Renewable Energy Sources in Islands

Technical, Economic and Social Considerations

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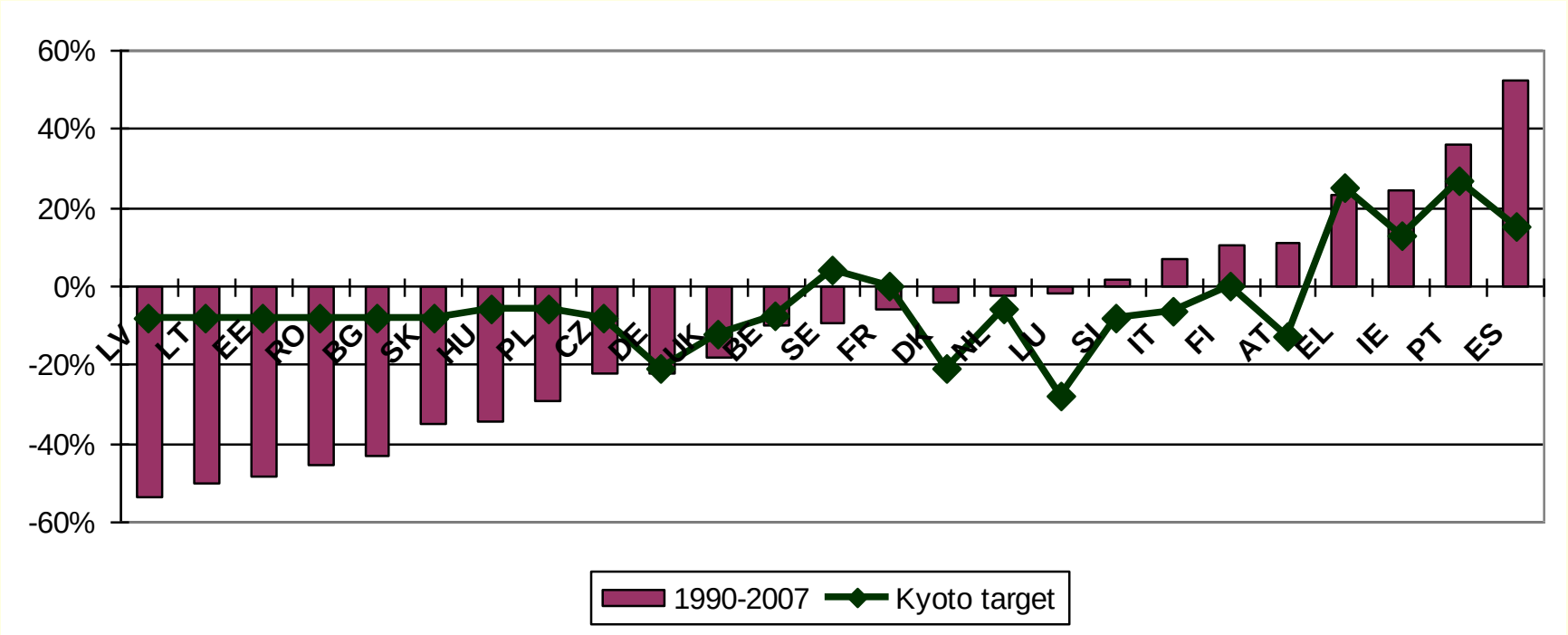
Outline

- Progress in the EU
- The targets for 2020
- Barriers and responses
  - ➔ Technical
  - ➔ Economic
  - ➔ Social
- Some data from Greece
  - ➔ and from Greek islands

Deviation from 2010 targets

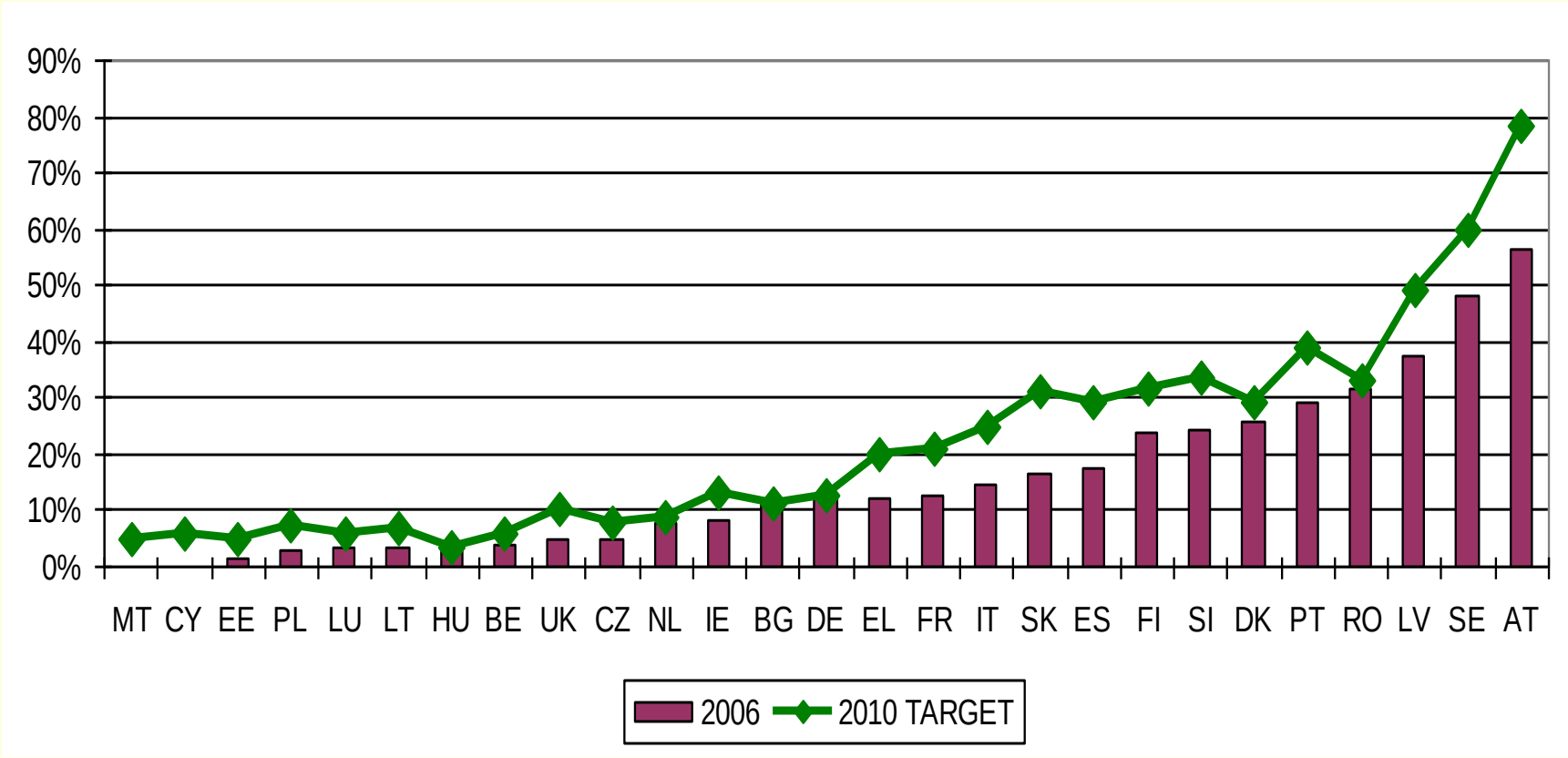
Kyoto targets



EU-15: -5% → -8%

Source: EUROSTAT

Deviation from 2010 targets
RES in electricity generation



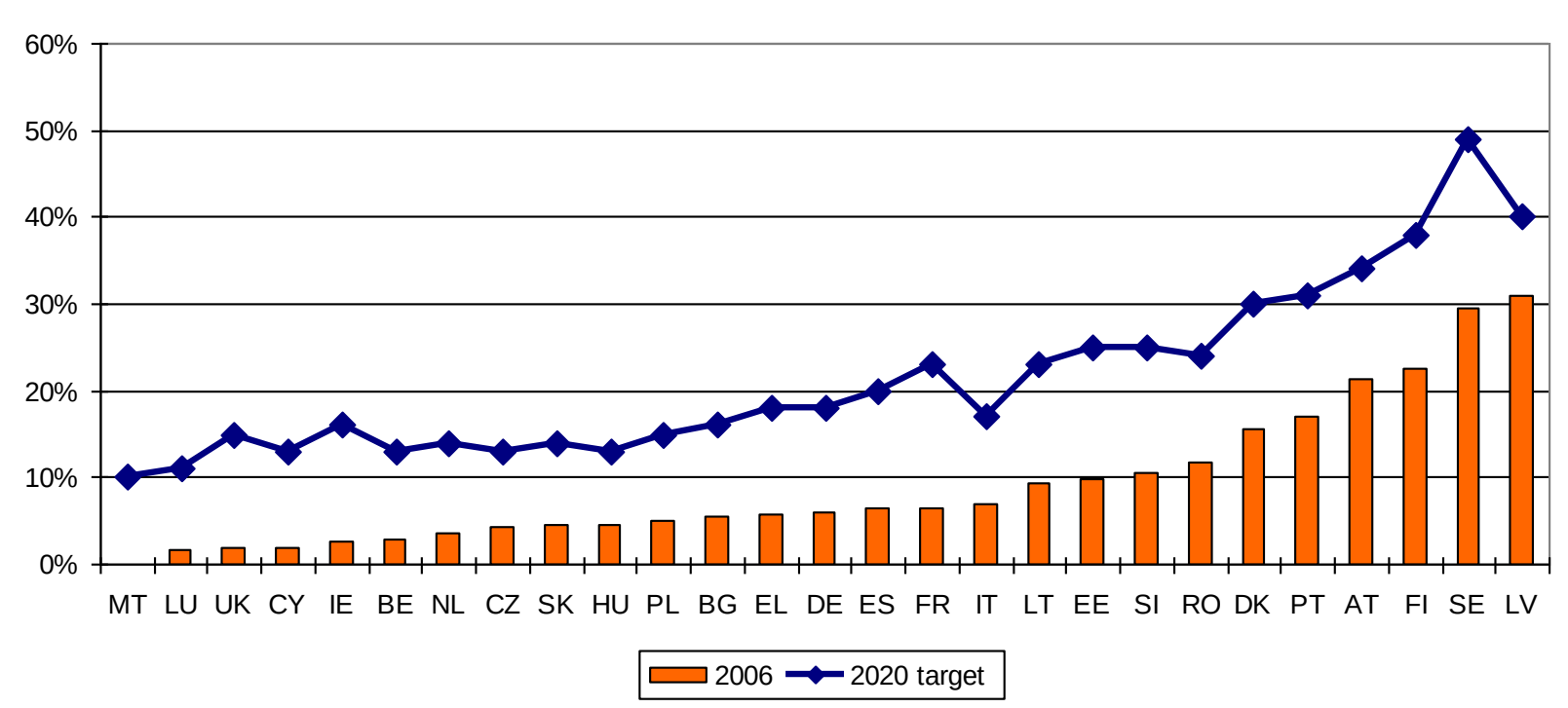
Source: EUROSTAT

EU-27: 14.6% → 21%

A strategic goal for EU for 2020

- Reduction of greenhouse gases by 20%
  - ➔Improving energy efficiency by 20%
  - ➔Increasing the share of RES to 20%
  - ➔Increasing the share of biofuels in transport to 10%
- More ambitious goals are necessary for effectively facing the threat of climate change

Share of RES in gross final energy consumption



EU-27: 7% → 20%

Source: EUROSTAT

Considerations

- Technical
  - ➔ Technical progress and commercial maturity
  - ➔ Several barriers still not overcome
- Economic
  - ➔ Increasing cost competitiveness
  - ➔ Unfair pricing still hindering their large scale implementation
- Social
  - ➔ High social acceptance
  - ➔ Reactions still not eliminated

Technical barriers

- Intermittency
- Discrepancy between energy consumption and RES availability
- Lack of Infrastructures

Possible responses

- ➔ Storage systems
- ➔ Hybrid systems
- ➔ Energy savings and load management
- ➔ Decentralisation
- ➔ Interconnection

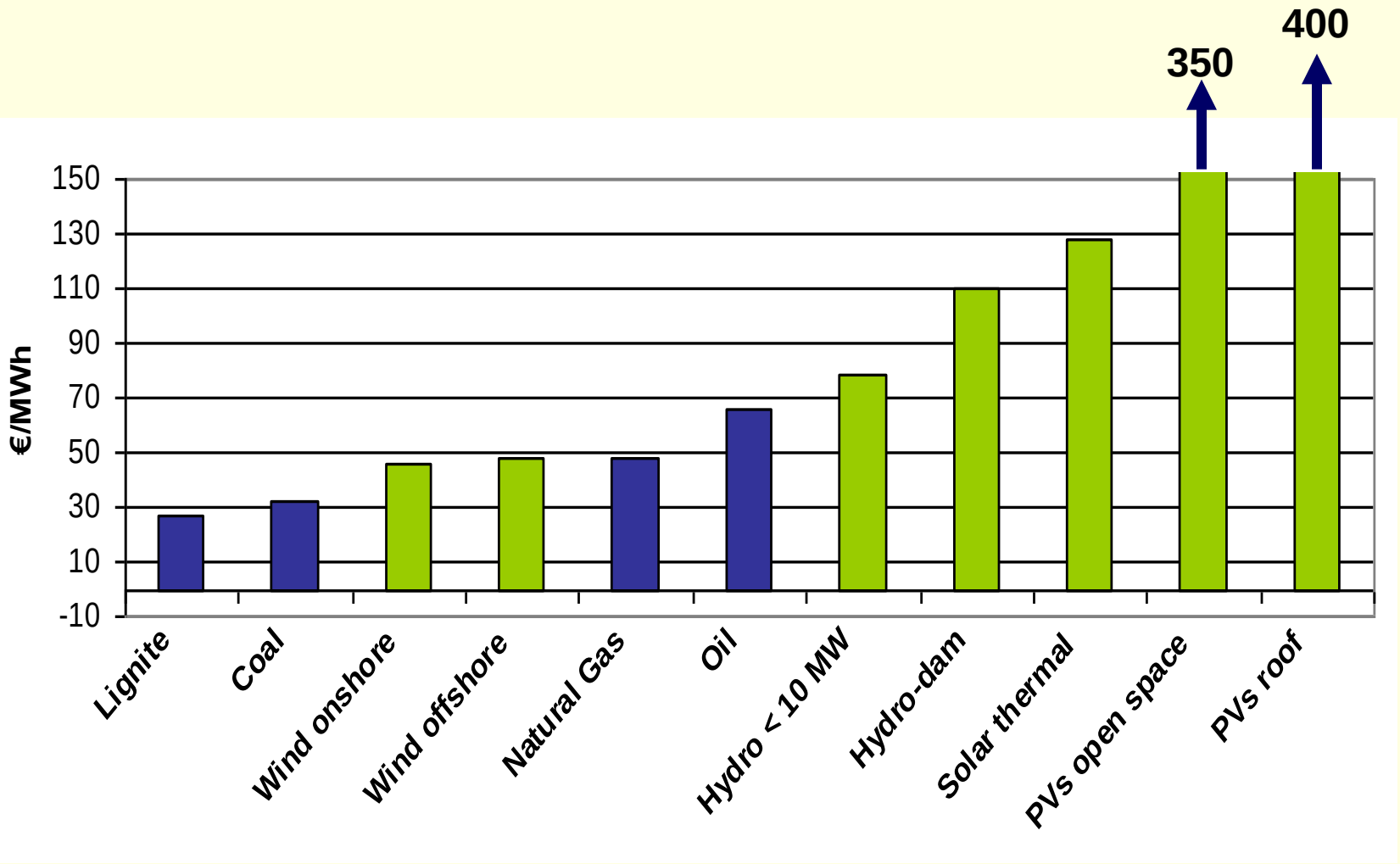
Economic barriers

- Costs and prices
  - ➔ Environmental externalities
  - ➔ Social side-effects
- Economies of scale

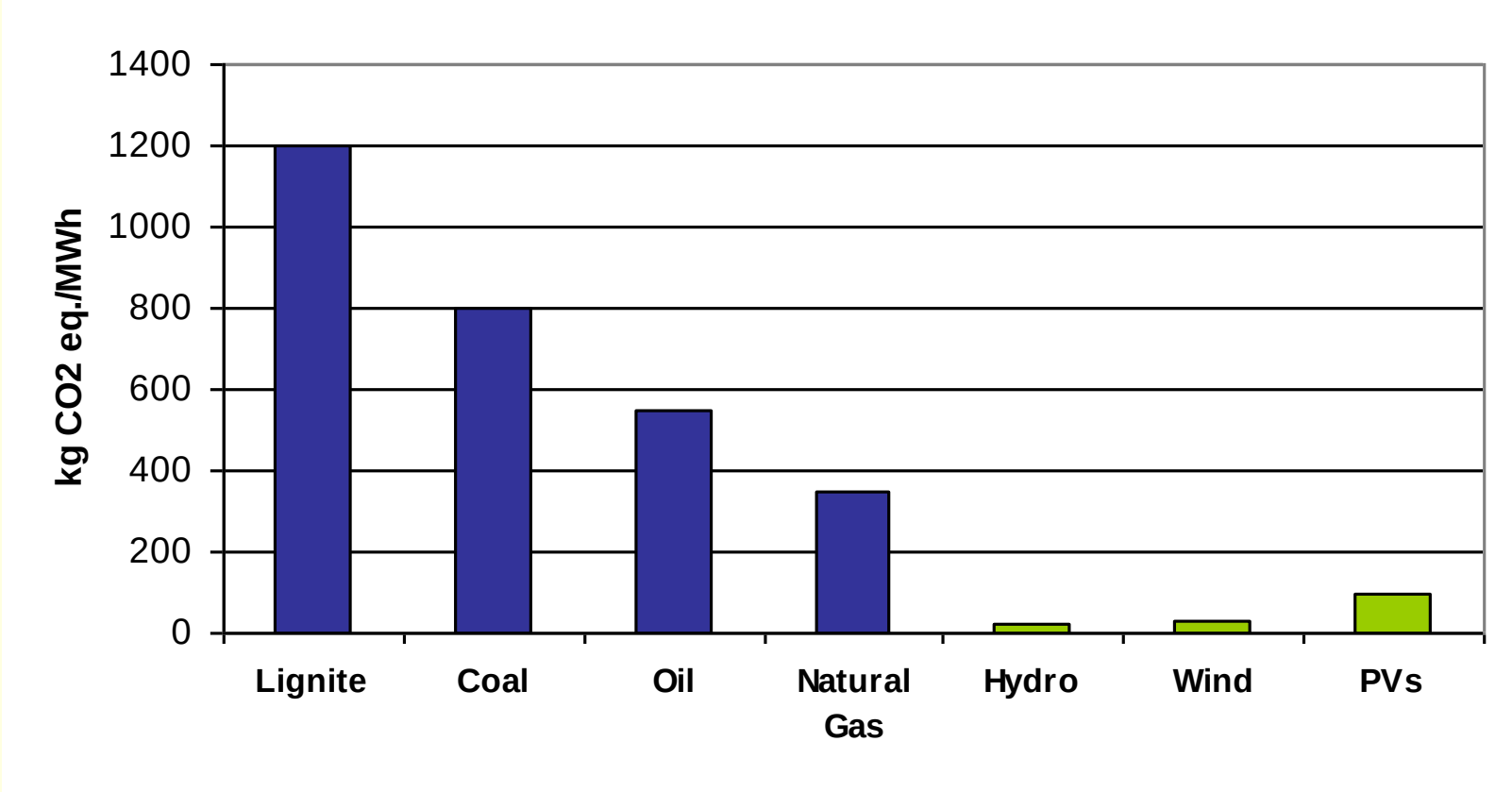
Possible responses

- ➔ Internalisation of external costs of conventional fuels
- ➔ Incentives for RES (subsidies, pay-back tariffs etc)
- ➔ Public procurement and support
- ➔ Information campaigns
- ➔ Removal of technical barriers

Private cost



CO_2 emissions



Social cost of thermal/nuclear electricity

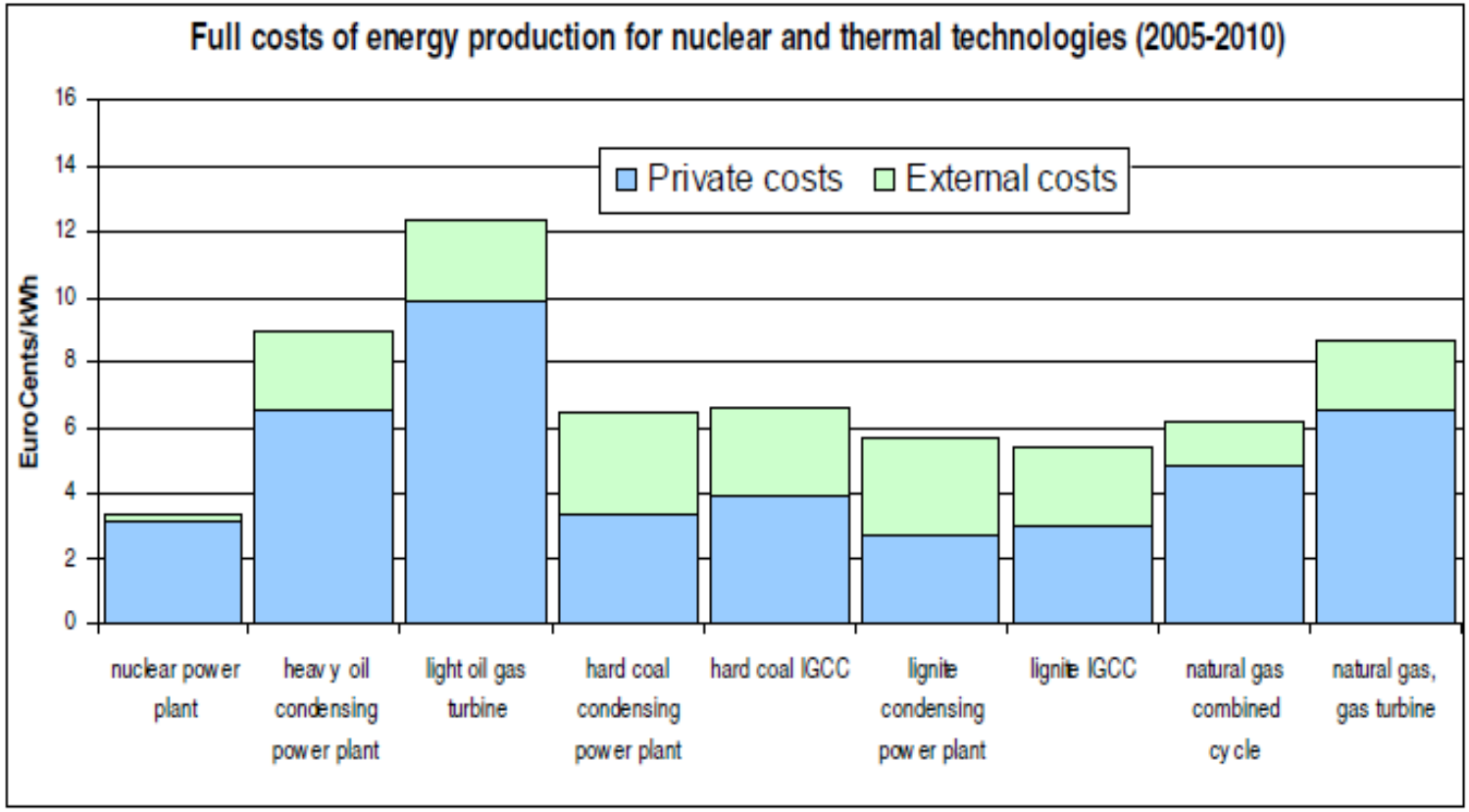


Figure 4.1 Full cost composition for nuclear and fossil fired technologies in 2005-2010

Source: CASES Project, *2008*
European Commission

Social cost of renewable electricity

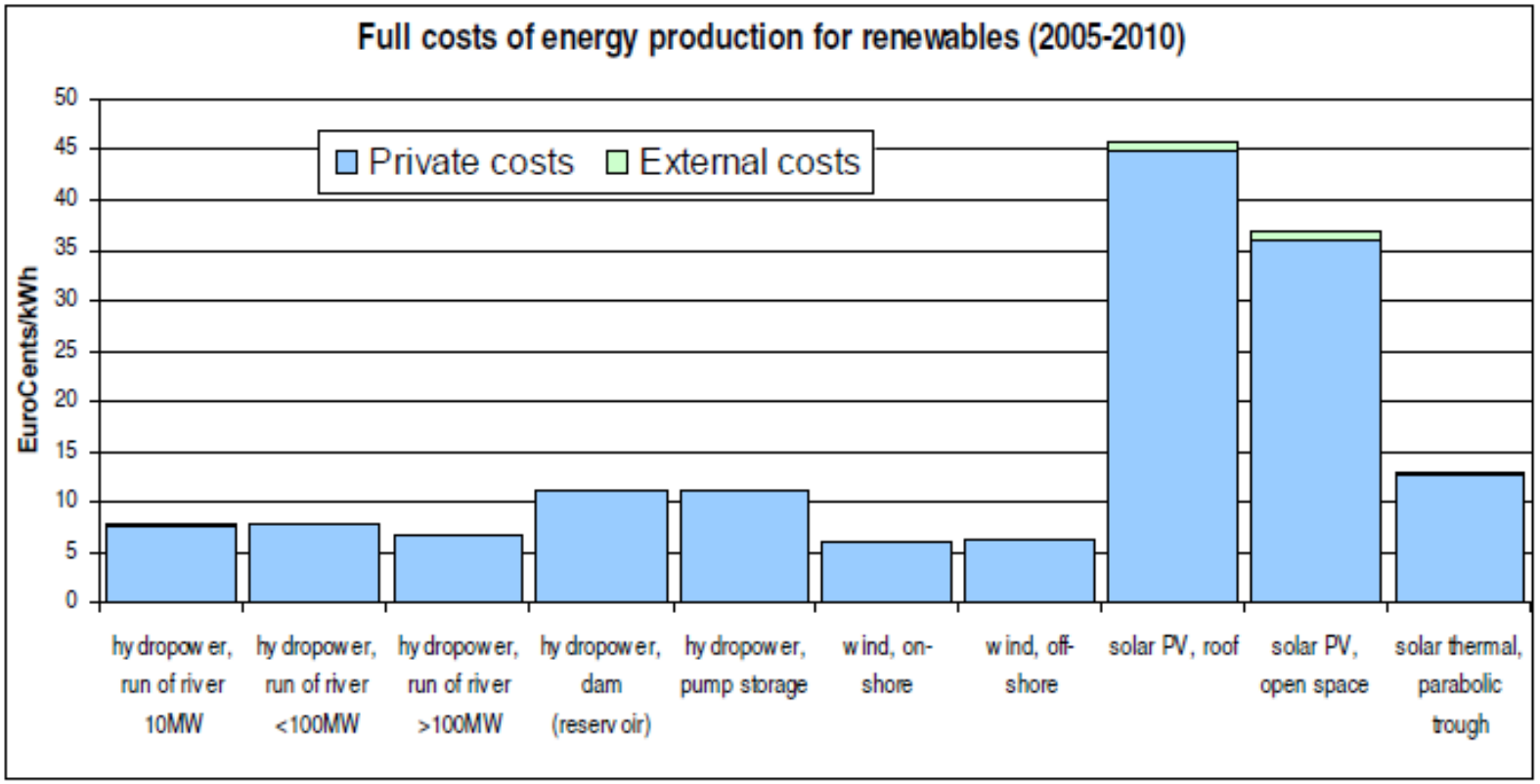


Figure 4.2 Full cost composition for renewables technologies in 2005-2010

Source: CASES Project, *2008*
European Commission

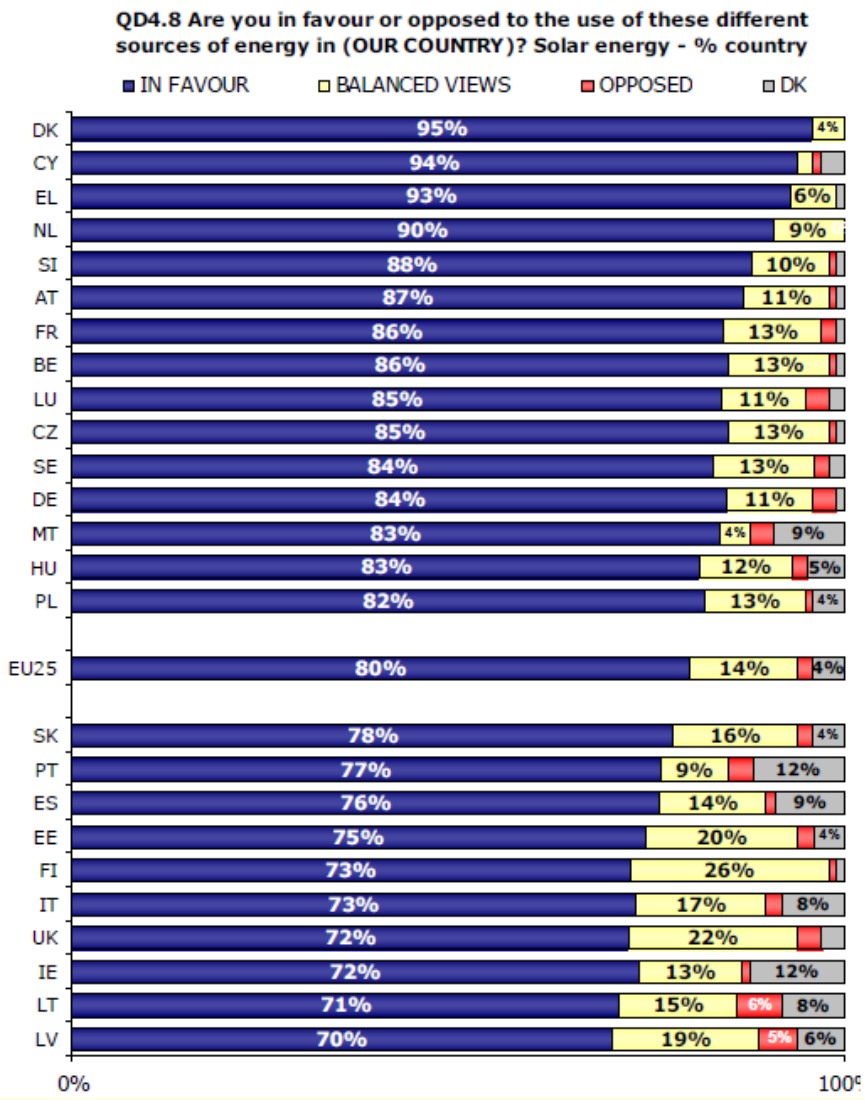
Social and administrative barriers

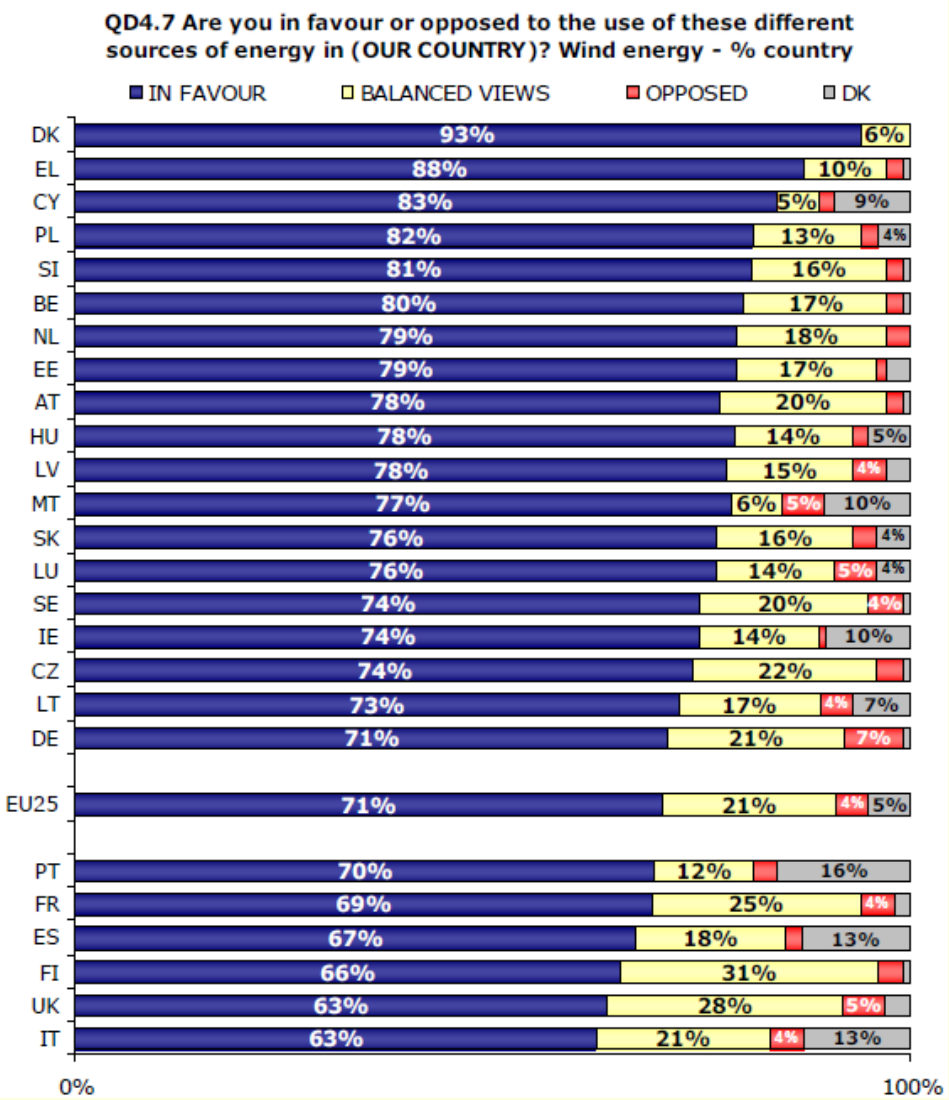
- Bureaucracy
- Information flow
- Market acceptability
- Lack of technical expertise
- Social attitude and NIMBY

Possible responses

- ➔ Simplification of procedures
- ➔ Education on RES at all levels
- ➔ Seminars and continuous education of engineers
- ➔ Standardisation
- ➔ Campaigns
- ➔ Removal of economic barriers

Social inconsistencies





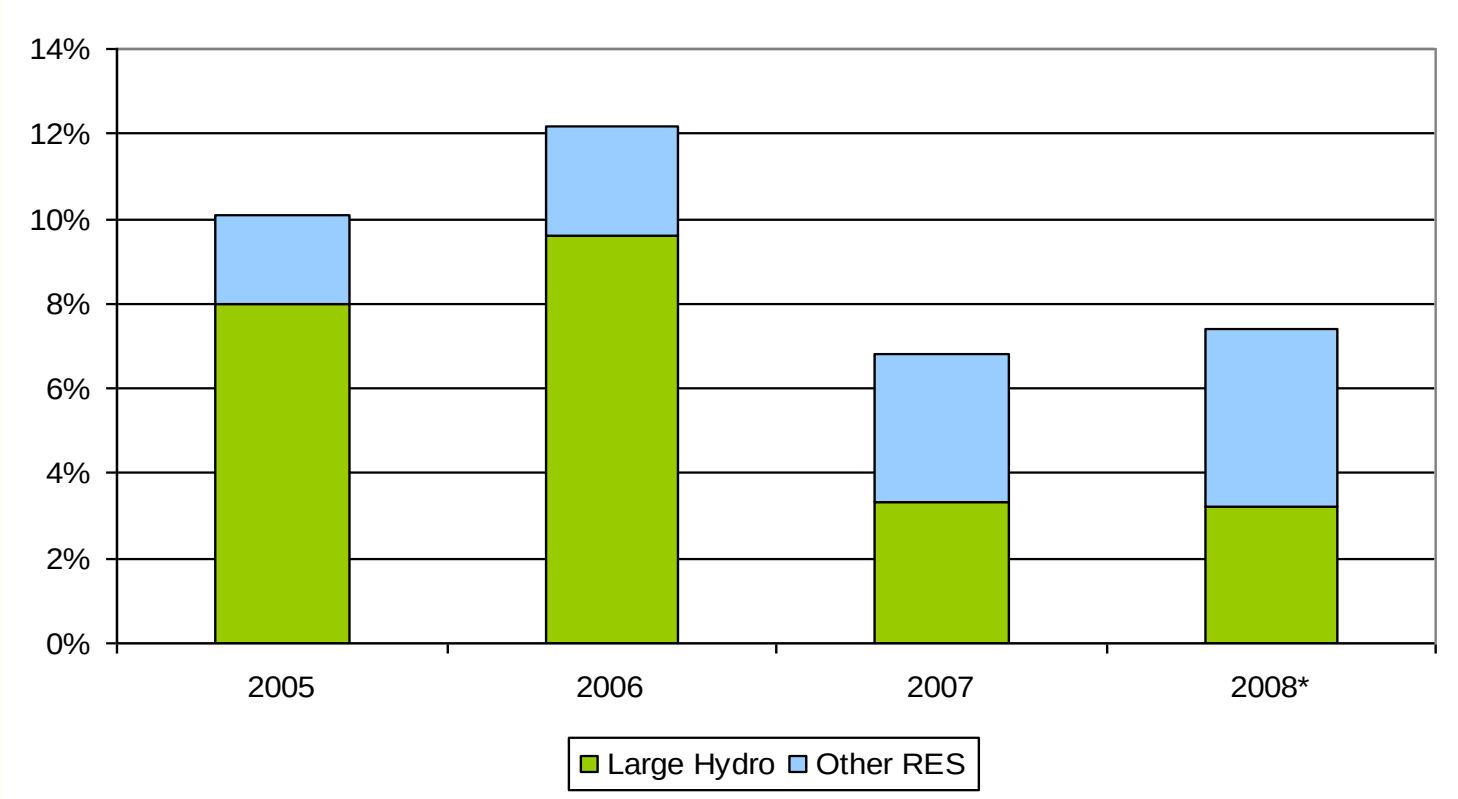
Source: Special Eurobarometer, Energy technologies, 2007

The particular case of islands

- Technical issues:
  - ✓ **Higher potential, especially wind and solar**
  - ✗ **Higher sensibility to load variations** (in autonomous)
- Economic issues
  - ✓ **Higher competitiveness with respect to oil**
  - ✗ **The cost of grid accommodation and interconnections**
- Social issues
  - ✓ **Local development, prototype 100% RES communities**
  - ✗ **Priority to tourist activities (perceived as being in contradiction)**

The development of RES in Greece (1)

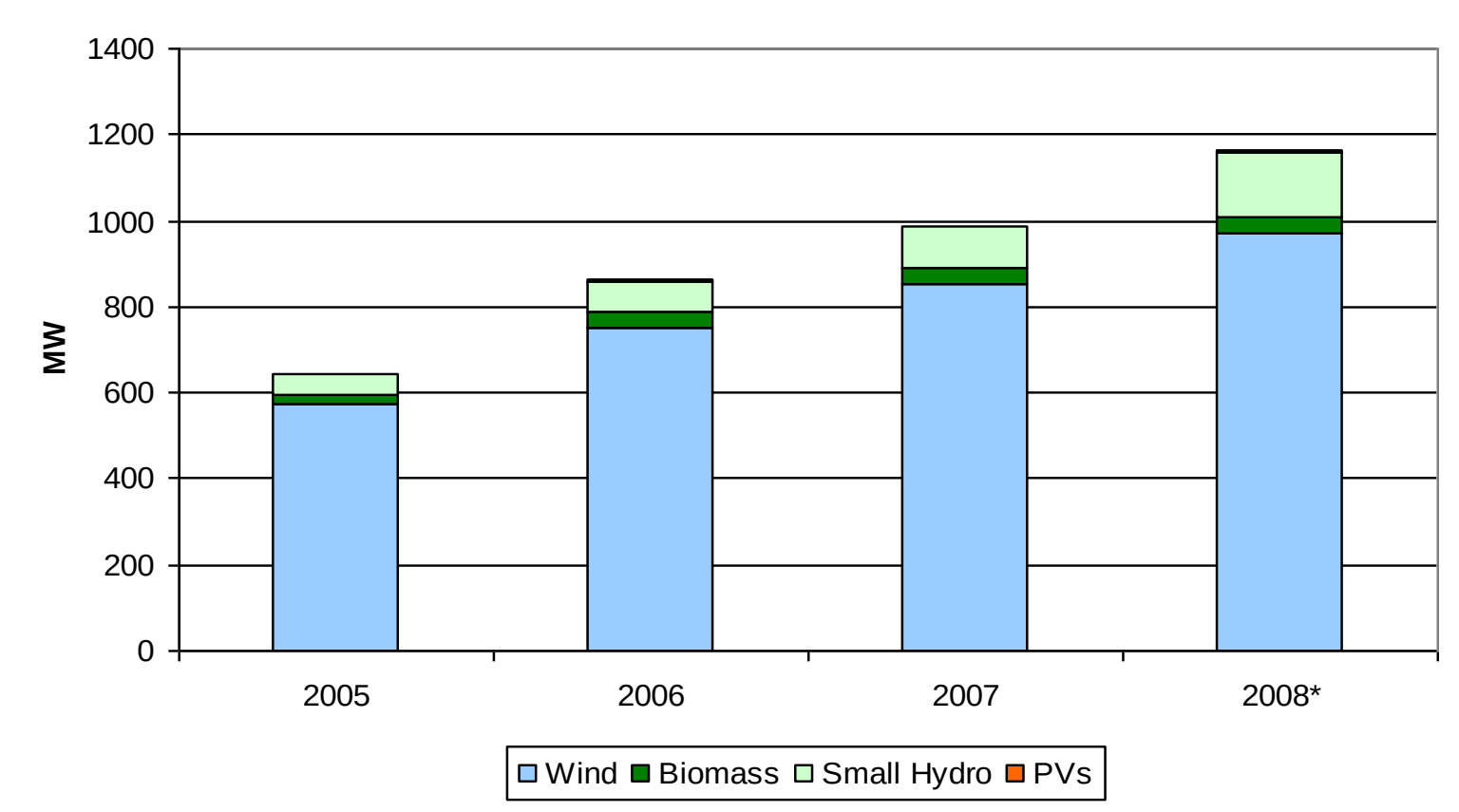
% RES in electricity generation (GWh)



*** 2008 data are for the first 9 months**

Source: Regulatory Authority for Energy, 2009

The development of ‘other’ RES in Greece (2)



*** 2008 data are for the first 9 months**

Source: Regulatory Authority for Energy, 2009

The bottleneck

	Operation license	Installation license	Production license	Applications
Wind	869	957	6717	40,022
Biomass	34	21	95	482
Geothermal	0	0	8	336
Small Hydro	109	101	534	1960
PVs	0.8	66	112	3065

12% of applications in autonomous islands

Source: Regulatory Authority for Energy, 2009

…of which in autonomous islands

- Wind
  - ➔ In operation: 225 MW (23%)
    - In Crete: 155 MW (69%)
  - ➔ With production license: 373 MW (5.5%)
    - In Crete: 222 MW (60%)
- Photovoltaics
  - ➔ In operation: 0.89 MW (12%)
    - In Crete: 0.70 MW (79%)
  - ➔ With production license: 87.9 MW (80%)
    - In Crete: 87 MW (99%)

Conclusions

- Different progress in RES deployment in different EU countries
  - ➔ Differences in RES potential are not enough to explain different performances
  - ➔ Generally, far below present and future targets
- There are still significant barriers for the large scale deployment of RES
- Given the high incentives, social and administrative barriers are the most important factors hindering RES deployment.
  - ➔ Political will, overall policy context, social responsibility and institutional reform

The experience in islands

- Islands have attracted the interest of investors
  - ➔ Especially big islands possessing the necessary infrastructures and technical support
  - ➔ Physical and technical limits for further deployment
  - ➔ An overall technical, social and institutional reform is urgent

Let’s see particular aspects
and successful experiences in islands

in the EU
and in Greece