Exploring Feed-in Tariffs for California

CEC Feed-In Tariff Workshop
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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

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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

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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.)

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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)

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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

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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)

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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

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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

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Feed-in Tariffs Internationally

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

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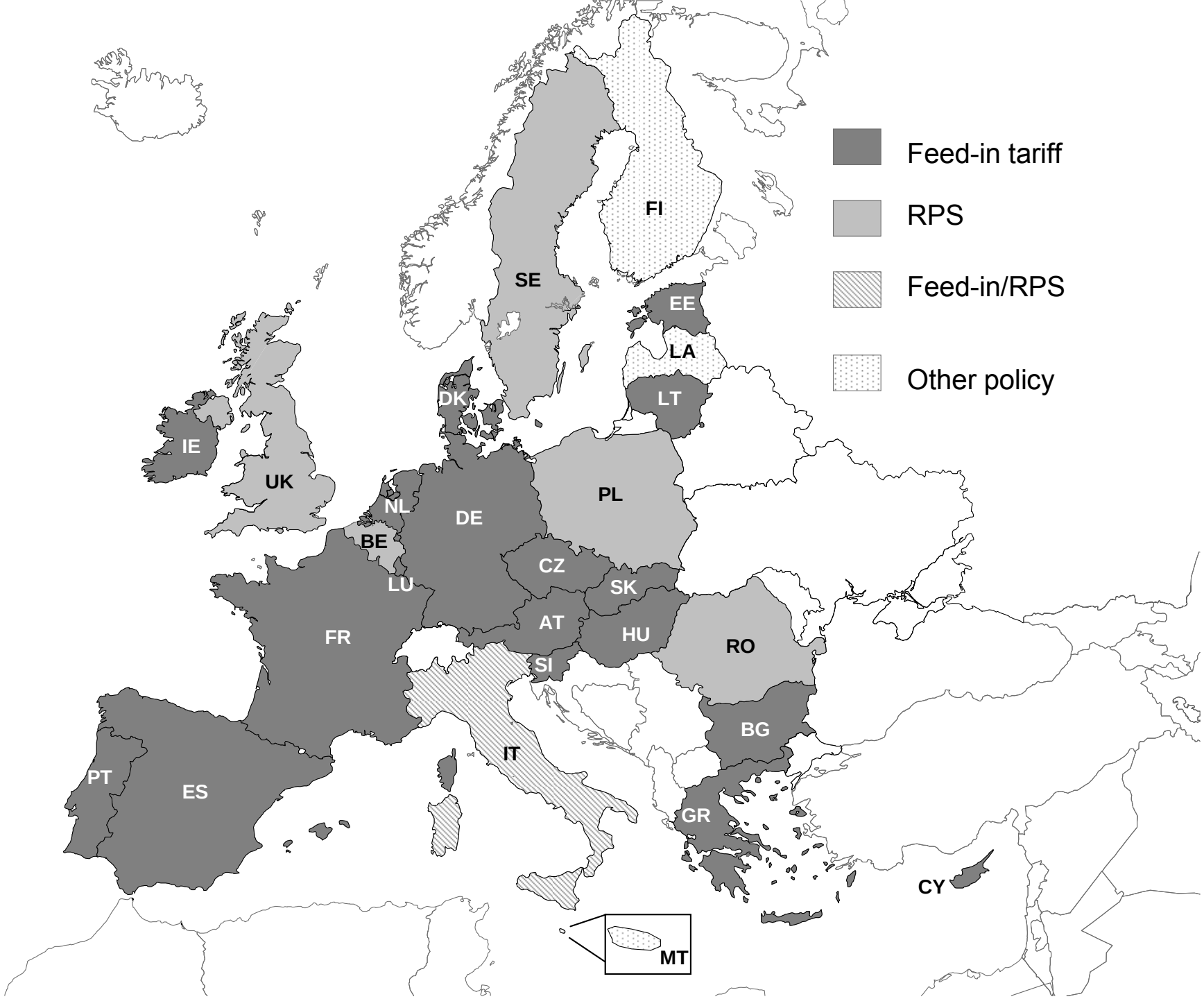
Feed-in tariff
RPS
Feed-in/RPS
Other policy
FI
SE
EE
LA
LT
DK
IE
UK
NL
DE
PL
BE
CZ
LU
SK
AT
HU
FR
RO
SI
BG
IT
PT
ES
GR
CY
MT

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

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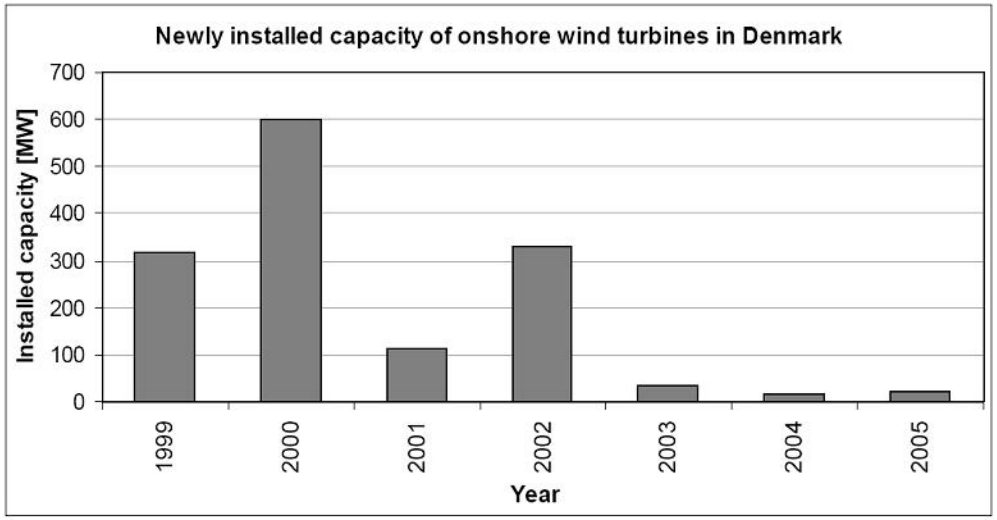
DENMARK

•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

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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%+)

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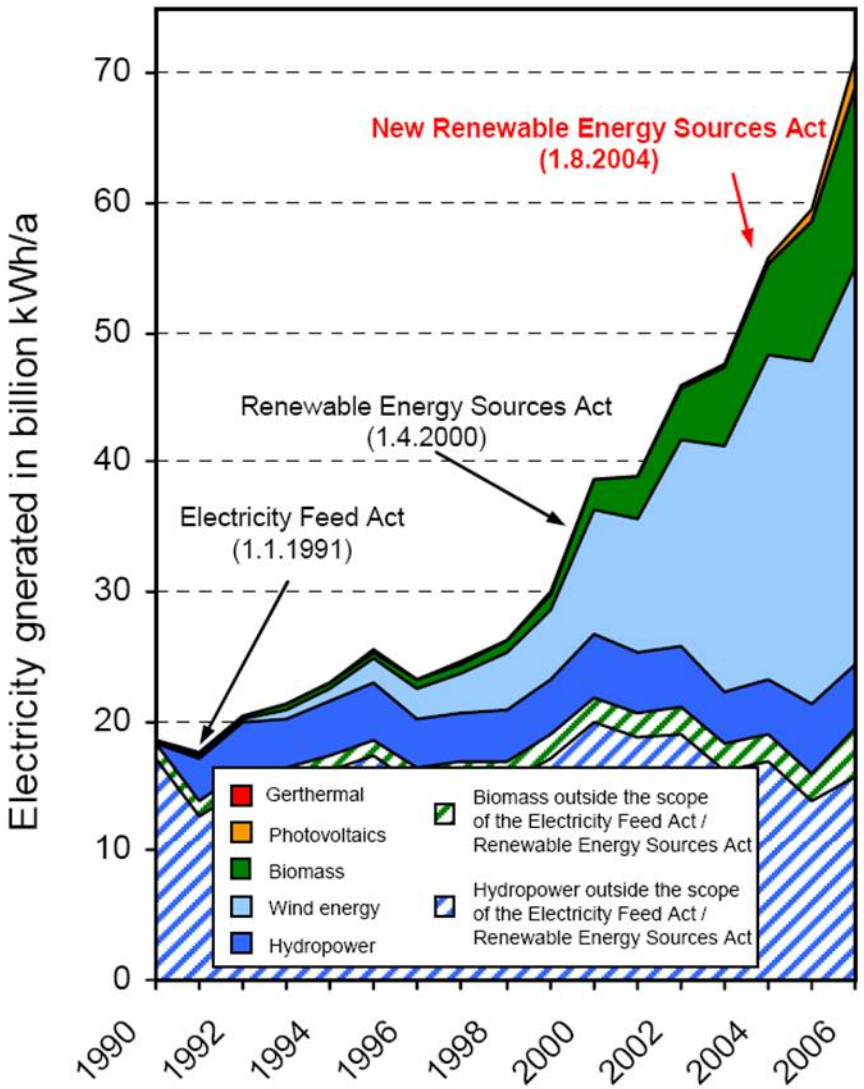
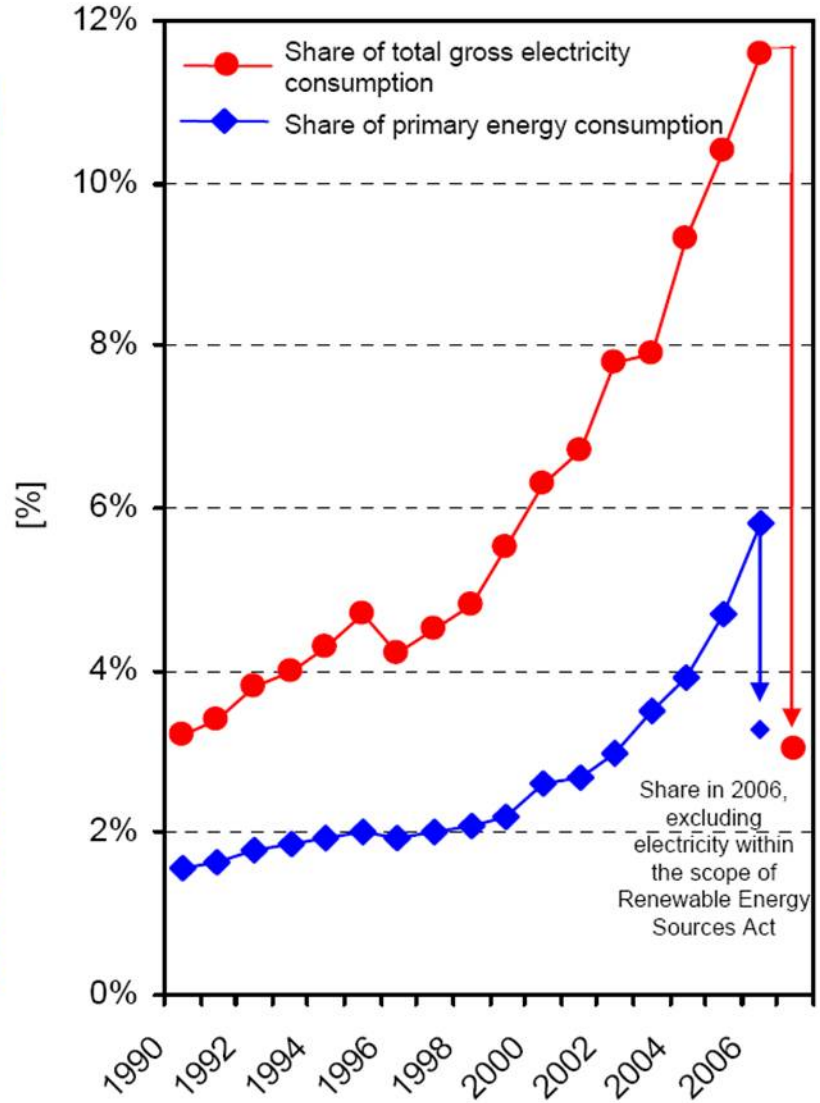
Germany Achieves Renewable Energy Targets ahead of Schedule under Feed-in Tariff





14% in 2007

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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

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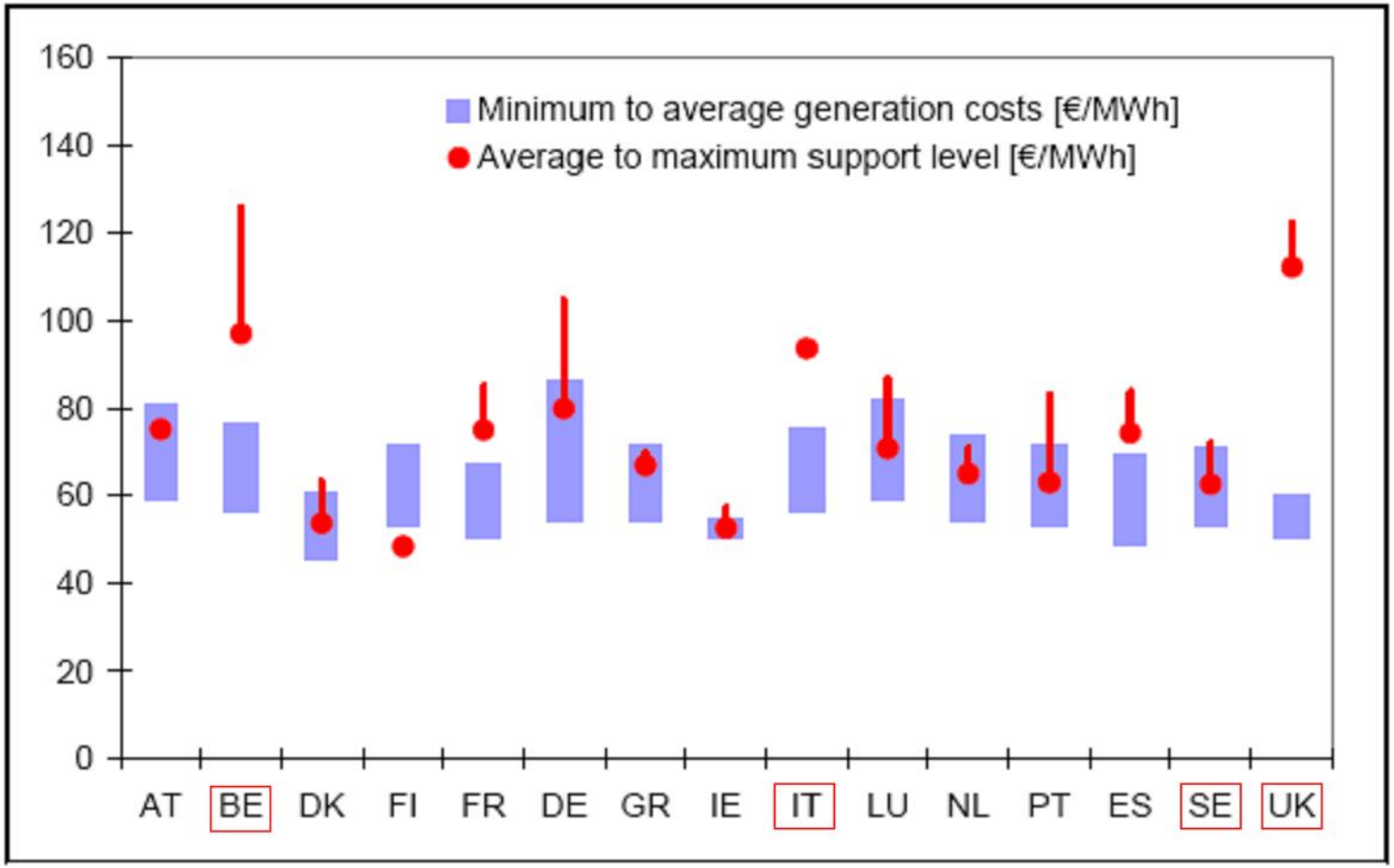
Feed-ins “achieve larger deployment at lower costs.” - Nicholas Stern



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!

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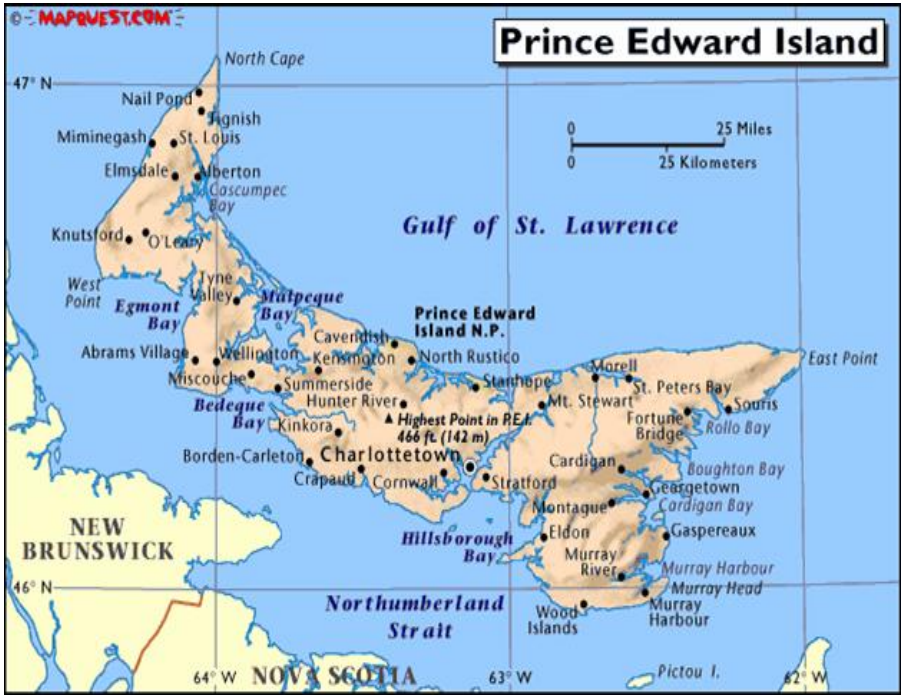
Feed-in Tariffs in North America?

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…

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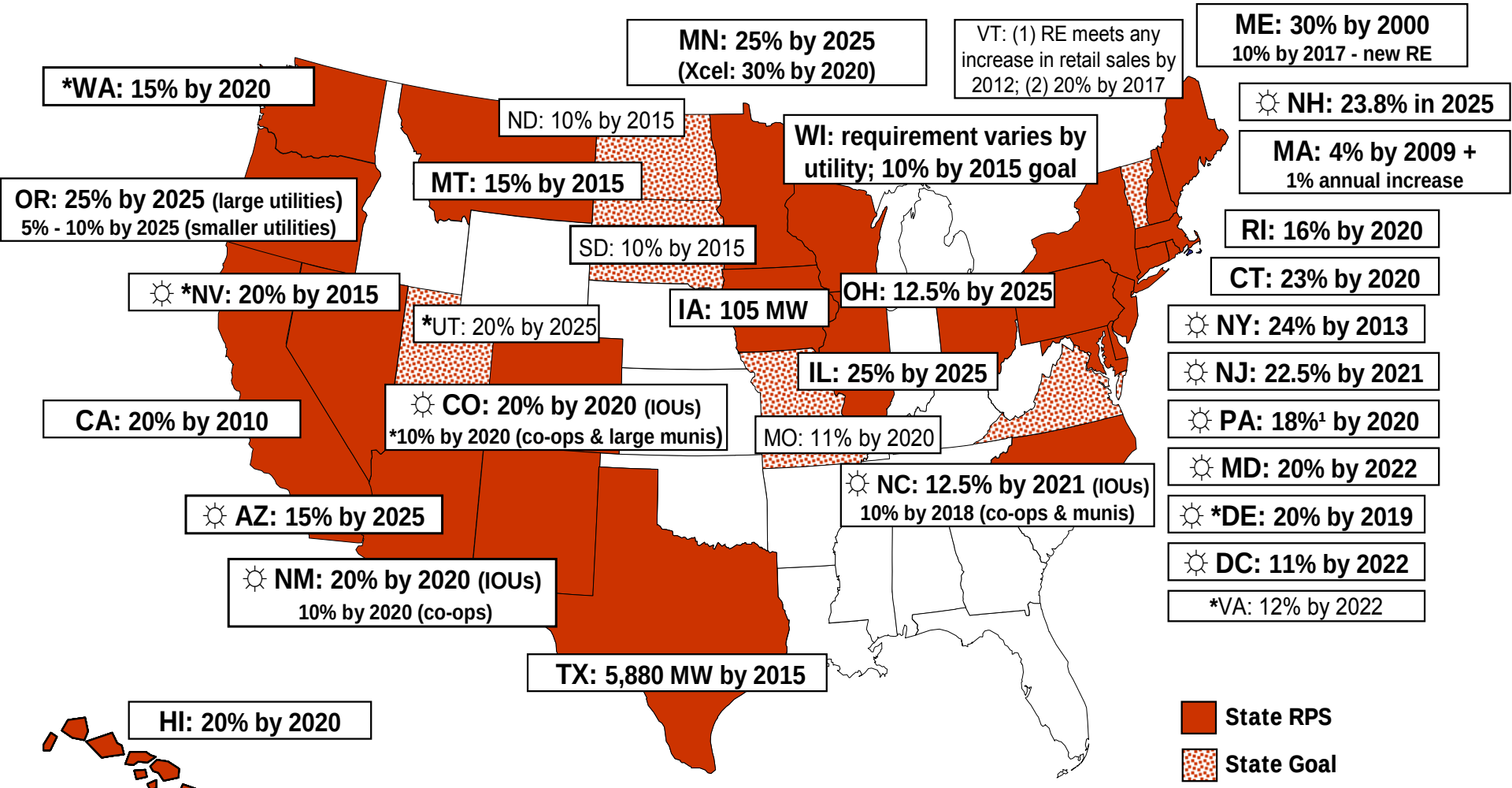

☼ Minimum solar or customer-sited RE requirement
* Increased credit for solar or customer-sited RE
¹PA: 8% Tier I / 10% Tier II (includes non-renewables)

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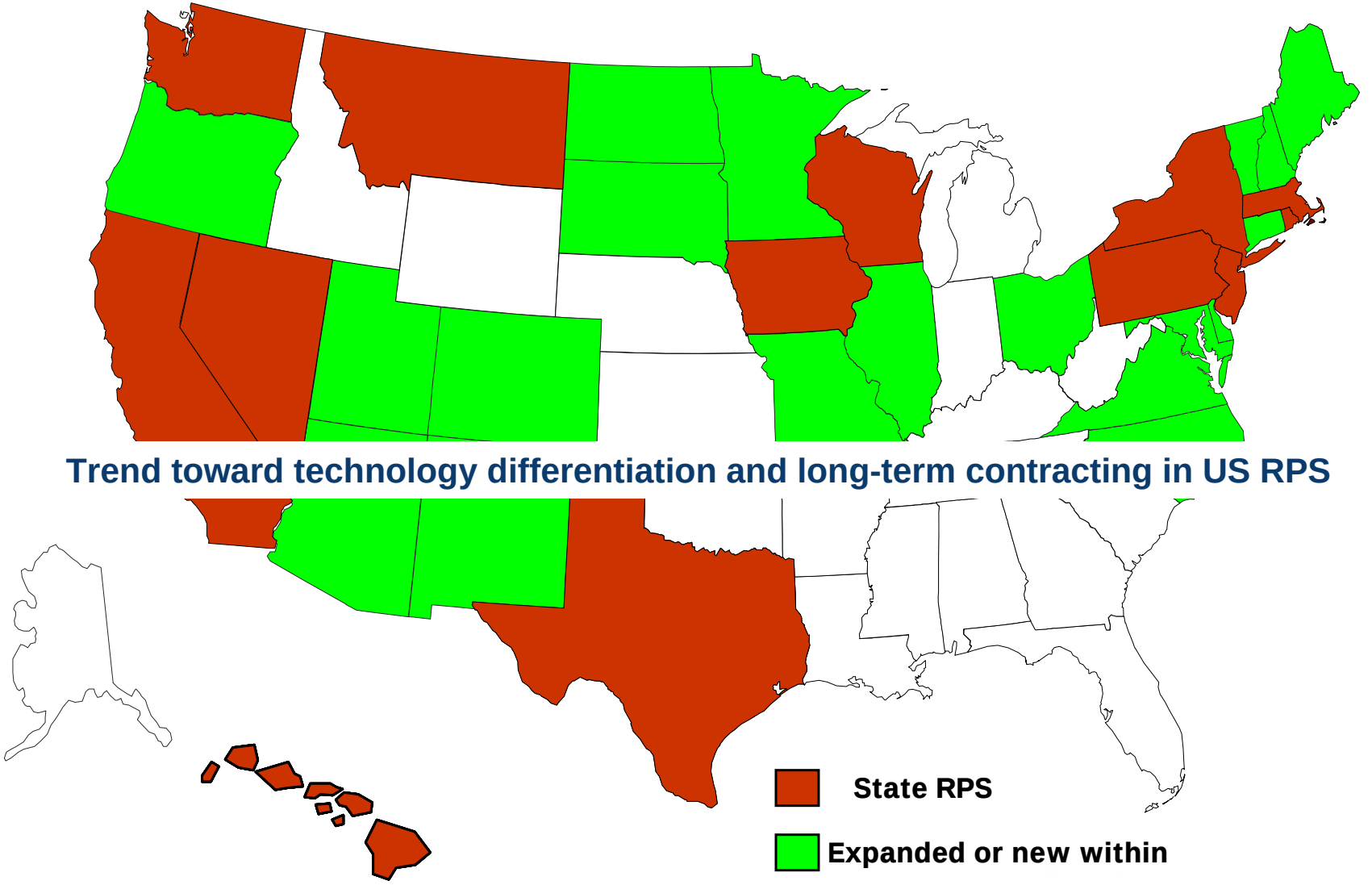

Trend toward technology differentiation and long-term contracting in US RPS

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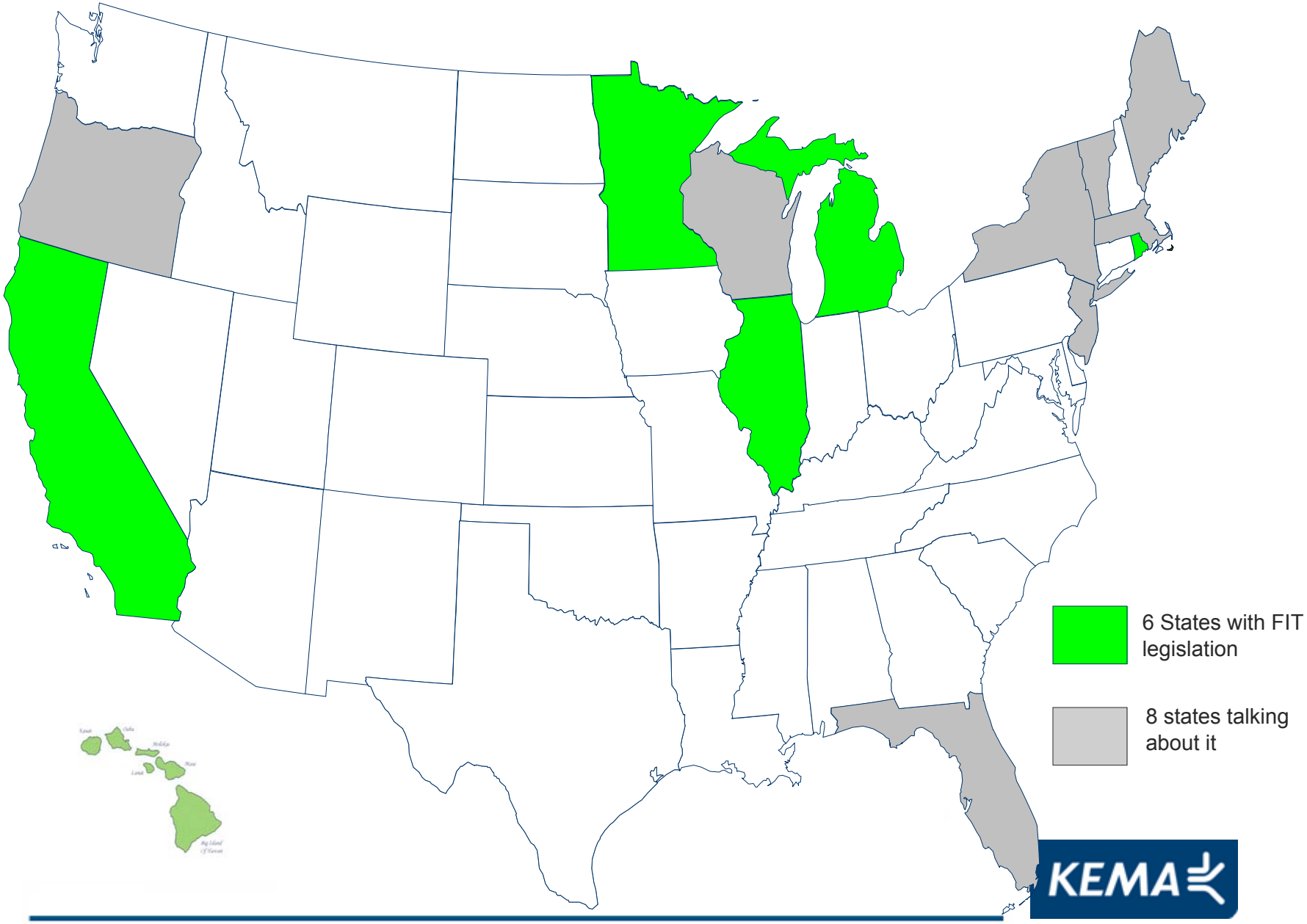
Feed-in Tariffs under Consideration



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

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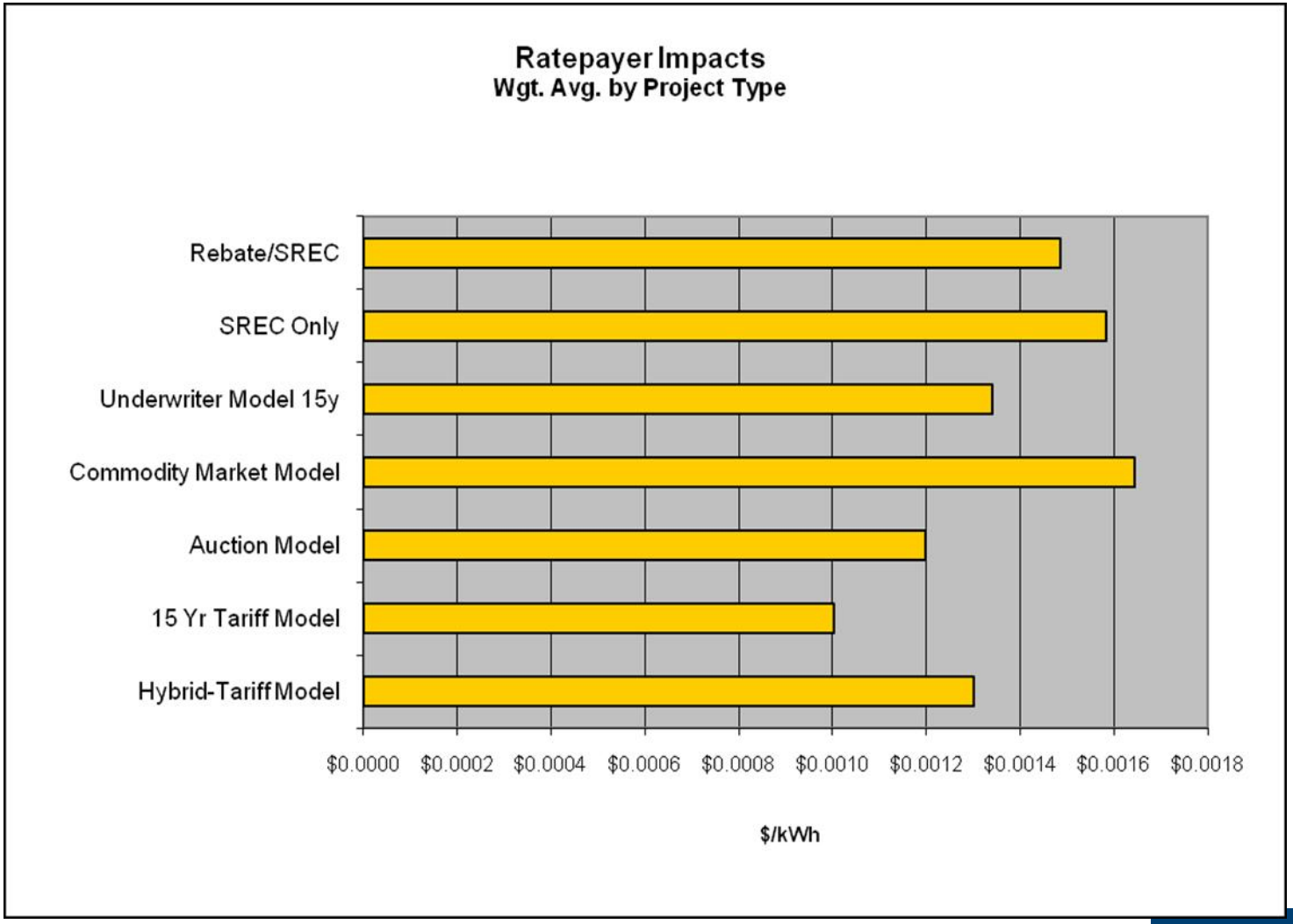
New Jersey Analysis Suggests Solar Feed-in Tariff has Lowest Ratepayer Impact of Models Considered



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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

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Questions?

Thank you for your attention.