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# Enabling renewable energy in the European Union

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# Agenda

1. The European Perspective –  
*The EU RES targets and directives*
2. The Member State perspective –  
*National targets and support policies*
3. Perspective on future cost reduction - *Analysis of learning curves*
4. Enabling technologies –  
*Focus on power grids*

# 1. The European Perspective – EU RES targets and directives



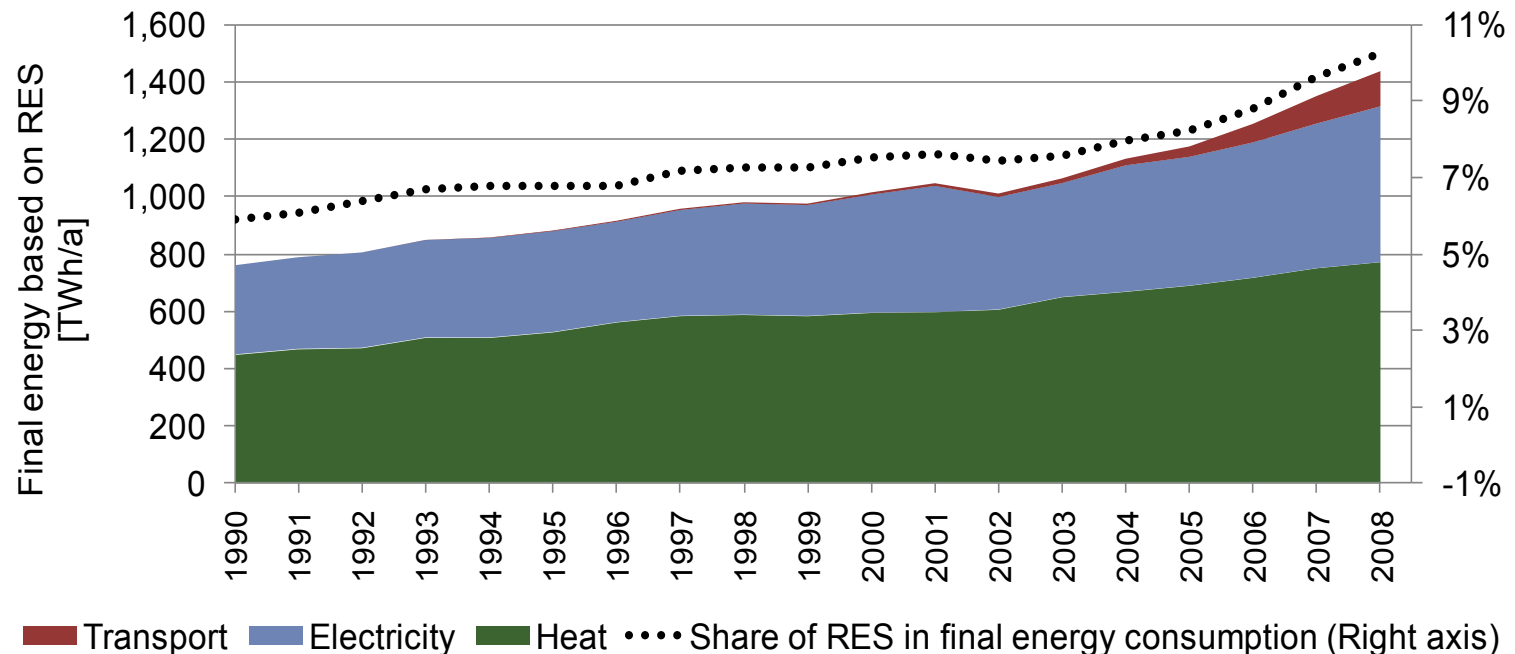
# EU RES targets 2010: 12% RES energy and 5.75% biofuels



- **1997 EU White Paper:** double share of RES in energy consumption to **12% until 2010**
- **2001 RES electricity directive:** Increase share of RES-E in total electricity consumption to **21% by 2010**; differentiated Member State targets
- **2003 biofuels directive:** increase share of biofuels in total fuel consumption to **5.75% in 2010** (same target for all Member States)

# Total final energy from RES in 2008 was just below 11%

- **2010 Target will almost be met:**
  - 19% RES-E in 2010, instead of 21%
  - 4% biofuels, instead of 5.75%



# EU RES targets 2020: 20% RES energy and 10% biofuels

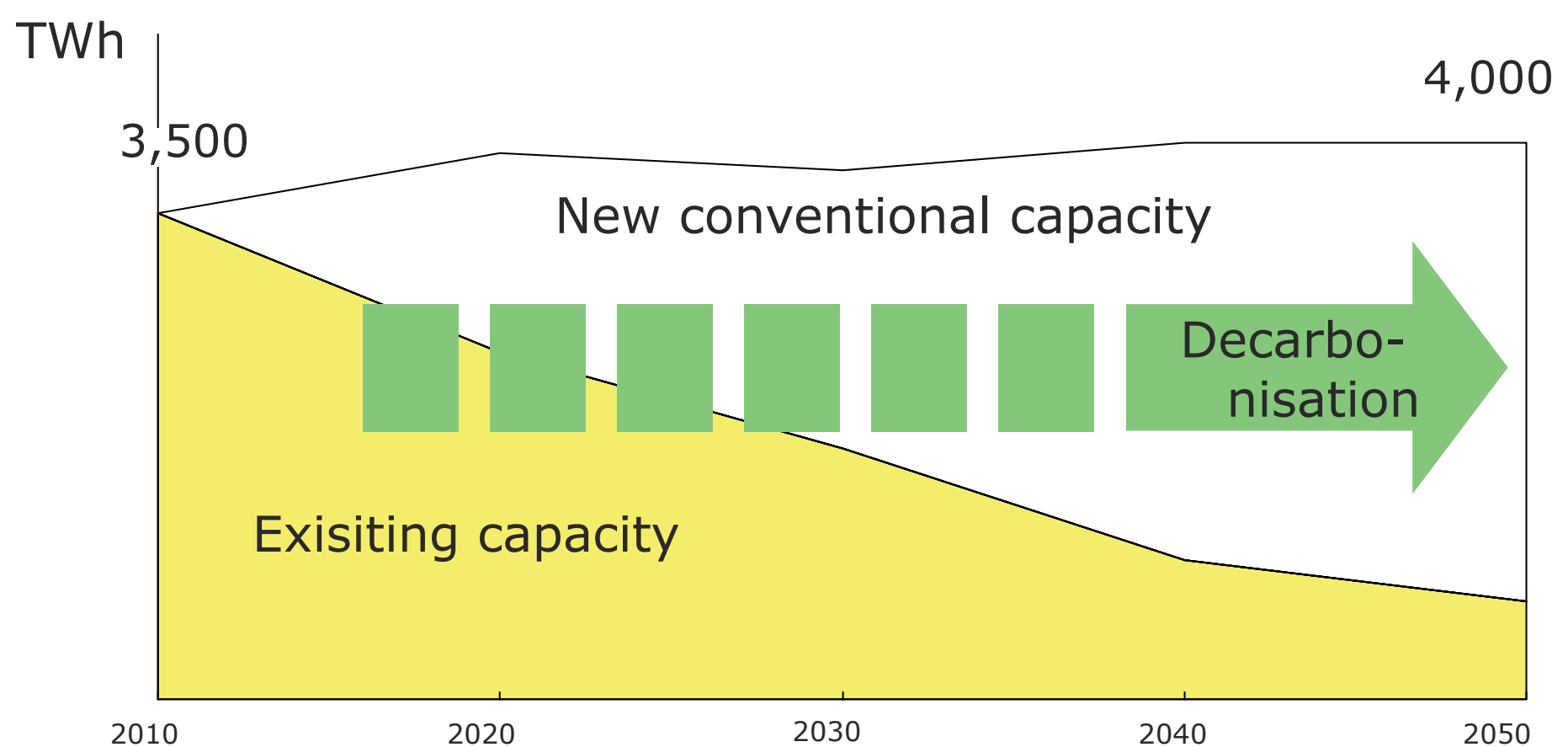


- **2007** European Council agrees on **2020 energy and climate targets**
  - Decrease greenhouse gas emission by at least 20% (30% if other countries make a comparable effort)
  - 20% RES in gross final energy consumption
  - Save 20% primary energy
  - 10% RES in total transport energy consumption (all RES, not only biofuels)
- **2009 RES directive** puts 2020 RES targets into law

# The EU decarbonisation goal is to reduce our greenhouse gas emissions by 80-95% by 2050.

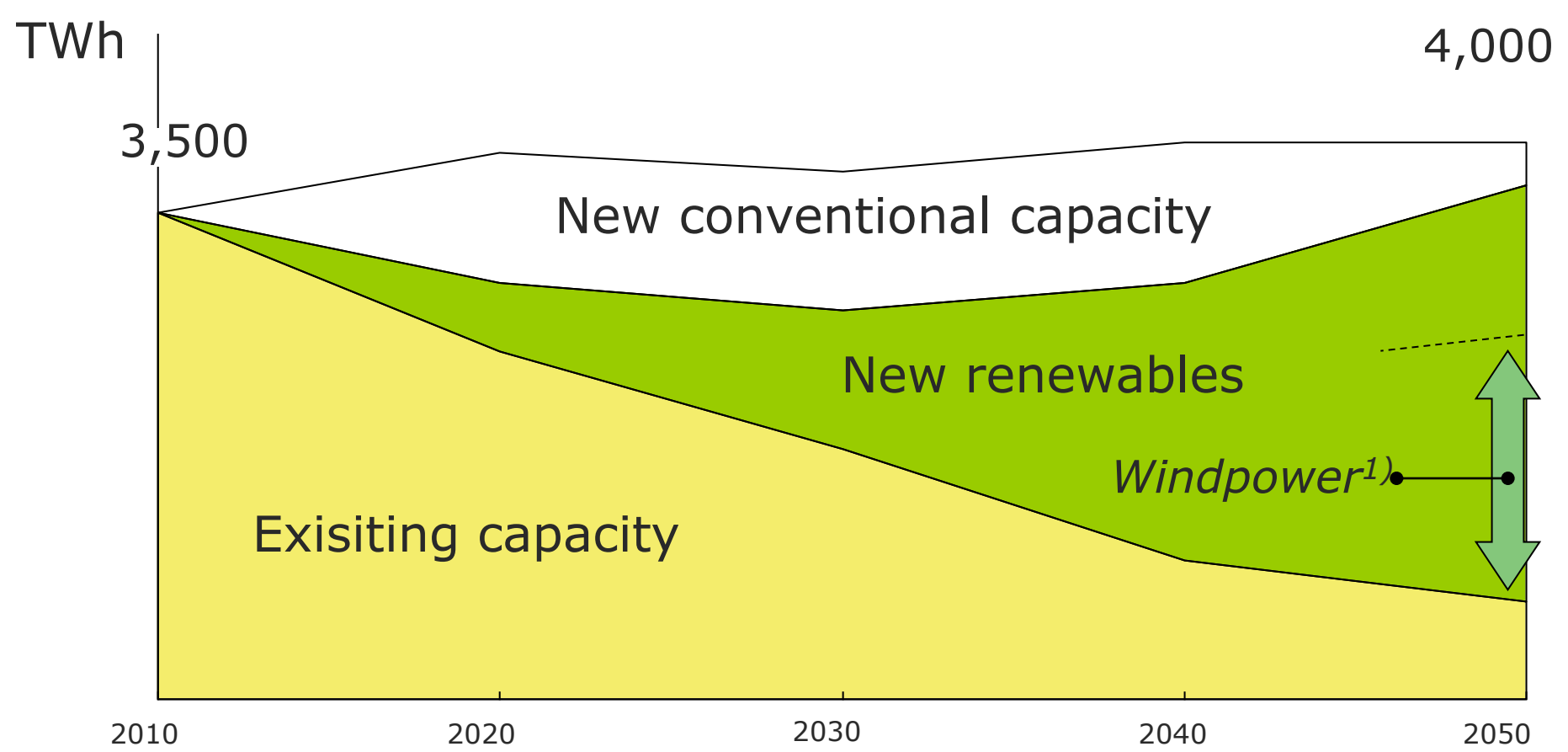
- The EU decarbonisation goal is to reduce our greenhouse gas emissions by 80-95% by 2050.
- In 2011, the European Commission plans to present a comprehensive roadmap towards 2050.
- Most existing generation capacity will be replaced by renewable sources with very low marginal cost.
- BeyondThe EU decarbonisation goals will be of crucial importance for the future power plant portfolio

# By 2050 most existing generation capacity will be replaced.





# A great share of these plants are likely to be fluctuating renewables.

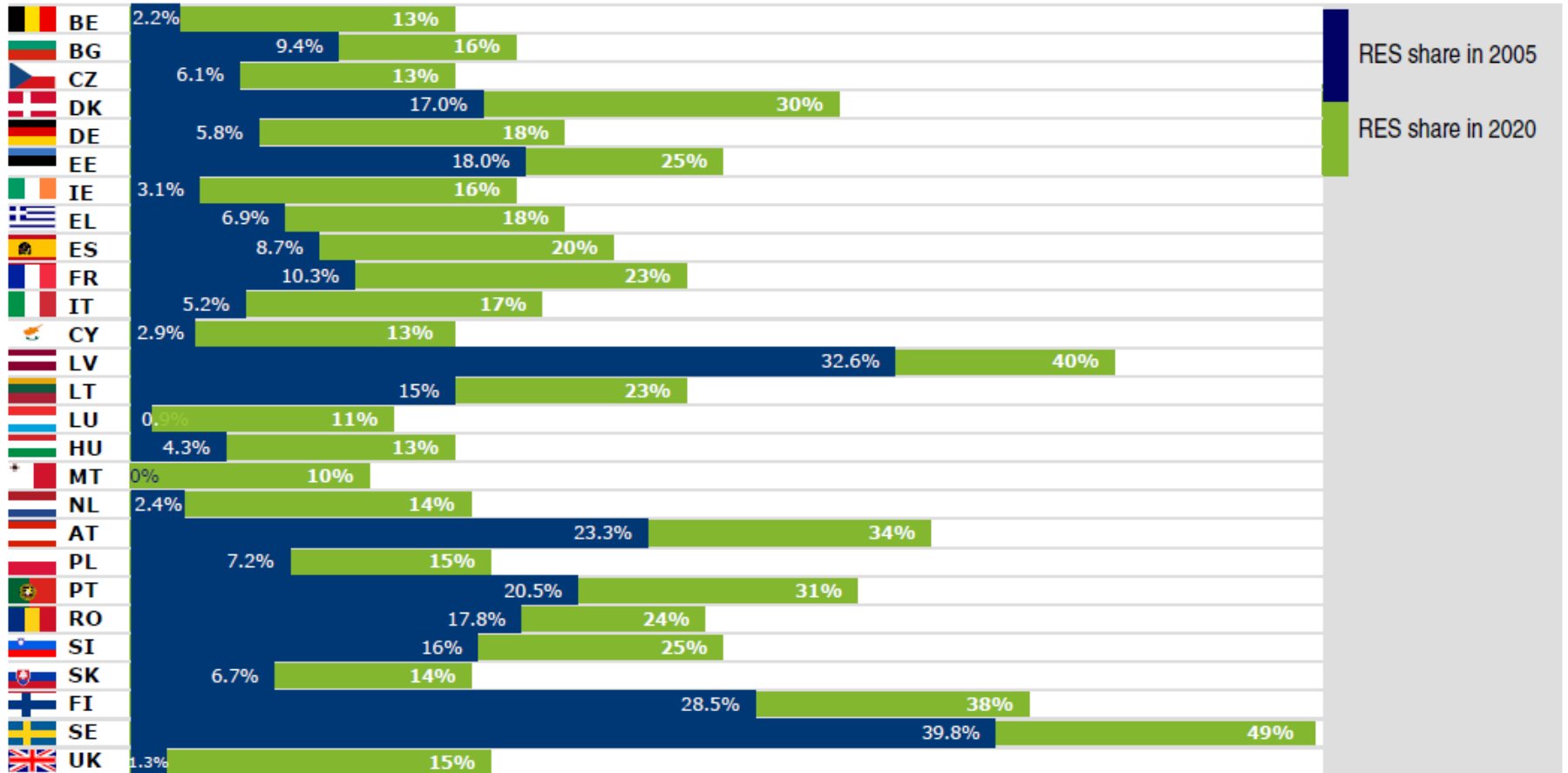


1) According to EWEA vision

## 2. The Member State perspective – National targets and support policies



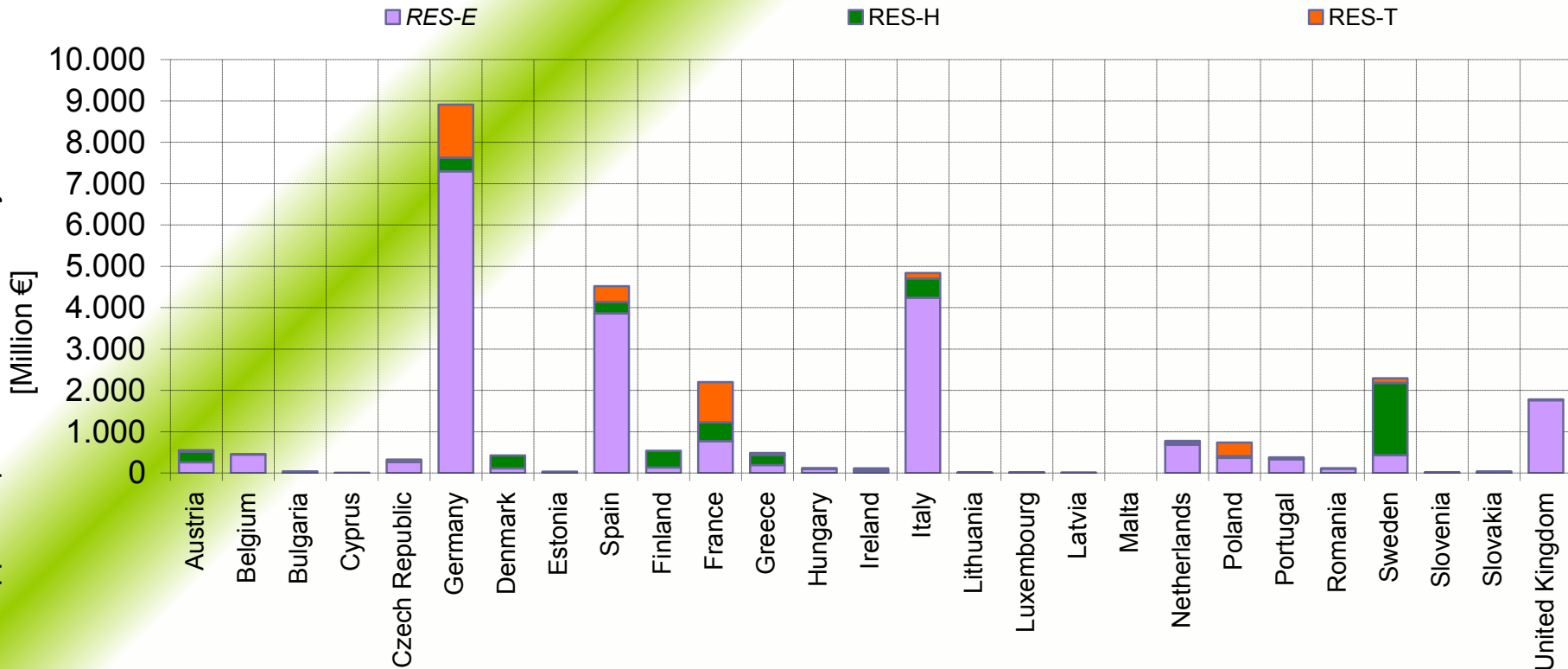
# National targets for 2020 and 2005 share in final energy



Based on 2005 starting point, recent progress and a balanced sharing of the effort, weighted by GDP/capita

# Net support expenditures for RES by sector in 2009

Net support expenditures for RES by sector in 2009

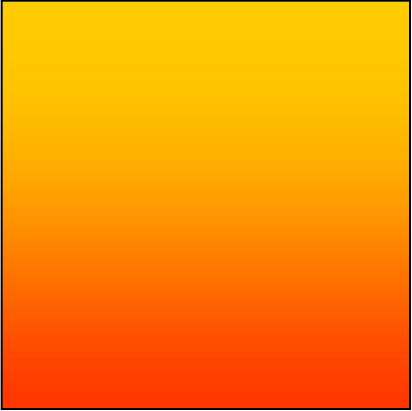


# Main support policies for RES electricity



- Feed-in tariffs
- Feed-in premiums
- Quota obligations based on tradable green certificates
- Tendering schemes
- Fiscal and financial incentives
  - Loan guarantees
  - Soft loans
  - Investment grants
  - Tax incentives

# Main support policies for RES heat

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- Investment grants
  - Tax exemptions and other fiscal incentives
  - Use obligations
  - (Bonus mechanisms)

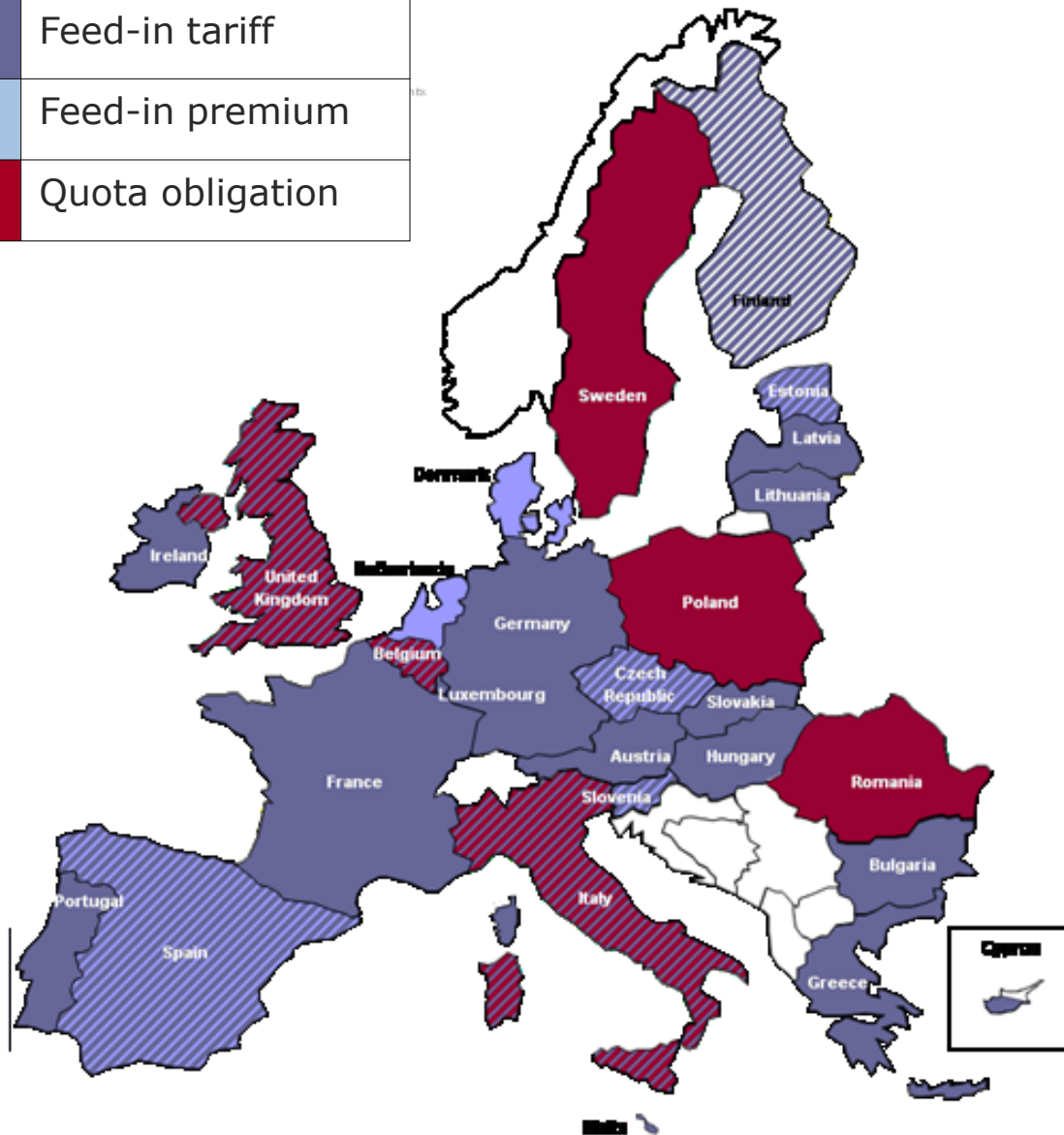
# Main support policies for biofuels



- Quota
- Tax exemptions

# Overview of RES-E support systems in the EU-27

	Feed-in tariff
	Feed-in premium
	Quota obligation



Source:  
RE-SHAPING 2010

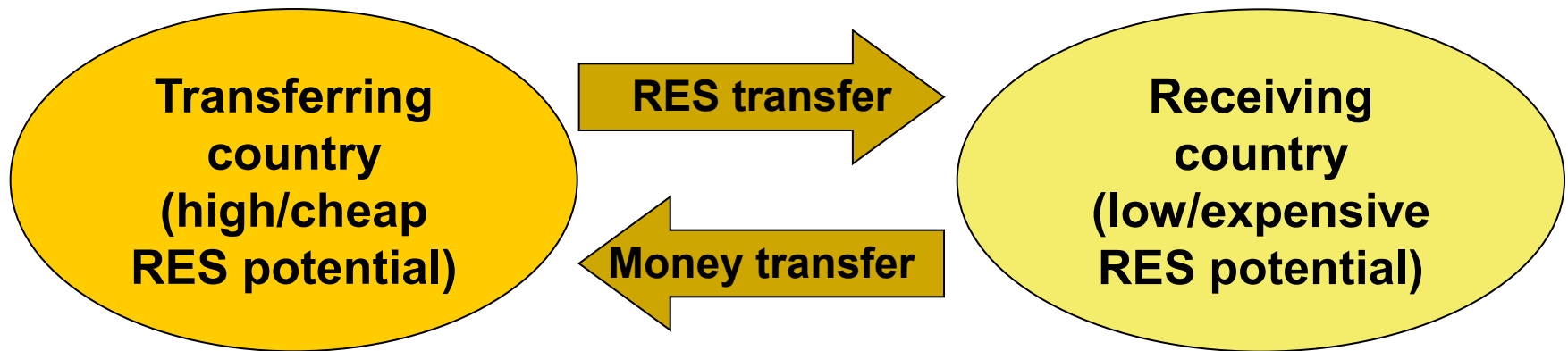


# Debate on national versus harmonised support

- “Traditional” position of European Commission: Certificate trading easier to harmonise, more in line with internal market
- 2001 directive: proposal for harmonisation in 2005?
- 2005: too early for harmonisation, optimisation of support schemes
- January 2008: Commission suggest European wide guarantees of origin certificate trade, strong opposition
- End of 2008: Cooperation mechanisms as compromise
- 2010: Energy Commissioner Oettinger suggests in an interview EU wide feed-in tariffs (“accident”?)
- 2014 review?

# The directive allows for cooperation mechanisms to reach targets at lower cost

- Types of mechanisms:
  - Statistical transfer between Member States
  - Joint projects between Member States
  - Joint projects between Member States and third countries neighbouring the EU
  - Joint support schemes



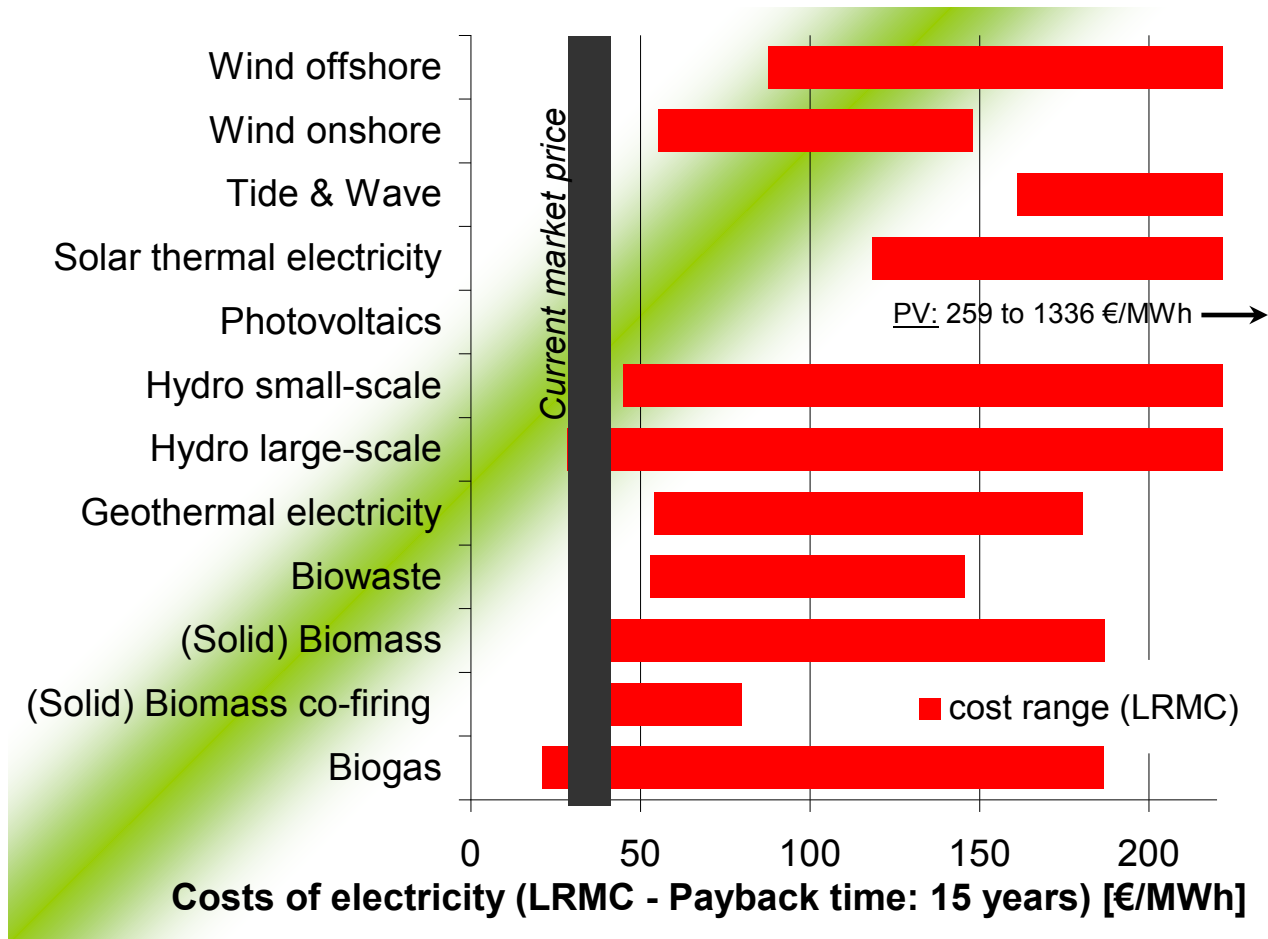
# Which instrument fits best?

- Conclusion OPTRES: The right framework conditions are often more important than the type of support schemes
- Success factors:
  - Stability
  - Certainty for investors
  - Reduction of non-costs barriers (improved administrative procedures, grid access, etc.)
- The appropriateness of support schemes also depends on the maturity of the technology market and the preparedness of the energy market

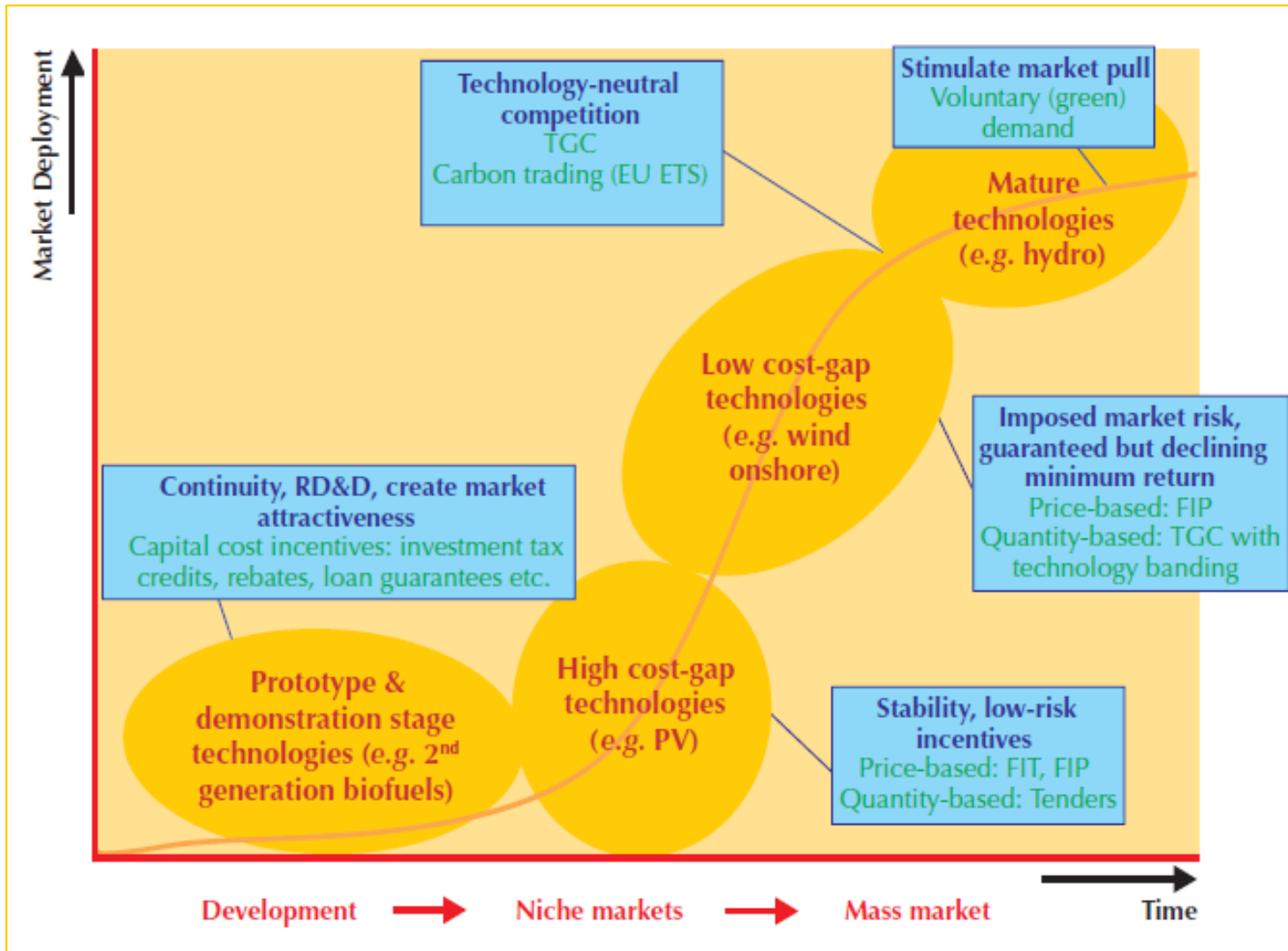
### **3. Perspective on future cost reduction - *Analysis of learning curves***



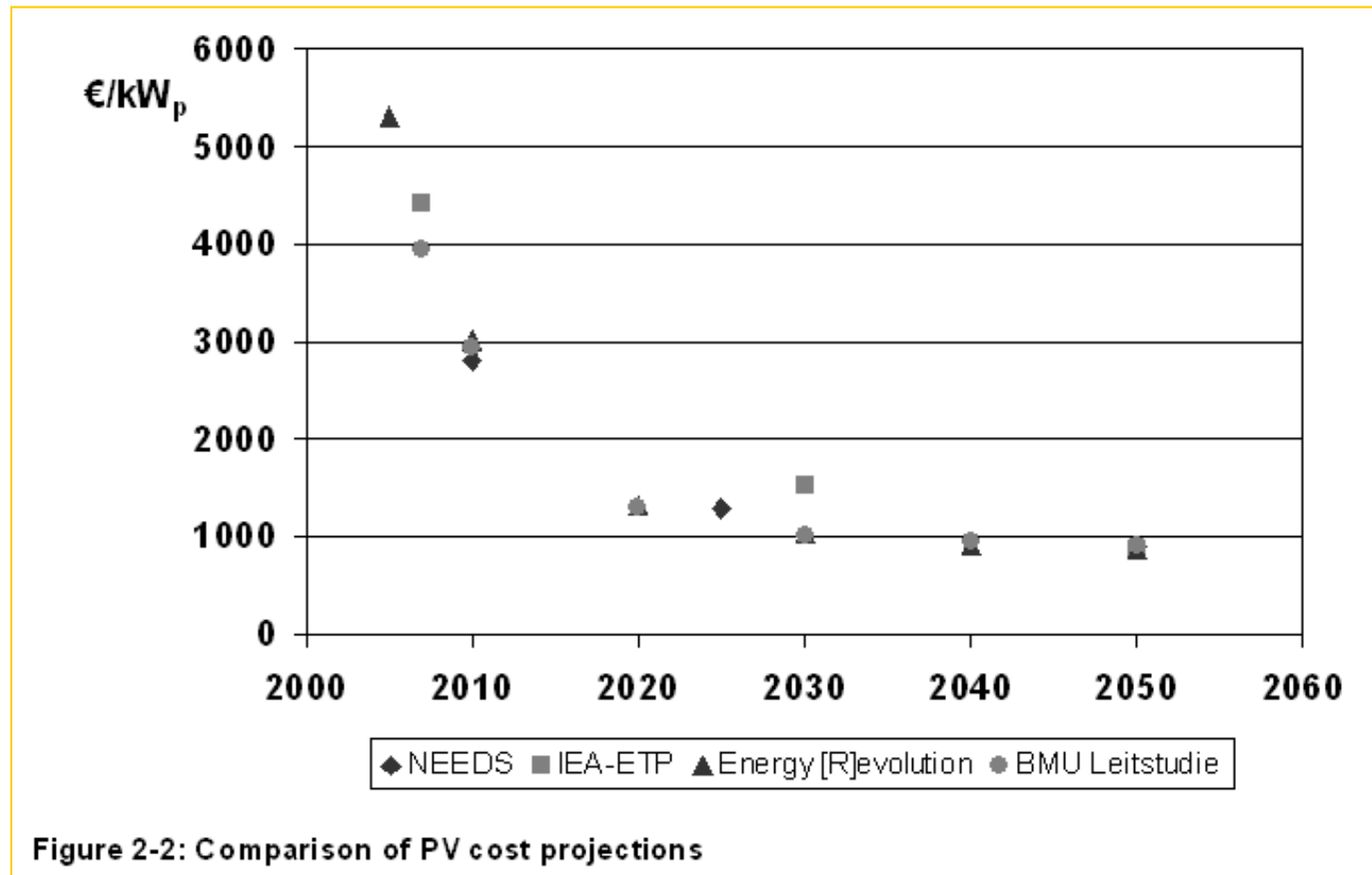
# Generation cost of renewable technologies are in a broad range.



# IEA perspective: policy choice by market maturity?

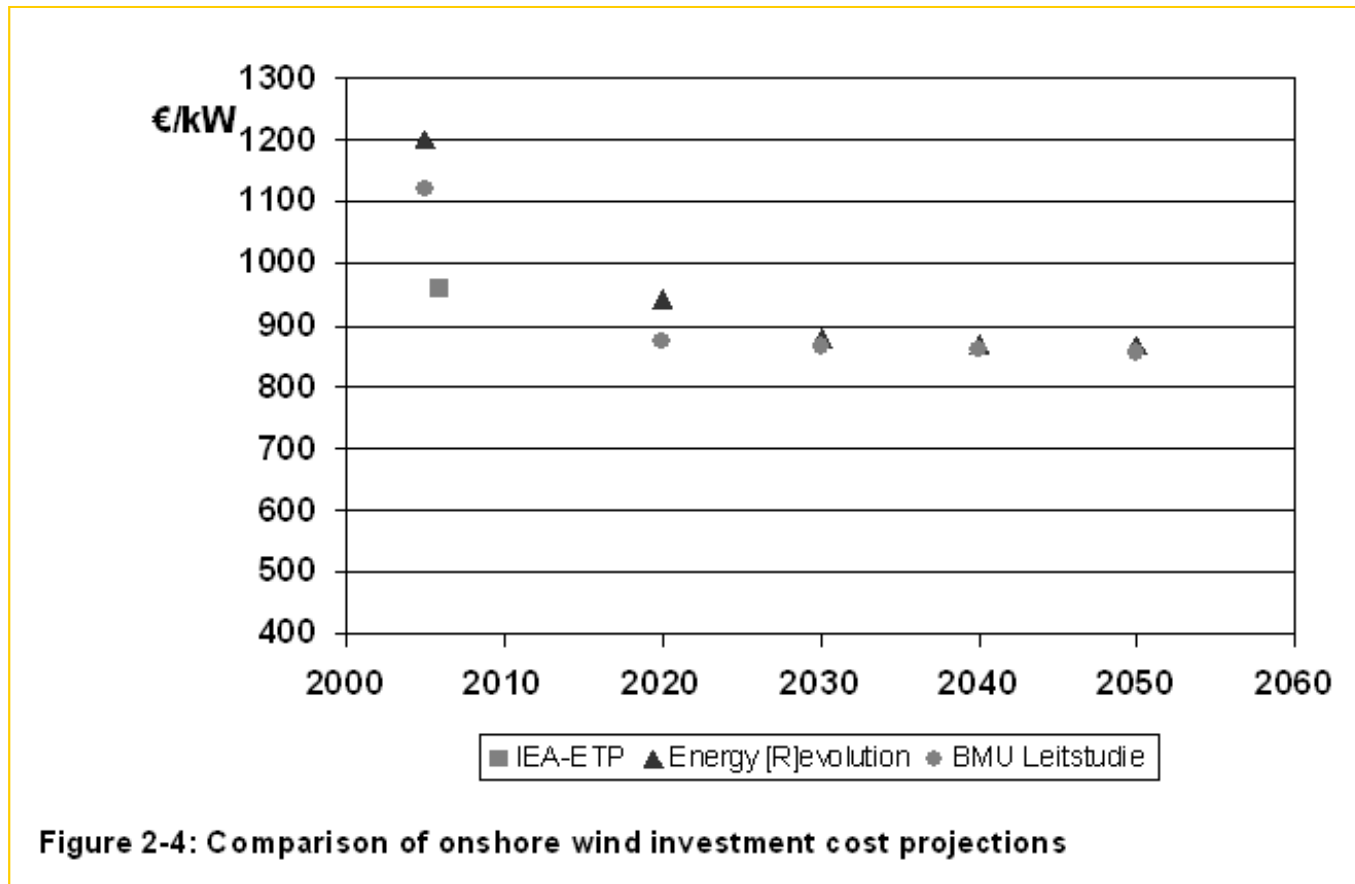


# PV Learning curve projection



Source: BMU, 2010, Role and Potential of Renewable Energy and Energy Efficiency for Global Energy Supply

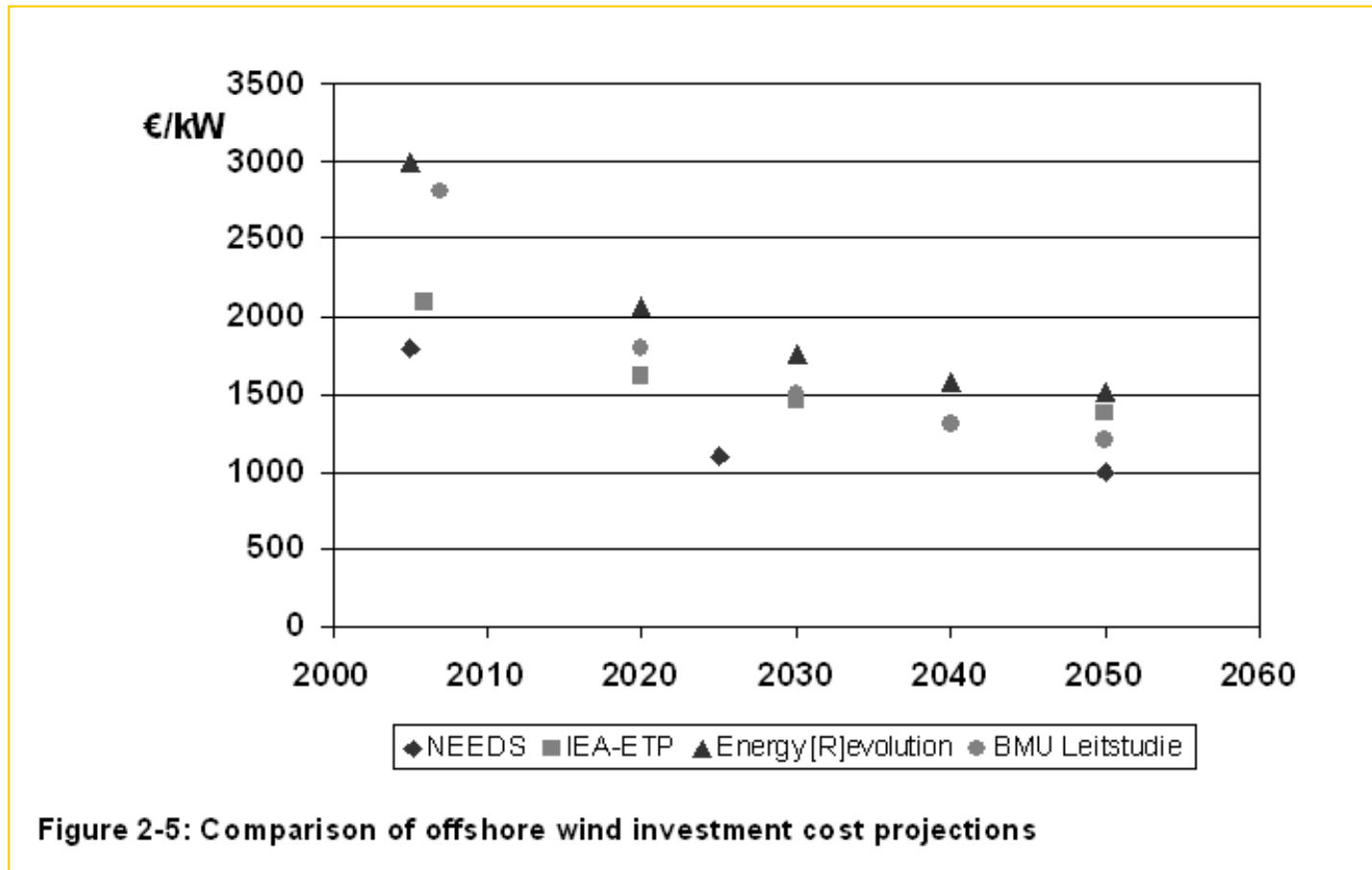
# Onshore Wind Learning curve projection



Source: BMU, 2010, Role and Potential of Renewable Energy and Energy Efficiency for Global Energy Supply



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Source: BMU, 2010, Role and Potential of Renewable Energy and Energy Efficiency for Global Energy Supply

# Biomass Plants Learning curve projection

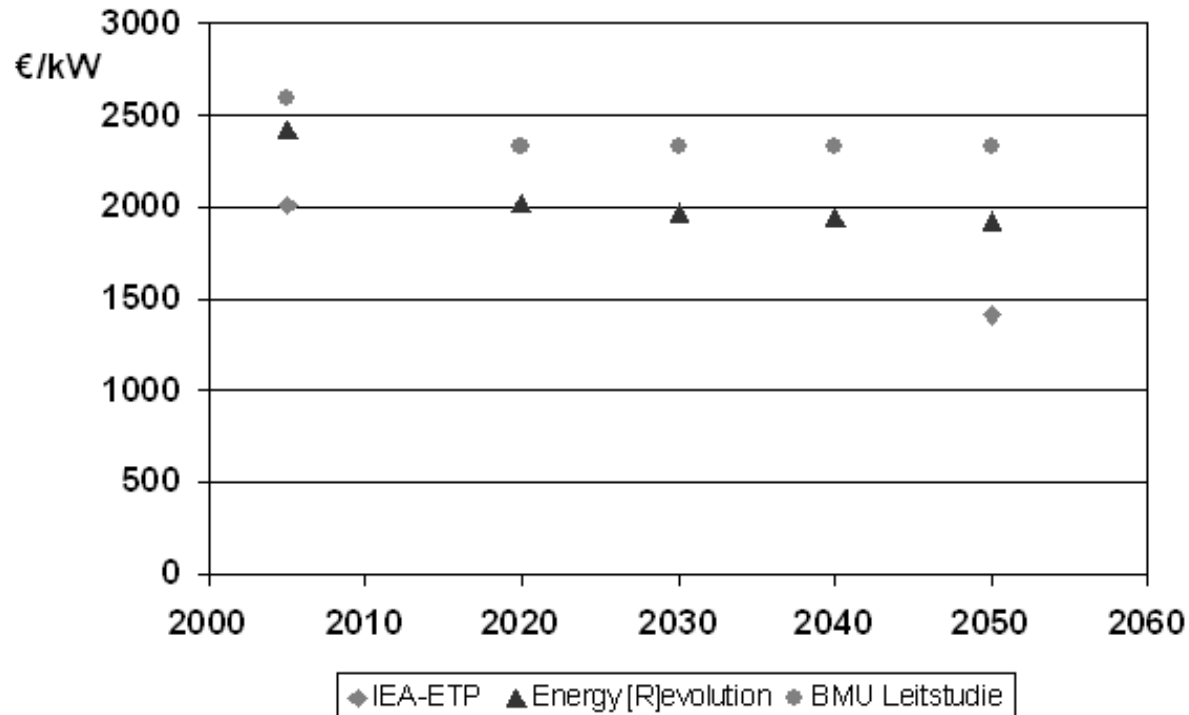


Figure 2-7: Comparison of biomass power plant investment cost projections

Source: BMU, 2010, Role and Potential of Renewable Energy and Energy Efficiency for Global Energy Supply

# Geothermal Plants Learning curve projection

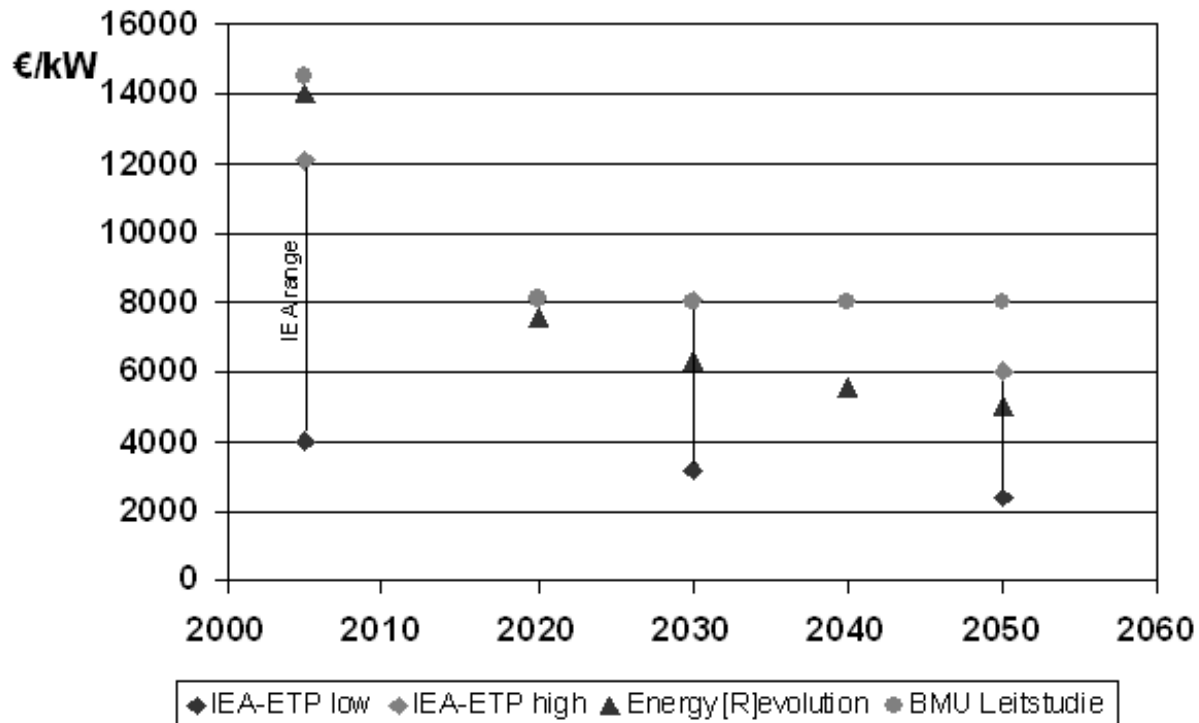


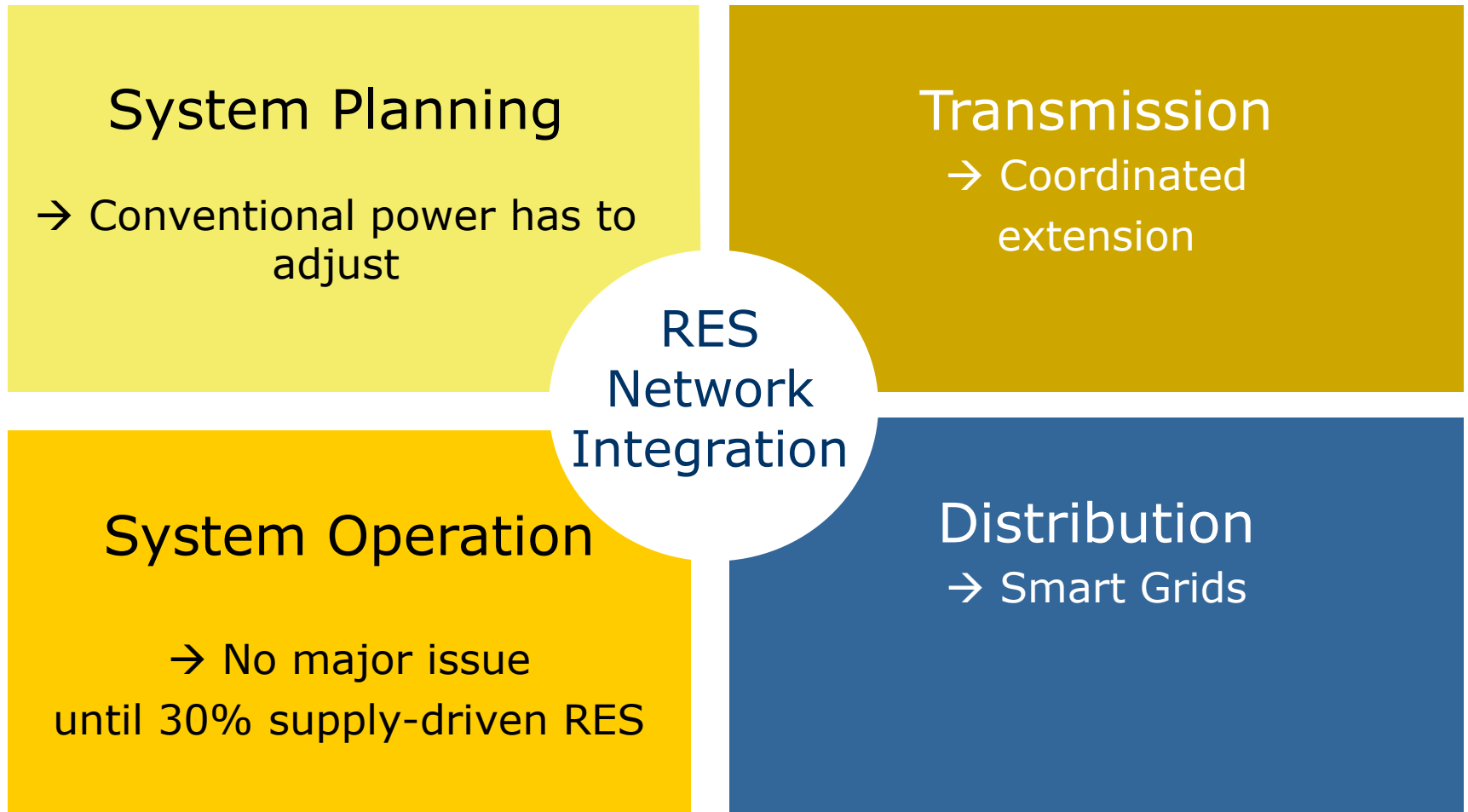
Figure 2-8: Comparison of geothermal EGS power plant investment cost projections

Source: BMU, 2010, Role and Potential of Renewable Energy and Energy Efficiency for Global Energy Supply

## 4. Enabling technologies – Focus on Power System Integration



# System integration of renewables has four dimensions.



# Main conclusions

1. The European RES goals for 2020 are ambitious, but the 2050 roadmap will go far beyond these goals
2. National approaches towards RES support are very diverse.
  - Feed-in systems have proven to be successful but have to be managed carefully
  - Non-cost barriers are important and require individual national approaches
3. Cost reduction potential can still be expected from PV, wind and geothermal
4. System integration will mainly be an issue from 2020 onwards in system with high wind penetration