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Best Practice Examples - Quota Obligations and Tender Schemes

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Agenda

Quantity based support instruments

1) Quota obligations

- Tradeable Green Certificates (TGC) in EU countries
- Renewable Portfolio Standard (RPS) in the United States

2) Tender schemes

- France, UK

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Price versus quantity

- Difference between price-based and quantity based support mechanisms (primarily Feed-in tariff vs. quota obligation)

SUPPORT MECHANISMS	**Price**	**Quantity**
Feed-in tariff	„Political price“	Market
Quota-based support/ Tender	Market	„Political quantity“

Quota obligations

(TGC and RPS)

Quota based support – obliged parties

- Obliged party (producer, consumer or supplier) has to provide a certain percentage of renewable electricity in a given year
- Examples:
  - California (supplier): 22 % in 2010; 33 % in 2020
  - UK (supplier): 15.4 in 2015

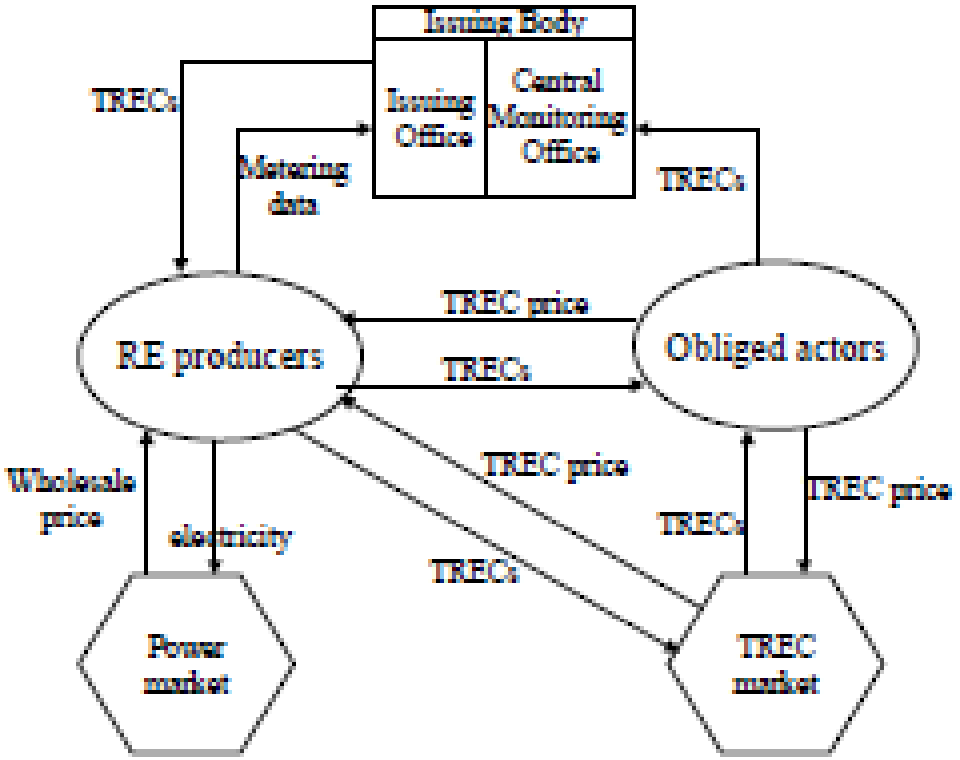
  → Steadily increase the target over time

Quota based support – compliance

- Obliged party has different options to prove compliance with quota based obligation
  - Produce renewable electricity
  - Buy renewable electricity (bi-lateral, physical trade)
  - Trade certificates (multi-lateral, virtual trade)

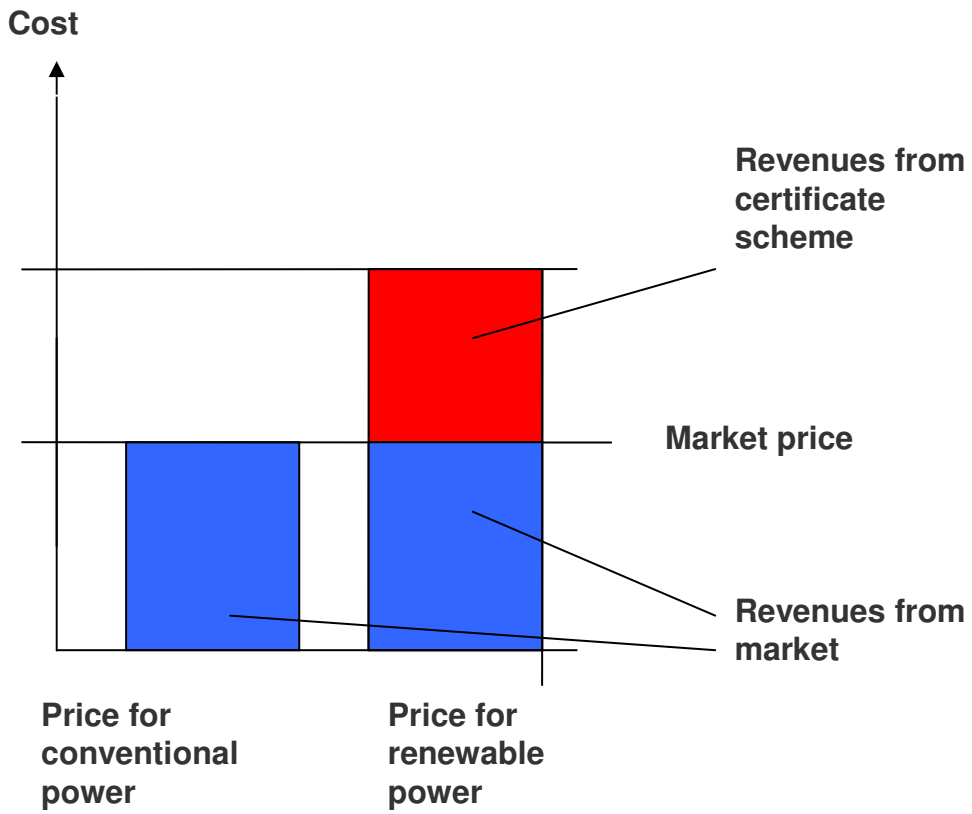
  → Certificate trading is to increase flexibility of the support instrument

How does certificate trading work?



ECN 2005

Revenues under TGC

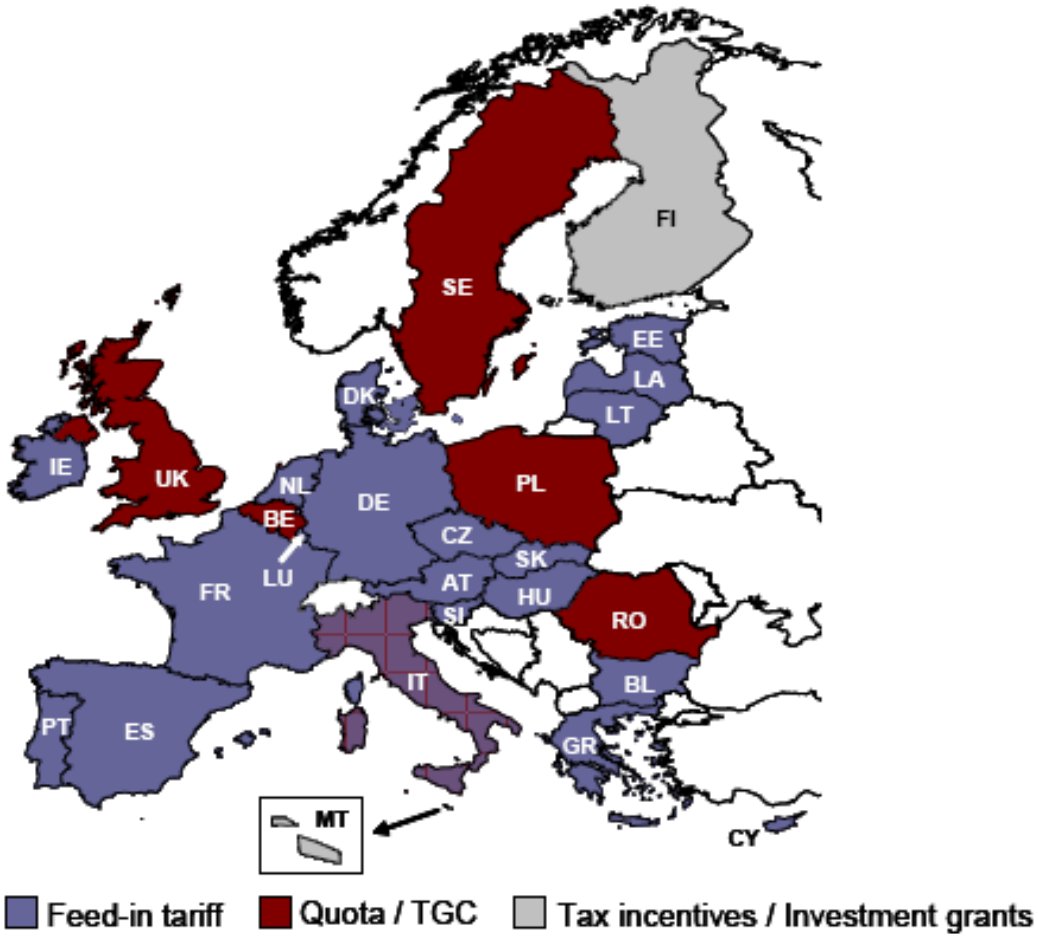


Source: Jacobs 2005

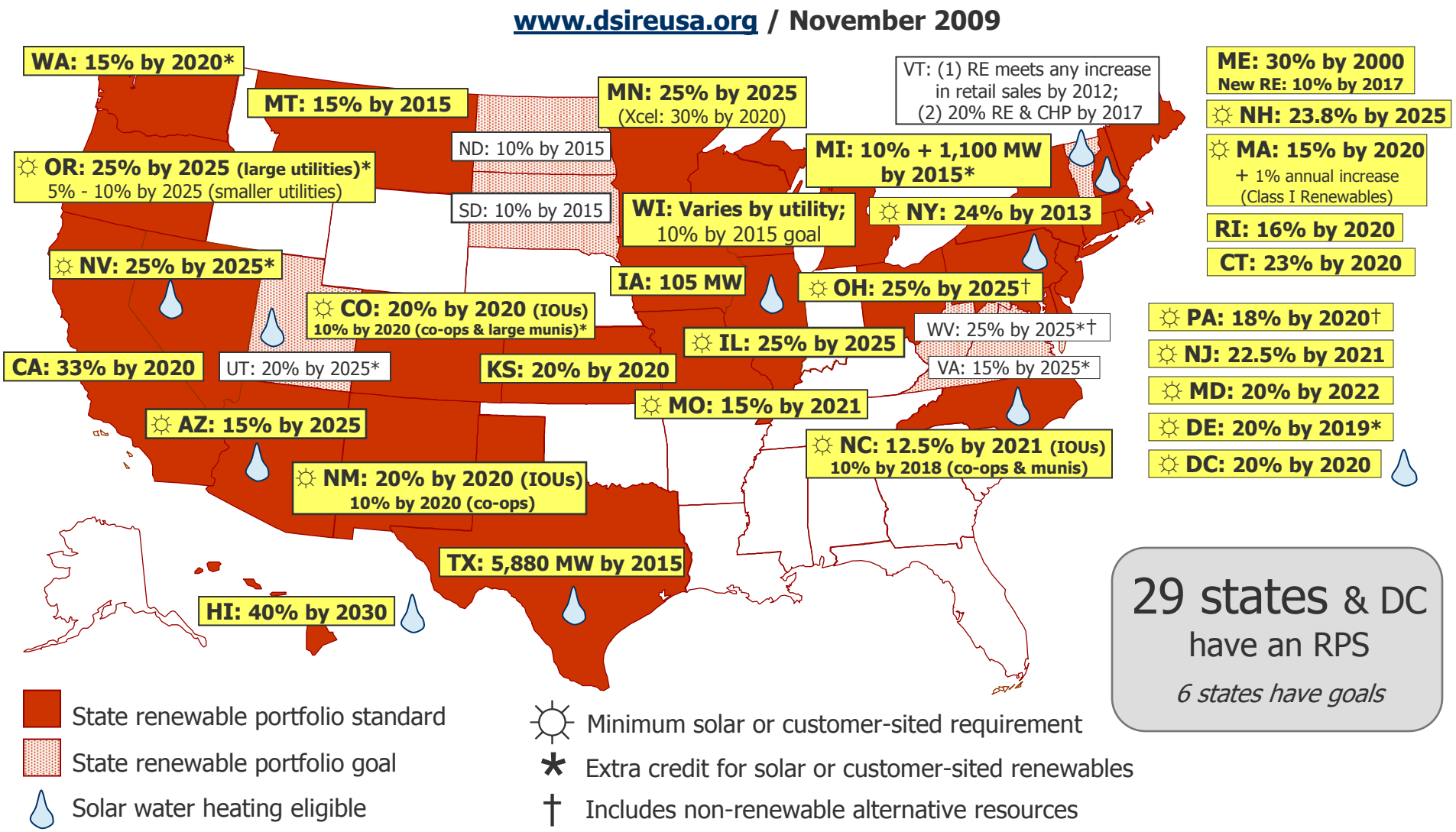
Quota obligations

- International best practise

Quota based mechanisms in the EU (red)

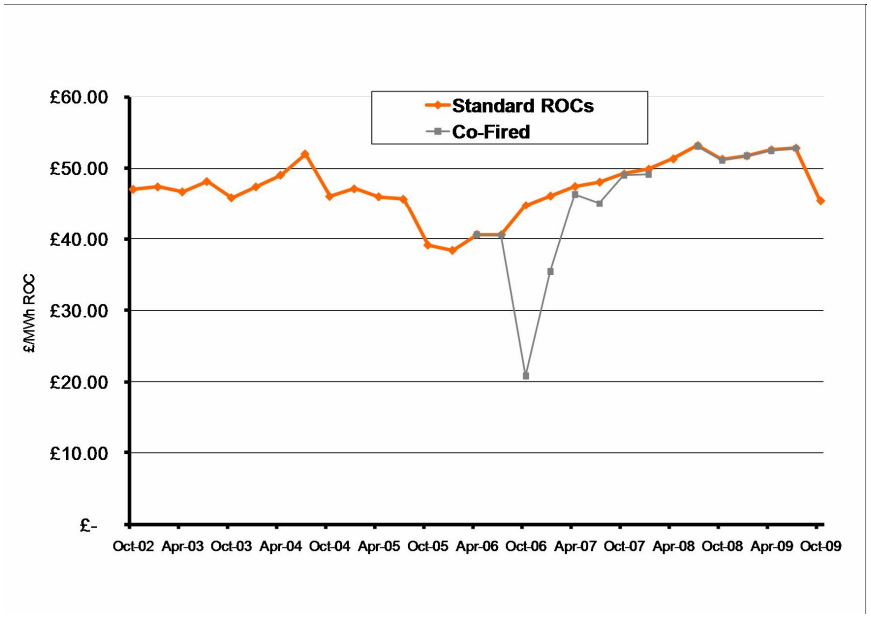


RPS in the USA



Quota based support - Best practise

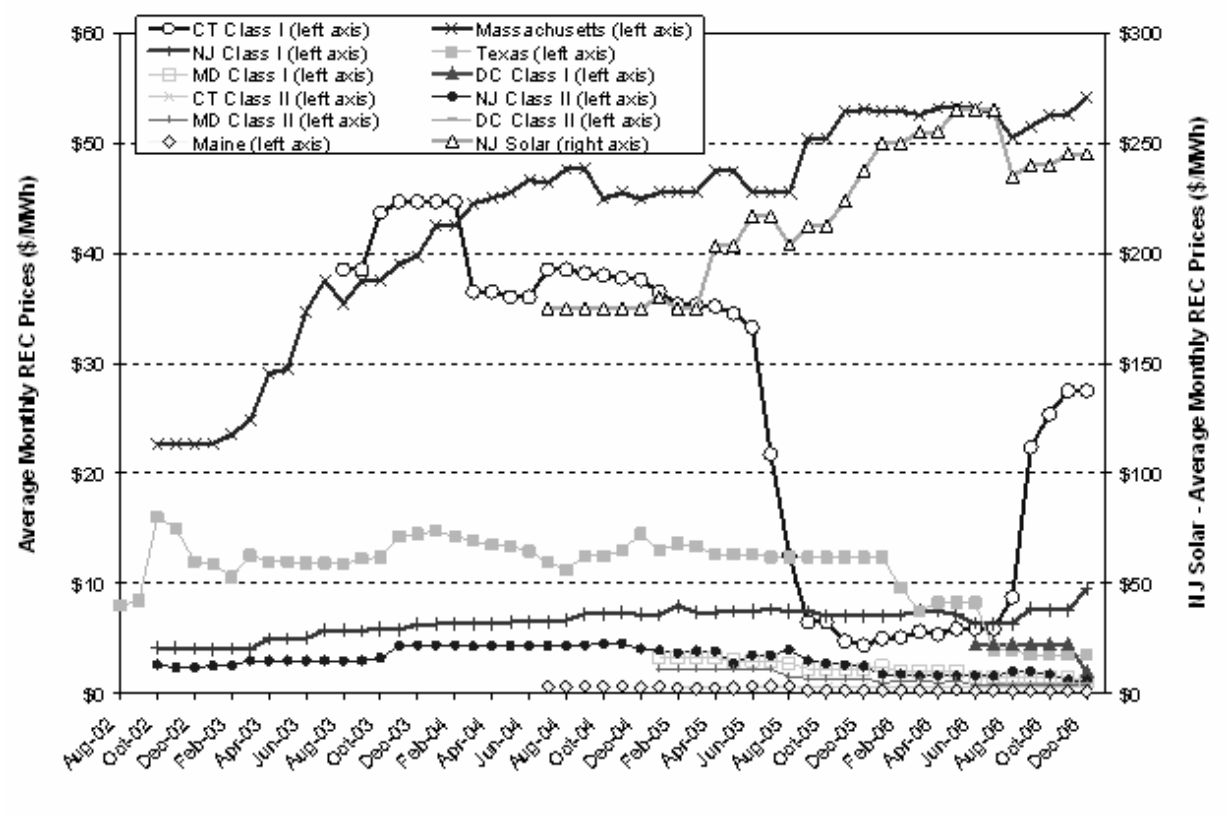
- Liquidity of market needed (large number of actors and project; international market?)
  - Certificate market
  - Conventional power market



Source: http://www.e-roc.co.uk/graph.cfm

Quota based support - Best practise

- Price volatility of different certificate trading schemes in the US (2002-2006)



Source: Mendonca et al. 2009

Minimum level for certificate price

- Minimum certificate level - to reduce investment risk in immature markets
- De facto security of price based support instruments

1. Technology-specific minimum prices in Flanders (2006):

	Wind Onshore	Hydro	Solar	Biomass and others
Minimum prices [€/MWh]	80	95	450	80

3. Transitional minimum prices in Sweden (bonus on the electricity price):

	2004	2005	2006	2007	2008
Minimum prices [€/MWh]	6.5	5.4	4.4	3.3	2.2

Source: Optres 2007

Penalties for non-compliance

- Penalty for non compliance needs to be sufficiently high
- Significantly above the marginal generation costs
- Penalty = maximum certificate price
- Sweden has linked the penalty to the certificate price

(150% of certificate price)

Quota targets, fulfilment and penalty level in Sweden:

Compliance period		2002/2003	2003/2004	2004/2005
RES-E target		7.4%	8.1%	10.4%
Quota fulfillment		77 %	99 %	99,9 %
Penalty	SEK/MWh	175	240	306
	€/MWh	18.98	26.03	33.19

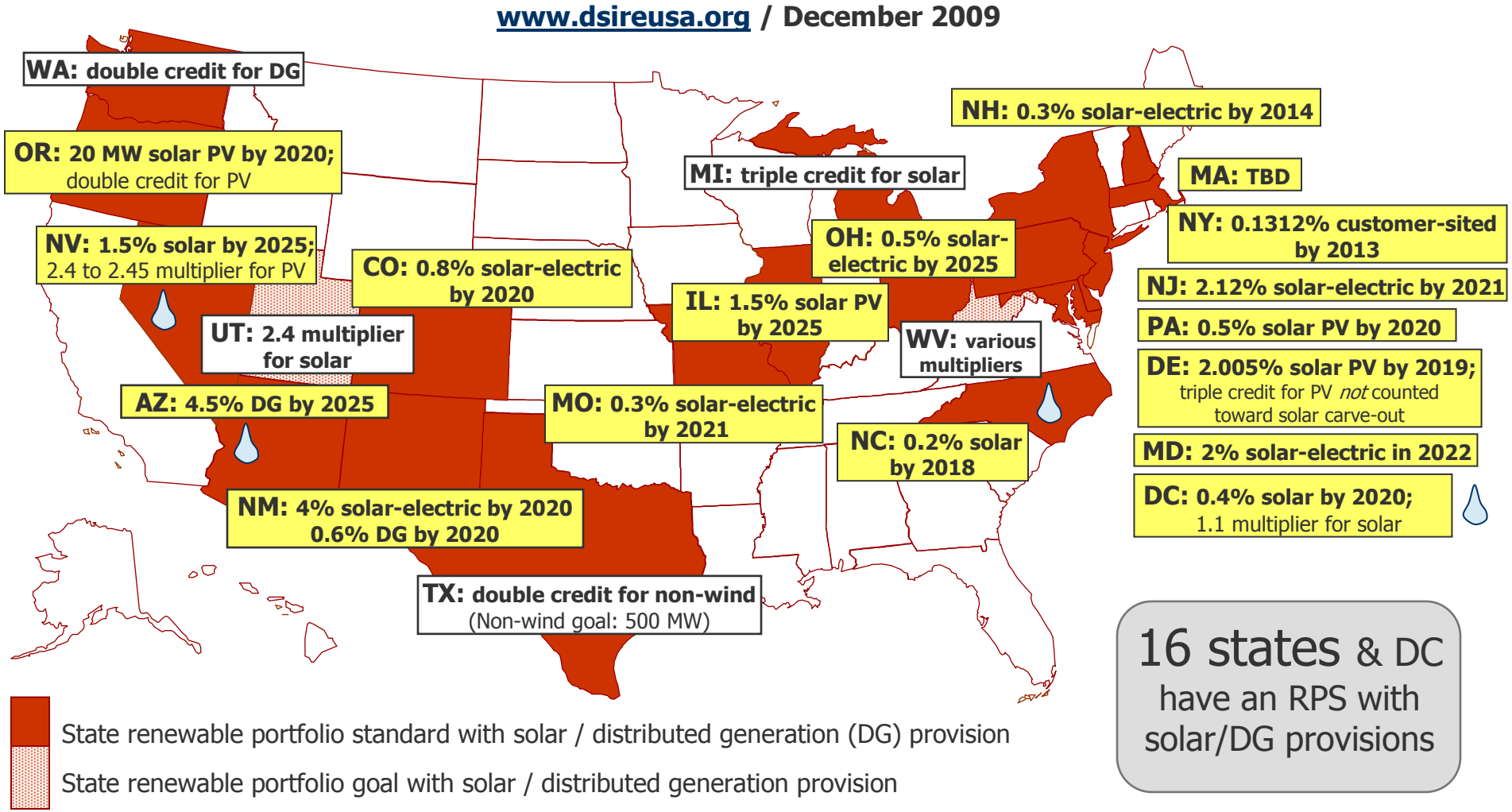
Source: Swedish Energy Agency

Long time frame for support

- Time frame should reflect long-lifetime of renewable energy power plants (more than 20 years)
  - UK ROC scheme - timeframe until 2037
  - Sweden: original time horizon until 2010 – crucial problem for investment security

Technology specific support

- Technolgy-specific quotas (RPS in US)



Technology specific support

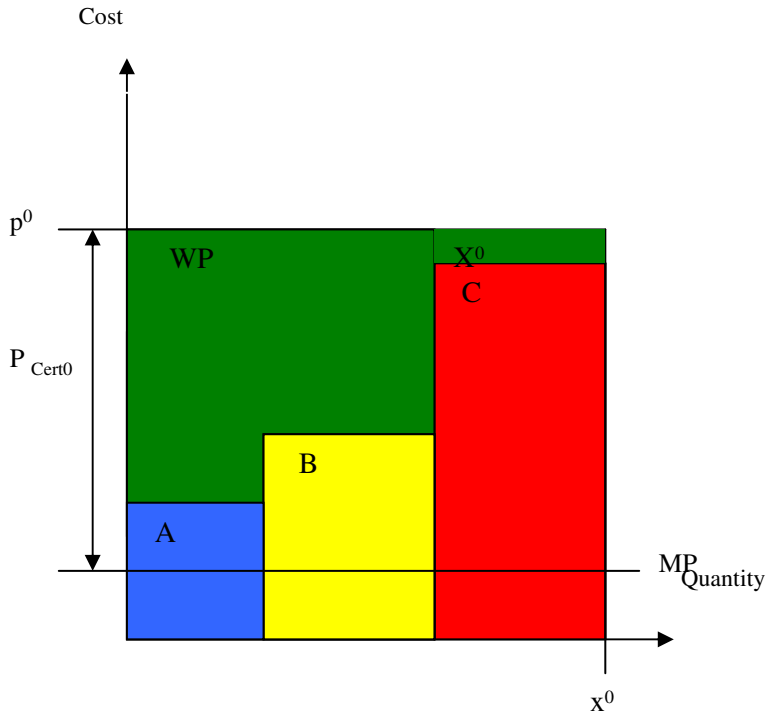
- Certificate banding (UK)
- Different numbers of years for issuing certificates (Italy)
- Combination with other instruments (FIT for solar in Italy)

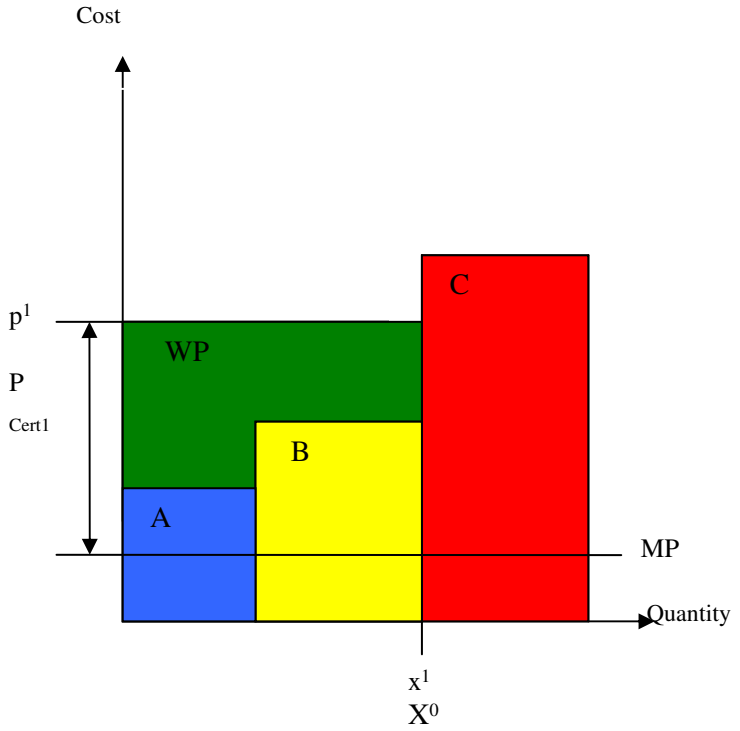
Generation type	ROCs/ MWh
Landfill Gas	0.25
Sewage gas, Co-firing of biomass	0.5
Onshore wind, Hydro, Co-firing of energy crops, Co-firing of biomass with CHP , Energy from waste with CHP, Geopressure, Standard gasification & pyrolysis	1
Offshore wind, Biomass, Co-firing of energy crops with CHP	1.5
Wave and tidal stream, barrage and lagoon (up to 1GW), Advanced gasification & pyrolysis, Anaerobic digestion (AD), Energy crops with or w/o CHP, Any Biomass with CHP, Solar photovoltaics, Geothermal, All microgeneration (sub 50kW, e.g. small wind)	2

Quota obligations – pros and cons

Quota obligation - Advantages

- Exact target achievement (in theory)
- Cost efficiency through focus on least cost technologies (additonal support for less mature technologies is needed)

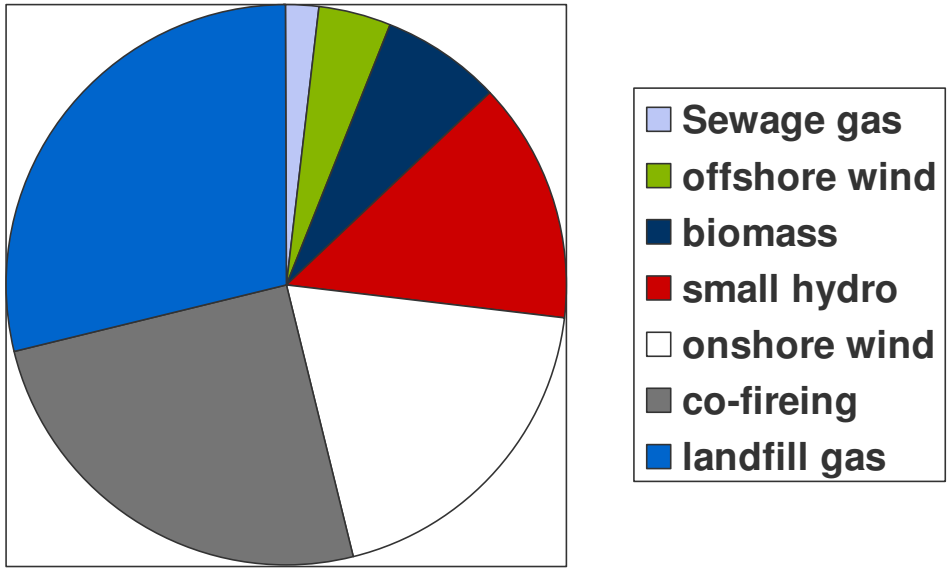




Source: Jacobs 2005

Quota obligation - Disadvantage

- Exclusive support of low cost technologies
- Certificates issued in the UK (2007)
- Wave power, solar PV and micro hydro were excluded



Source: Ofgem 2007

Quota obligation - Disadvantage

- Little investment security (volatile market and certificate price) requires risk premium for financing (increased capital costs)
- Little dynamic efficiency (focus on mature technologies), de facto penalizing technological innovations

Quota obligation - Disadvantage

- Best applicable in fully liberalized electricity markets
  - Large number of independent renewable power producers (for liquidity on certificate market)
  - Large number of independent conventional power producers (for liquidity on the spot market)

→ Countries with long-term tradition in liberalized energy markets

Tender/auctioning mechanism

Tender/auctioning mechanism

- Government issues call for tender
  - Either for total investment cost of one project (investment focused)
  - Generally: cost per unit of electricity (generation focused)
  - For example: 100 MW wind energy onshore
- Bidder with the lowest price "wins" contract and has the exclusive right for renewable electricity generation
- Bid normally includes power generation cost for a long period of time

Tender mechanism

- International best practise

Tender – International best practise

- Used in Ireland (until 2005), England (until 2003), France, Denmark (offshore wind) and China (until 2009)
- Tenders should be technology specific
- Continuity of calls for tender in order to create sustainable market growth (avoid stop-and-go cycles)
- Auctioned capacity should not be to low (transaction costs) nor too high (strategic bidding)
- Establish a high penalty for non-compliance (to avoid unreasonably low bids)

Tender –

Pros and cons

Tender - advantages

- High degree of cost-efficiency because lowest bidder is chosen (theoretically)
- Legislator can require additional "demand" (regional distribution, etc).

→Direct control of legislators over power plant selection (China)

Tender – disadvantages

- Low effectiveness because of low bids and non-fulfillment of projects
- Stop-and-go development cycles – insecurity for industry
- Difficulty of establishing a national industry (UK experience) because of import of cheapest technologies
- Intense price competition favors large players (utilities) or public companies (without profit interests)

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Thank you for your attention!

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