"Lessons Learned from Promotion Strategies for Increasing the Share of Res-E"

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LESSONS LEARNED FROM PROMOTION STRATEGIES FOR INCREASING THE SHARE OF RES-E

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1 INTRODUCTION

CORE MOTIVATION:

Policy targets for an INCREASE of RES-E!

(e.g. RES-E directive of the EC to increase the share of RES-E from 12% to 22% until 2010)
Which instrument fits best?

Should an ambitious RES-E target be met in the short and long-term?

Who should benefit from the system most?

Should RES-E technologies be promoted on broad scale?

Should a trading system be built up?

Should the system be implemented on a national or international level?

Is international burden sharing for consumer an important goal?

How should the premium costs / burden for consumer be distributed over time?

Answer depends on POLICY OBJECTIVE
INTRODUCTION

MAJOR PROBLEM:
Correct design of promotion strategies

• with respect to:
  • renewable targets
  • Financial incentives
  • Credibility for investors
  • Transfer costs!
## 2. SURVEY ON POLICY STRATEGIES

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3. REQUIREMENTS TO SUCCESSFUL STRATEGIES

Major objectives:

- increase the amount of electricity from renewables and
- reduce costs!

![Graph showing the relationship between MW/Number of plants and Costs (EUR/kW)](image)

(MW/Number of plants = effectiveness; Costs (EUR/kW) = efficiency)
STATIC COST RESOURCE CURVES

- cheapest capacities
- predicted
- more expensive capacities
- Uncertainty

EURO/kWh vs kWh

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HOW FEED-IN TARIFFS WORK
HOW QUOTA-BASED TRADABLE GREEN CERTIFICATES WORK
All regulatory promotion strategies -- Quota-based TGC systems, Feed-in tariff systems, rebates -- create artificial markets and cause transfer costs (additional costs)
Why is it important to minimize these additional costs?

These additional costs have finally to be paid by the final customers

(regardless which promotion scheme is chosen)
Method of approach

Minimise additional costs for consumers = Producer Surplus + Generation costs - Revenues electricity market

- **Price, costs [Euro/MWh]**
- **Generation Costs (GC)**
- **Producer surplus (PS)**

**MC (Static cost curve)**
- $p_{MC}$: marginal generation costs
- $p_{ele}$: market price for (conventional) electricity
- $p_{MC}$: Marginal price for green electricity (due to quota obligation)

**Quota Q [MWh]**
The lower the costs are which have finally to be paid by final customers, the higher will be public acceptance, the larger will be the amount of additional electricity generated from RES.
The simulation tool Green-X

EU-Project Green-X
DG Research
Web: www.green-x.at
The simulation tool Green-X

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Green-X
Deriving optimal promotion strategies for increasing the share of RES-E in a dynamic European electricity market

Platform Win2000 SP3
Win XP SP1
Version 4.4.3

Thomas Faber, Claus Huber, Gustav Resch
Energy Economics Group
Vienna University of Technology
GREEN-X allows...

... to simulate various policy strategies for the promotion of RES-E in a dynamic framework on a national or international level (considering DS-effects)

(Current: EU-25, end 2006: EU28, future: EU 39???)
THE „POLICY“ TRACK OF EEG EU PROJECTS

1999        2001        2003       2005       2007

ELGREEN

THEORETICAL MODELING

GREEN-X

TRACK:
GREEN-NET

OPTRES

EMPIRICAL APPLICATION

FUTURES-E

PROG-RES
4. LESSONS LEARNED: COMPARISON OF STRATEGIES

Effectiveness:

Costs:

(2000-2004)
EFFECTIVENESS VS COST

Effectiveness vs Costs

Costs (c/kWh)

kWh/cap/yr

Tradable certificates

Feed-in tariffs

IT
BE
UK
AT
DE
ES
SE
Costs of promoted kWh vs costs of new kWh

Costs of promoted RES-E versus costs of "new" RES-E

- SE
- BE
- UK
- IT
- ES
- DE
- AT

Costs of promoted RES-E (all plants)
Costs of promoted RES-E (new installed plants)

[€ Cent/kWh]
5. SUCCESS CRITERIA FOR FIT‘s

1 Use a stepped FIT and calculate starting values carefully

2 Decrease over time!

3 Realistic time frame
EMPIRICAL PROBLEM OF FITs: The example of wind

- Revenue increase!
- Profits increase!
6. SUCCESS CRITERIA FOR QUOTA-BASED TGC‘s

1 Penalty >> MC

2 Ensure long-term planning horizon!

3 Focus on new plants

EURO/kWh

P_{qu}

Market price

Marginal Costs

kWh

Q_{Qu}
MAJOR PITFALLS FOR QUOTA-BASED TGC’s

1 Market is to small:
e.g. in a small country for one technology with very limited potential -> Non-Liquid because every single plant is known (e.g. Flanders (BE))

2 Windfall profits for existing capacities (e.g. Flanders (BE), Sweden)

3 Penalty is to low (e.g. UK)

4 Planning horizon to short (e.g. UK 2003, Italy)
QUOTA: EXISTING VS NEW CAPACITY

Market clearing price = price of certificate

Windfall profits

-existing capacity

New capacity

Total Quota

[cent/kWh]

△ Quota

PS Total Quota

PS

△ Quota

[GWh/year]
IMPACT OF THE SHAPE OF THE COST CURVE

Producer Surplus

P_{Zert}

Biomass

Loc. B

Costs

Quota

[GWh/year]

[cent/kWh]
IMPACT OF THE SHAPE OF THE COST CURVE

[cent/kWh]

P_Zert

Producer Surplus

Munic. waste

Biomass pure

Wind

Costs

Quota

Small Hydro

[GWh/year]
7. INVESTMENT SUBSIDIES FOR PV

- AU PVRP
- IT (Tetti PV)
- DK SOL 300+SOL 1000
- NL EPR
- CA ERP
- JP RPVDP
- ES ICO-IDAE

€/kWp

PUBLIC MONEY SPENT FOR PV

Spent money per kWp

Total money spent

€/kWp

Mio. €

8. COMPETITION?

• Competition among manufacturers exist
• Most important argument for TGCs: it is assumed that they foster competition between generators
• Objective of competition -> competitive prices
• Competitive prices:
  Prices = marginal costs (of generation)
• Currently:
  certificate prices > average feed-in-tariffs
• No indicator for real competition in TGC markets!
• -> Utilities are in favour of TGC because they can make more money in TGC markets!
9. CONCLUSIONS (1)

- No “One size fits all” approach!
- Careful design of a strategies: by far the most important success criteria!
- There should be a clear focus on NEW capacities!
- To ensure significant RES-E deployment in the long-term, it is essential to promote a broad portfolio of different technologies
- For FIT: Consider „learning“ by a dynamic component!
- Ensure credibility of the system! Avoid „stop-and-go“ approaches

IMPROVE THE CURRENT SYSTEMS!
DYNAMICS FOR FIT AND INVESTMENT SUBSIDIES IMPORTANT!

- RES-E-costs decrease must support decrease!
- conventional electricity prices increase over time

electricity prices, RES-E-costs

time
8. CONCLUSIONS (2)

- Instead of harmonisation: Stimulate/Foster competition between promotion schemes/between countries: Which system/where provides new RES-E capacities at lowest costs for society?
- Exchange lessons learned for improvement of strategy design!
- Currently, for feeding electricity into the grid a well-designed (dynamic) FIT provides a certain deployment of RES-e fastest and at lowest costs for society
- However, for sustainable policy -> parallel focus on demand-side conservation of high priority!
INTERESTED IN FURTHER INFORMATION?

• Download reports from:
  www.eeg.tuwien.ac.at
  www.green-x.at
  www.optres.fhg.de

• E-Mail to:
  Reinhard.Haas@tuwien.ac.at