

DISTRIBUTED SOLAR GENERATION: VALUE AND PRICING A NORTH AMERICAN PERSPECTIVE

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PART 1

PRICING ISSUES: PROS AND CONS OF NET METERING

Historic Basis for Pricing Generation

A. Costs

B. Market

Net Metering is Neither

Benefits of Net Metering

- A. Strong Incentive for Increasing Market Penetration
- B. No Emissions in Energy Production
- C. Complements Reservoirs
(Important in Brazil—Not so Important in USA)
- D. Profitability for Solar Commercial Interests

Cons of Net Metering

A. Cross Subsidies

- A. Paying Retail, Delivered Price for Wholesale Energy
- B. Solar Hosts Do Not Pay Their Share of Demand, Transmission and Distribution Costs
- C. Social Regressive Impact
- D. Disincentive for Productivity and Efficiency (e.g. Batteries, Direction Shifting Panels, Smart Inverters and System Support Services)

(continued...)

Cons of Net Metering

A. Cross Subsidies (continued)

- E. Discourages Technical Innovation
- F. Maintains Prices Elevated Over Underlying Costs
- G. Puts More Efficient Wind and Large Scale Solar at Competitive Disadvantage
- H. Encourages Off Peak Production (Negative Prices in Some Cases—California Duck Curve)

New Trends for Pricing Distributed Solar

- A. Three Part Tariffs (Kansas)
- B. Energy Only Net Metering (Texas)
- C. Reconfiguring Distribution Systems to Resemble High Voltage Systems (New York and California)
- D. Dynamic Pricing
- E. California's Solar Mandate

Impact of Price Distortions

- On Energy Efficiency
- On Solar Host Behavior on Peak
- On RPS where Least Efficient Resource is Paid the Highest
- Unjustifiable Reallocation of Fixed & Demand Costs

PART 2

VALUE ISSUES

Benefits Claimed by Advocates of Value of Solar Approach

- A. Avoided Energy Costs
- B. Avoided Capacity Costs (Generation and Transmission)
- C. Environmental Externalities
- D. Jobs and Economic Development
- E. Hedging Fuel and Energy Costs and Price Volatility
- F. Distribution System Benefits

Purpose of Value of Solar Studies

- Set Actual Price for Solar DG; or
 - Justify Paying High Price (e.g. Net Metering)
 - Deviation from Historic Norms:
 - Cost of Service (except regarding cost of capital)
 - Market Based
 - Avoided Cost

Methodology

- No Commonly Accepted Methodology
- Wide Variance in Conclusions

Narrow Focus of Value of Solar Studies

- Technology Specific
 - No Comparison with Alternatives for Attaining Value
 - No Assessment of Risks of Technology Specific Focus
 - Impacts of SIP's

Value

- Economic
 - Energy Value Depends on Time of Production
 - Mostly Off Peak
 - Capacity Value Depends on Availability
 - Consequences of Non-Availability
 - Hedge Value Depends on Cost and Callability
 - High Price Could Exceed the Risk to be Hedged
 - Is it Really Callable?

(continued...)

Value

- Economic (continued)
 - Transmission Effects
 - Distribution Effects
 - Transaction Costs

Externalities in a Limited and Selective Way

- Avoided Costs in a Generally Limited and Selective Way
 - Energy
 - Fuel
 - Transmission, Distribution, and Generation Capacity
 - Jobs/Economic Development
 - Transmission and Distribution Losses

Externalities

- Primary Justification for High Price
 - Rarely Weighs DG Against Alternatives for Reducing Carbon
 - Subjective Choice of Externalities
 - Questionable Valuations of Carbon Prices and REC's
 - Overlooks Effects of Intermittency
 - Fails to Track Impact on Dispatch and Displacement (i.e. Real Time)
 - Ignores Social Impact (e.g. Regressive Nature of Net Metering)
 - Distorts Carbon Prices

Jobs and Economic Development

- Highly Myopic View
 - No Consideration of
 - Job Impact of Choosing High Cost Technology
 - Job Impact of High Priced Electricity
 - Fact that Most Solar Manufacturing is Abroad
 - Loss of Mining Jobs

Fuel and Energy Price Consideration

- Long Term Price Forecasts: Notoriously Unreliable (MN vs ME: re annual adjustments)

Generation Capacity Considerations

- Fails to Fully Reflect Intermittency
- Fails to Fully Reflect Solar DG's Non-Coincidence with Peak Demand
- Fails to Recognize Non-Callable Nature of Solar DG

Transmission Capacity Considerations

- Ignores Lumpiness of New Transmission
- Ignores Scarcity of Right of Way

Distribution Issues

- Often Ignores Bi-Directional Flow Issues
- Often Ignores Transaction Costs
- Ignores Revenue Attrition Issues with Net-Metering
- Ignores Planning Issues

Conclusions

A. Preferential Pricing for Distributed Solar

- A. Distorts Market Prices
- B. Fails to Pass on to Consumers the Full Declining Costs of Solar Panels
- C. Highest Cost, Least Effective Means of Reducing Carbon Emissions
- D. Dilutes Energy Efficiency Price Signals
- E. Transfers Wealth from Less Affluent to More Affluent Customers
- F. Discourages Technological Productivity and Gains in Solar Energy
 - i. MIT Study—Harms Solar Energy in Long Run

Value of Solar Theories

- A. Highly Subjective
- B. No Generally Acceptable Methodology for Valuation
- C. Lack Foundation in Historic Energy Pricing (Costs or Market)
- D. Never Technology Neutral
- E. Lacks Granularity Required to be Accurate