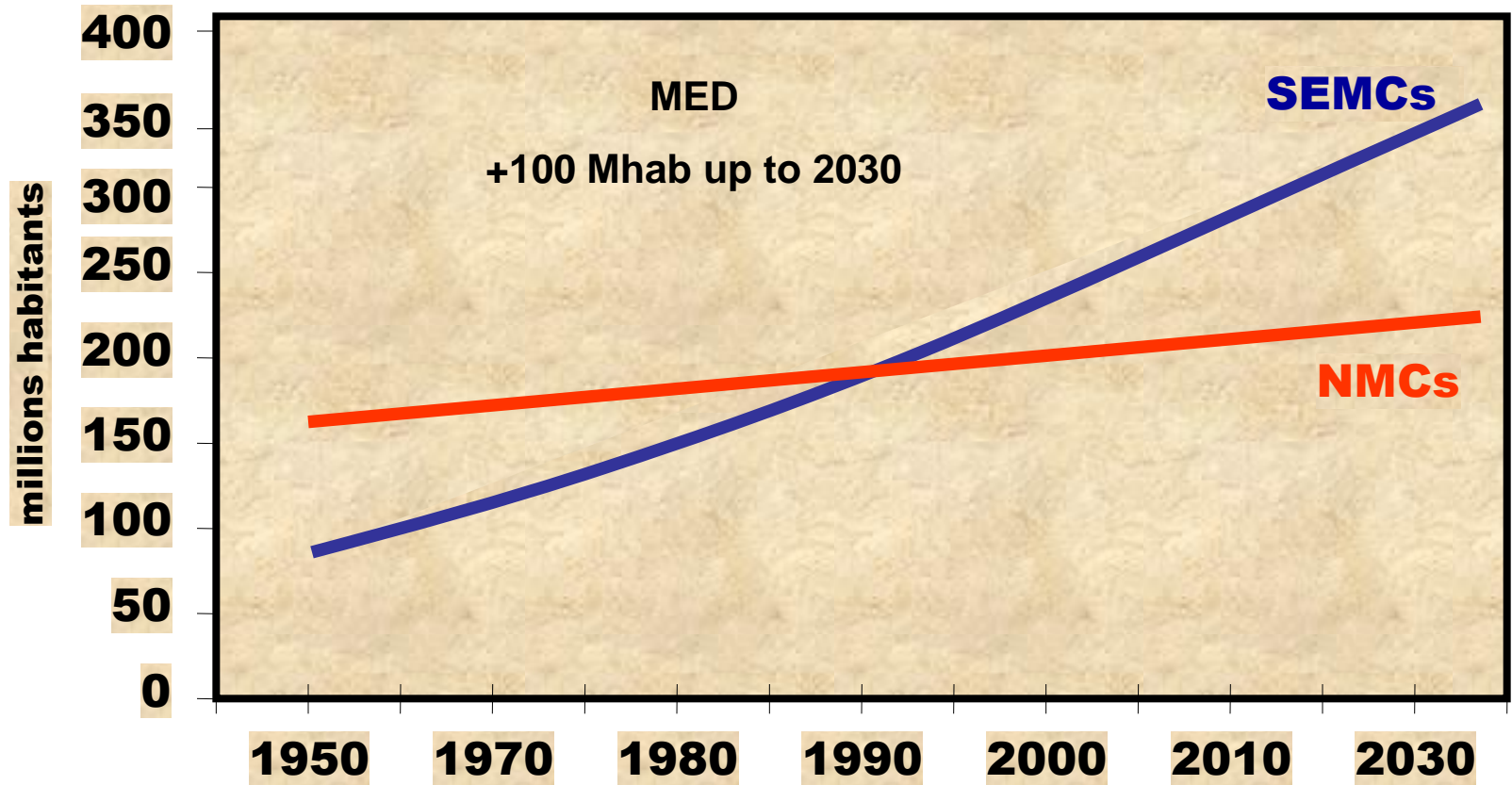


“ Renewable Energy Penetration in Mediterranean Countries Plan Bleu Reference vs. Alternative Scenario

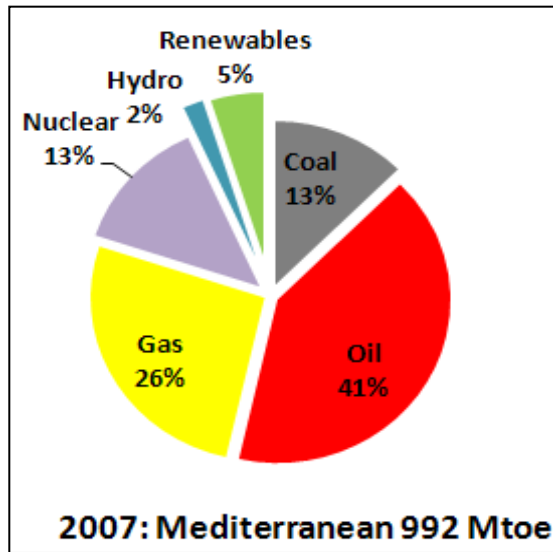
*El Habib EL ANDALOUSSI
Plan Bleu*



Mediterranean demography



Med : A strong energy demand & a low renewable energy production



7% Renewable

MED : consume 992 Mtoe in 2007

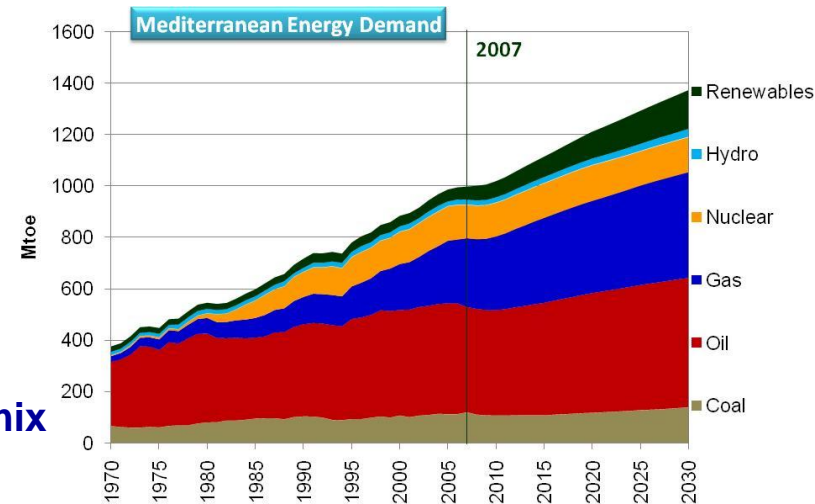
= 2 toe/capita

+ Strong dependency on oil & natural gas

Renewable Energy : only 7% of the energy mix

REFERENCE SCENARIO : 2030

- 2007-2030 : primary energy demand : +40%
 - Hydrocarbons : 80 % ; RE : 12 % of energy mix
- Increased energy dependency :



12% RE



A strong increase of energy & electricity demand in SEMCs

MED primary energy consumption:

- 2007 : 990 Mtoe (SEMCs = 30%)
- 2030 : 1416 Mtoe (SEMCs = 43%)

→ +3.1% p.a. in SEMCs ; +0.7% p.a. NMCs

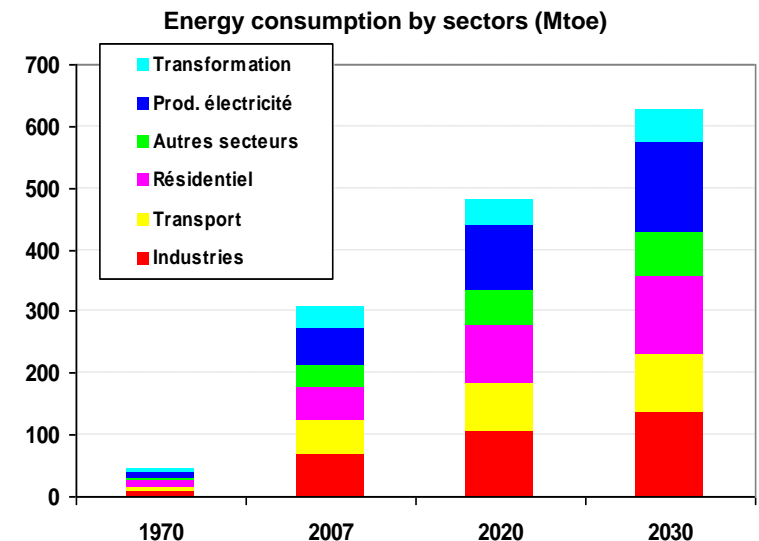
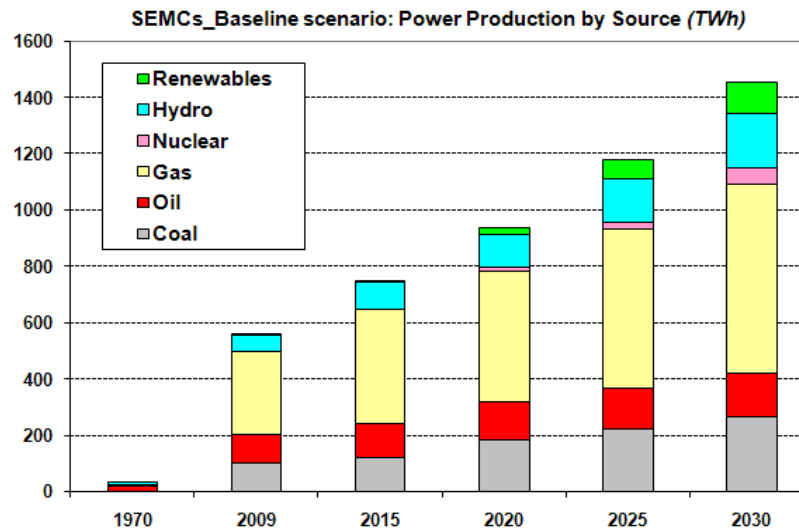
MED electricity demand :

- 2007 : 1910 TWh (SEMCs = 30%)
- 2030 : 3116 TWh (SEMCs = 48%)

→ +4.6% p.a. in SEMCs ; +0.8% p.a. NMCs

| Baseline scenario | | Primary Energy Demand (Mtoe) | | | % Growth annual rate | |
|-------------------|------|------------------------------|------|------|----------------------|-----------|
| | 1970 | 2007 | 2020 | 2030 | 1970-2007 | 2007-2030 |
| Med | 377 | 992 | 1219 | 1416 | 2,6% | 1,6% |
| SEMCs | 45 | 299 | 462 | 609 | 5,3% | 3,1% |
| NMCs | 333 | 693 | 757 | 807 | 2,0% | 0,7% |

| Baseline scenario | | Power Generation (TWh) | | | % Growth annual rate | |
|-------------------|------|------------------------|------|------|----------------------|-----------|
| | 1970 | 2007 | 2020 | 2030 | 1970-2007 | 2007-2030 |
| Med | 371 | 1910 | 2545 | 3166 | 4,5% | 2,2% |
| SEMCs | 32 | 530 | 981 | 1501 | 7,9% | 4,6% |
| NMCs | 339 | 1380 | 1564 | 1665 | 3,9% | 0,8% |



Strong increase of CO₂ emissions in SEMCs

2007 GHG emissions : 2 156 MtCO₂

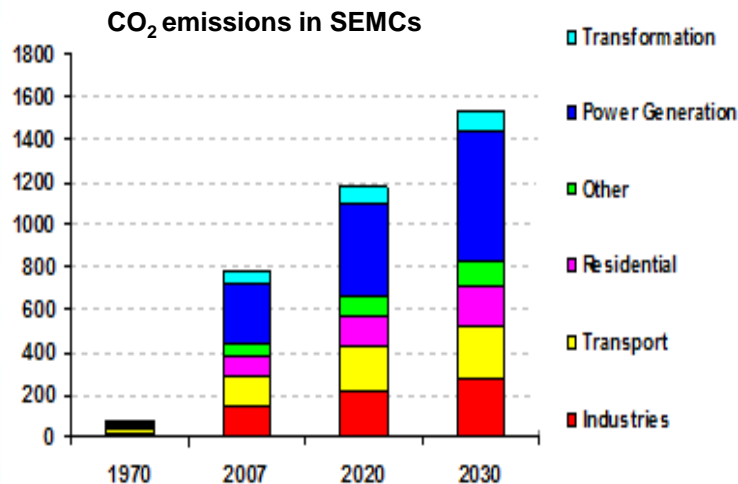
- 2/3 : NMCs

Reference scenario : 2007-2030

- MED : +1.5% p.a.

- SEMCs : +3% p.a.

| Reference scenario | | | CO2 Emissions (Mt) | |
|--------------------|------|------|--------------------|------|
| | 1970 | 2007 | 2020 | 2030 |
| Med | 950 | 2156 | 2580 | 2968 |
| SEMCs | 107 | 775 | 1154 | 1490 |
| NMCs | 843 | 1380 | 1425 | 1478 |



SEMCs : Strong potential of energy savings,

→ Need to implement accelerated energy efficiency policies

SEMCs : Strong potential for RE penetration

→ Need to implement ambitious RE production policies

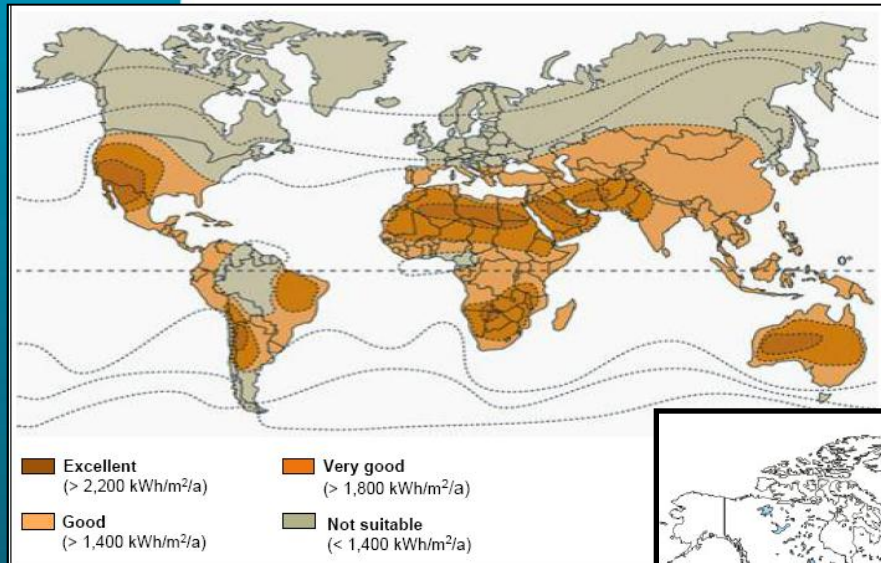


- **The New Alternative Scenario developed by Plan Bleu**
 - Go further than previous alternative scenarios
 - Introduction of stronger energy efficiency policies & renewable energy penetration
- **Objectives in Med countries :30/30/30 in 2030**
 - Increase energy & electricity efficiency by 25 & 30 %
 - Share of RE in the energy mix : 25 % (i.e. x 2)
 - Reduce CO₂ emissions by 30 %

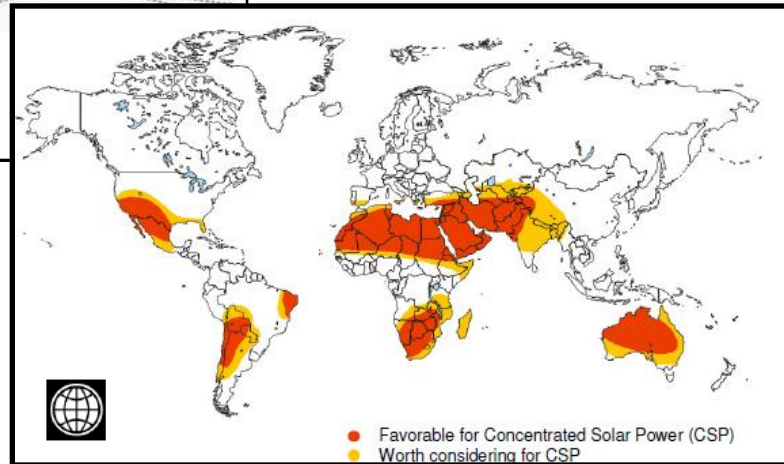


From Global Solar Potential... to Mediterranean Solar Plan

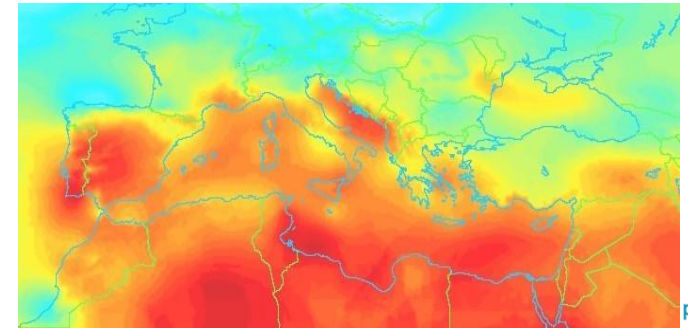
Solar radiation at the global level...



... The best areas for CSP ...



...hence MSP & Desertec projects location choices

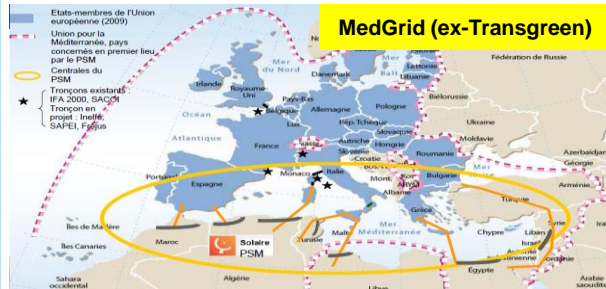


Regional & National Solar Plans

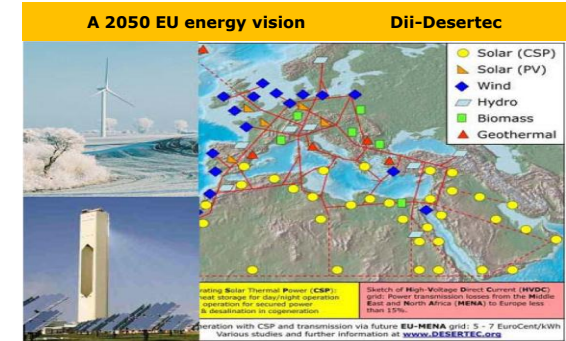
UNION
POUR LA MEDITERRANEE

PLAN SOLAIRE MEDITERRANEE
Mediterranean Solar Plan

Mediterranean Solar Plan:
20000 MW by 2020

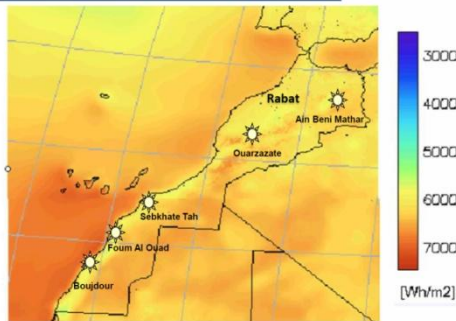


MedGrid: 5000 MW
on cables reinforcing
Med. electric loop



Dii-Desertec : Extensive CSP
power plant development
(target export 15%)

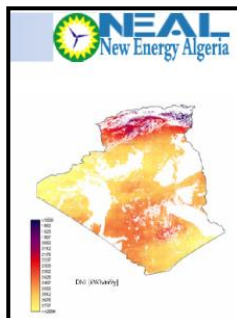
CARTE D'IRRADIATION SOLAIRE DU ROYAUME DU
MAROC



Morocco Solar Plan :
>4000 MW RE
2000 MW CSP
2000 MW Wind farms

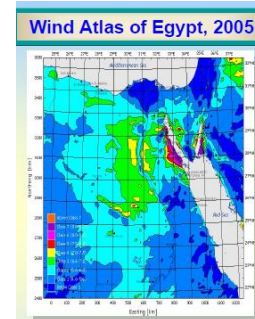


Tunisian Solar Plan
> 4700 MW :
1700 MW Solar
2700 MW Wind farms
300 MW other RE



Algerian RE program
>120000 MW :
7000 MW CSP
2000 MW Wind farms
2800 MW other RE

An Overview on Wind Power Projects



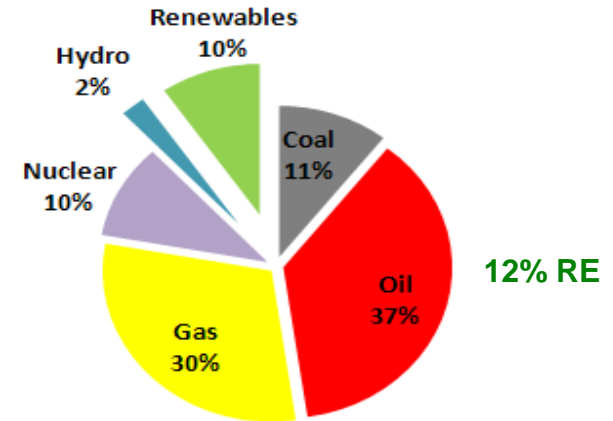
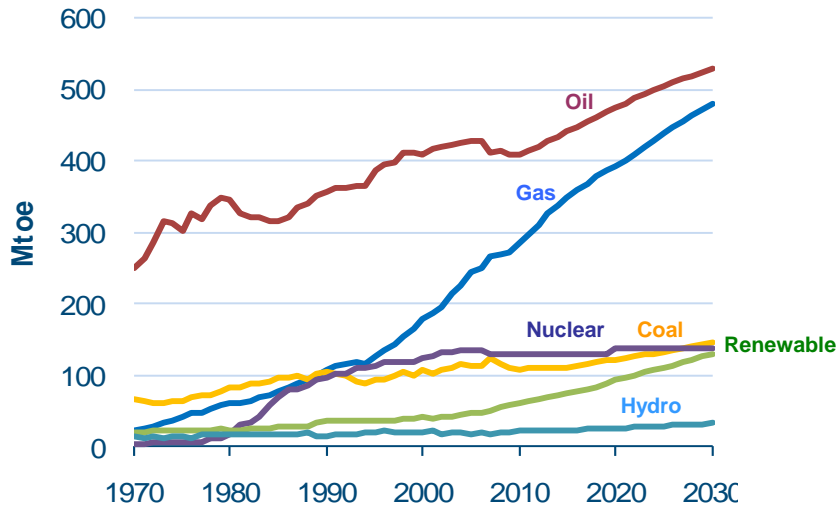
Egypt RE program
> 7200 MW :
7200 MW Wind farms
..... MW CSP
..... MW other RE



plan
bleu

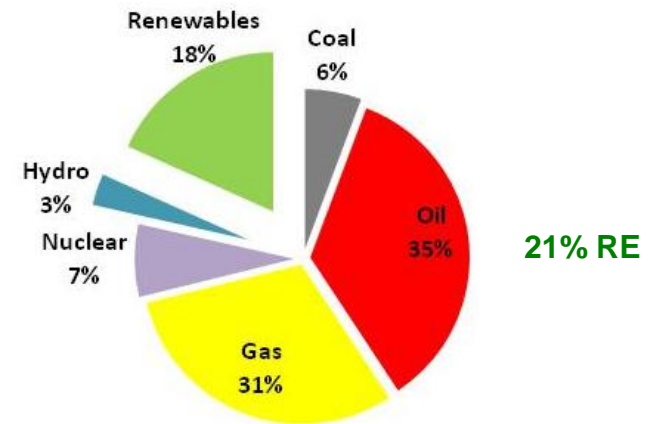
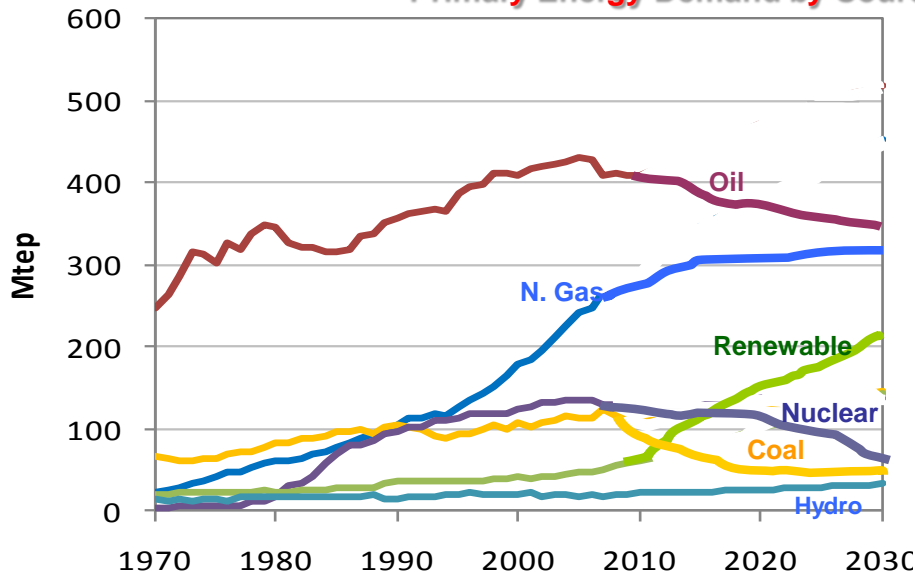
Reference vs. Alternative Scenario : Primary Energy Demand in Med.

Primary Energy Demand by Source in the Reference Scenario



2030 Reference Scenario : MED = 1416 Mtoe

Primary Energy Demand by Source in the Alternative Scenario

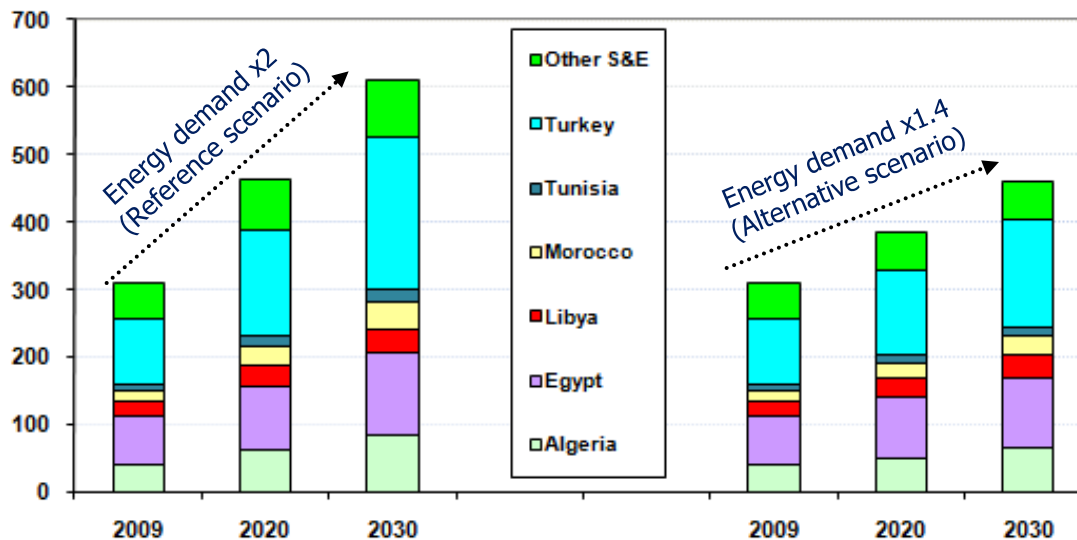


2030 Alternative Scenario : MED = 1040 Mtoe

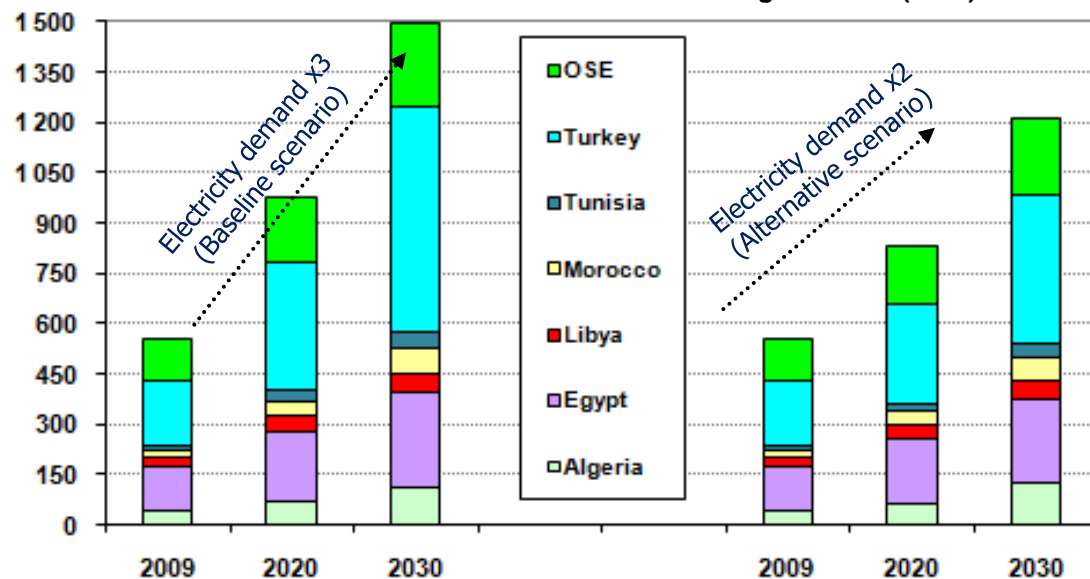


SEMCs Primary Energy Demand & Power Generation, by country & by scenario

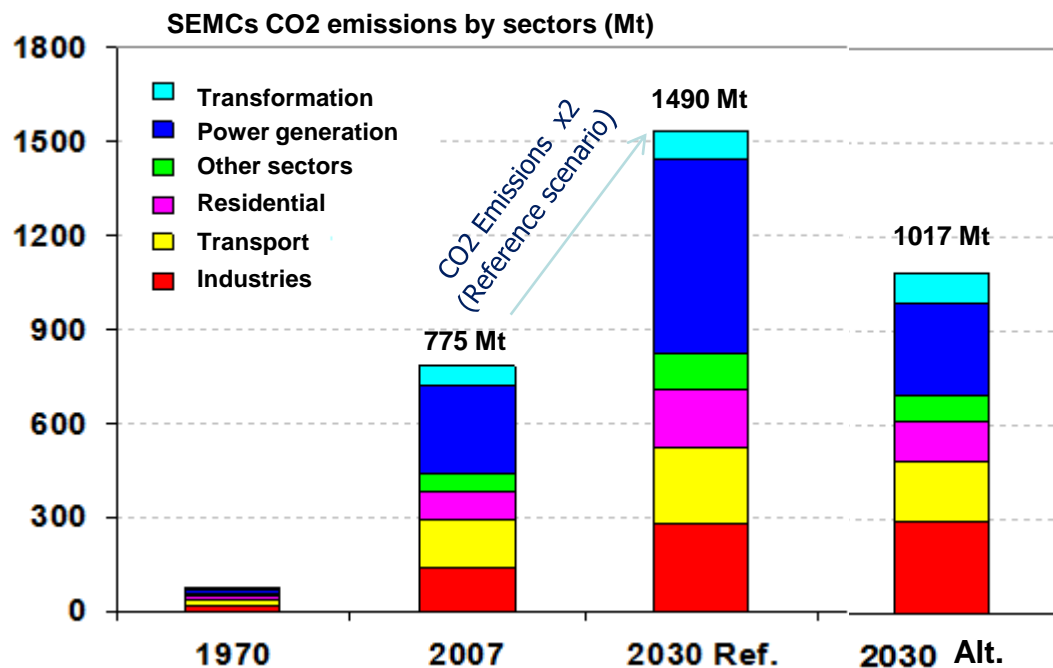
SEMCs Reference & alternative scenarios : Primary energy consumptio (Mtoe)



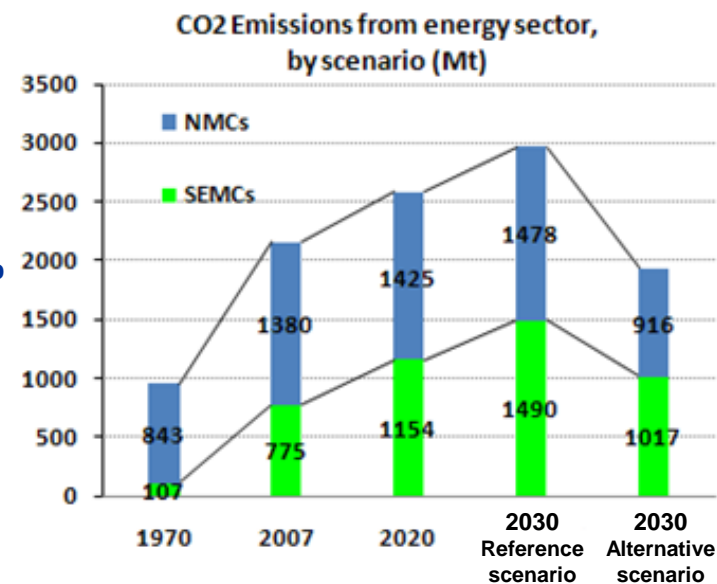
SEMCs Reference & alternative scenarios : Power generation (TWh)



SEMCs : CO₂ Emissions by Scenario



- Reference : CO₂ emissions are doubling
- Alternative : CO₂ emissions raise « only » by 31%



Thank you for your attention

Work in progress

Please send your questions & comments to :

ehelandaloussi@planbleu.org

For more information

www.planbleu.org

