Feed-in Tariff Design Implications for Financing of Renewable Energy Projects Over 20 MW

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Objectives

- To explore the impact of Feed-in Tariffs ("FITs") on financing new renewable energy ("RE") generators in excess of 20 MW
  - not a comprehensive FIT design review for RE generators > 20 MW
- Summarize current conditions in RE finance markets
- Discuss policy, market & infrastructure conditions necessary to attract lowest cost financing for RE projects
- Outline specific Feed-In Tariff ("FIT") options and financing implications
- Recommend FIT design characteristics that:
  - enable RE projects > 20 MW to access lowest-cost capital
  - address stakeholder interests to maximum extent possible
  - could be applied to Competitive Renewable Energy Zones ("CREZ")

What is the current financing challenge?

RE finance: U.S. landscape

	Pre-Crisis (up to mid-2008)	Post-Crisis (Current)
Market Characterization	• Tax-based incentives • Well-defined structures • Moderate investor risk tolerance	• Tax-based incentives → Grant in lieu of ITC provides temporary cash incentive • Overall market uncertainty • Re-evaluation of structures: lease vs. partnership flip (PTC-based projects) • Low investor risk tolerance
Capital Supply and Demand	• Capital supply exceeds demand (fewer projects than investment $)	• Capital demand exceeds supply (fewer investment $ than projects)
Tax Equity	• Robust market • Many participants • Low-cost	• Severely limited supply (consolidation, loss of tax appetite) • Few participants • High cost
Debt	• Robust market • Long tenors (~15 year) available • Low spreads	• Limited supply • Shorter tenors (5-7 year "mini-perms") • Widening spreads offset low cost of borrowing
Development Activity	• Ever increasing number of projects in development	• The pace of development has slowed considerably
Overall	• Capital readily available • Many types of products available • Low cost of capital • Creative structuring	• Limited capital available • Reduced number of products (e.g. turbine financing) available • High cost of capital • "Flight to quality" (only best projects financed)

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RE finance: U.S. landscape

- American Reinvestment & Recovery Act
  - Extends PTC, and offers optional ITC or Cash Grant in lieu of PTC for projects in construction by year-end 2010
  - Creates $6 billion government loan guarantee program
  - Bonus depreciation for projects in-service by year-end 2009
- Near term market drivers
  - ITC and Cash Grant: increases financing options (e.g. lease transactions for wind); increases pool of investors; eliminates production risk
  - Reduced access to development capital slows the new project pipeline
- Longer-term trends
  - Discussions of national RPS and Carbon Cap & Trade
  - Sunset date on Cash Grant may suggest continued tax-based incentives; however, limited tax appetite and budgetary constraints may require transition to policy-based incentives such as RPS, FIT and/or Carbon Cap & Trade
- Summary
  - The current supply of capital is limited, and costlier than pre-credit crisis, with only the best projects being financed
  - The number of financial products (e.g. turbine financing) is reduced
  - Long-term recovery will be driven by regulatory policy and general economic conditions

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How to minimize the cost of financing RE?

Identify and mitigate risk

- Policy Maker Influence = Policy Maker Ability to Increase or Decrease Risk
- The decision to invest is an evaluation of the combined risk relative to the return
- In general, the greater the risk the higher the required return

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Risks associated with RE financing (1)

	Risk	Mitigation Strategy	Policy Maker Influence
Development (Timing)	• Project will be delayed or not be completed at all • Missed milestones increase (1) cost of development capital, risk of achieving permanent financing; (2) exposure to contractual penalties (liquidated damages), loss of security, off-take contract termination risk	• Clearly defined process for siting, permitting and interconnection • Off-take contract (contract for the sale of electricity and/or RECs) flexibility in commercial operation date	• High
Development (Contracting)	• Investment in development, proposal development, contract negotiations without yielding off-take agreement	• Assured access to off-take contract	• High
Contract Price Risk	• Setting a firm power purchase price before development contingencies are resolved and project costs fully known	• Minimize time gap between finalizing project costs and financial closing	• High
Revenue	• Adequacy of revenues to provide target returns • Revenue volatility	• Long-term fixed-price contract for both energy and RECs	• High
Operating	• Min. availability, performance penalties • Project curtailment (adds volume risk)	• O&M contract guarantees • Off-take contract operational performance flexibility • Priority dispatch or curtailment limitations/compensation	• High

Risks associated with RE financing (2)

	Risk	Mitigation Strategy	Policy Maker Influence
Regulatory	• Incentive structure that is short-term focused, unstable, and not transparent	• Long-term, stable and transparent incentive structure	• High
Transmission & Interconnection	• Cost allocation exceeds pro forma	• Fix cost allocation • Provide contract provisions that enable cost adjustment if allocation is higher than expected	• High
Credit	• Off take counterparty is unable or unwilling to pay	• Entering into contract with investment grade counterparty or securing a like guarantee	• High
Legal	• Time and cost of contract negotiations • Appeals/lawsuits challenging procurement results	• Price incentive policy with a defined process and standardized contract	• High
Construction	• Delays and cost overruns	• Fixed-price date-certain construction contract	• Low
Resource	• Resource (i.e. sun, wind) is not available as predicted	• Third party independent assessments	• Low
Technology	• Technology does not perform as expected • Contractual damages for performance failures	• Equipment & construction contractual guarantees and warranties	• Low

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How does a FIT minimize risk?

- It depends on design

Why minimize risk?

- To reduce cost of energy
- To increase likelihood of financing given current market low risk tolerance levels

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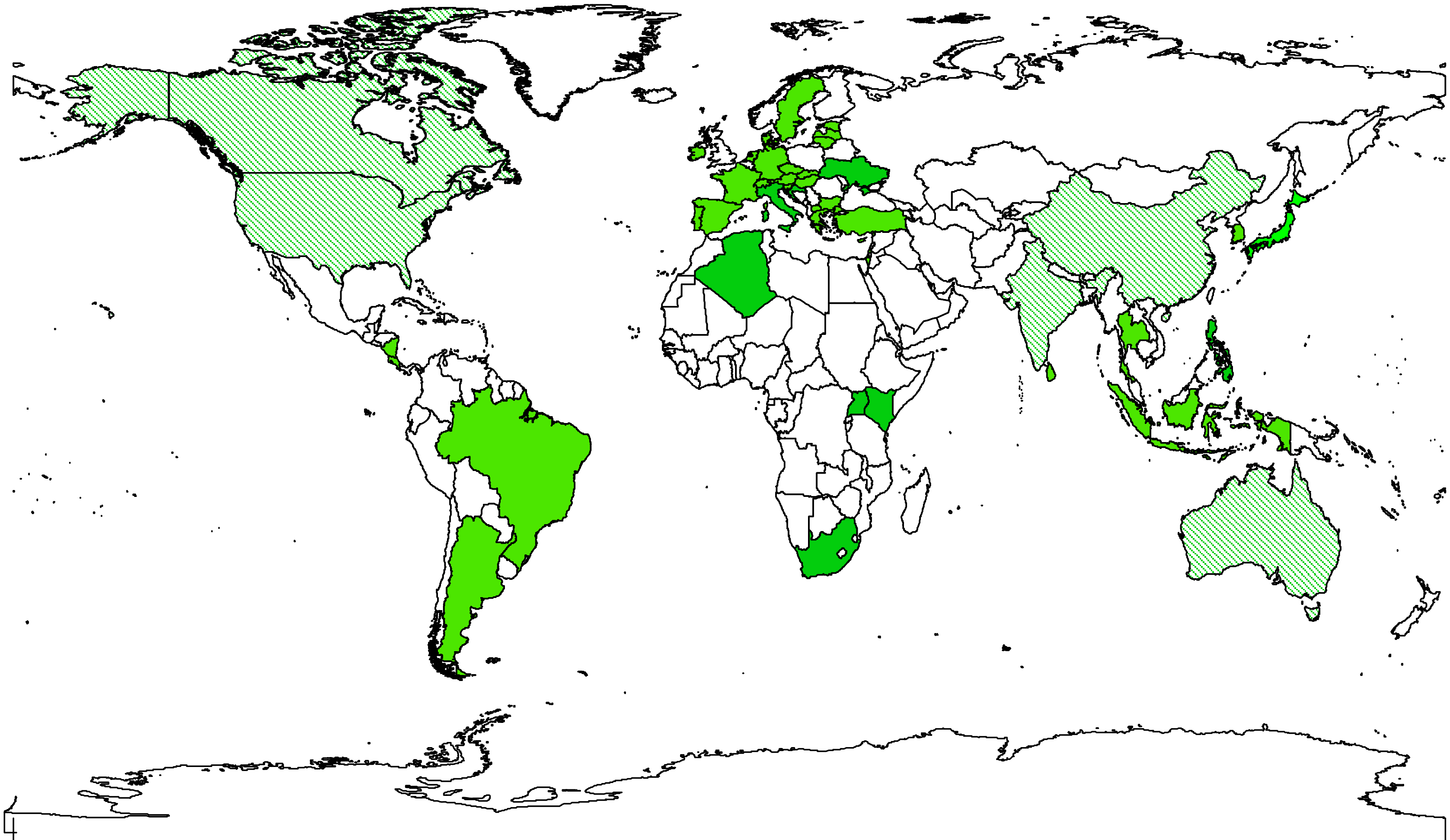
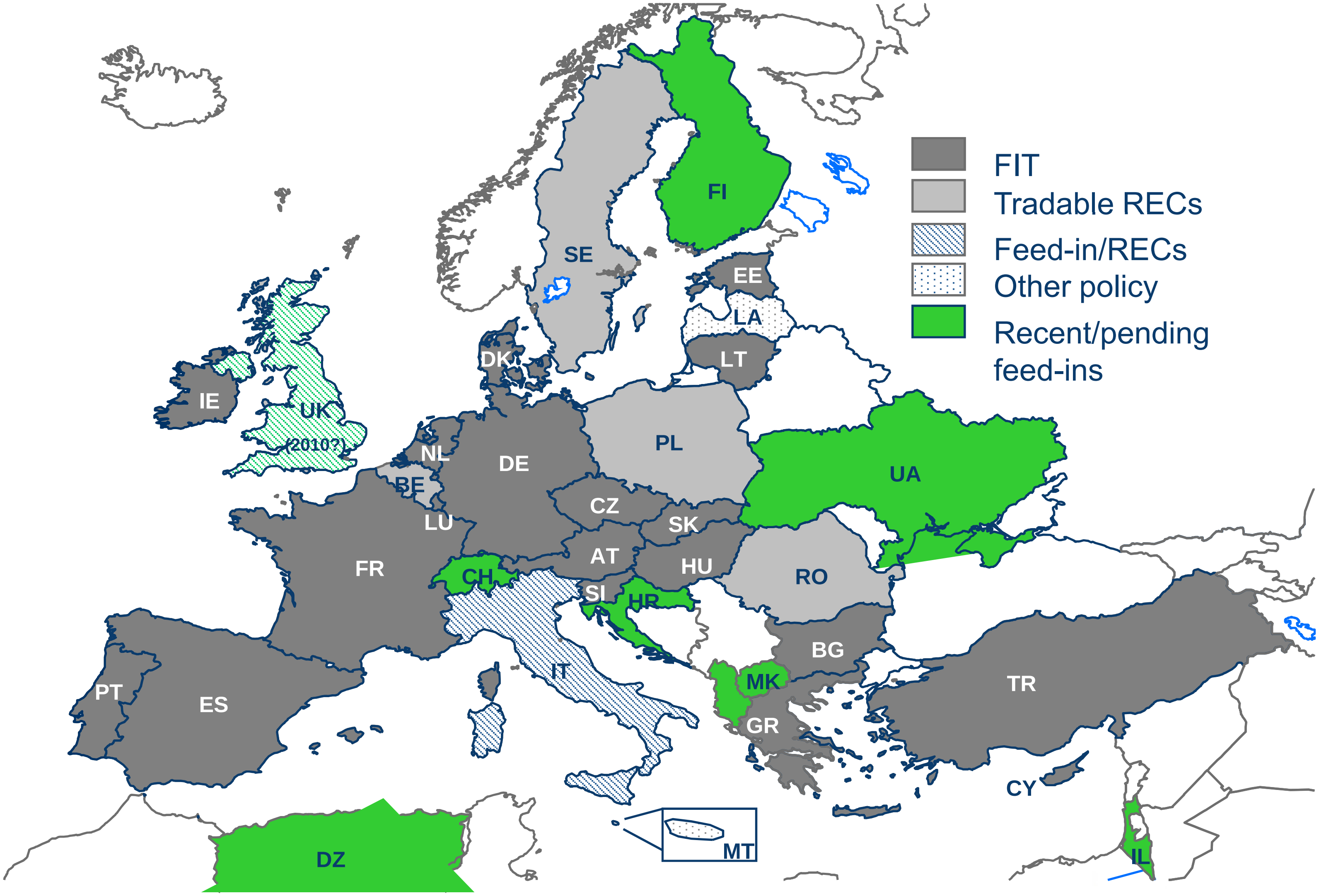
FITs worldwide



National Feed-in Tariffs
Regional Feed-in Tariffs

Source: REN21. (2009). Renewables Global Status Report: 2008.

FIT design varies widely in Europe



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Characteristics of successful European FITs[1]

- Tariff is guaranteed and binding
- Fixed-price payment ($/kWh)
- Long-term (e.g. 20 years)
- Guaranteed interconnection
- Must-take requirement for power
- Prices based on generation cost
- Differentiated
  - By technology
  - By size
  - By application, by fuel, by resource
- Rates for new projects adjust over time

[1]As defined by the European Commission, International Feed-in Cooperation, and others

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Achieving lowest-cost financing via FITs

- Investor confidence is determined by both price and policy certainty
- FITs providing transparency, stability and simplicity will drive long-term, lowest-cost financing
- General FIT characteristics beneficial for capital providers:

General Characteristic	Financing Perspective
Regulatory Stability	• Avoid boom-bust cycles (i.e. PTC) • Policy adjustments should be limited in frequency and market-based • No adjustments (other than inflationary) for operating projects
Long-Term Political and Societal Support	• Long-term contracts are a financing necessity • Pricing that provides a fair rate of return will attract a broader pool of investors • Necessary government guarantees and support
Simplicity	• Incentive structure simplicity lowers cost and decreases time to completion • Complexity acts as a barrier to entry for many investors
Transparency	• A clearly defined policy allows for assessment of risk
Price and Contract Certainty	• Mitigating contracting risks reduces development financing cost magnitude and risk exposure (cost) • Investors will not take market price risk • Creditworthy contract counterparty
Interconnection	• Minimize curtailment (eliminate volume risk) • Clarity on interconnection cost allocation

Key FIT design characteristics and financing implications – Structure

Characteristic	Options	Financing Preference	Financing Implication
Setting Price & Tariff Differentiation	Value, Cost of Generation, Competitive Bench Marks	Cost-based pricing designed to ensure reasonable profitability;	Ensuring sufficient return is very important for securing financing
Tariff Structure	Fixed, Stepped Fixed, Fixed Premium, Hybrid, Contract for Differences	Options fixing all revenues are preferable to those fixing part of revenue (e.g. fixed premium) (consider inflation indexing O&M portion)	Price certainty and stability, even if there is step down, is valuable for financing
What is Being Sold	Bundled, Unbundled	Bundled	A bundled product reduces exposure to market price counterparty credit risk
Quantity and Cost Limits	Capacity Cap, Generation Cap, Cost Cap	No limits, or ample notice of changes	Quantity limits, if any, need to be clearly defined, transparent and stable
Queuing	Application Fee, Performance milestones, Fee for Extensions	Only as needed to address quantity/cost limits or declining tariff rates	Queuing protocols need to be clearly defined, transparent to discourage speculative queuing and ensure stable eligibility requirements

Key FIT design characteristics and financing implications – Contract Terms & Conditions

Characteristic	Options	Financing Preference	Financing Implication
Counterparty (follows from cost allocation policy decision)	Who Buys, Who Pays, Cost Recovery	Credit-worthy entity and collection mechanism not exposed to revision during contract term	Need to ensure that the buyer of the power is a creditworthy counterparty or have additional contractual guarantees from a creditworthy entity for life of contract
Contract Duration	Short-Term (3-7 yrs), Medium-Term (10-14 yrs), Long-Term (15-20 yrs)	Long-Term , accounting for fuel price risk where applicable	Long-term (i.e.20-year) contracts will reduce risk and enable the most favorable & lowest-cost financing terms, accounting for fuel price risk, if applicable
(Pre-Operational) Development Credit and Performance	Deposit Requirements, Financial Information, Development Security	No credit, security or development milestone performance requirements*	Imposing substantial credit requirements or development milestones would eliminate potential to mitigate development risk
Operational Collateral or Security	Operational Collateral & Liquidated Damages	Must-take: no minimum performance requirements or associated liquidated damages/collateral	Mitigating timing and performance risks should lower cost of capital
Contract Breakage Penalty	Explicit contract language; Collateral and Liquidated Damages	Explicit contract language; otherwise, collateral as low as possible to achieve buyer protection	Discourage generator from seeking better price without raising financing cost

* Trade-off with managing queuing issues

Key FIT design characteristics and finance implications – Changes in Available Tariff over Time

Characteristic	Options	Financing Preference	Financing Implication
Price Adjustment Approach	No Adjustment, Fixed with Inflation, Degression, Indexed to Value	If degression required, it is subject to periodic adjustments based on current market conditions (supply & demand, capital cost, financing cost, etc.)	Degression subject to periodic adjustments, or "refresh" of rates, based on market conditions to allow a fair rate of return for new generation will promote continued access to capital
Price Adjustment Timing	Scheduled Reductions, Capacity-Dependent, Administrative Review	Administrative Review	Automatic reductions do not account for market conditions. Administrative Review is acceptable as long as process is clearly defined and transparent
Price Adjustment Magnitude	Experience Curves, Uniform Steps	No preference, as long as periodic adjustment possible to assure sufficient revenue to support financing	Market-based adjustments will support financing. Automatic price reductions, taken outside the context of current market conditions, may create a barrier to financing

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Lowest-Cost Financing (“LCF”) FIT Design Summary

Recommendations specific to FIT elements for maximizing least-cost financing of new RE generators > 20 MW; a comprehensive FIT design must be completed prior to implementation

Characteristic	Recommendation
Tariff Structure	Fixed revenue (consider inflation indexing O&M portion)
Setting Price & Tariff Differentiation	Cost-based
Contract Duration	20 years, accounting for fuel price risk where applicable
Counterparty (Cost Allocation)	Credit-worthy counterparty; Not exposed to revision during term
What is Being Sold	Bundled energy & RECs
Operational Collateral or Security	Must take; no minimum performance
Price Adjustment Approach	Periodic market-based adjustment
Price Adjustment Timing	Administrative review
Price Adjustment Magnitude	No preference as long as revenue supports financing
Development Credit and Performance (Pre-Op)	No credit or performance requirements
Quantity and Cost Limits	No limits
Queuing	To address caps & rate changes only
Contract Breakage Penalty	Explicit contract language
Eligibility	No preference

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How does this LCF design compare with the CA RPS from a financing perspective?

FIT relative to Current CA RPS

Reducing risk lowers cost of financing and thereby reduces generator revenue requirements, increasing probability of project penciling out as viable at a given price.

	Proposed FIT	Current CA RPS*
Development Risk	• Reduced risk if minimal development milestones, and if long-term contract is guaranteed to be available upon project completion	• Increased development risk associated with bid solicitation process
Development Cost	• Reduced by elimination of cost associated with RPS bid preparation and contract negotiation	• Increased costs associated with bid preparation and contract negotiations
Development Life-Cycle	• Shorten development time by eliminating required bid/contracting and re-costing/re-pricing stages (prior to closing)	• Lengthens the development life-cycle, as development is usually slowed or stopped during bid evaluation and contract negotiation
Market Participants	• Increase the number of developers by eliminating market barrier caused by bid process	• Bid process acts as a barrier to entry for small or thinly capitalized developers
Financing	• Increase development and contract certainty, in conjunction with an overall stable and transparent structure, should increase the number of investors	• Capital providers will usually not get involved until after an RFP bid is successful

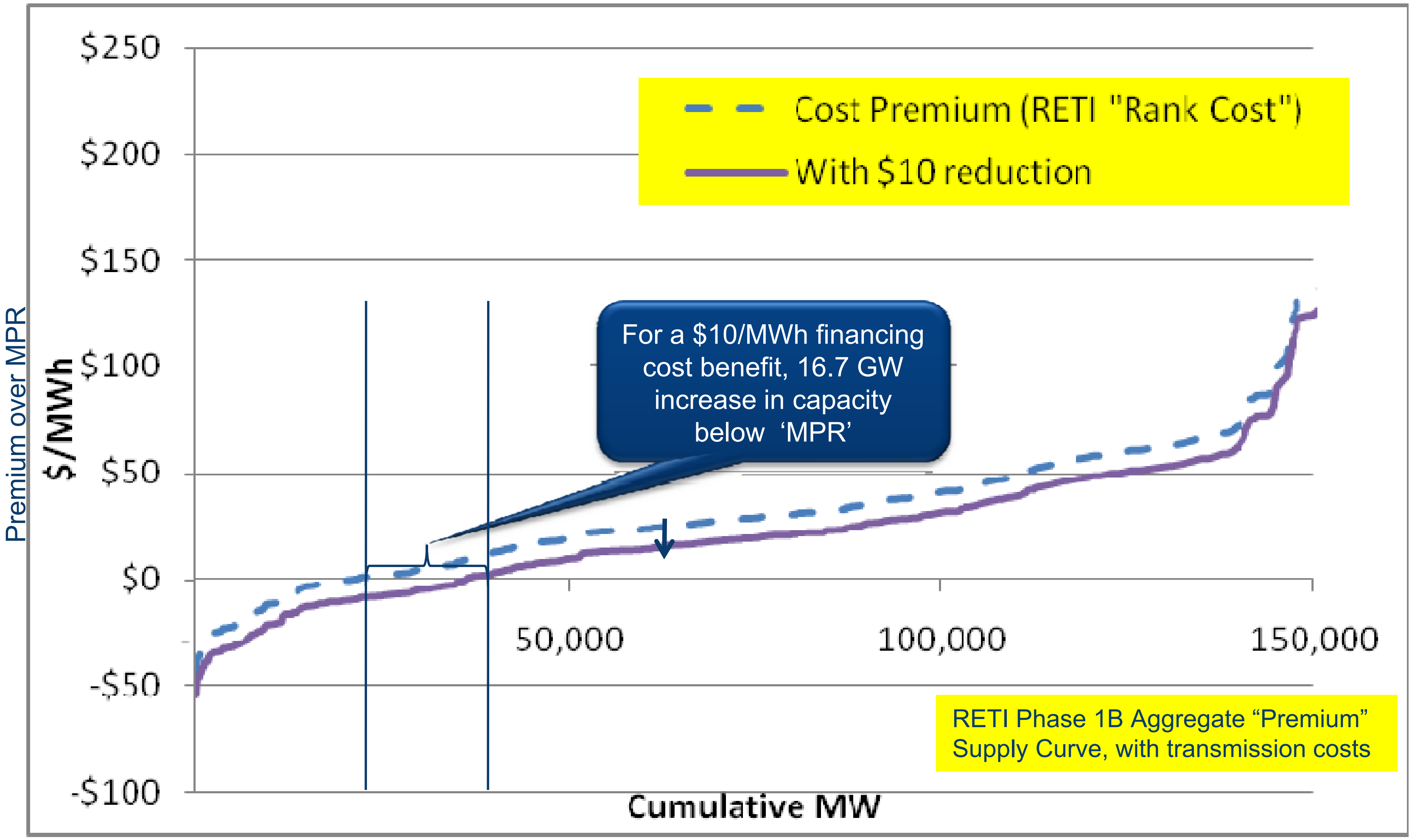
*Includes proposed penalties for under- and non-performance

FIT & Cost of Meeting RE Goals

- What are you trying to accomplish?
  - FITs can allow meeting diversity goals, and growing emerging[1] technologies to reach more cost-effective scale more quickly
  - FITs may allow price differentiation and, potentially, paying less than a competitive solicitation may yield in some cases
- FITs can reduce cost of financing. What are implications?
  - The basis of comparison and details are critical
  - Studies have suggested that cost savings of 10 – 30% may be possible from maximizing investor certainty (de Jager 2008)
  - To illustrate, reducing costs by $10/MWh (on the lower end of this range) could place large parts of supply curve into a more economic range
  - See illustration using RETI supply curves (next page)

1. commercially-proven but currently not cost-competitive under RPS solicitations

Illustration: What if FIT could reduce RE costs by $10/MWh?



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How do other stakeholder concerns relate to financing?

Stakeholder Concerns: A financing cost perspective

- Stakeholder concerns unrelated to FIT policy design
  - Siting
  - Permitting
  - Cost-control
- Stakeholder concerns related to financing[1]
  - Interaction with current RPS
  - Tradable RECs
  - Resource and Transmission Planning
  - Transmission constraints

[1]Drawn from comments prepared for Staff Workshops on Renewable Energy "Feed-in Tariffs" (June 30, October 1, and December 1, 2009) by PG&E, SDG&E, SCE, Alliance for Retail Energy Markets, Western Power Trading Forum, and Constellation

RPS – FIT Interaction > 20 MW

Issues with contemporaneous applicability:

- Could create additional opportunities for developers between RPS cycles without detracting from RPS solicitations, or
- Could result in projects gravitating toward whichever avenue – FIT or requests for offers (RFOs) – offered more lucrative contracts, to the exclusion of the other
- Where technology-specific FIT price is higher, this is a policy decision to encourage that technology beyond the level under RFO
- When FIT might be below an RFO price outcome (MPR), developers might either participate in RFO-only, or prefer the terms and conditions and avoided transaction costs, and certainty of FIT even if price might be lower than a possible RFO contract price

Mitigation:

- Options may be limited, but deserve further study
- Impose restrictions, e.g. once participate in RFO and have contract, may not change to FIT (and vice versa)
- Limit FITs to priority CREZ(s) near permitted transmission line; competitive RFO elsewhere

Interaction with tradable RECs

- In most current Power Purchase Agreements RECs are bundled with electricity and sold in long-term contracts, so the existence of RECs by themselves will not be likely to aid project financing
- The sale of RECs and electricity as separate, unbundled commodities increases investor risk – even under long-term contracts
- Short-term REC markets are inherently risky and therefore lead to higher risk premiums and financing costs
- Financiers deeply discount projected revenues from spot-market sales of short-term RECs
- Empirical studies from the International Energy Agency, European Commission, and others have demonstrated that spot tradable REC markets are less cost-efficient than policies based on solicitations or FITs[1]

[1] Commission of *the European Communities. (2005). The support of electricity from renewable energy sources. Brussels. Summit Blue Consulting, & Rocky Mountain Institute. (2007). An analysis of potential ratepayer impact of alternatives for transitioning the New Jersey solar market from rebates to market-based incentives (Final Report). Boulder, CO: Summit Blue Consulting. Prepared for the New Jersey Board of Public Utilities, Office of Clean Energy; de Jager, D., & Rathmann, M. (2008). Policy instrument design to reduce financing costs in renewable energy technology projects. Utrecht, the Netherlands: Ecofys International BV. Prepared for the International Energy Agency, Renewable Energy Technology Development*

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How can utilities plan for the price paid, location and total amount of renewable energy interconnected through FITs?

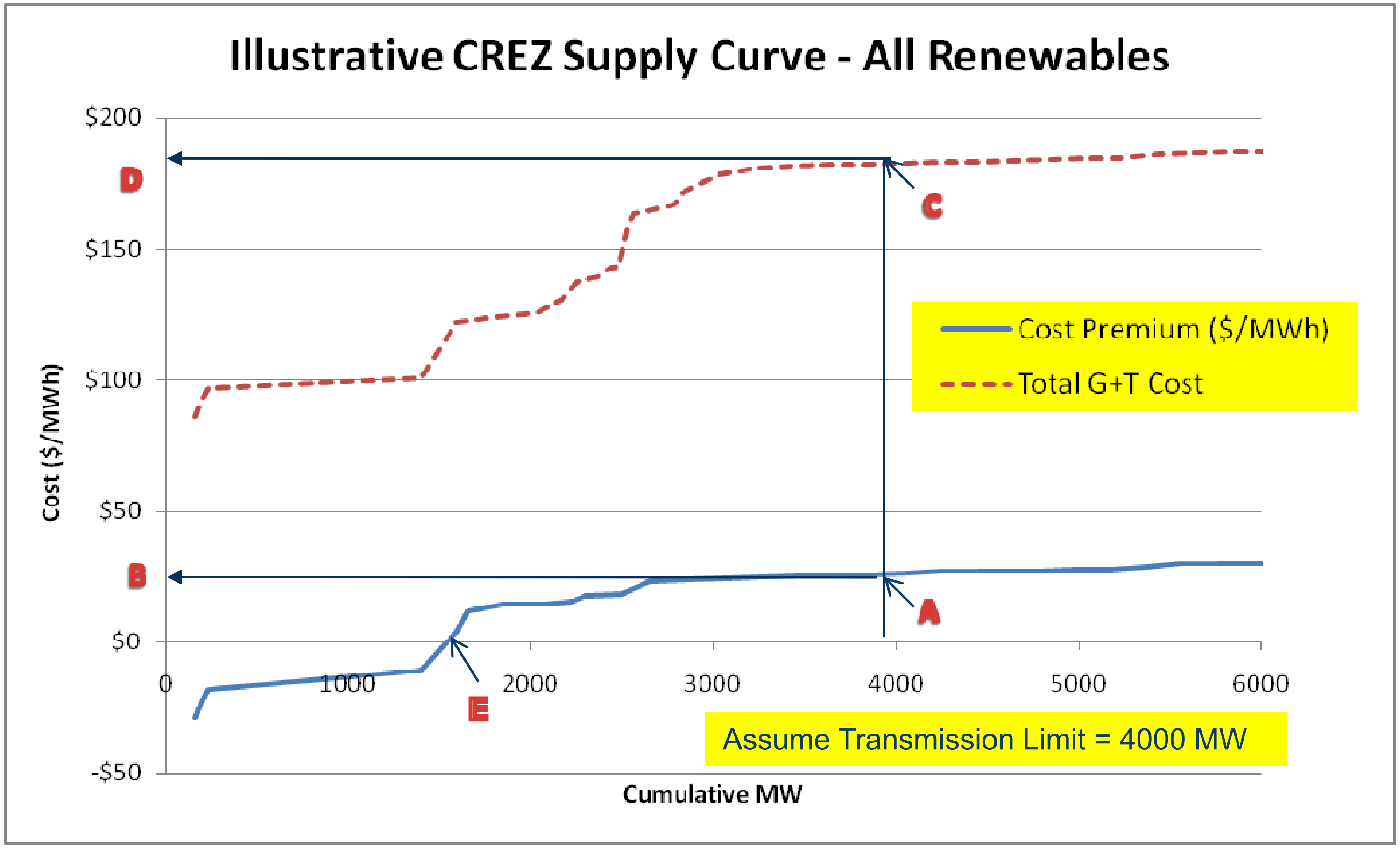
- For example, should FITs vary based on renewable energy located in a priority CREZ with proximity to a permitted transmission line?

Interaction with transmission: Conceptual Design Issues for CREZ-Based Feed-in Tariff

- Additional objectives: efficiently utilize new transmission capacity quickly at least societal cost
- FIT could also address RPS interaction by applying in a capped context, only in a limited footprint (i.e. CREZ)
- Additional issues (beyond FIT in general):

Issue	**RPS**	**FIT Design Recommendation**	**FIT Implications**
Timing	Does not target CREZs or consider CREZ transmission limits	• Offer FIT effective once transmission is permitted	• More development activity/investment likely earlier, while transmission being developed (developers don't need to wait for selection and contracting); • More flexible timing and less risk placed on generators, so that can unleash faster development and wider range of participants
Quantity	Signed contracts may leave CREZs undersubscribed; Contract failures may also leave transmission under-subscribed.	• Technology-specific rates set using supply curves to fill the line • To avoid using a cap (which would increase developer risk), set rates to avoid oversubscription.	• Whether projects pay for transmission or transmission cost is socialized impacts the FIT rate level • May need a second pass (higher rate) if line ultimately undersubscribed
Pricing/Rates	Competitive bid likely to result in strategic pricing, clustering around publicly-available supply curve clearing price.	• Price setting for FIT is different in CREZ → set rates for each technology just high enough to yield a reasonable return on enough generation to subscribe the line without oversubscribing	• Policy choices re: how aggressive, conservative or differentiated • Diversity of prices can achieve combination of technology/size diversity and cost minimization objectives ; prices below MPR possible (see supply curve example on following pages)
Allocation of Available Capacity Among Technologies	Favors large, least-cost, best-fit projects.	• Depends on policy objectives; see discussion of pricing/rates	• Greater diversity of project technology, size, and type of developer possible

Illustration: Fictitious CREZ example based loosely on RETI Phase 1B supply curves



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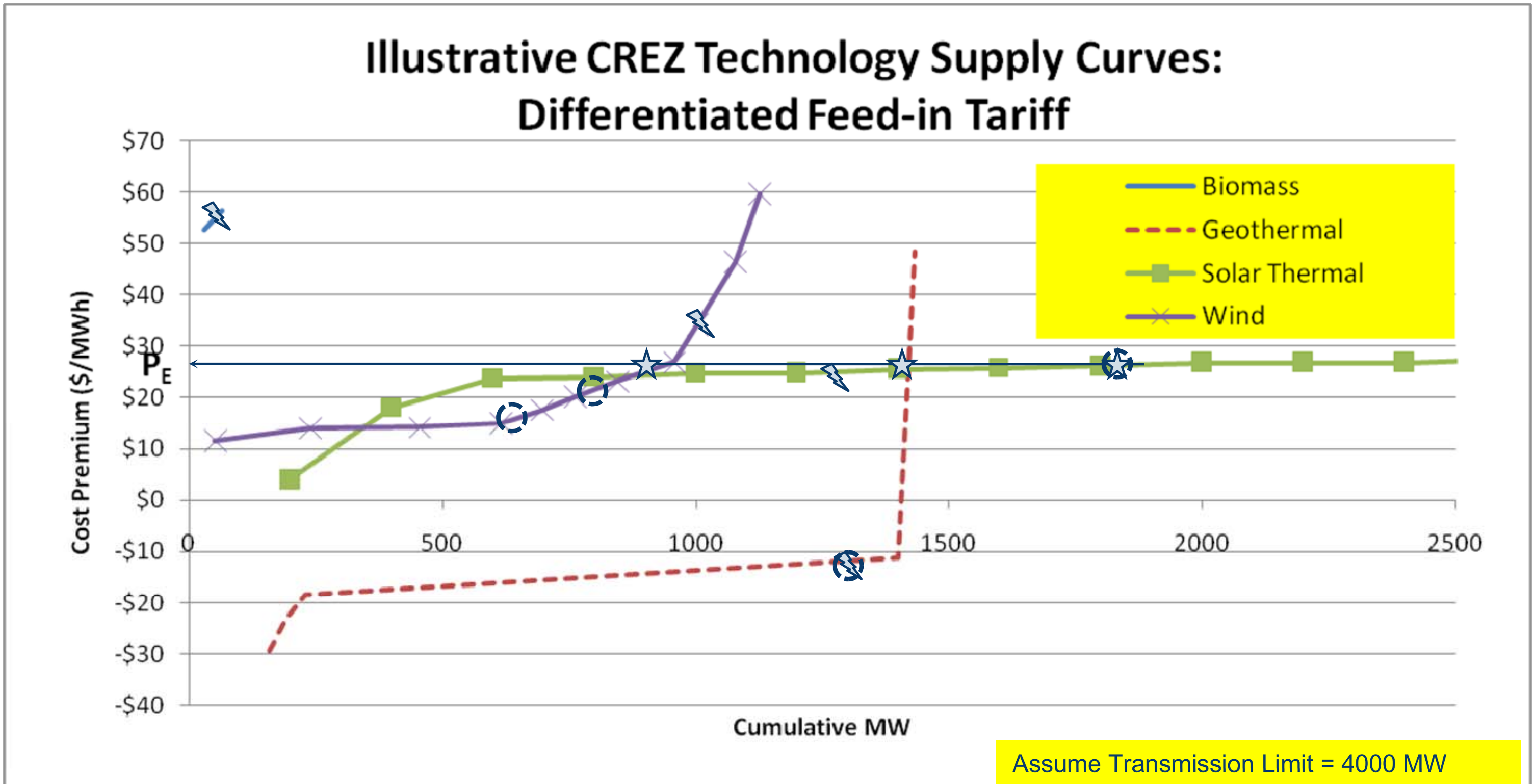

See next slide for key to ☆ ⚡ ◌ which represent price/quantity implications of different FIT designs

Illustrative 'FIT for CREZ' Pricing Designs & Their Implications

☆ P_E

"Equal Premium"	Solar	Geo	Bio	Wind	Total
Premium ($/MWh)	$ 26.00	$ 26.00	$ 26.00	$ 26.00	
FIT Rate (G&T Cost)	$ 183.00	$ 101.00	$ -	$ 137.00	
Expected MW	1,800	1,400	-	850	4,050

"Diversified"	Solar	Geo	Bio	Wind	Total
Premium ($/MWh)	$25.00	$ (11.00)	$ 56.00	$ 34.00	
FIT Rate (G&T Cost)	$182.00	$ 101.00	$ 171.00	$ 143.00	
Expected MW	1,400	1,400	70	1,030	3,900

"Cost Minimizing"	Solar	Geo	Bio	Wind c.f. > 31%	Wind c.f. < 31%	Total
Premium ($/MWh)	$ 26.00	$ (11.00)	$ -	$ 17.00	$ 23.00	
FIT Rate (G&T Cost)	$ 183.00	$ 101.00	$ -	$ 125.00	$ 137.00	
Expected MW	1,800	1,400	-	630	210	4,040

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Next steps for the development of a FIT for RE projects > 20 MW

- Financing
  - Attempt to quantify cost reduction benefits of specific financing-related design choices, including the LCF FIT design discussed
- Consideration of Implications and Interactions
  - E.g. potential impact of a 20+ MW FIT on system planning
- Process
  - Involve members of the financing, development and manufacturing communities, and utilities, in the FIT evaluation and development process
  - Determine price-setting process
- Tariff Design
  - Identifying appropriate technology differentiation
  - Policy decisions on how aggressive or conservatively to set prices
  - Price setting

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Thank you for your attention.

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