



CEER-ICER workshop on Renewable Energy Strategy

# **Renewable projects on a regional/international level**

**Association of Mediterranean Regulators  
for Electricity and Gas  
(MEDREG)**

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**20<sup>th</sup> June 2012**



**MEDREG**  
**Association of Mediterranean Regulators**  
**for Electricity and Gas**  
**(MEDREG)**

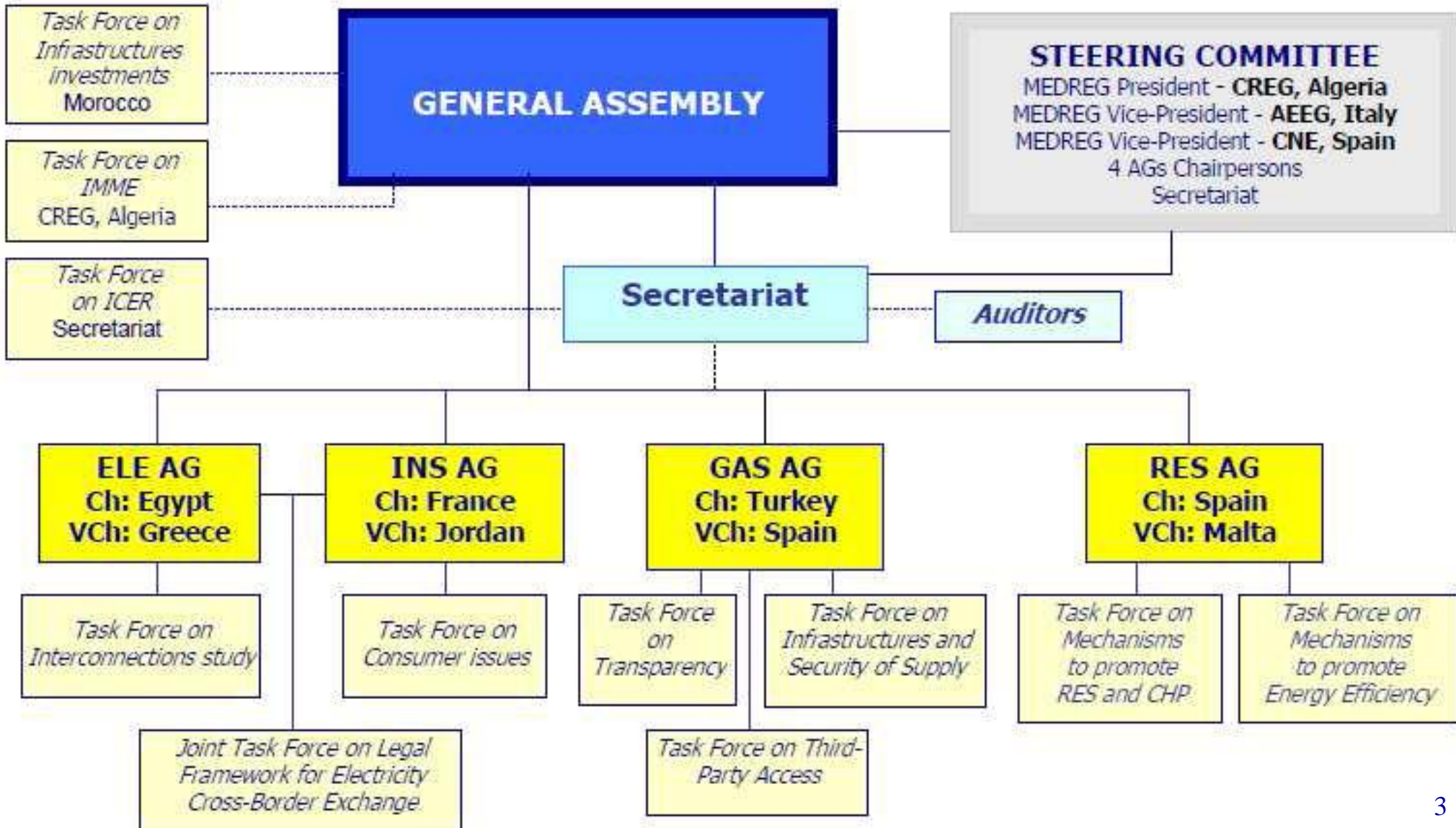


## **Mission and objectives**

- **The main objective of MEDREG is to create the conditions for a further step in terms of regional cooperation in the energy sector, which could lead to the creation of a Mediterranean Energy Community.**
- **Specific objectives of MEDREG are to facilitate the development of investments, infrastructures and interconnections, in order to support greater efficiency and integration of energy markets based on secure, safe, cost-effective and environmentally sustainable energy systems in the Mediterranean basin.**



# MEDREG Organization (May 2010-May 2012)





## Ad-Hoc Group on the Environment, Renewable Energy Sources and Energy Efficiency (RES AG)

done	→	✓ <b>Terms of Reference.</b>
done	→	✓ <b>Questionnaire</b> to verify the status quo in the different countries.
done	→	✓ Executive Summary of the environment, RES and energy efficiency: <b>benchmarking exercise (2007, 2008, 2009, 2010 data).</b>
done	→	✓ Report on main regulatory mechanisms and experiences: assessment of the <b>pros and cons of different national mechanisms</b> to promote renewable energies and energy efficiency ( <u>two documents</u> ).
done	→	✓ Paper on the valuation of the effects of the <b>introduction of successful mechanisms in non-EU countries</b> , considering the importance of the different context in terms of market structure and regulatory and legislative framework ( <u>two documents</u> ). <b>(Winner of 1<sup>st</sup> ICER Distinguished Scholar Awards 2010)</b>
done	→	✓ Assessment to a supra-national level of the possible effects of extending the functioning of national mechanisms to a supra-national level. <u>Two documents.</u> ( 2011)
for approval	→	✓ Case study of the application of article 9 on flexibility mechanisms in the EU Directive 2009/28/CE ( 2012).

## Contents

- **Objective of the case study:** To develop a new RES facility in the South of the Mediterranean
- **Introduction.** Target of the Mediterranean Solar Plan
- **The EU Directive 2009/28/CE .** Flexibility mechanisms involved in the project (article 9)
- **Case study analysis:** Technology, location, costs.
- **Regulatory framework.** Agreement between countries/ Share of RES energy/ Certification /Support systems
- **Energy transmission.** Direct infrastructure investments/ Interconnections/ Transit countries/ Energy network integration/ Cross-border trade and transit mechanisms.
- **Financing of the project.** External and internal financing mix
- **Conclusions**

# Document: “Case study of the application of article 9 on flexibility mechanisms in the EU Directive 2009/28/CE”

## ✓ Objective of the Case Study

- Development of a new Concentrated Solar Power plant on application of the article 9 of Directive 2009/28/EC under different perspectives:
  - ✓ Regulatory framework
  - ✓ Technical aspects
  - ✓ Economic issues



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- ✓ Introduction: Mediterranean Solar Plan
  - Supported by Union for Mediterranean (UfM)
  - Targets:
    - ✓ To develop 20 GW of renewable electricity capacity on the South Shore of the Mediterranean by 2020
    - ✓ Development necessary infrastructures for the electricity interconnection with Europe.
    - ✓ The Plan also envisages Saving and Energy Efficiency, as well as Technology Transfer.



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- ✓ EU Directive 2009/28/CE, article 9: Flexibility mechanisms:
  - Statistical transfers between Member States
  - Joint projects between Member States
  - Joint support schemes between Member States
  - Joint projects between Member States and third countries
    - EU Member State cooperates in a project located in a non-EU country.
    - The aim of the project must be the production of electricity from renewable sources.
    - The project is helped to reach national mandatory targets by the EU Member State.

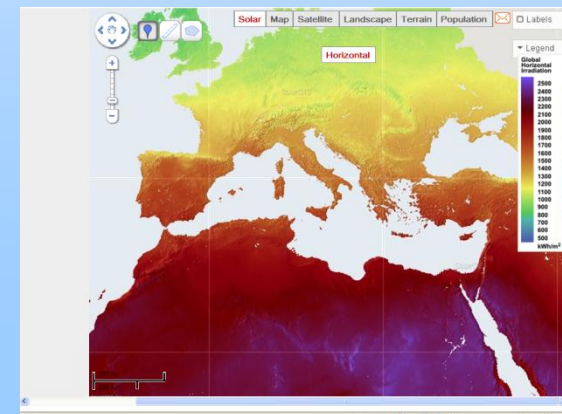




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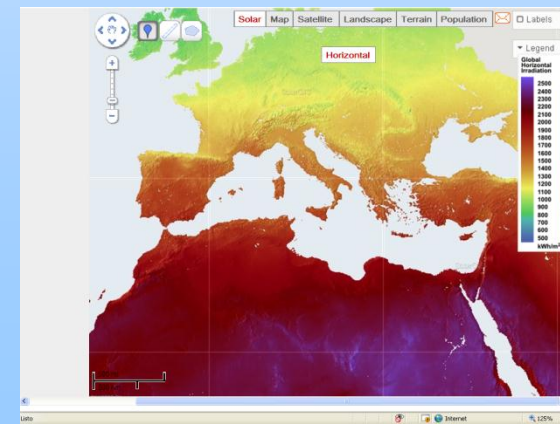


- ✓ Regulatory framework. Agreement between countries :
  - Renewable energy certification:
    - It is necessary to certify that energy comes from renewable sources, according to objective and transparent mechanisms.
    - Certification control must follow the Guarantee of Origin system (Directive 2009/28/EC) or another system using an independent certifier.
    - The system, with clear rules and appropriate controls must be recognized at international level.



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- ✓ Regulatory framework. Agreement between countries:
  - Share of the RES energy:
    - Electricity must be shared between origin and destination countries.
    - Each country must pay the electricity consumed (at different prices)



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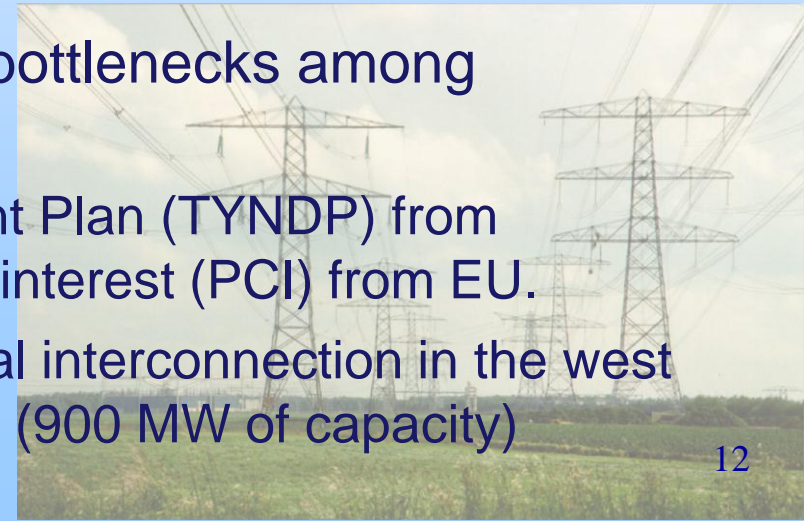


- ✓ Regulatory framework. Agreement between countries :
  - Support schemes and pros-cons in the context of the case study:
    - Tenders:
      - 😊 Competitive and transparent mechanism,
      - 😊 Very cost-effective solution.
      - 😞 Usually involves extra uncertainties.
    - Tradable Green Certificates (Quota):
      - 😊 Market compatibility,
      - 😞 No developed market in some countries.
      - 😞 Risk of uncertainty
    - Feed-in-Premium:
      - 😊 Very effective and efficient system,
      - 😞 It is necessary a transparent and developed electric market to get a price reference
    - Feed-in-Tariff:
      - 😊 Effective and efficient system/ 😊 Easy to implement
      - 😊 Reduce uncertainty

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## ✓ Energy transmission.1/2

- According art 9 of RES Directive, it is necessary enough interconnection capacity between all transmission countries.
- Direct infrastructure investments (Grid reinforcements in the Mediterranean region)
  - 2010 European Commission Communication: “Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network.”
- Interconnection projects to remove bottlenecks among mediterranean countries:
  - Ten Years network Development Plan (TYNDP) from ENTSOe. Projects of Common interest (PCI) from EU.
  - The only south-north operational interconnection in the west side is between Morocco-Spain (900 MW of capacity)



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✓ Energy transmission.2/2

- RES network integration: access rules and priority of dispatch:
  - Generators must comply with grid codes and technical specifications.
- Cross border trade and transit mechanisms
  - Electricity must be firmly nominated to the allocated interconnection capacity by all responsible TSOs.
  - Compensation mechanism for cross-border flows of electricity (Inter-TSO Compensation Mechanism, ITC) : Regulation (EC) No 714/2009 and Commission Regulation (EU) No 838/2010 .



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- ✓ Financing of the project. External and internal financing mix
  - Non-refundable subsidy: 50% initial investment. Electricity for origin country.
    - Grants are typically provided from Official Aid Development:
      - ✓ Government organizations
      - ✓ European Investment Bank,
      - ✓ World Bank
      - ✓ Regional aid Banks, etc.
  - Private initiative: 50%. Electricity for destination country.
    - The project must be attractive in terms of profitability-risk for private investors.

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## ✓ Case study analysis. Concentrated Solar Power Technology

### 1. Solar Tower



### 2. Stirling or parabolic dishes



### 3. Fresnel collectors



### 4. Parabolic trough

- Several plants built in the South of Europe.
- Technical and economic data available.



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- ✓ Cost analysis. Hypothesis 1/3
  - Capacity installed: 10MW.
  - Economic life: estimated at 25 years.
  - Hours of operation: 3353 h. (South of Europe’s average (3.048h) plus 10%)
  - Capital investment data:
    - ✓ Equipment, civil works, grid connections and others
    - ✓ 5,61M€/MW installed. (x 10MW=Total; 56,1 Million €).
  - Non-refundable subsidy: 50% of Capital investment from official international aid development (Countries, Institutions and Banks).
    - ✓ Total subsidy:28,05 M€



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## ✓ Cost analysis. Hypothesis 2/3

- Operating costs:
  - Auxiliar fossil fuel: For operational and technical reasons, 15% of the energy of the plant will be produced using natural gas.
  - Maintenance costs, management costs, electricity consumption, insurance and outsourcing services and other variable costs.
  - Operating costs: 67,49 €/ MWh.
- Generation:
  - 50% electric generation for domestic consumption (in the domestic market of the origin country)
  - 50% electric generation is exported and consumed in the EU country.

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## ✓ Cost analysis. Hypothesis 3/3

- Operating Income:
  - The 50% of the electricity generated is consumed in the origin country will receive the regular market price (or equivalent price). In the study, price for electricity consumed in domestic market is set at 51€/MWh, average price in the some european electric markets:
  - The other 50% consumed in the EU country will be sold at a fix price: Feed-in Tariff system: Effective and efficient system and easy to implement with low regulatory and market risks.
  - Inflation Rate (IR): 3%. Incentives are increased every year by IR-X ( $x=0.5$ ), according to some European support schemes.
- Corporate Tax: 35%.

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- ✓ Cost analysis. RESULTS

Internal Rate of Return: 8 %



Feed in tariff system . To energy for the destination country:(50%):  
182,63 Eur/MWh



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✓ Economic Data Summary

	5 MW. Energy for export to EU		5 MW. Energy for domestic use	
	By unit	Total	By unit	Total
Private investment	5,61(M€/MW)	28,05 M€	5,61(M€/MW)	28,05 M€
Subsidies			-5,61(M€/MW)	-28,05 M€
Production (year) at 100% of performance	3.353 h/ year	16,76 GWh	3.353 h/year	16,76 GWh
Operating costs (year)	67,49(€/MWh)	1,131 M€	67,49(€/MWh)	1,131 M€
Income: Electricity market price (year)			51 €/MWh	0,85 M€
Income: Feed in Tariff (year)	182,6 €/MWh	3,06 M€		

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## ✓ Conclusions

- Opportunity for EU countries to achieve 20/20/20 targets defined by the European Union's energy and climate change package.
- Opportunity for the Mediterranean non-EU country to improve development, employment, transfer technology, security of supply using RES energy, etc.
- It is important to remove existing bottlenecks in some congested corridors, developing infrastructures in transmission and interconnection lines.
- Cross border trade and transit mechanism must be set clearly.
- Non-discriminatory access rules and priority of dispatch of renewable energy have to be properly defined.
- It is necessary a system to certify and guarantee the renewable origin of the energy according transparent rules.