

Feed-In Tariffs

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Approach

- Consider a different means of procuring renewables for purposes of meeting a 33% renewables target (*NOT* the 20% requirement)
- Rather than require utilities to hold annual solicitations, should the CPUC require IOUs to buy any renewable energy offered at or below the Market Price Referent (MPR)?
- Such an approach would be similar to feed-in tariffs in place in various European countries

Feed-in Tariffs

- Characterized by a specific price paid by electricity companies, for a period of several years, to renewable energy generators
- Price and term may (and often does) differentiate by technology
- Additional costs are paid by load-serving entities in proportion to their sales volume and passed through to consumers as a premium
- Either fixed price or fixed premium/environmental bonus above spot market prices

Renewable Energy Feed-In Tariffs

EU Countries with Feed-In Tariffs for RE

Country	Feed-in tariff
Austria	•
Belgium	• ¹
Cyprus	•
Czech Republic	•
Denmark	•
Estonia	•
Finland	•
France	•
Germany	•
Greece	•
Hungary	•
Ireland	•
Italy	
Latvia	•
Lithuania	
Luxembourg	•
Malta	
Netherlands	•
Poland	
Portugal	•
Slovenia	•
Slovakia	
Spain	•
Sweden	
United Kingdom	

- Portugal introduced first RE feed-in tariff in 1988, updated in 2001
- Germany, Denmark, and Spain considered model countries with significant results
- Ireland established a feed-in tariff in 2005

Advantages and Disadvantages of Feed-in Tariffs

- Advantages
 - Support mid-to-longer-term technologies
 - May be tailored to support different market conditions (developing less desirable sites, moving renewables into spot market, encouraging repowering)
 - Can “jump start” a market for eligible technologies
 - Offers investment security and market stability
- Disadvantages
 - Risk of over-funding, particularly if technology cost reductions and learning curve not built into tariffs
 - May not be provide stable market attractive to investors if frequently amended

Country Examples

- Denmark
- Germany
- Spain

Denmark

- RE facilities connected prior to April 21, 2004: feed-in tariff
 - RE Plants receive the spot market price plus a subsidy to provide a guaranteed price of 8.1 eurocents/kWh
 - applicable for 20 years from date of connection
- RE facilities connected after April 21, 2004: production incentives
 - Wind: plants receive the spot market price plus a 1.3 eurocents/kWh production incentive
 - applicable for 20 years from the date of connection
 - additional subsidy of 1.6 eurocents/kWh is provided for new facilities that replace decommissioned wind turbines 450 kW and smaller.
 - the maximum allowable price for new wind power is 6.4 eurocents/kWh meaning that subsidies may be adjusted down so not to go above the maximum price.
 - Biogas: plants connected between April 22, 2004 – December 31, 2008
 - 1st 10 years: receive the spot market price plus a subsidy of 3.4 eurocents/kWh
 - 2nd 10 years: receive the spot market price plus a subsidy to 0.8 eurocents/kWh
 - Other RE plants: spot market price plus a 1.3 eurocent/kWh subsidy

Germany

- **Tariff Structure**
 - Grid operators must pay fixed rates and may pass costs along to customers
 - Rate of payment depends on year of commissioning
 - rate is decreased annually at 1–5%, depending on technology
 - Total length of time for tariff is 20 years
 - excluding hydroelectric projects which have payment periods of 15 or 30 years depending on size
 - payments are fixed for the 20–year period for all but wind power
 - Smaller capacity projects receive higher tariffs
- **Biomass**
 - Ranges from 8.4 eurocents/kWh (5 MW-20 MW) to 11.5 eurocents/kWh (for up to 150 kW)
 - Plants greater than 20 MW: 3.9 eurocents/kWh
 - Bonus for self-regenerating raw materials, CHP, or new technologies

Germany

(Continued)

- Wind Power
 - Higher payments initially, stepped down over time
 - On-shore wind
 - initial tariff paid for first 5 years: 8.7 eurocents/kWh in 2005
 - Lower “regular” tariff paid in years 6-20: 5.5 eurocents/kWh
 - initial fee can be extended beyond 5 years depending on the wind conditions of the site
 - wind parks that can not achieve 60 percent of the reference yield in planning materials are not eligible for feed-in tariff
 - Off-shore wind
 - initial tariff paid for 12 years is 9.1 eurocents/kWh in 2005
 - 6.2 eurocents/kWh beginning in year 13
 - Initial tariff can be extended beyond 12 years for facilities further from the coast in deeper water

Germany

(Continued)

- **Geothermal**
 - Between 7.16 and 15 eurocents/kWh, depending on size
- **Landfill gas, sewage gas, mine gas**
 - Between 6.65 – 8.65 eurocents/kWh
 - Depending on capacity size and technology, e.g., higher rates paid when innovative technologies are used
- **Hydropower**
 - Small hydro up to 5 MW
 - Facilities less than 150 kW receive 9.67 eurocents/kWh
 - Facilities between 151 kW and 5 MW receive 6.65 eurocents/kWh
 - Modernization of medium sized hydro 5 MW – 120 MW
 - increase in capacity only with a maximum increase of 150 MW
 - Rates range from 3.7– 7.67 eurocents/kWh depending on size of increased capacity
- **Solar**
 - Integrated PV: 59 – 62.4 eurocents/kWh, depending on system size
 - Surface mounted PV: 54 – 57.4 eurocents/kWh, depending on system size

Spain

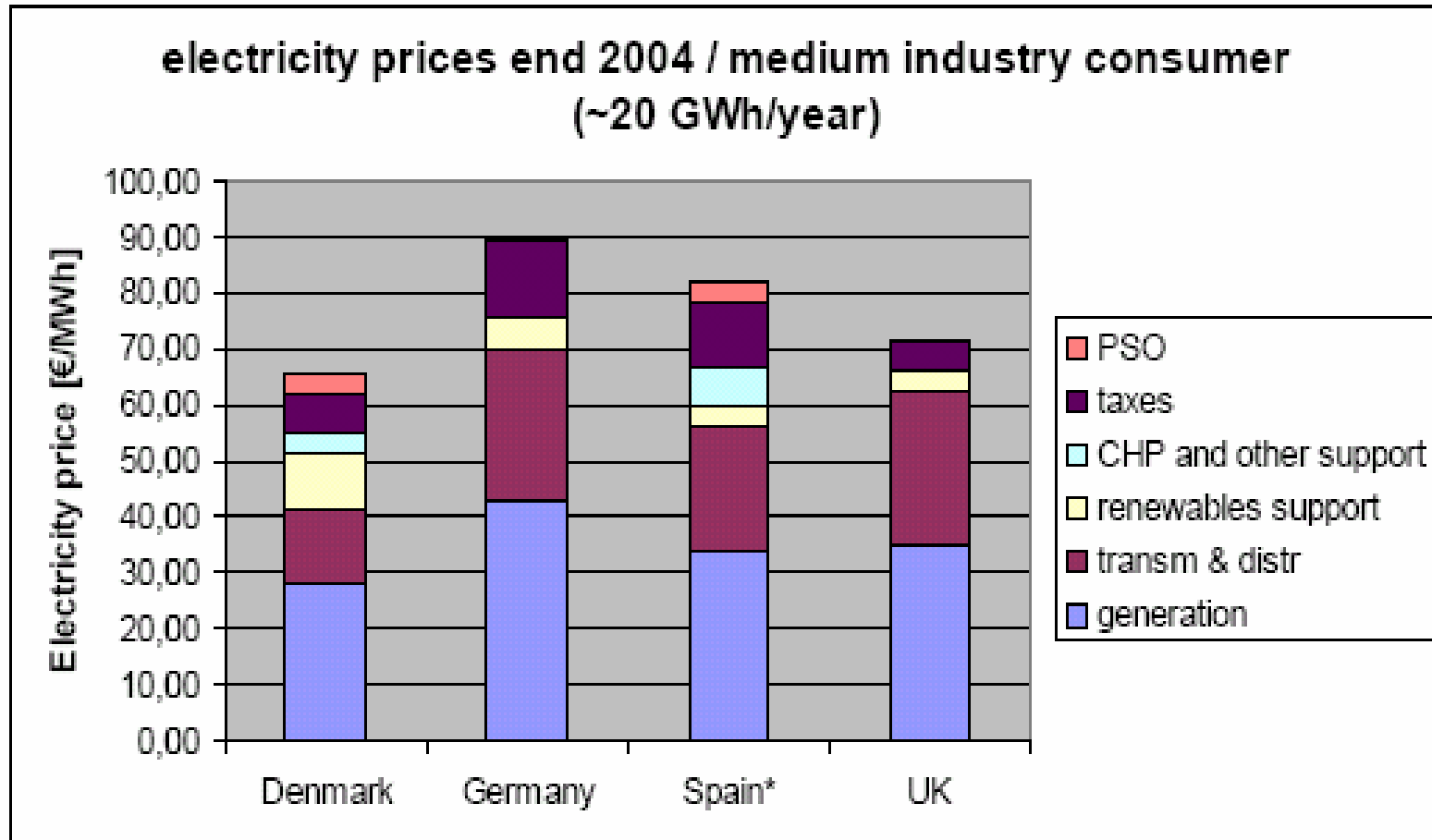
- General:
 - Market participation bonus
 - Fixed tariffs between 80% and 90% of average reference tariff (ART)
- Wind pricing options:
 - Special Regime Transition, available only until January 2007
 - 7.2 eurocents/kWh in 2005
 - fixed tariff set annually
 - Fixed Tariff Option
 - bilateral sales to distributors
 - 90% of the ART(6.5 eurocents/kWh in 2005) for the first three years
 - 85% of the ART for the next ten years
 - 80% of the ART for remaining project life
 - Market Sales Option
 - market price plus a subsidy based on ART and additional market incentive
 - subsidy: 2.9 eurocents/kWh in 2005 (40% of the ART)
 - market incentive: 0.72 eurocents/kWh in 2005 (10% of the ART)

Spain

(continued)

- **Solar PV:**
 - 1st 25 years
 - PV < 100 kW: 40 eurocents/kWh (575% of regulated tariff)
 - PV > 100 kW: 21 eurocents/kWh (300% of regulated tariff)
 - After 25 years
 - PV < 100 kW: 32 eurocents/kWh (460% of regulated tariff)
 - PV > 100 kW: 17 eurocents/kWh (240% of regulated tariff)
- **Solar Thermal:**
 - Available to first 200 MW of grid connected solar thermal
 - 21 eurocents/kWh for 25 years, then 17 eurocents/kWh for remainder of project life

Estimated Impact of Feed-In Tariffs on End-Use Electricity Prices



More on Estimated Impacts of Feed-in Tariffs on End-Use Electricity Prices (according to European Commission)

- Between 4% and 5% for Germany and Spain
- Around 15% for Denmark

Comparison Between Standard Offer #4 and Feed-In Tariffs

- Similarities
 - Fixed price for sustained period of time
 - Streamlined process
- Differences
 - Feed-in tariffs may be segmented by technology
 - Price of feed-in tariffs may be lowered over time

Questions to Consider

- Are SEPs still needed and/or necessary?
- Should MPR (or allowable price) vary by technology?
- Should there continue to be a time-of-delivery element? (baseload, peak, mid-peak, etc.)
- Should there be provisions for bonuses or adders for good grid behavior? (e.g., low-voltage ride-through for wind)
- Is legislation necessary?