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Exploring Feed-in Tariffs for California

CEC Feed-In Tariff Workshop
June 30, 2008
Sacramento, CA

Wilson Rickerson, Rickerson Energy Strategies

Background

2007 IEPR directed the Energy Commission, in collaboration with the CPUC, to explore feed-in tariffs for projects over 20 MW. Goals include to:

- Incorporate value of a diverse mix of renewable energy
- Include features of successful European feed-in tariffs
- Prepare a white paper on feed-in tariffs in 2008

Market Barriers to CA RPS

- Permitting/Siting (including avian issues)
- Contract Failure
- Site Control
- Financing
- Lack of transmission
- Developer risk
- Complexity of RPS solicitation process
- Suitability of solicitation process for smaller projects
- Cost changes between submission and completion of permitting (often exogenous) causing contracts to become infeasible

What is a Feed-in Tariff?

- Long-term contract/payment with a specified term and a fixed price to eligible generators – *if you build it, we'll buy it.*
 - Ex. based on generation cost (Germany)
 - Ex. premium on top of spot market (Spain)
- Standing price schedule may be set by legislation, regulation, contract or tariff
- Available to all eligible generators from interconnecting utility

Key Features of Feed-in Tariffs

- Guaranteed price
- Guaranteed buyer (eliminates market timing issues)
- Long-term guaranteed revenue stream which can improve investor confidence
- Generally, unbounded market regardless of completion date
- Comparatively low transaction costs
- Comparatively low administrative complexity
- Generally, guaranteed interconnection
- Can be differentiated by technology (type, size, resource quality, vintage, ownership, etc.)

Feed-in Tariffs have Limitations

- Unknown cost due to unknown quantity
- Fit with market structure (who is the buyer?)
- Risk of over-paying/under-paying
- Can over-stimulate the market or under perform
- Do not solve transmission availability issues
- Does not directly solve siting and permitting

Feed-in Tariff Design Risks

- Unresponsive tariff rates
- Could have the unintended consequence of favoring less efficient plants
- Unequal cost allocation
- Speculative queuing (under a cap, or tariff step-down)

But Feed-In Tariffs *Might* ... (1)

- Ideal: reduce risk without increasing ratepayer cost
 - Relative to VIABLE cost benchmark, not to failed contracts
- Reduce developer cost/risk/complexity in general, e.g....
 - Cost of capital, Transaction/contracting costs, security requirements
- Reduce utility, CPUC and CEC administrative burden substantially
- Provide a viable market for smaller projects or certain technologies and incremental expansions of existing projects
 - For whom cost, complexity, risk, timing of RPS solicitations may be barriers

But Feed-In Tariffs *Might* ... (2)

- Reduce potential for RPS contracts to become infeasible while permitting/siting or transmission issues being resolved
 - E.g. if costs of equipment rise, or unforeseen development costs incurred, which might be affordable under price-certain tariff but render bid price obsolete
- Increase willingness of developers to invest in (take on risk of) addressing siting/permitting or other barriers, when the reward (a contract) is (certain; not speculative)

Why Should California Consider Feed-In Tariffs?

- State is not on track to meet the RPS requirements by 2010
- New policy framework perceived as necessary if 33% renewables target is to be achieved by 2020
- Feed-in tariffs have driven rapid expansion in some markets
- MPR may set price floor above the cost that some renewables can be profitably developed
- Feed-in tariffs may help reduce contract failure rate
- Feed-in tariffs can be used to facilitate renewable projects in areas with new transmission
 - Provide transparent price signals
 - Protect against market collusion by generators

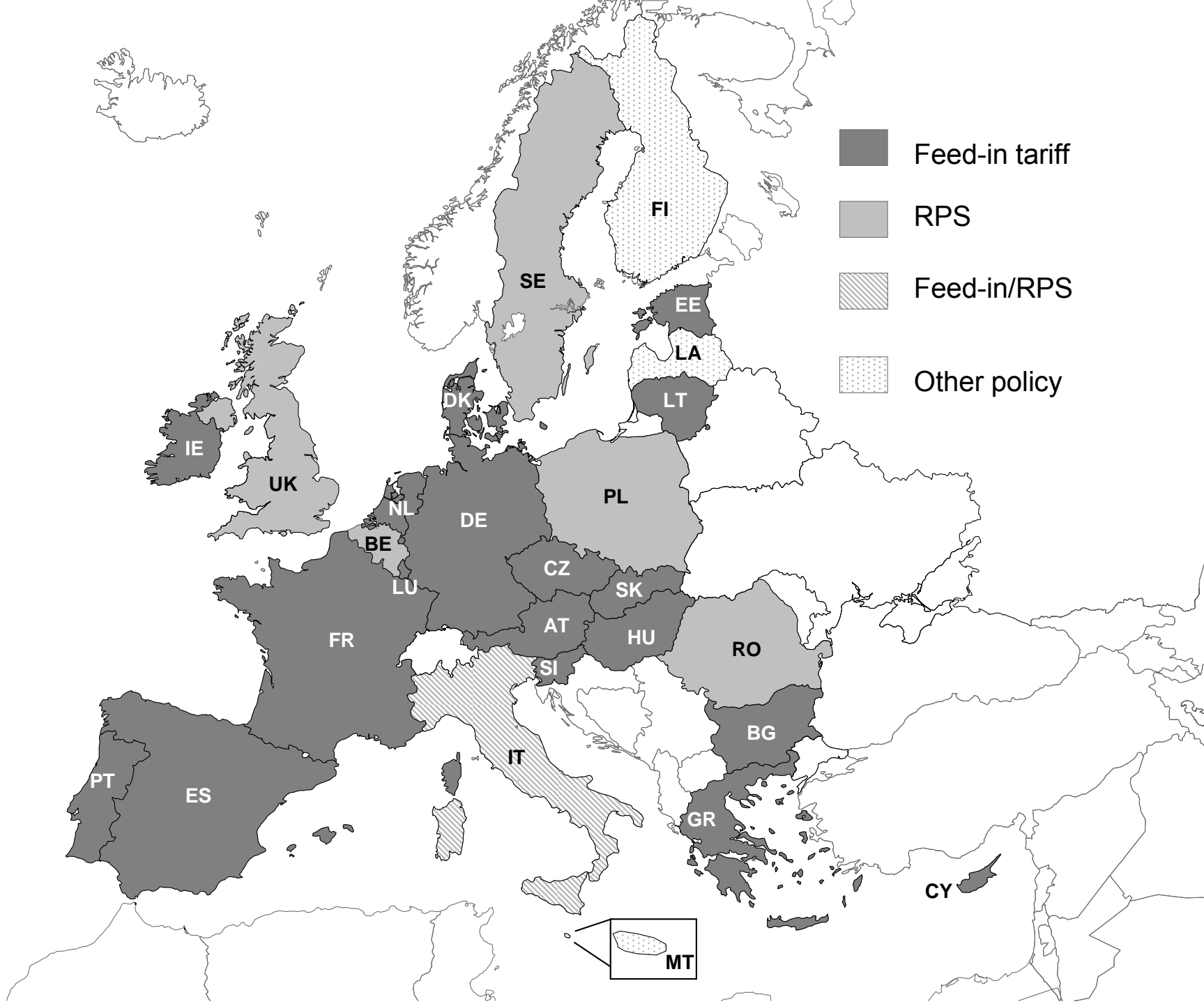


California is Already Experimenting with Feed-In Tariffs

- AB 1969 enacted in 2006
 - Tariff for each IOU for public water and wastewater facilities up to 1.5 MW
 - Priced at MPR
 - Statewide cap of 250 MW
- CPUC Order No. 07-07-027
 - For other renewable generators below 1.5 MW
 - Priced at MPR
 - Statewide cap of 478.4 MW
 - CPUC soliciting comments on expanding feed-in tariff beyond SCE and PG&E, and expanding project cap to 20 MW
- SCE standard contracts proposal
 - Biogas and biomass generators <20 MW
 - Priced at 2006 MPR
 - Expires 12/31/2008 or 250 MW

Feed-in Tariffs Internationally

- The most prevalent renewable energy policy globally
 - Europe
 - Ontario and Prince Edward Island
 - Brazil
 - Korea

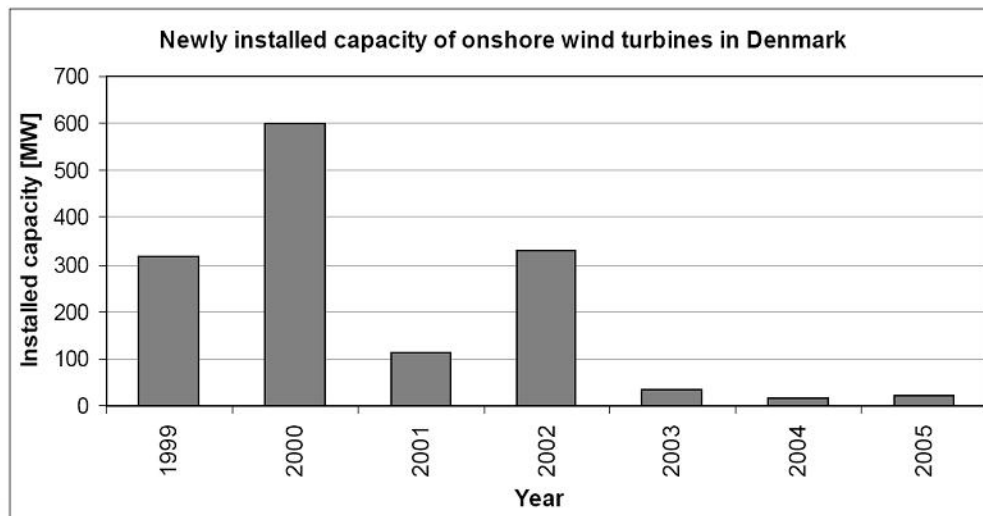


Feed-in Tariffs in Europe

- All EU countries required to adopt policy to meet RE targets
- The majority of EU countries have some form of feed-in tariff, but with different designs
- The three most successful have been:
 - Denmark
 - Spain
 - Germany

DENMARK

- **1992: Feed-in tariff set at 85% of current retail rate. Establishes DK as a leading wind power market**
- **2000: Attempt to switch to tradable credit system; market stumbles, then collapses**
- **Attempt to switch to fixed premium system with 1.34 Euro, but without energy purchase guarantee, or price floor (as in Spain), and market has yet to recover**



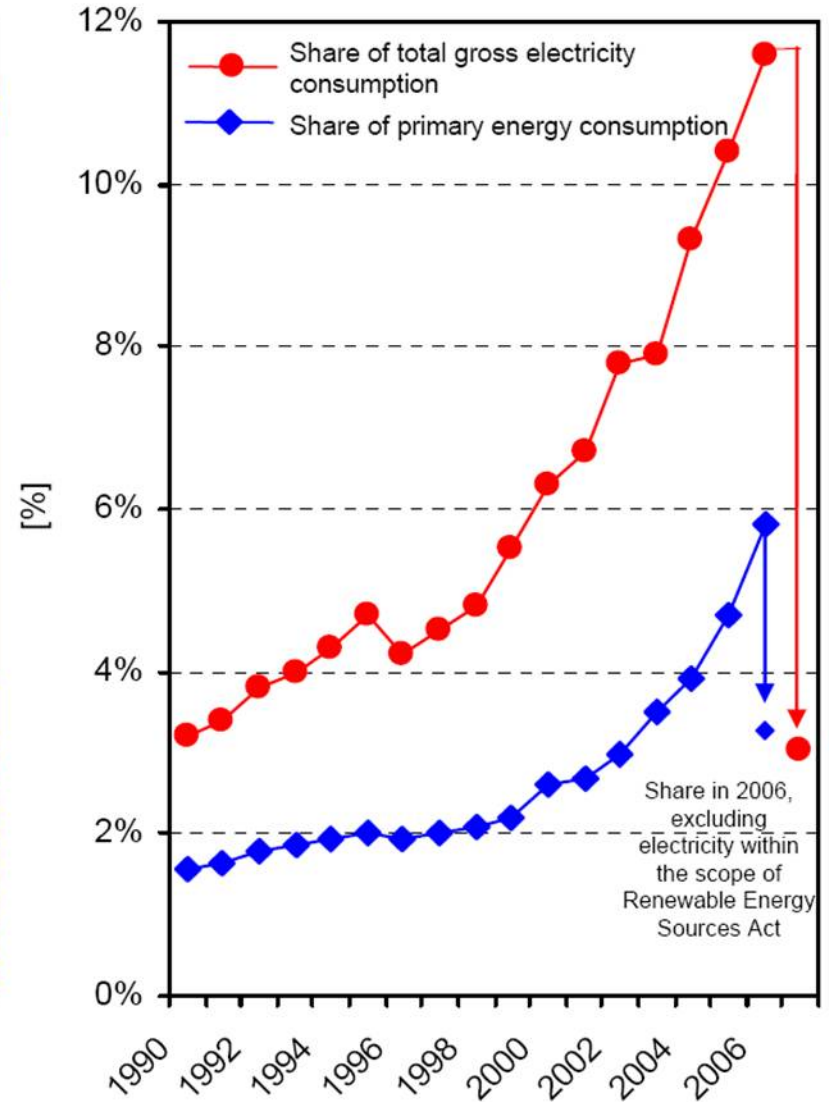
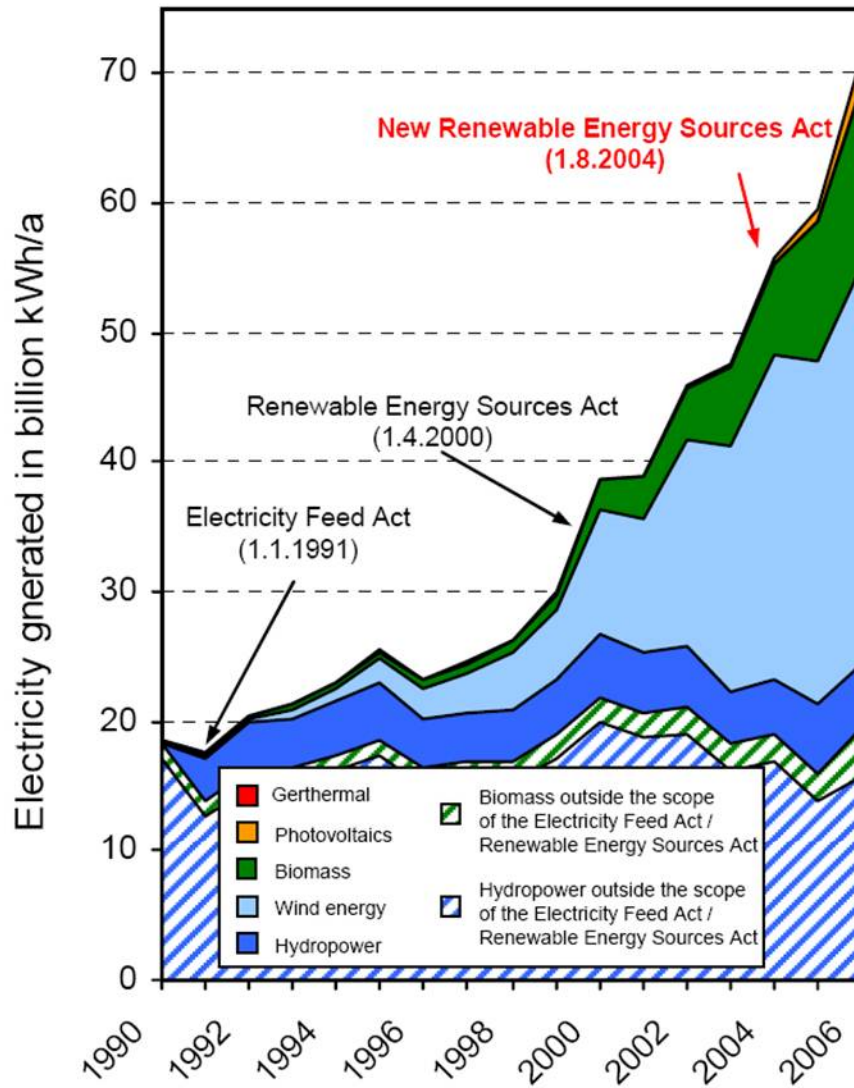
SPAIN

- Fixed premium (i.e. premium floating on top of spot market) has driven majority of market growth
- Ranges \$0.02-\$0.30/kWh, depending on technology
- Alternative fixed tariff option serves as a price floor for the market
- Wind and PV markets have experienced extremely rapid growth
- Some in Europe argue that the fixed premium is more compatible with the electricity market, but it has generally been higher than the fixed price tariff
- Observation: Premium approach puts potential hedge benefit at risk

GERMANY

- **1991-2000: Feed-in tariff set at 95% of current retail electricity rate for all technologies. Drives rapid wind growth**
- **2000: First renewable energy law establishes technology specific tariffs**
- **Turbines in lower wind regimes receive higher payments for longer periods of time**
- **2004: Renewable energy law revision further stratifies technologies by size, etc. and PV market accelerates more rapidly**
- **Germany is now the world's largest PV and wind energy market, and its biogas market has doubled in the past three years; share of electricity more than doubled between 2000 and 2007 (from 6.5% to 14%+)**

Germany Achieves Renewable Energy Targets ahead of Schedule under Feed-in Tariff



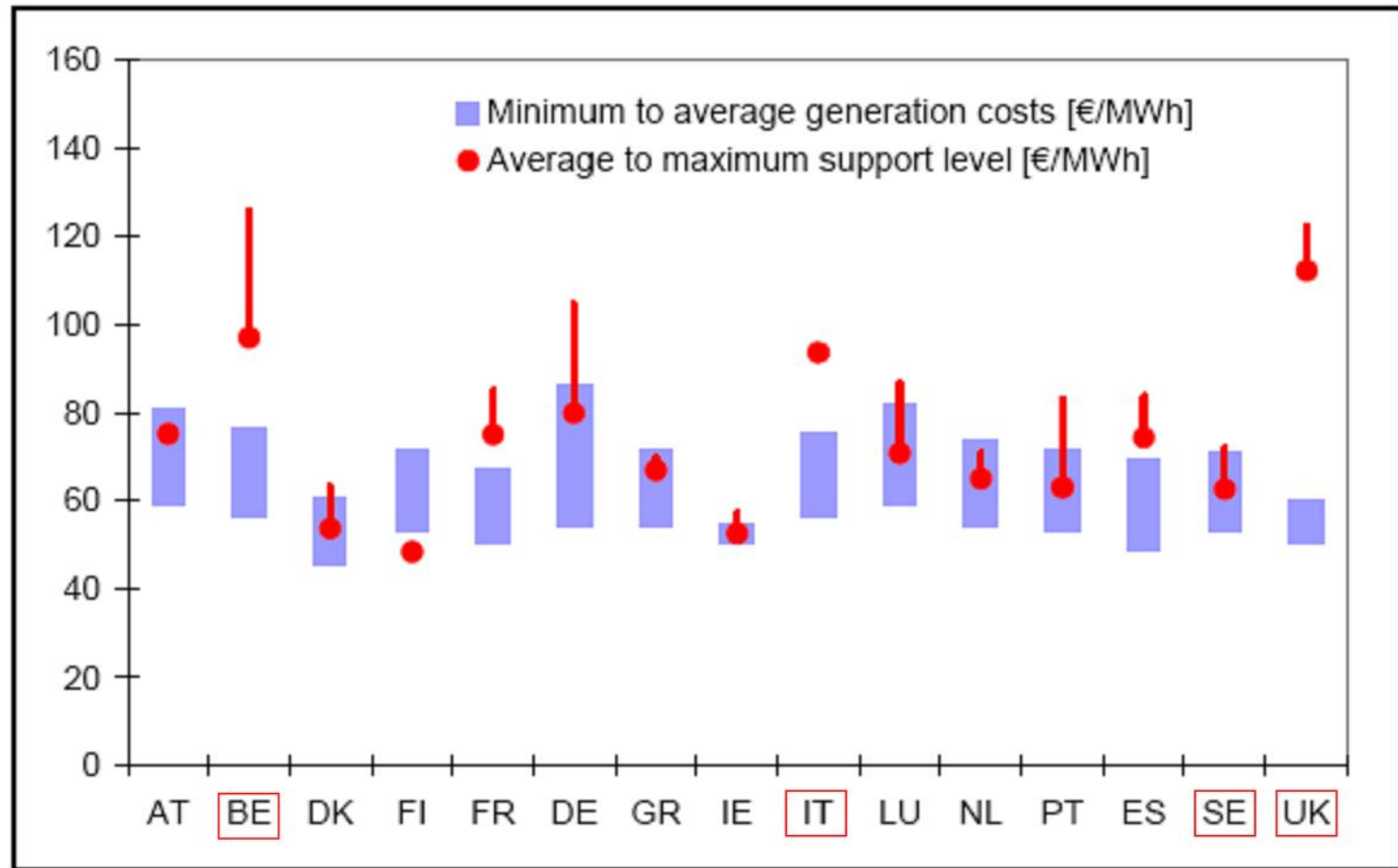
14% in 2007

German government analysis from 2006 showed policy savings primarily from electricity market price reductions

Costs (€billion)	
Incremental cost of purchasing renewable energy	3.2
Balancing electricity	0.1
Transaction costs of the renewable electricity law	0.002
Subtotal	3.302

Benefits (€billion)	
Reduction in the wholesale price for electricity from displacing conventional energy in the merit order	5
Savings from gas and coal imports	0.9
Mitigating the external costs of energy use	3.4
TOTAL BENEFIT	9.3

Feed-ins “achieve larger deployment at lower costs.” - Nicholas Stern



EU concludes that tradable credit markets tend to overcompensate generators when compared with feed-in tariff policies because of risk premiums

Is European Experience Relevant?

- Europe has enjoyed more rapid market growth than the US
- But are feed-in tariffs inherently superior to RPS?
 - Different market conditions
 - Flaws identified tend to be same flaws identified for poorly-structured RPS policies
 - Based on what criteria?
- Feed-in tariffs could serve as another mechanism for RPS compliance
- The devil is in the design details!

Feed-in Tariffs in North America?

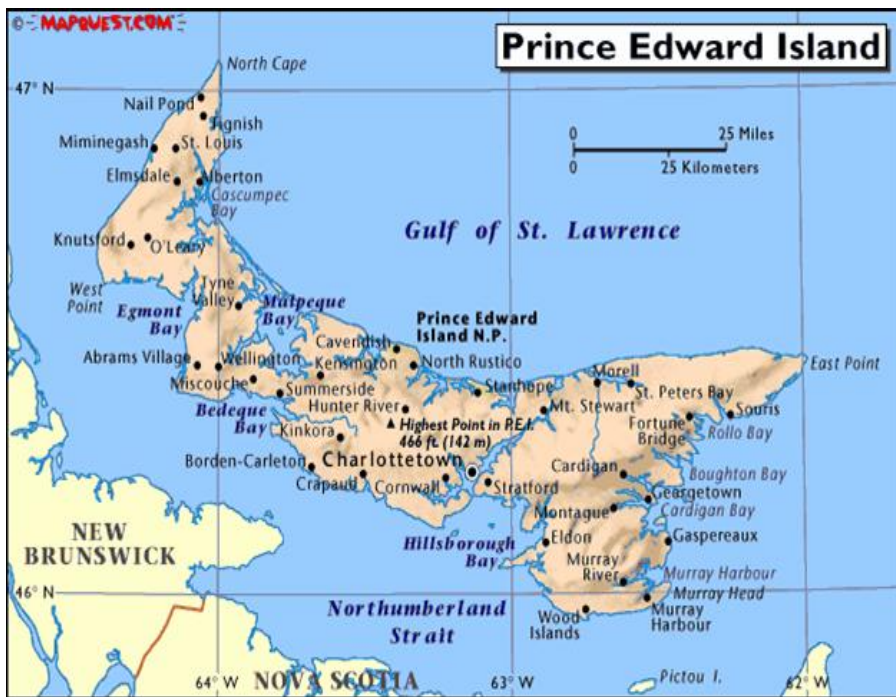


Ontario Standard Offer Contract

- 20 MW contract
- Initially capped projects at 10 MW
- As of May, 2008, limited to small renewables (<10 kW) and farm biogas systems under 250 kW pending development of new rules

Technology	PV	Wind	Hydro and Anaerobic Digester
Tariff (kWh CAD)	\$0.42	\$0.11	\$.11 + \$.035 for dispatchability on peak

Prince Edward Island: Minimum Purchase Price Regulation

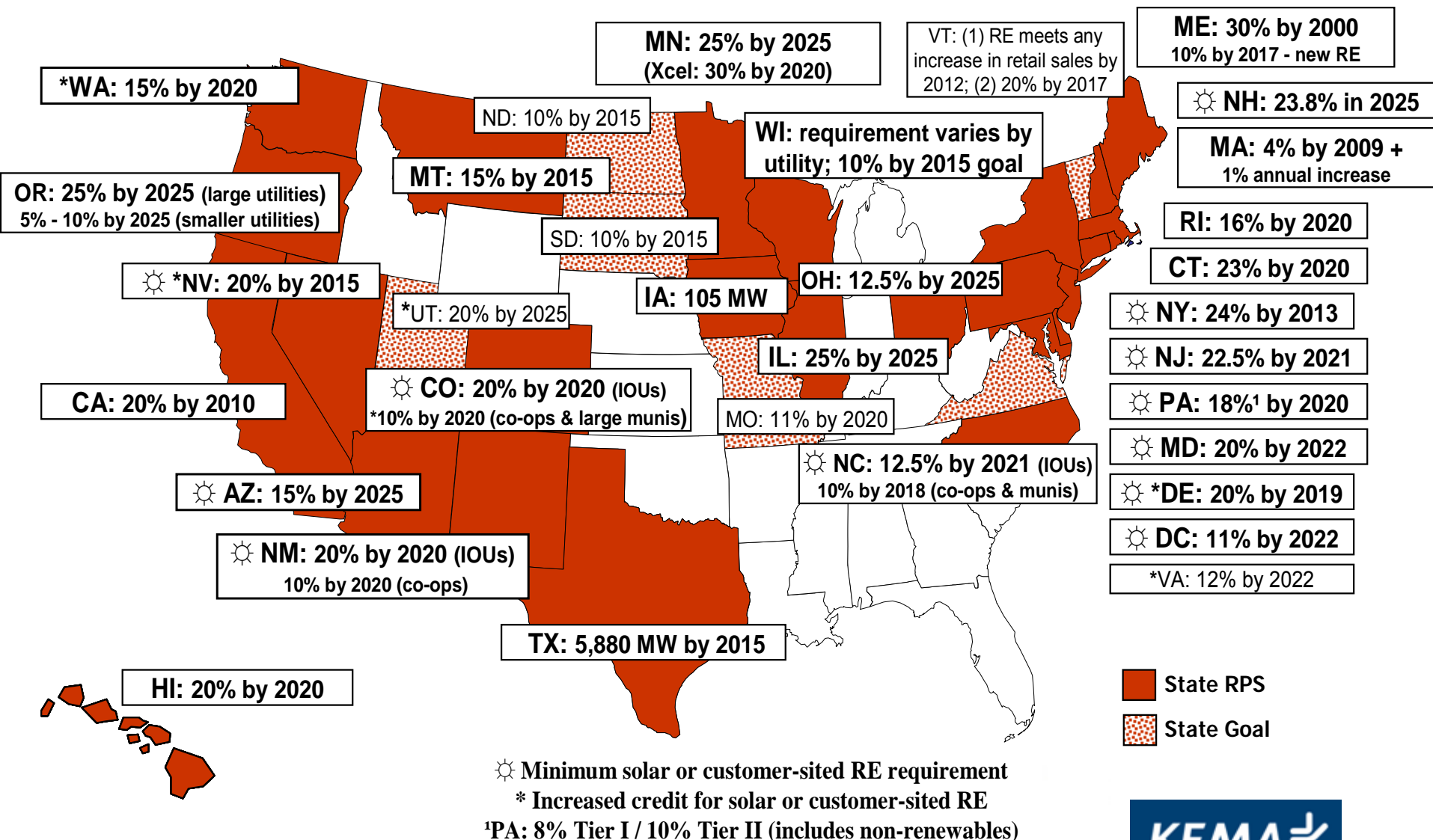


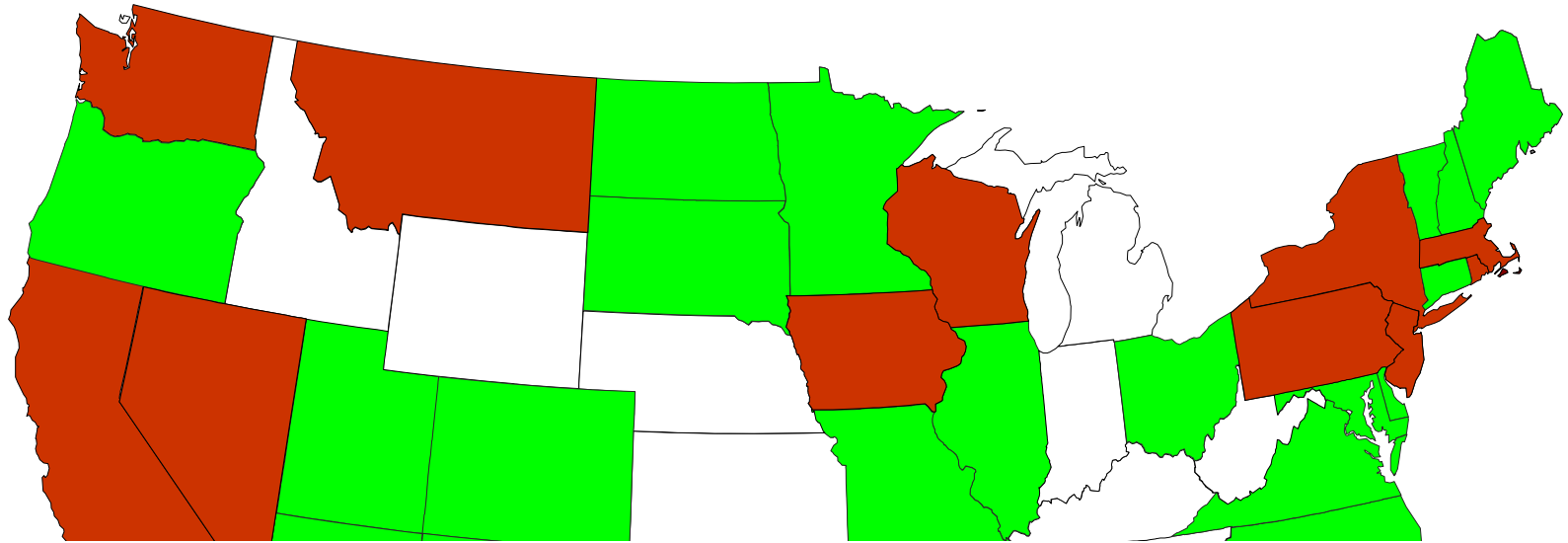
Technology	Wind, Biomass, Solar
Tariff	\$0.0575 CAD + \$0.02 tied to CPI
Cap	System: Not < 100 kW Total: 15% renewables penetration for wind
Contract length	20 years

Feed-in tariffs in the U.S., then...

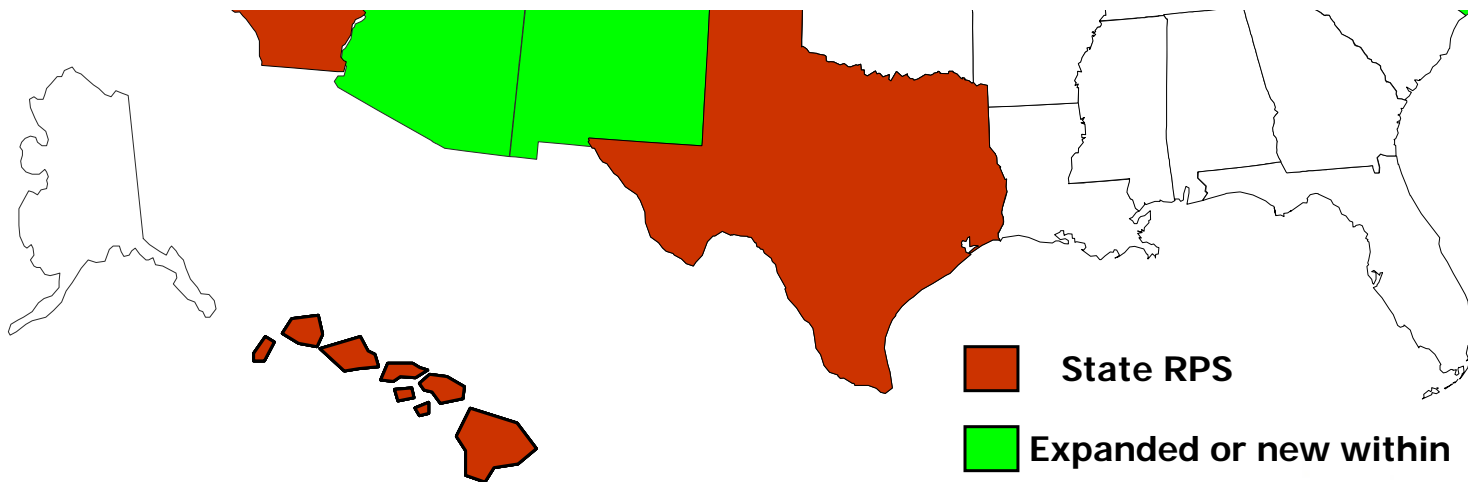
- PURPA
 - Standard Offer No. 4
 - New York Six Cent Rule

Feed-in tariffs in the U.S., now...



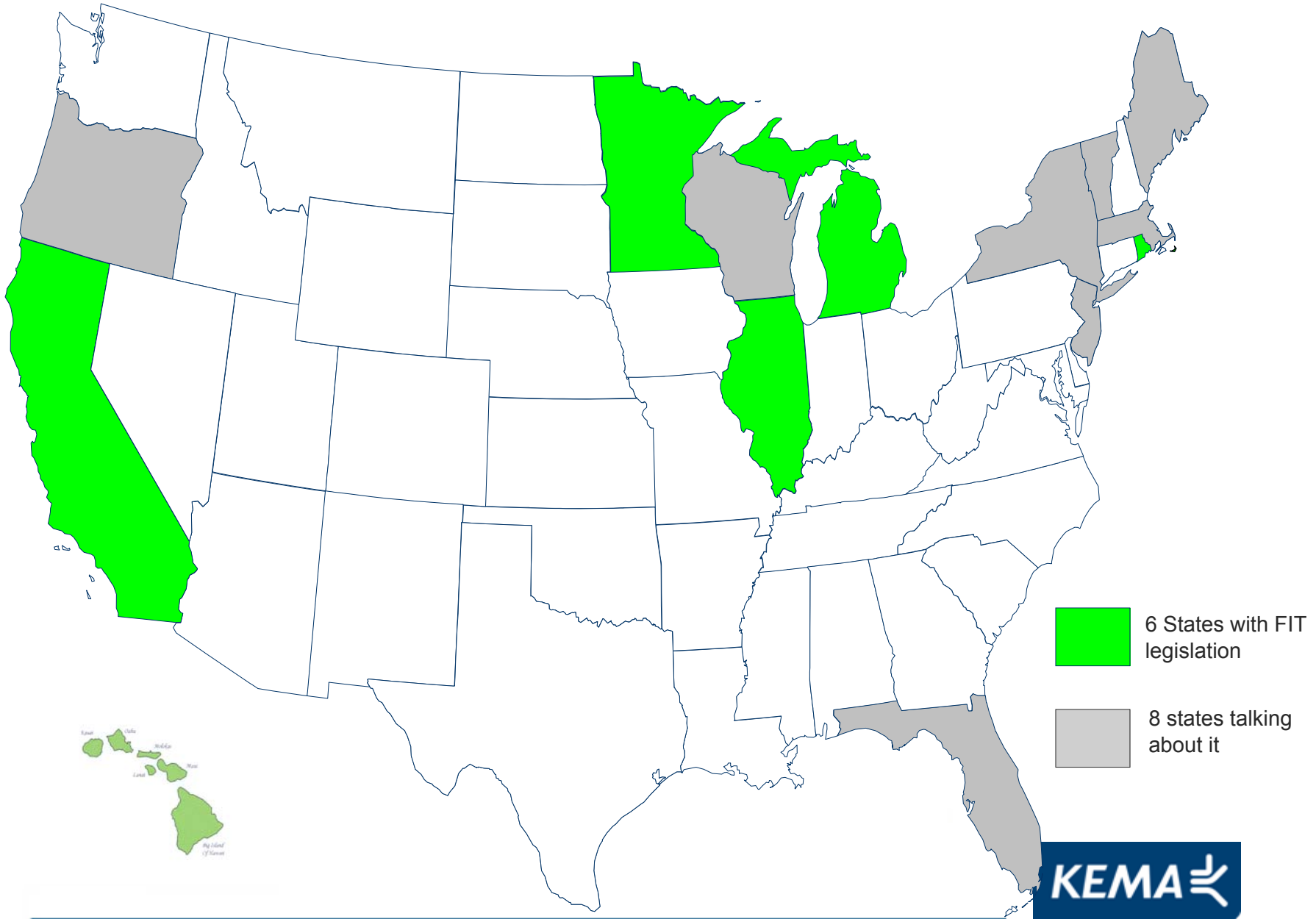


Trend toward technology differentiation and long-term contracting in US RPS



■ State RPS
■ Expanded or new within
the last 24 months

Feed-in Tariffs under Consideration



The Michigan Model

- Michigan, Illinois, Rhode Island, Minnesota bills proposed
 - Feed-in tariff based on European model
 - 20 year contracts
 - \$0.08 to \$0.14/kWh wind/biomass (\$0.25/small wind)
 - \$0.48-\$0.71 for PV
 - Minnesota: Only community-owned wind



Hawaii Bills

- Premium net metering for PV only
- 20 year contracts, \$0.70/kWh PV (HB 1748, SB 1223, SB 1609)
- \$0.45/kWh PV (HB 3237)



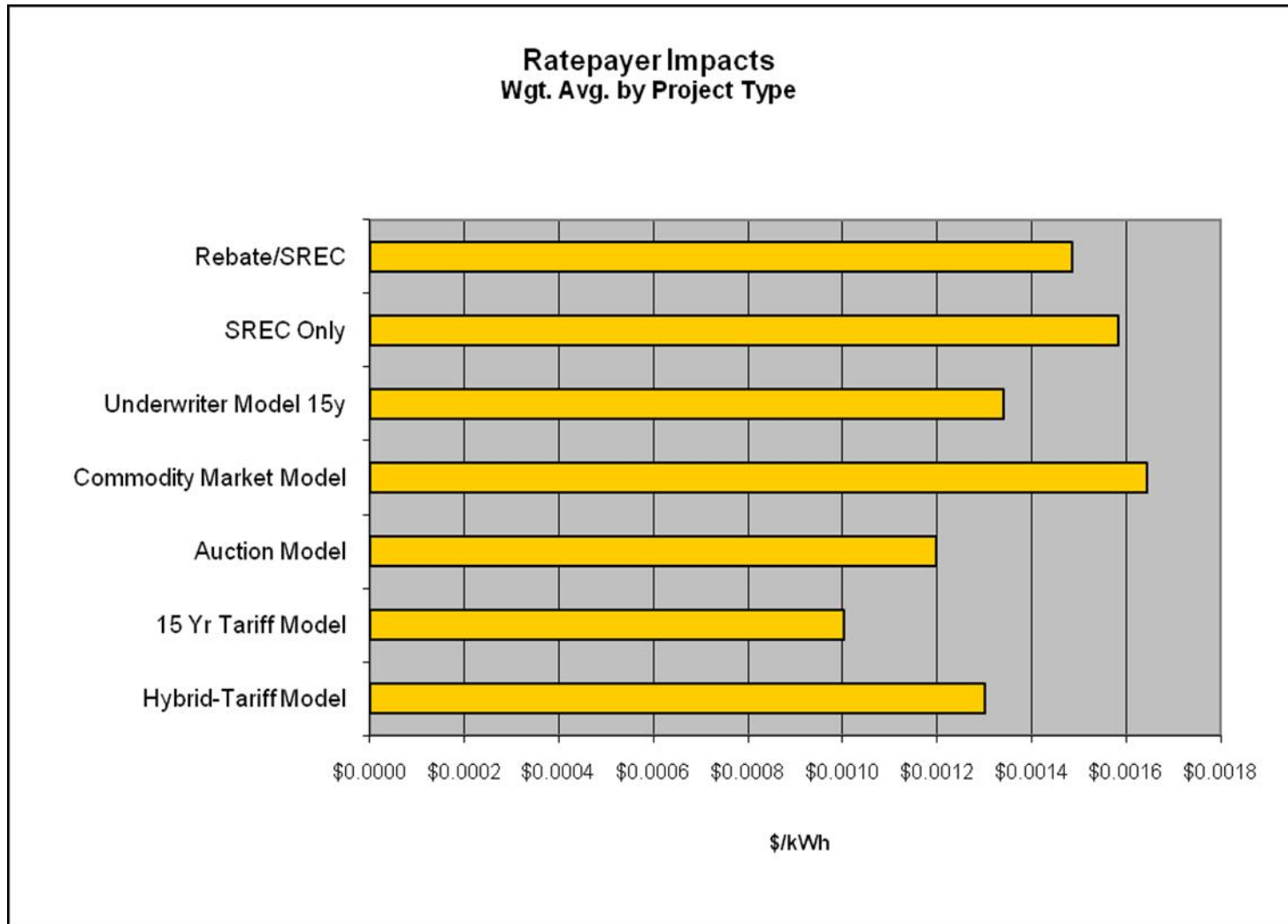
Feed-in Tariffs under Discussion in California

- **California Solar Initiative**

“PG&E supports consideration of a feed-in tariff as a potential solution to the current tension surrounding...various subsidies supporting solar generation... The various incentives including the CSI and net metering could be combined into a single incentive structure that declines over time.” February 24, 2006

- **AB 1969 (Yee) and CPUC Order No. 07-07-027**
- **2007 IEPR**
- **SB 451 (Kehoe) of 2007**
 - Would have raised cap to 1,000 MW
 - Vetoed because of REC rights
- **SB 1714 (McLeod) of 2008**
 - Initially specified fixed prices (\$0.35 and \$0.12/kWh)
 - Amended to request that CPUC set prices
- **SB 1807 (Fuentes) of 2008**
 - Would require CPUC to set prices based on generation costs

New Jersey Analysis Suggests Solar Feed-in Tariff has Lowest Ratepayer Impact of Models Considered



A Federal Feed-in Tariff?

Rep. Inslee's Federal REP Bill

The Renewable Energy Jobs and Security Act

- **Introduced by Congressman Jay Inslee (D-WA) in June, 2008**
- Uniform national standards for priority interconnection and transmission of power from new “renewable energy facilities” (REFs) below 20 MW.
- 20-year fixed-rate contracts.
- Uniform national Renewable Energy Payment (REP) rates would be set by FERC for a 10% internal rate of return on investments
- REP rates would be differentiated by the technology and size of facility
- Utilities would be reimbursed through a privately-run national renewable energy corporation (RenewCorps)
- RenewCorps would use a system benefits charge payable by every electric consumer in the U.S. to redistribute costs by region



Questions?

Thank you for your attention.