

# **DISTRIBUTED SOLAR GENERATION: VALUE AND PRICING A NORTH AMERICAN PERSPECTIVE**

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PART 1

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# **PRICING ISSUES: PROS AND CONS OF NET METERING**

# Historic Basis for Pricing Generation

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A. Costs

B. Market

Net Metering is Neither

## Benefits of Net Metering

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- 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

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## 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

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## 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

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- 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

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- 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

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# VALUE ISSUES

# Benefits Claimed by Advocates of Value of Solar Approach

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- 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

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- 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

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- No Commonly Accepted Methodology
- Wide Variance in Conclusions

# Narrow Focus of Value of Solar Studies

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

# Value

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- 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

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

# Externalities in a Limited and Selective Way

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



# Externalities

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- 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

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- 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

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

# Generation Capacity Considerations

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- 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

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

## Distribution Issues

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

# Conclusions

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## 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

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- 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