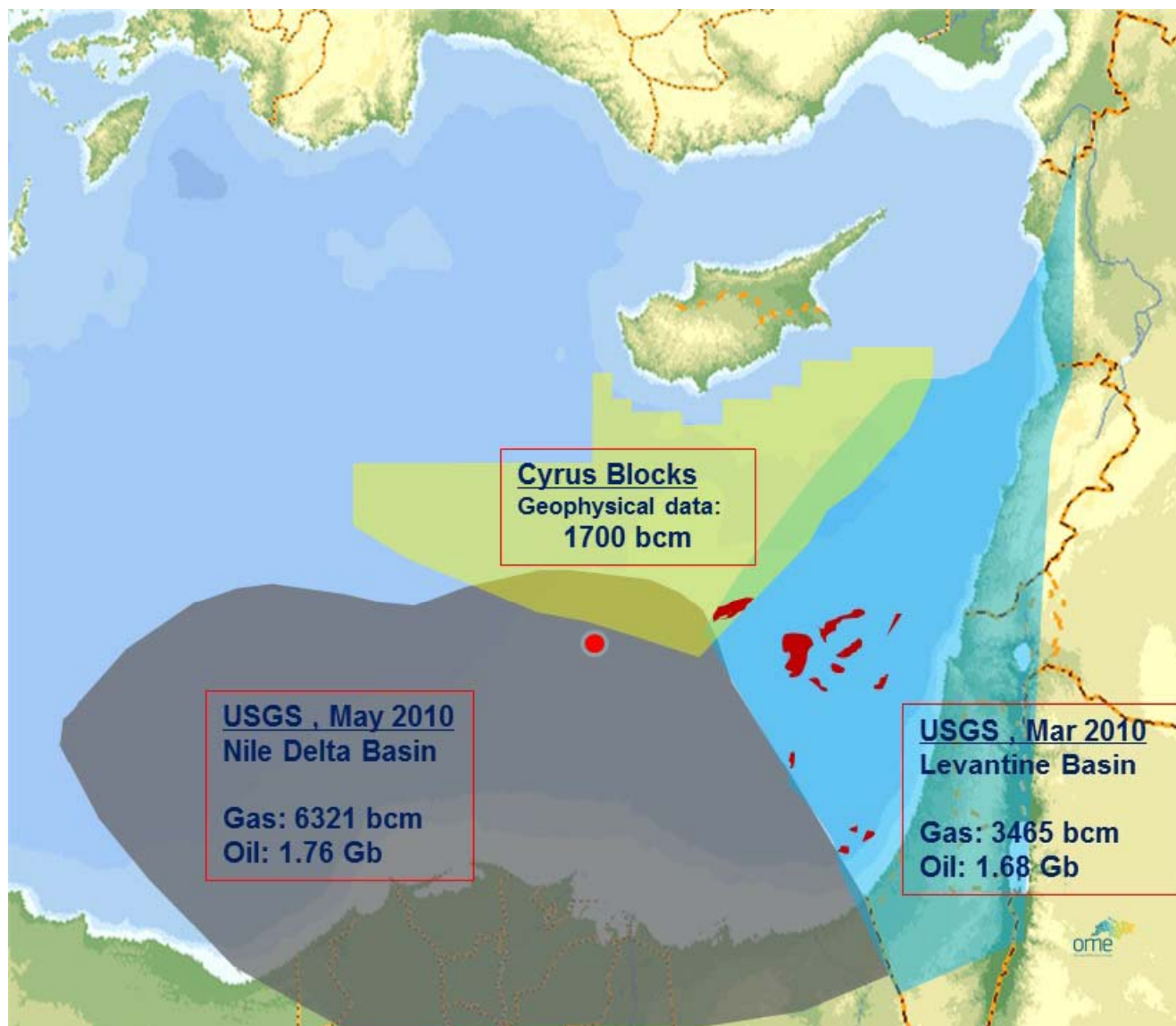
<sup>1</sup> EIA estimates used for ranking order. ARI estimates in parentheses.

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

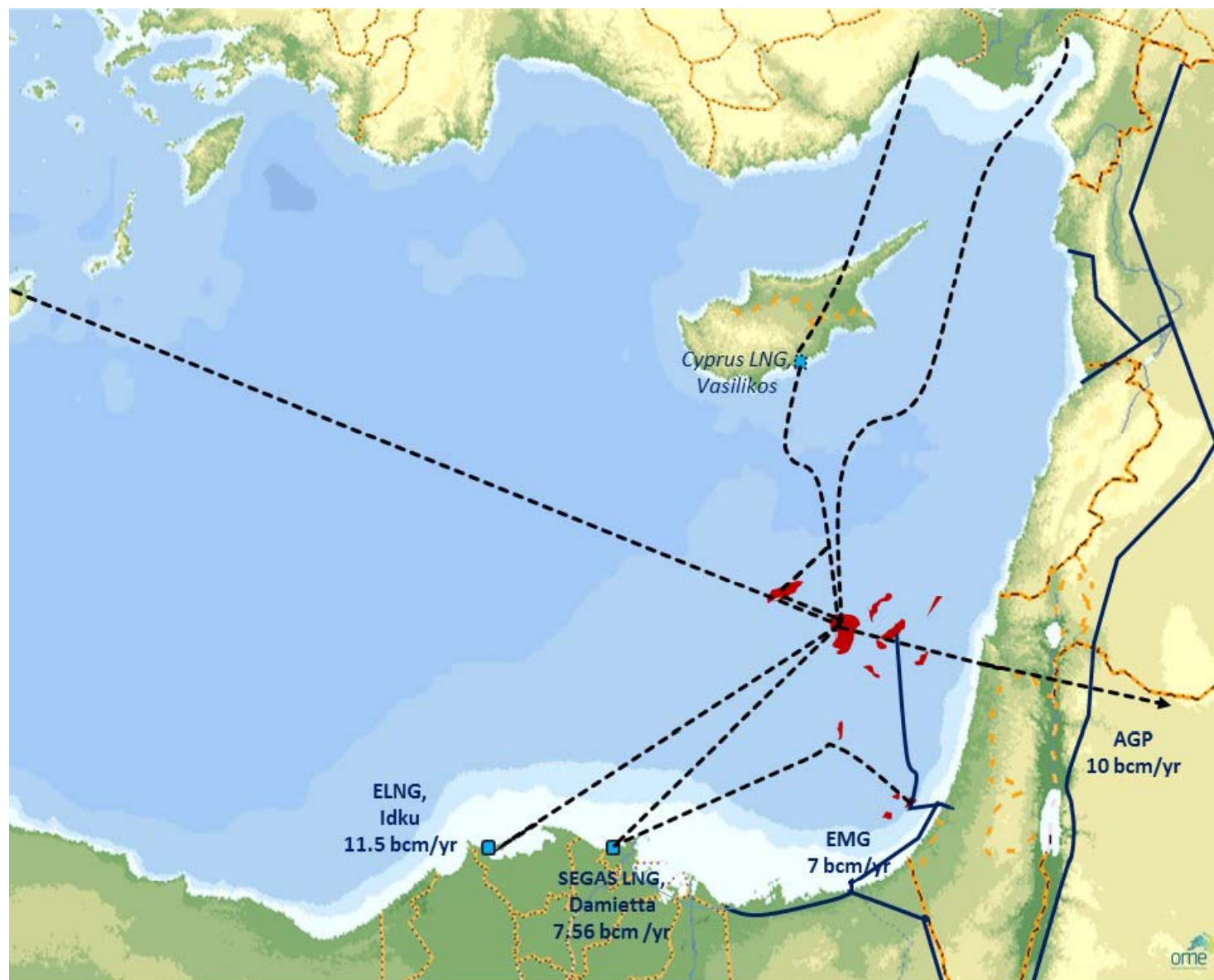
...but plenty of obstacles

# A new North Sea is emerging ?

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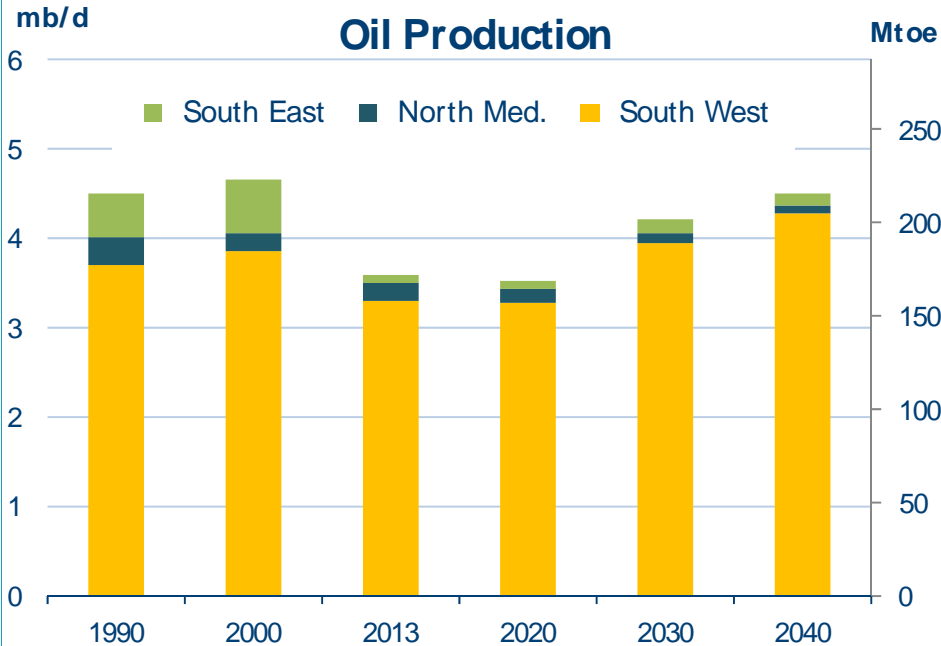


# A new North Sea is emerging ?





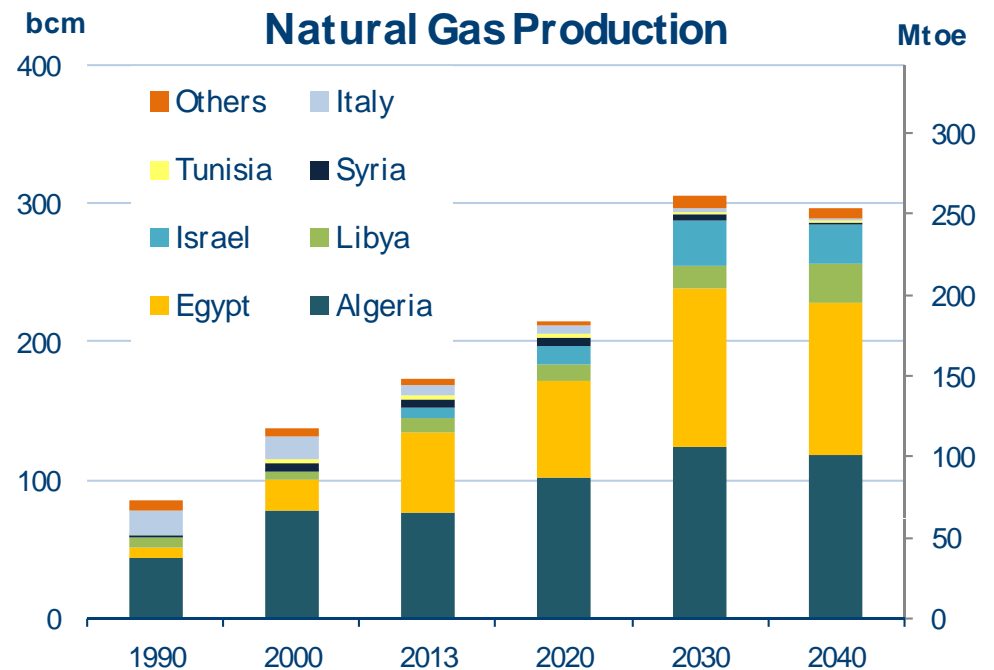
# MEDITERRANEAN OIL AND GAS PRODUCTION OUTLOOK



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

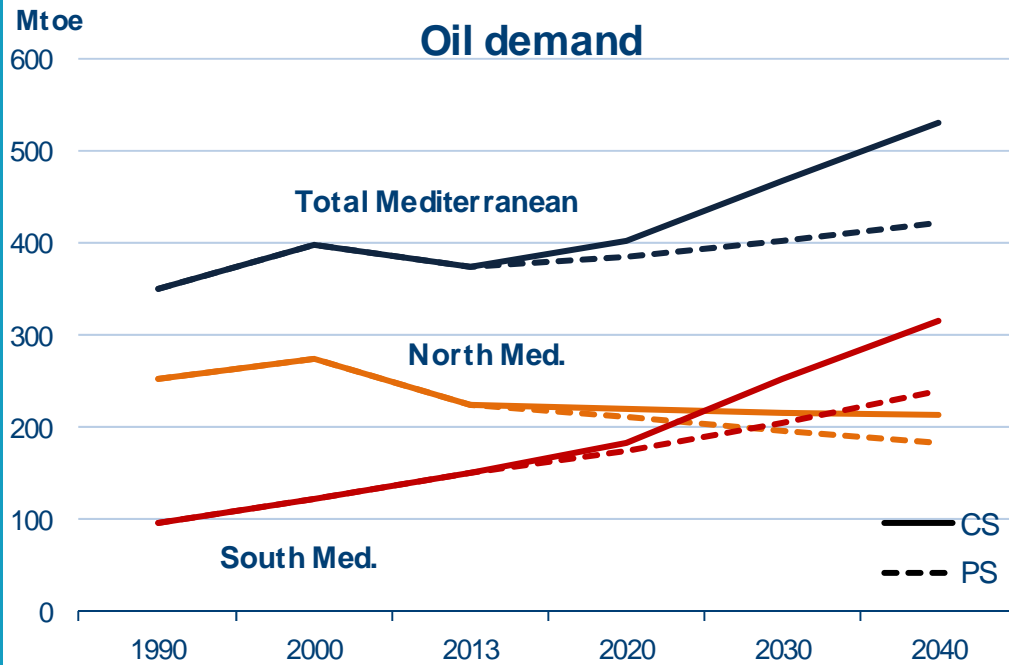


*Med. gas production will increase by more than 70% by 2040*



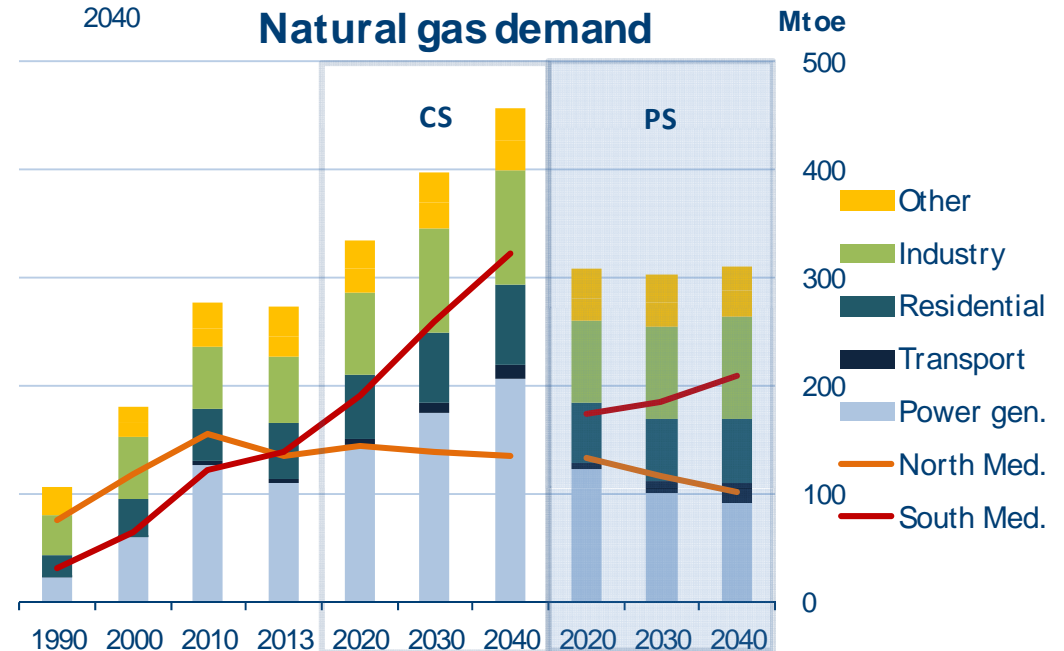


# MEDITERRANEAN OIL AND GAS DEMAND OUTLOOK



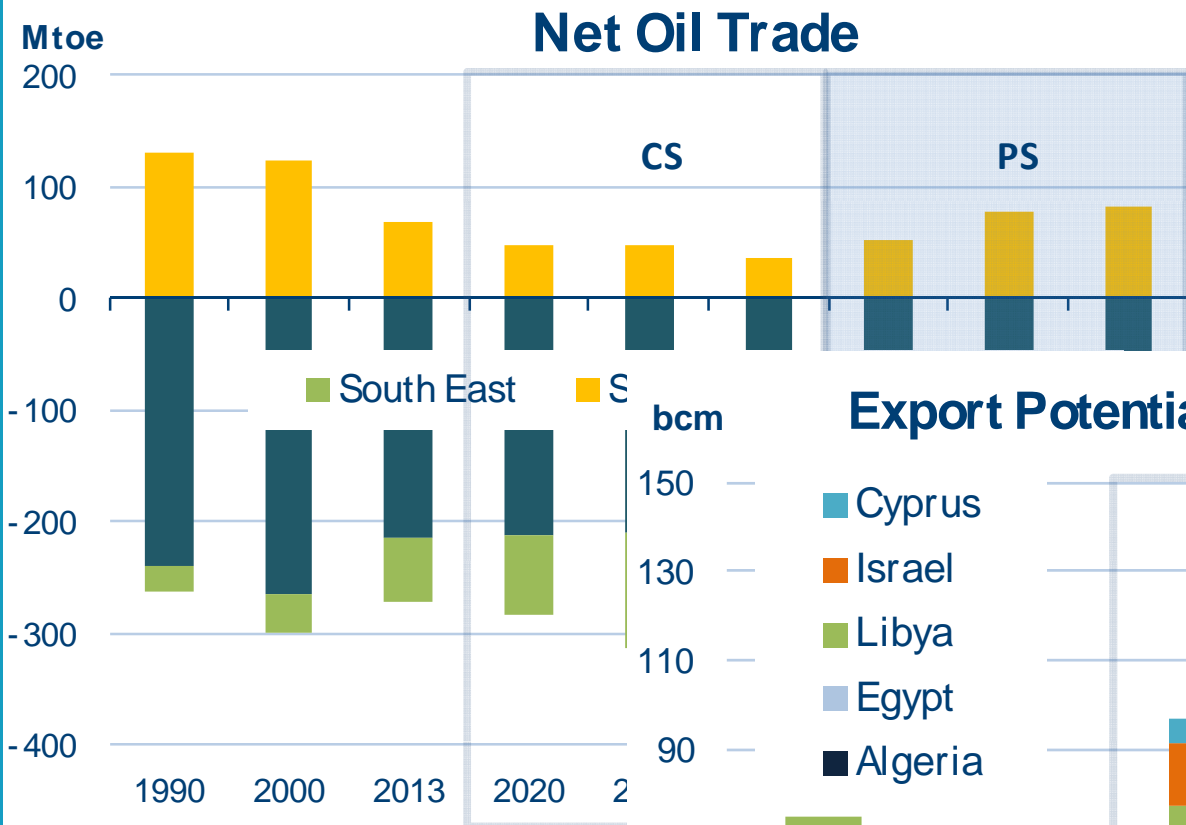
*Med. oil demand expected to increase between 13% (PS) and 42% (CS). More oil will be consumed in the South than in the North*

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

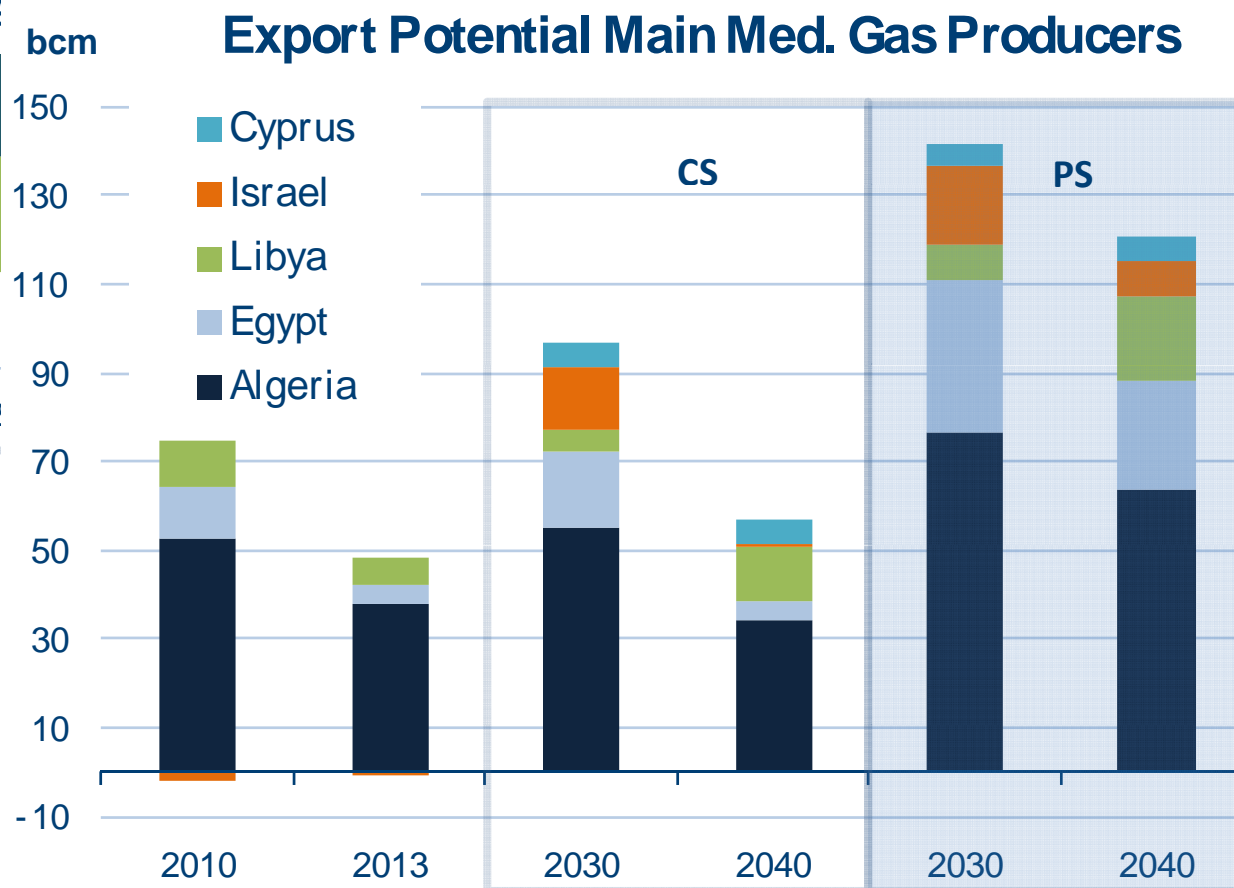




# MEDITERRANEAN OIL AND GAS TRADE POTENTIAL OUTLOOK



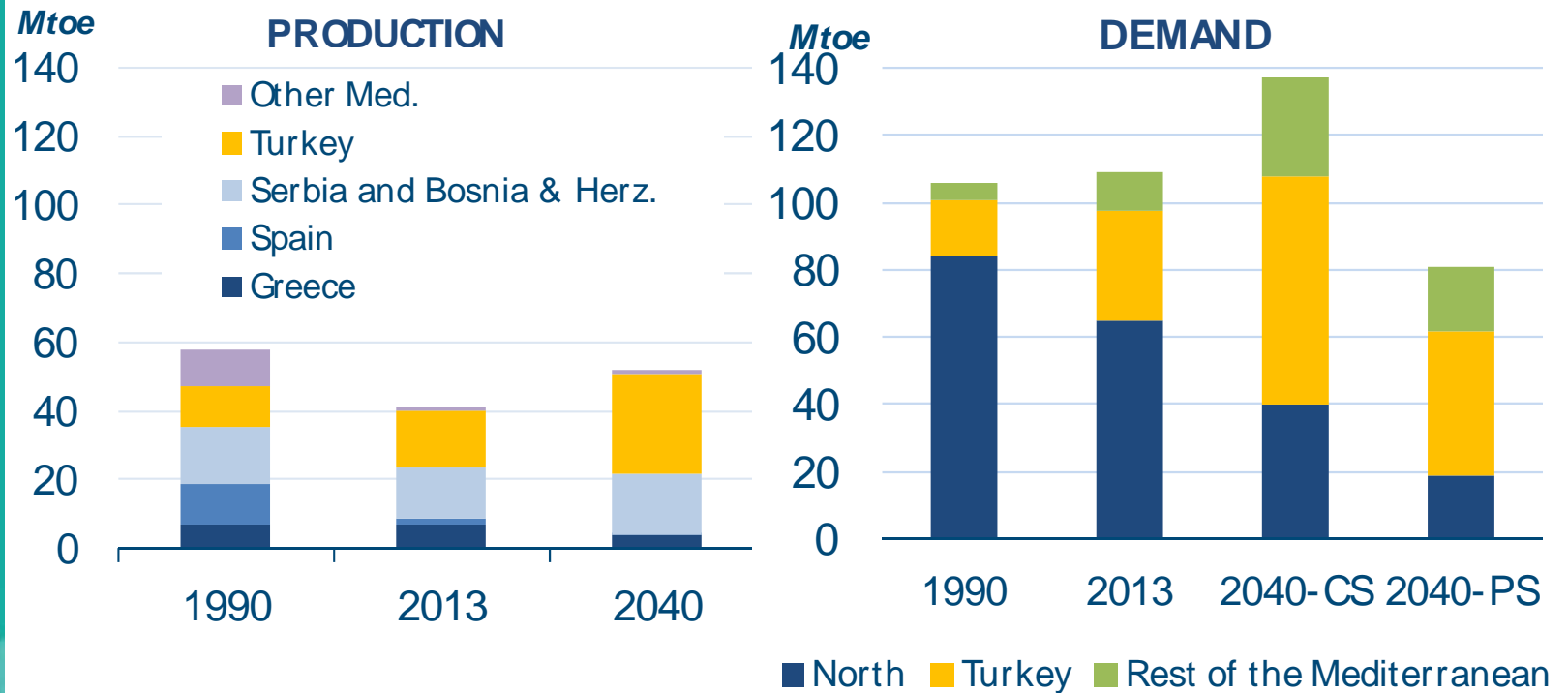
*The region will import more oil to satisfy its demand*



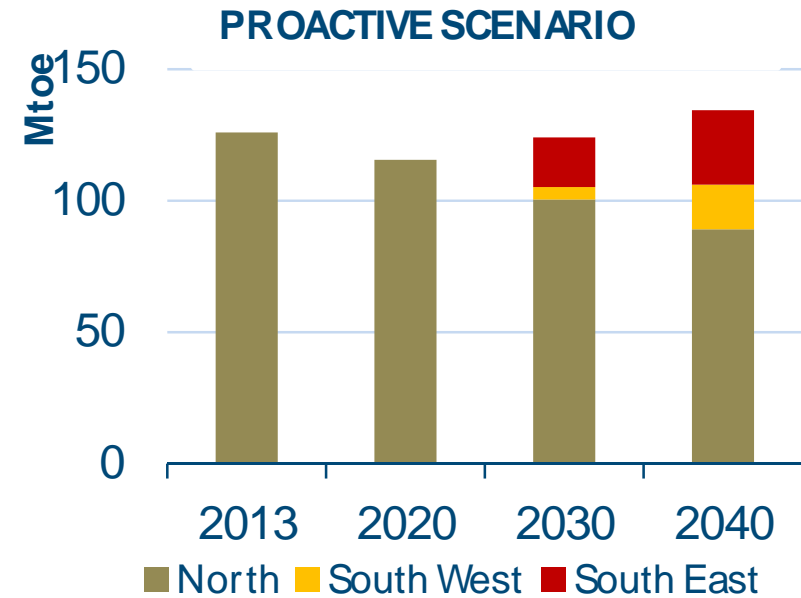
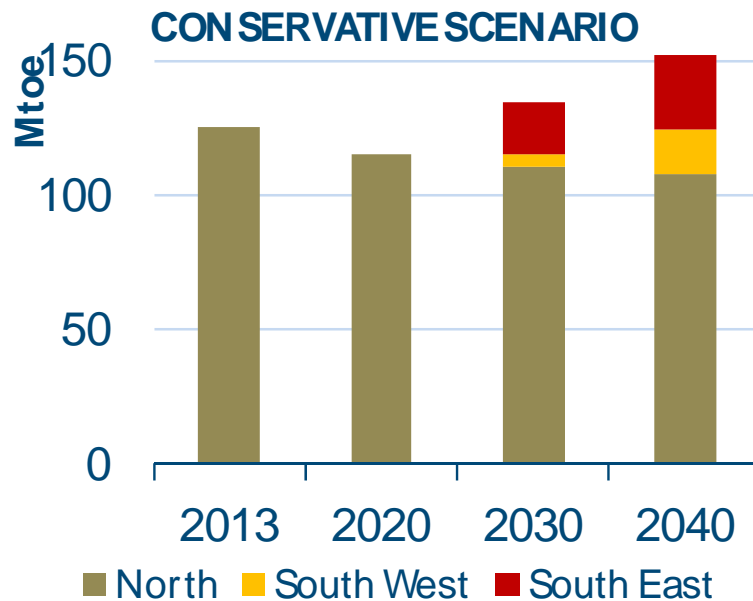
*By 2040, 5 countries could export some 60bcm in CS. But double that amount in PS*



# COAL PRODUCTION AND DEMAND

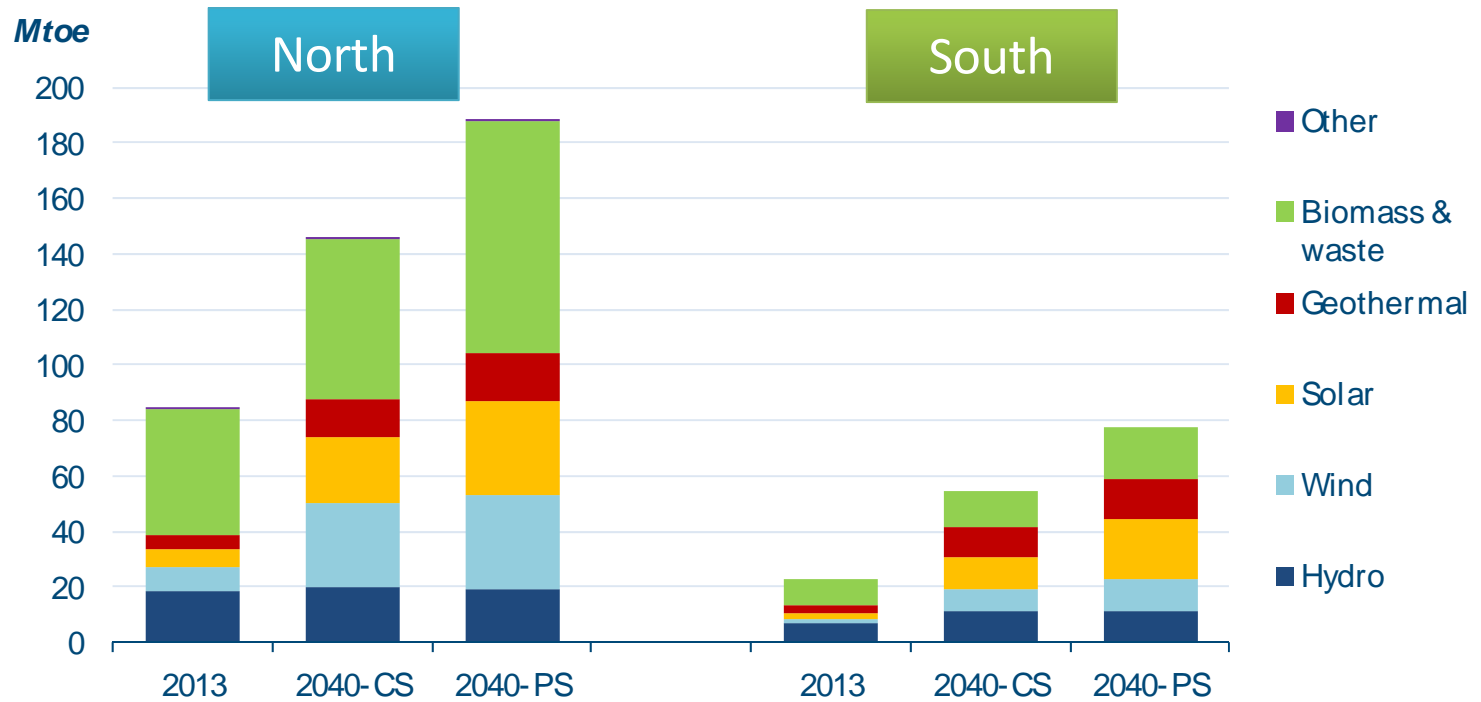


***Coal is not a major fuel in the energy mix of the Med. (11%) but it is a pivotal fuel for some countries, especially Turkey – as a diversification option.***



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

# RENEWABLES

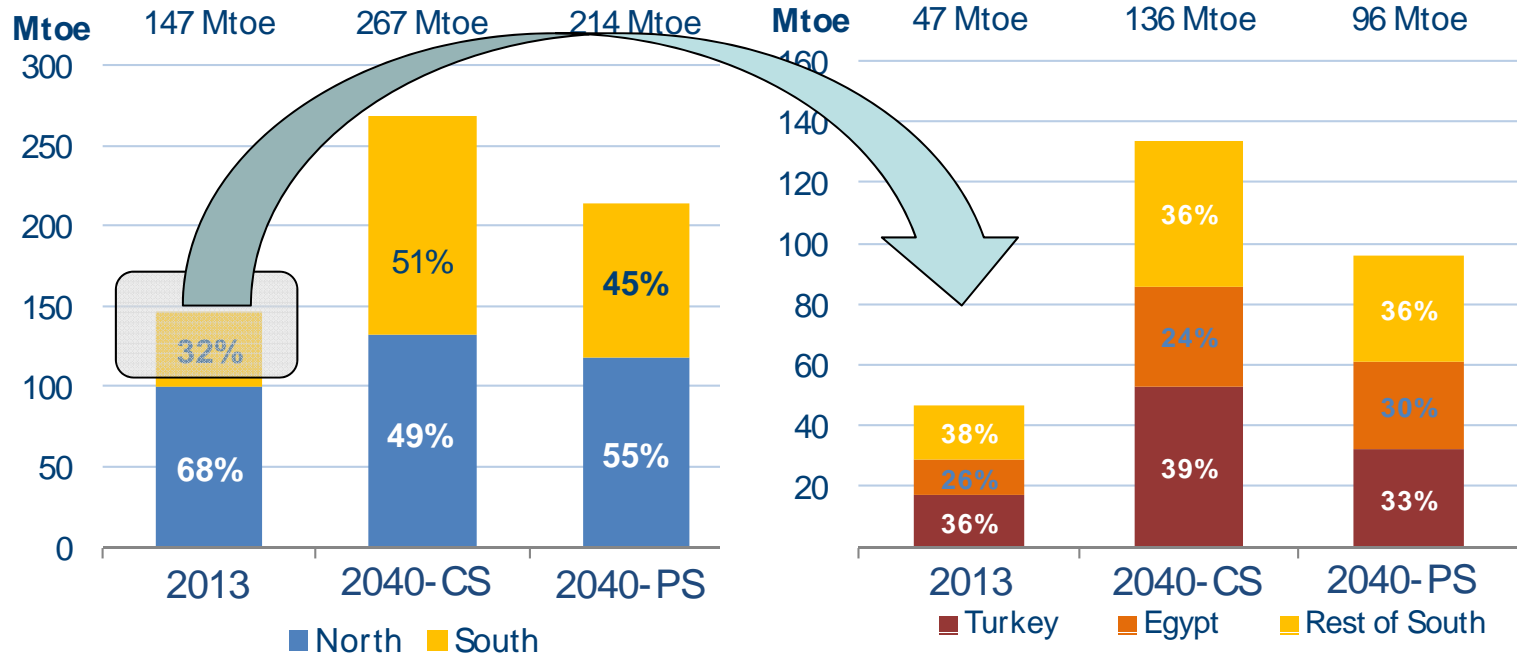


***Outstanding increase in RES production in both scenarios.***

# **ELECTRICITY**

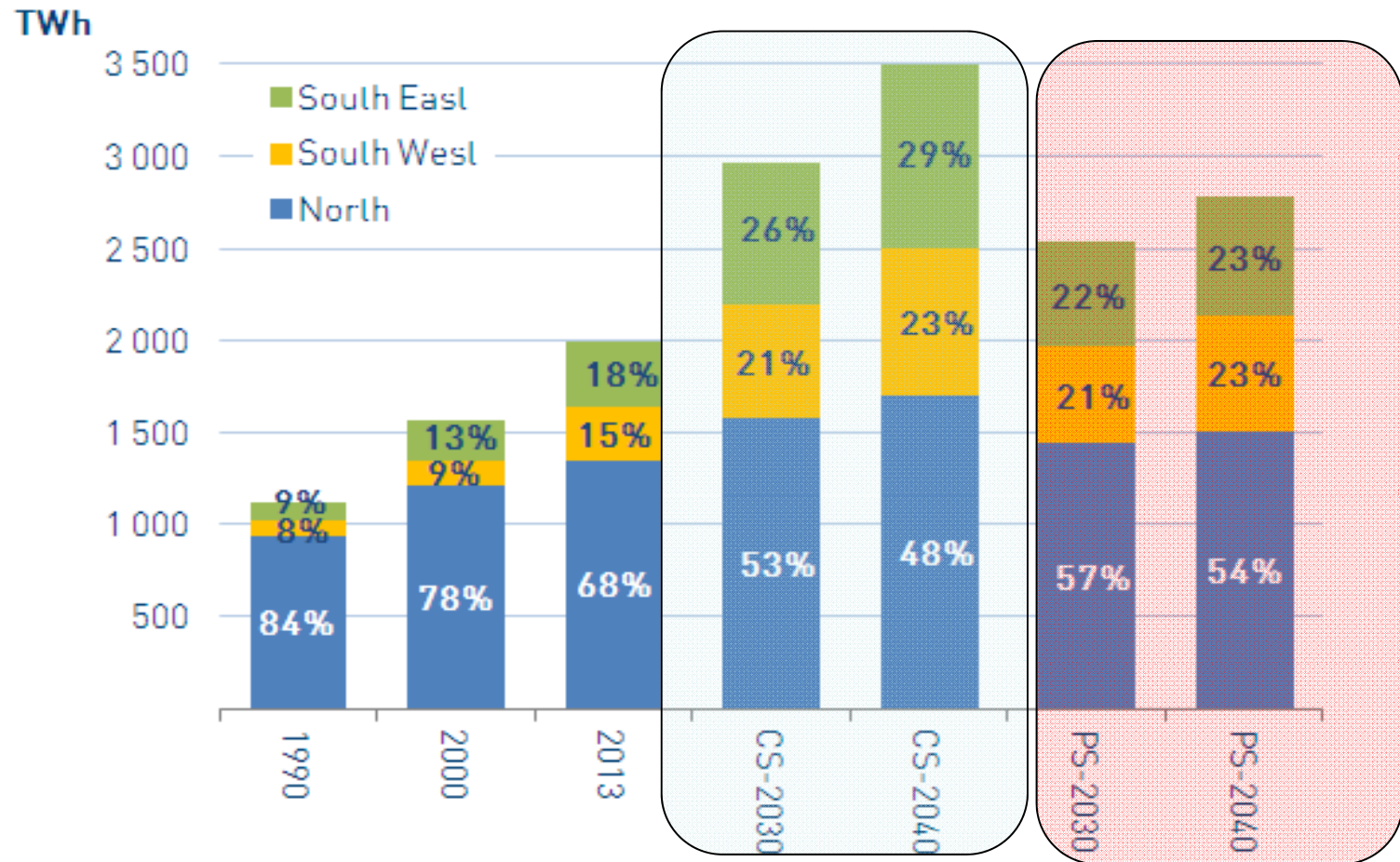
## **Demand, Generation, and Installed Capacity**

# ELECTRICITY CONSUMPTION



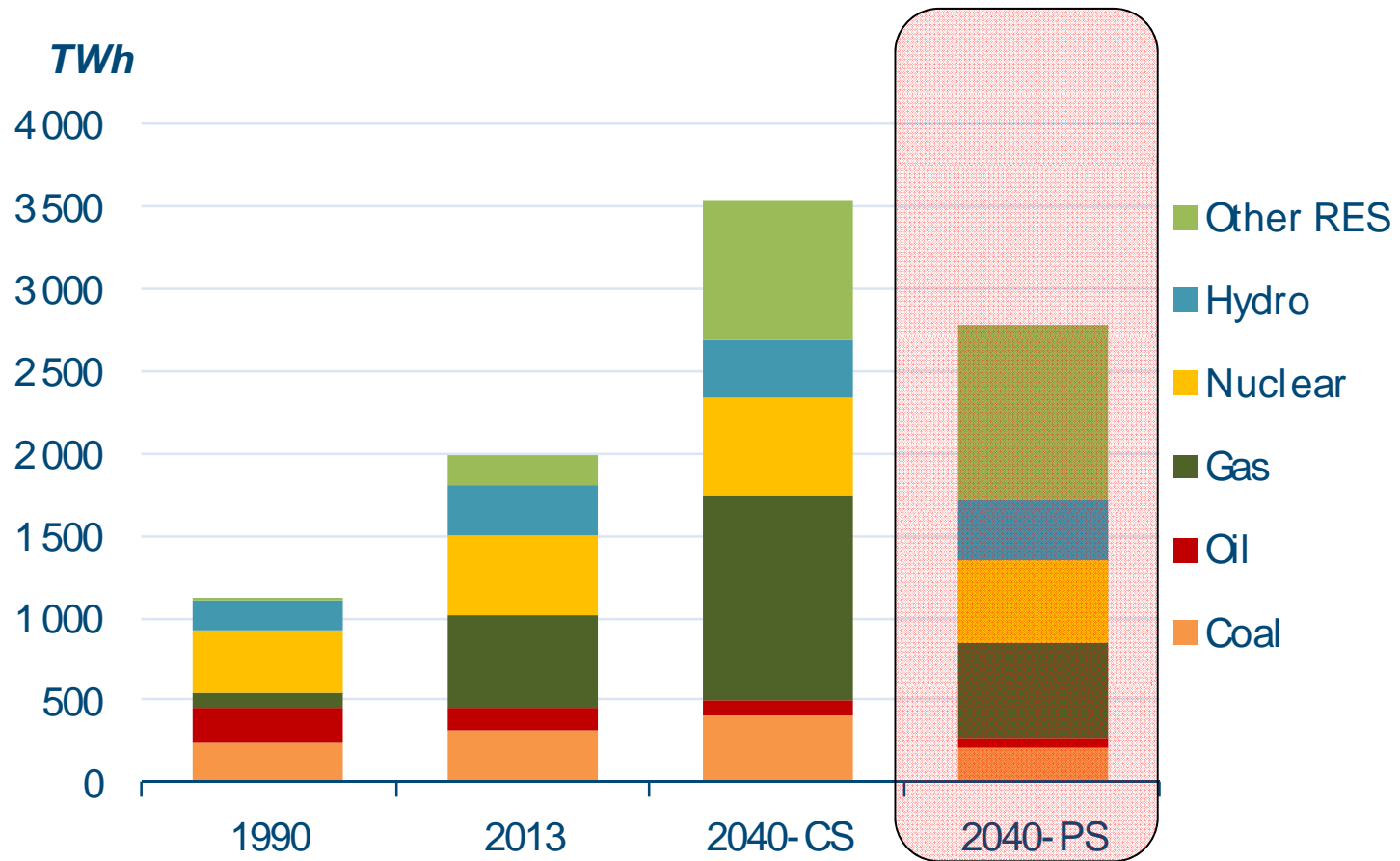
***will ~triple by 2040 in South Med,  
important efficiency measures are needed to smooth such  
a boom in CS.***

# MEDITERRANEAN ELECTRICITY GENERATION



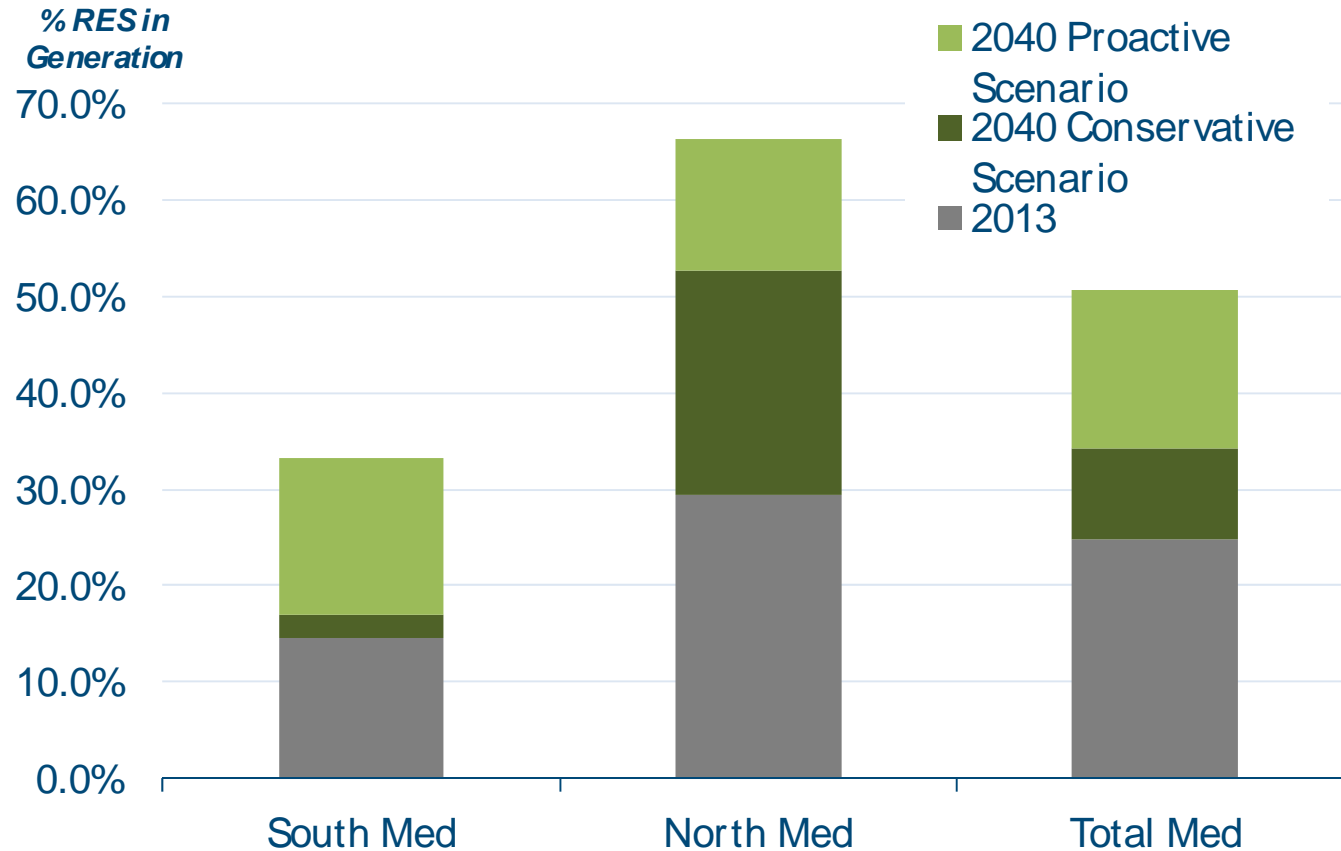
*The share of North Med will decline*

# 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

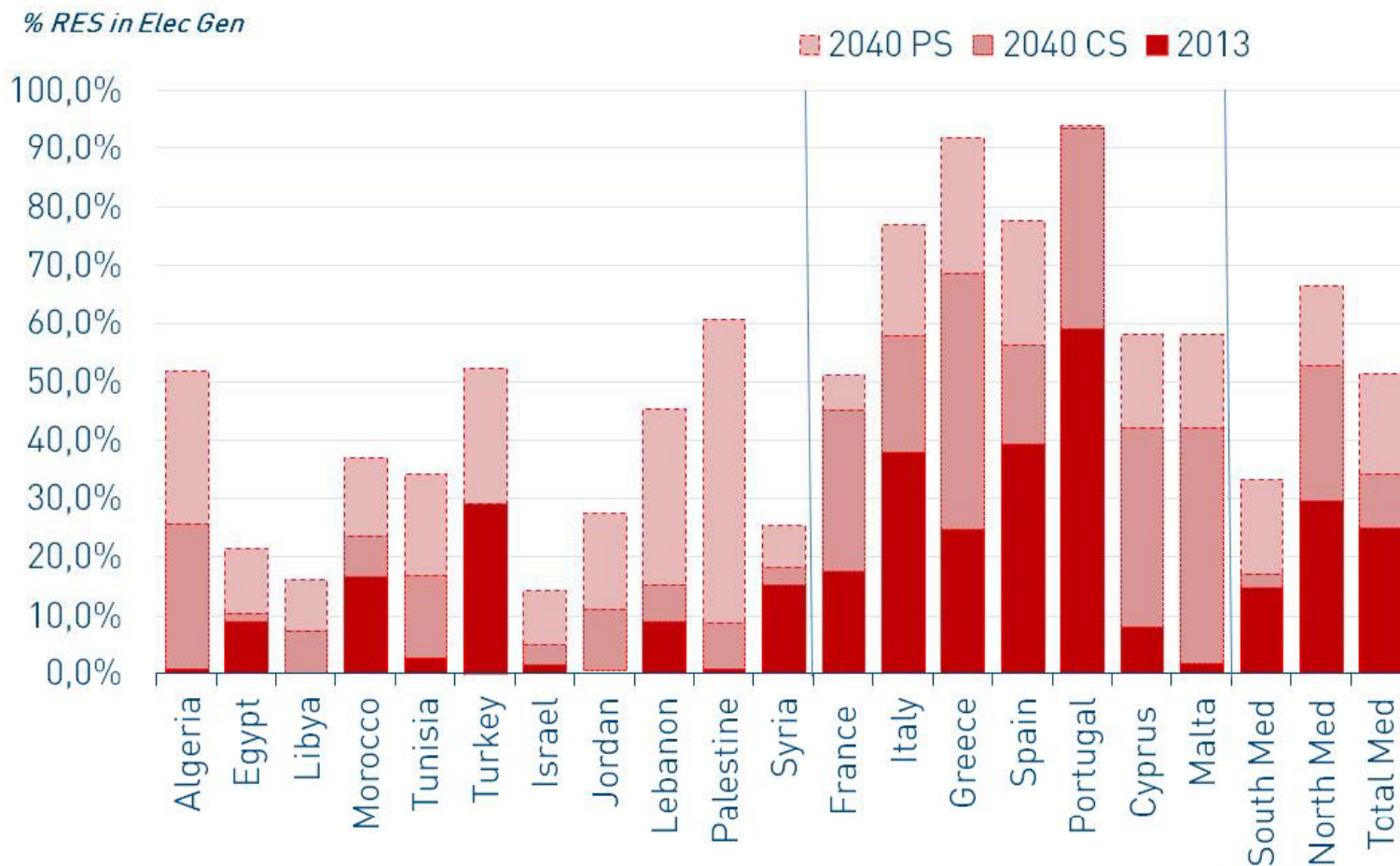


***In CS, RES share in elec gen would be 34% by 2040 (53% in the North and 17% in the South)***

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



# SHARE OF RES IN ELECTRICITY GENERATION BY COUNTRY

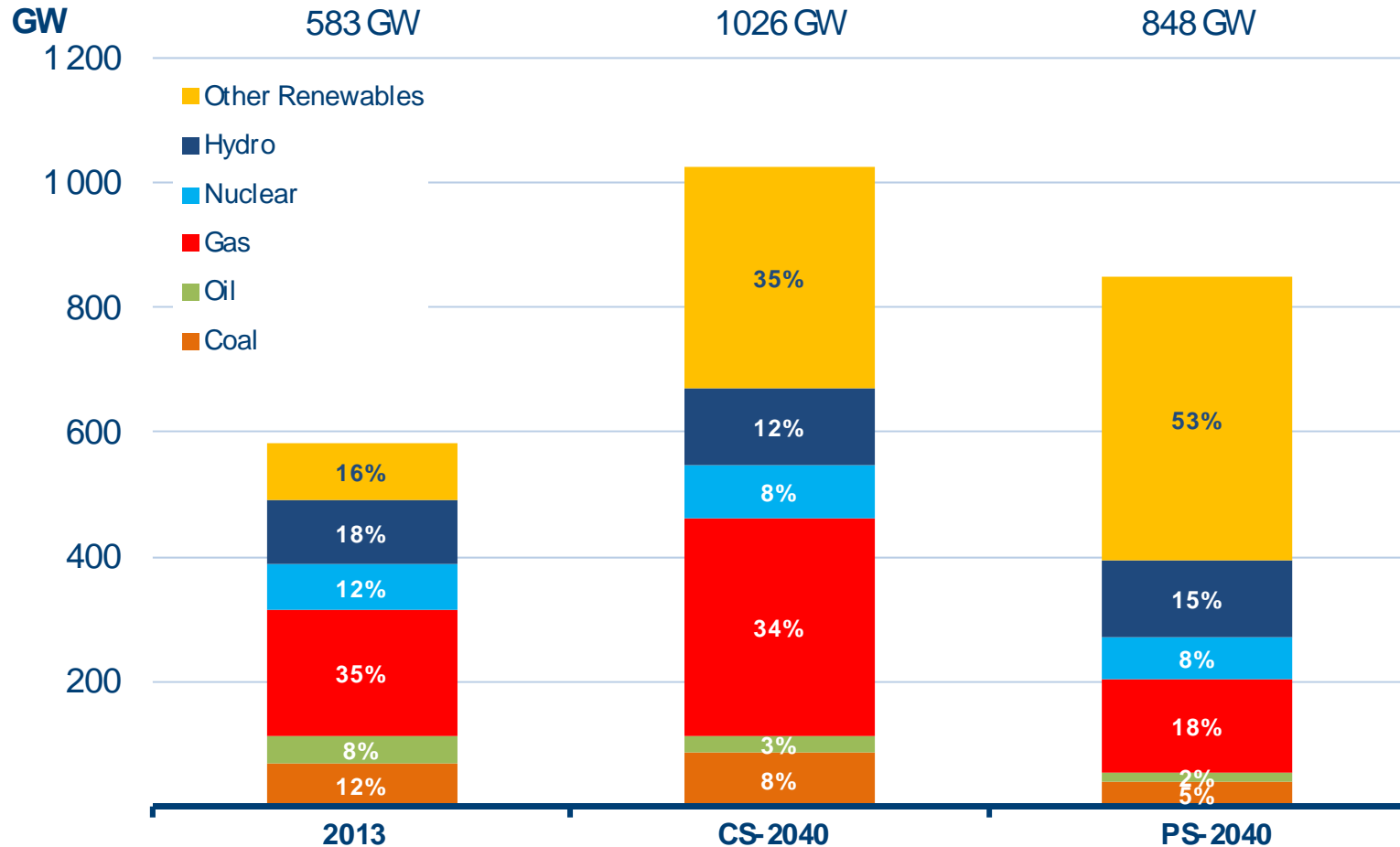


Sources: North Med, IEA; South Med, OME

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

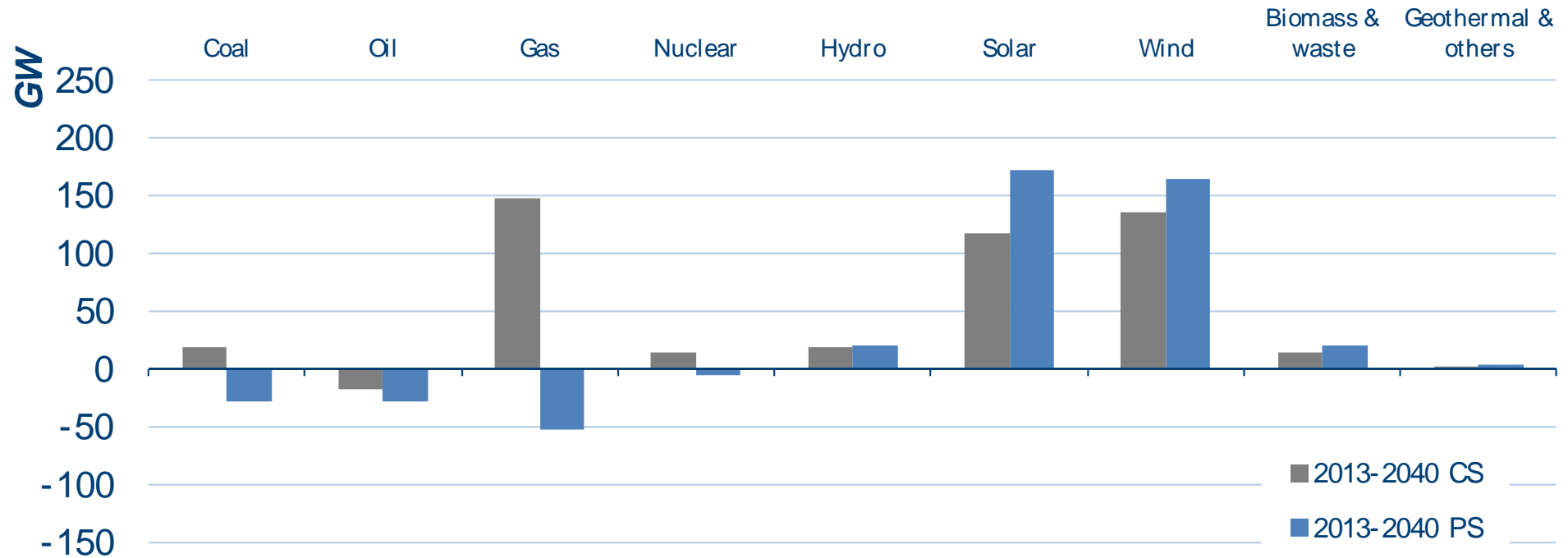
***More than 50% in PS (66% in the North and 33% in the South)***

# 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



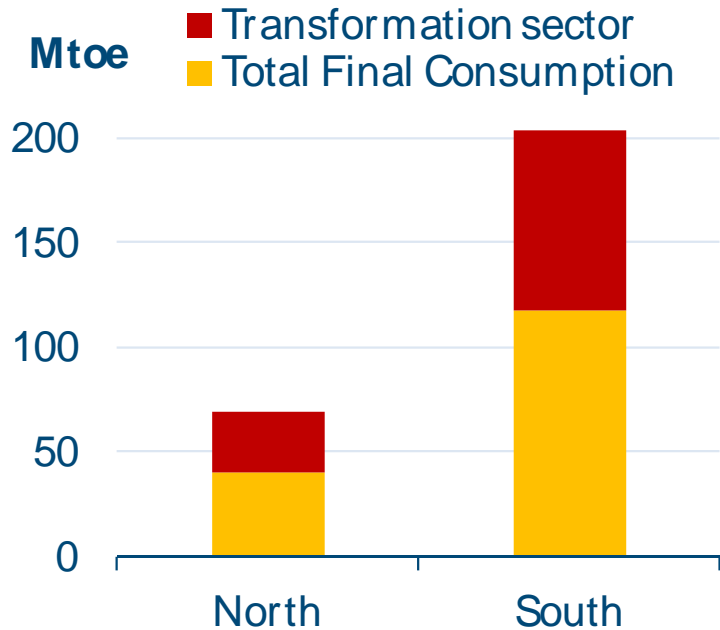
***Most additions are from solar and wind  
drop of gas (and fossil fuels in general) in the PS.***



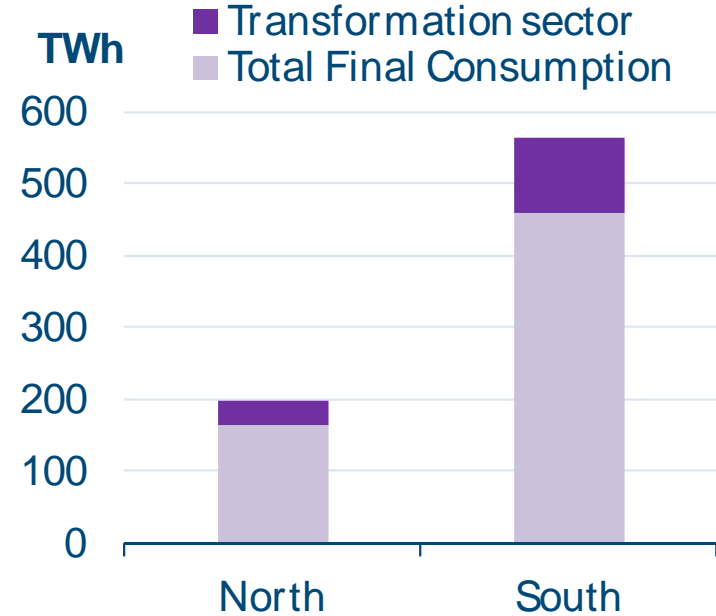
# ENERGY EFFICIENCY

# ENERGY & ELECTRICITY SAVINGS

## Energy Savings



## Electricity Savings

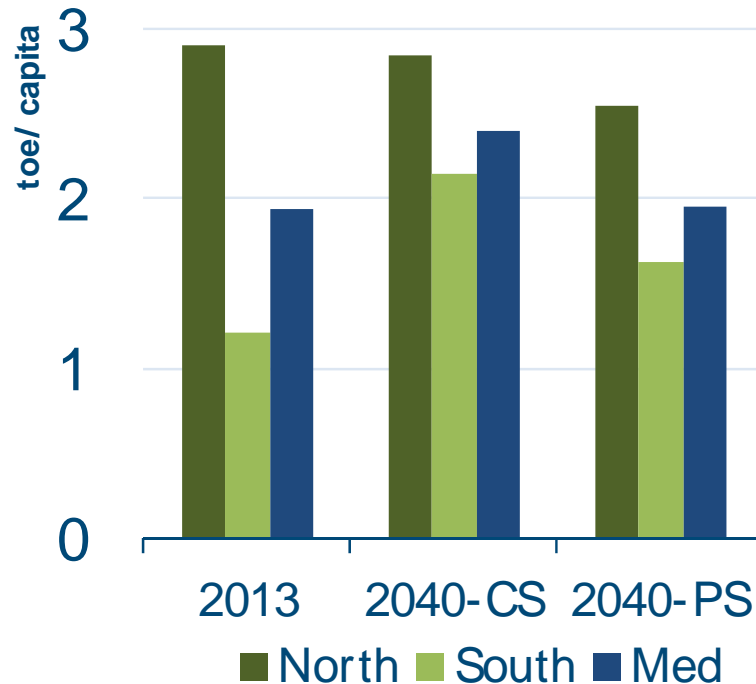


***Savings in the PS could amount to 270Mtoe, (~ 20% less than the CS), 157 Mtoe of which for TFC alone.***

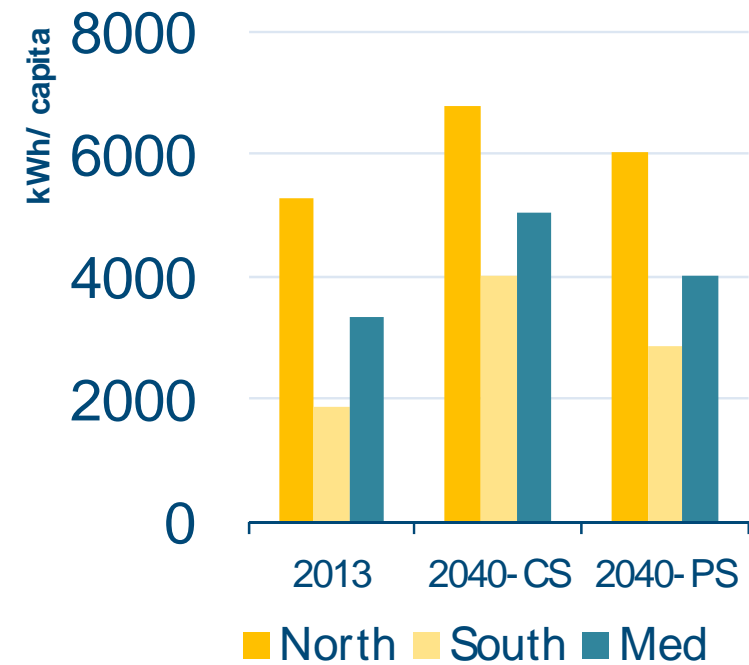
***Electricity Savings in the PS could amount to 760 TWh, (~ 21% less than the CS), 625TWh of which for TFC alone.***

# ENERGY & ELECTRICITY DEMAND PER CAPITA

## Energy Demand per capita



## Electricity Demand per capita

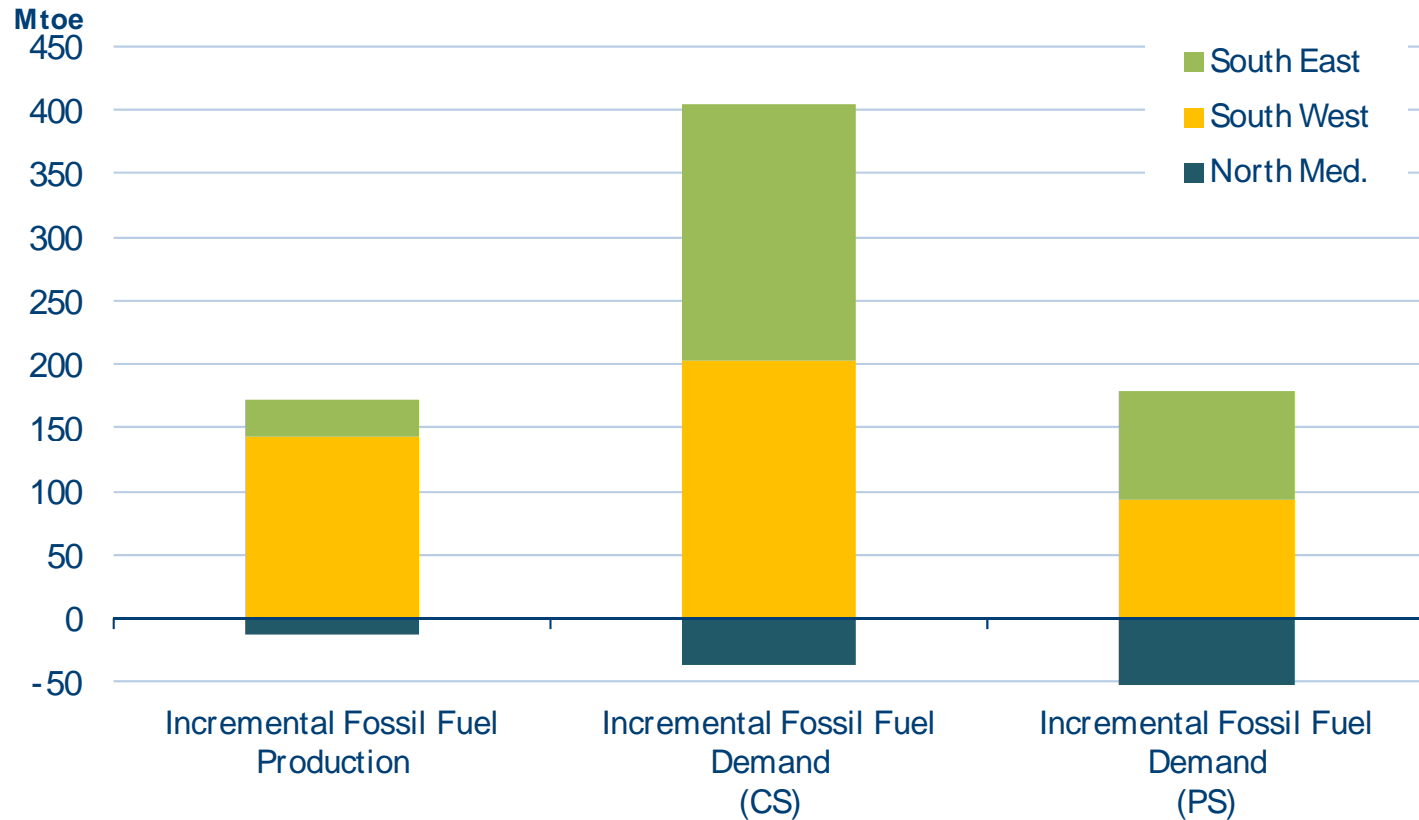


***in the South per capita energy demand will continue increasing to 2040 in both scenarios.***



# ENERGY SECURITY

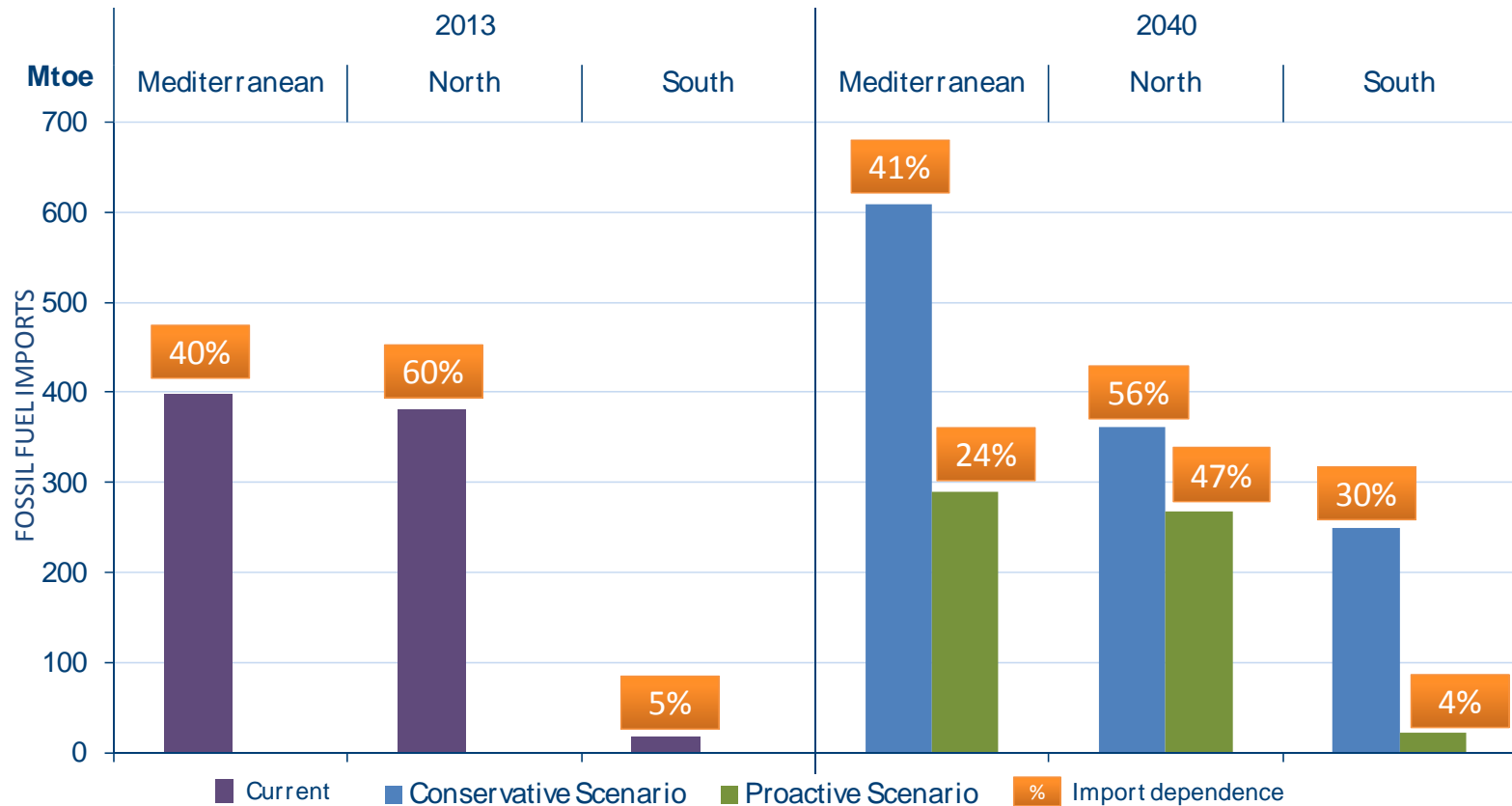
# INCREMENTAL FOSSIL FUEL DEMAND & PRODUCTION



***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

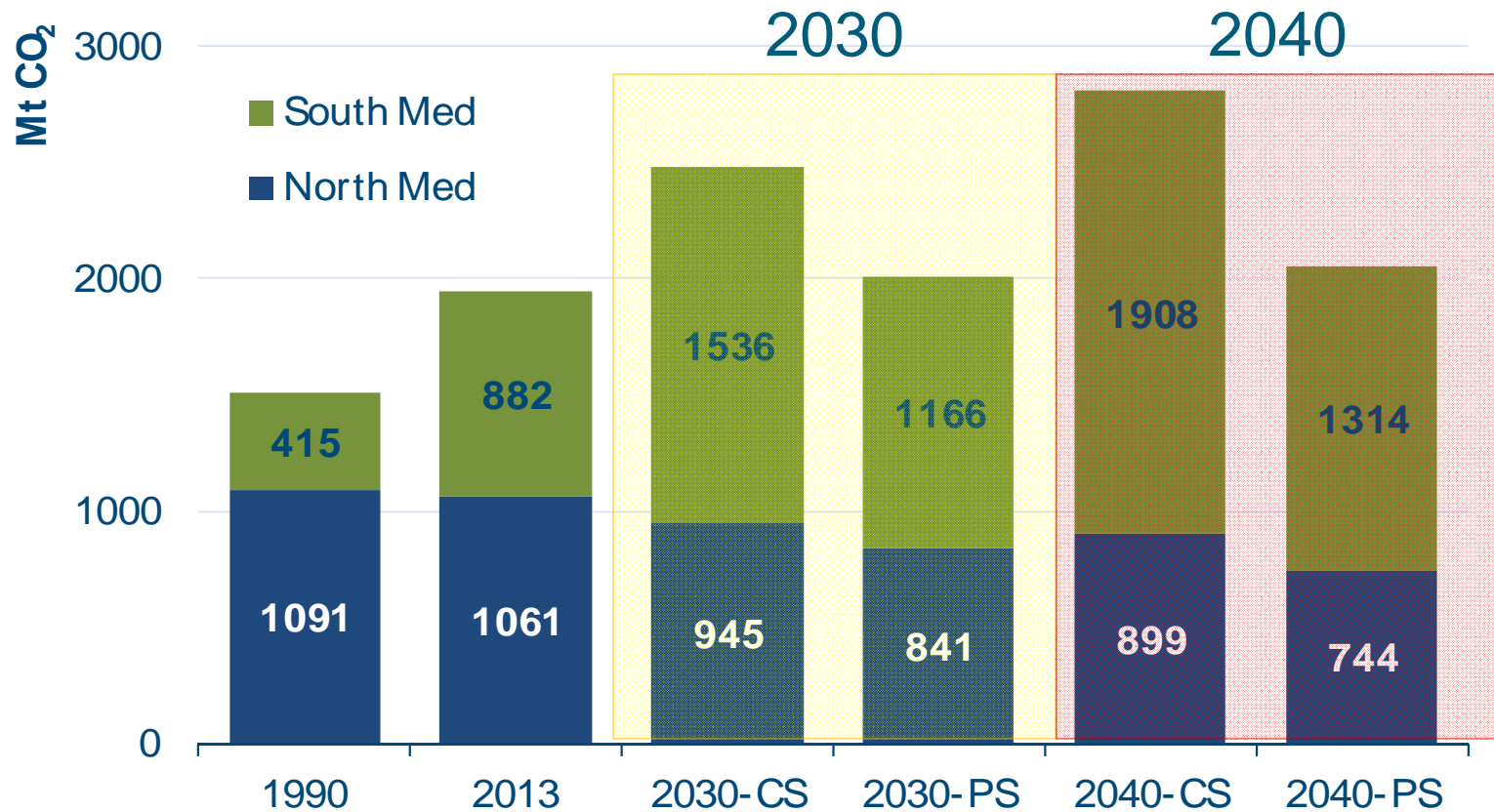


***Import dependence to increase in CS especially in the South. Fossil fuel net imports to be halved in the PS for the Med***



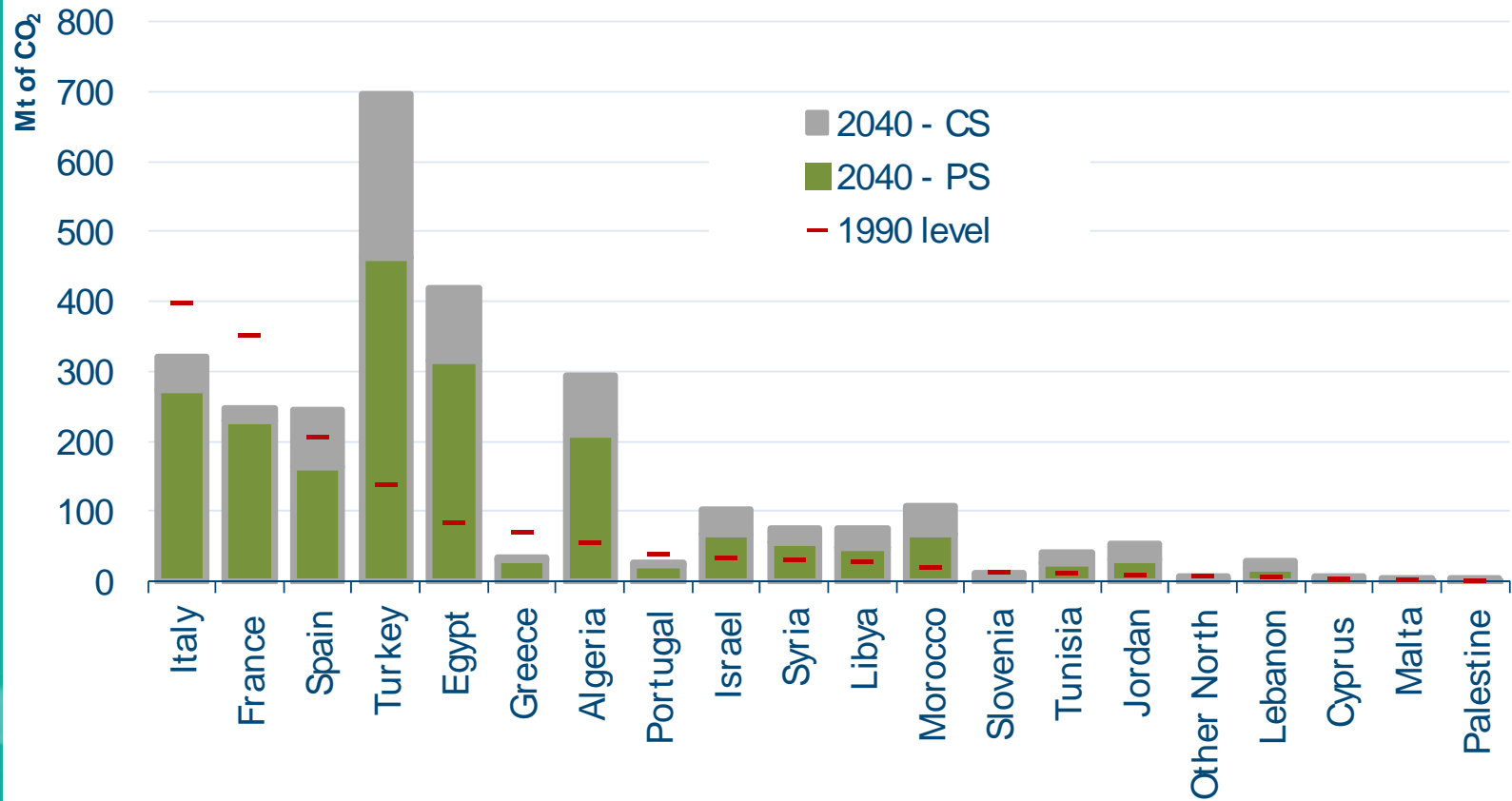
# CO<sub>2</sub> EMISSIONS

# CO<sub>2</sub> EMISSIONS BY REGION



***As a result, in PS, more moderate increase of CO<sub>2</sub> 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<sub>2</sub> EMISSIONS BY COUNTRY



***Turkey and Egypt to become the biggest CO<sub>2</sub> 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 across 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**



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Thank you.