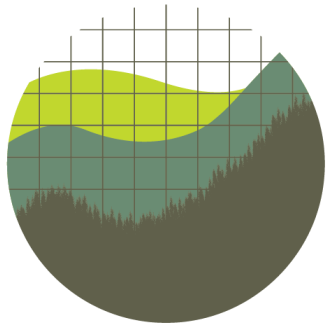

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# Distributed Energy Resources: Values and Compensation Mechanisms

National Council on Electricity Policy Annual Meeting

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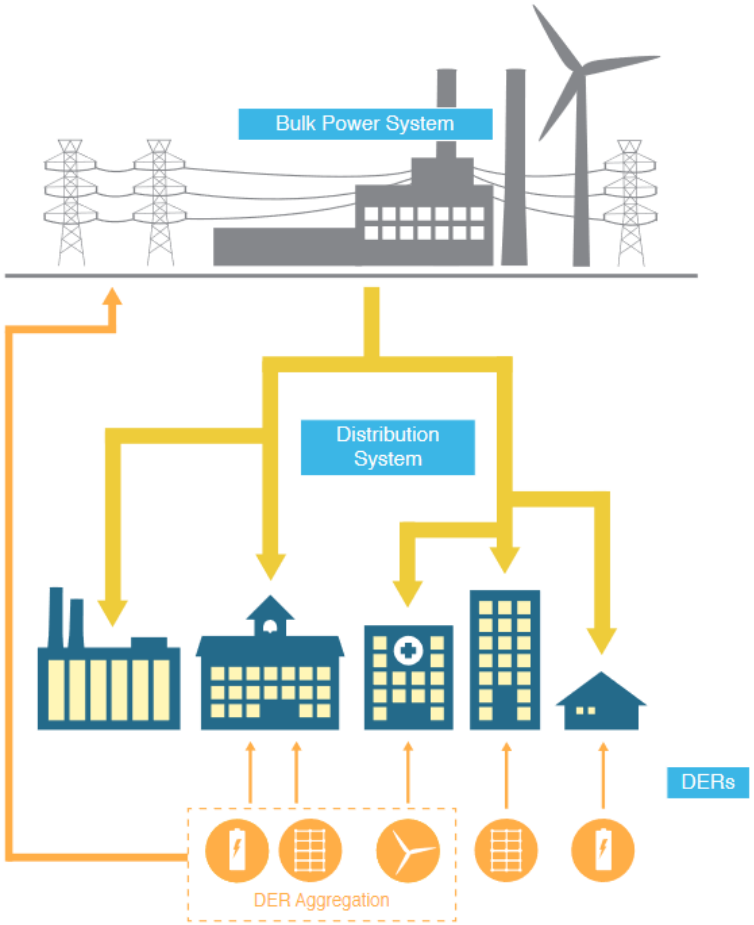
Burcin Unel, Ph.D.

# The Electricity Grid and DERs




Source: Policy Integrity, Getting the Value of Distributed Energy Resources Right

# Value of DERs – Costs and Benefits

**Table 4. Potential Benefits of DERs.**

| Perspective | Category | Benefit |
|---|---|---|
| Electricity system stakeholders (i.e., utilities and their customers, including DER owners) | Bulk power system | Avoided energy costs |
| | | Avoided generation capacity costs |
| | | Avoided reserves and ancillary services costs |
| | | Avoided transmission capital costs and line loss |
| | | Avoided financial risk of primary energy source price volatility |
| | | Avoided environmental compliance costs |
| | Distribution system | Avoided distribution capital costs and line losses |
| Society | Public health and safety | Improved resilience to disruptive hazards and stressors |
| | | Public health benefits of avoided local pollution |
| | Environmental | Environmental benefits of avoided local pollution |
| | | Avoided greenhouse gas emissions |

Source: Policy Integrity, Getting the Value of Distributed Energy Resources Right

# Value of DERs – Costs and Benefits

**Table 5. Costs of DERs.**

| Perspective | Category | Costs |
|---|---|---|
| Utilities + ratepayers who do not own DERs | Program costs | Measure costs (to utility) |
| | | Financial incentives |
| | | Program and administrative costs |
| | | Evaluation, measurement, and verification |
| | Integration | Interconnection costs (in excess of utility's own costs of interconnection) |
| | Capital costs (if any) | Distribution grid segment upgrades prompted by DER additions* |
| DER owners | Costs of DER adoption and operation | Measure costs (to participants) |
| | | Interconnection fees |
| | | Annual operations and maintenance costs |
| | | Resource consumption by participant |
| | | Transaction costs to participant |

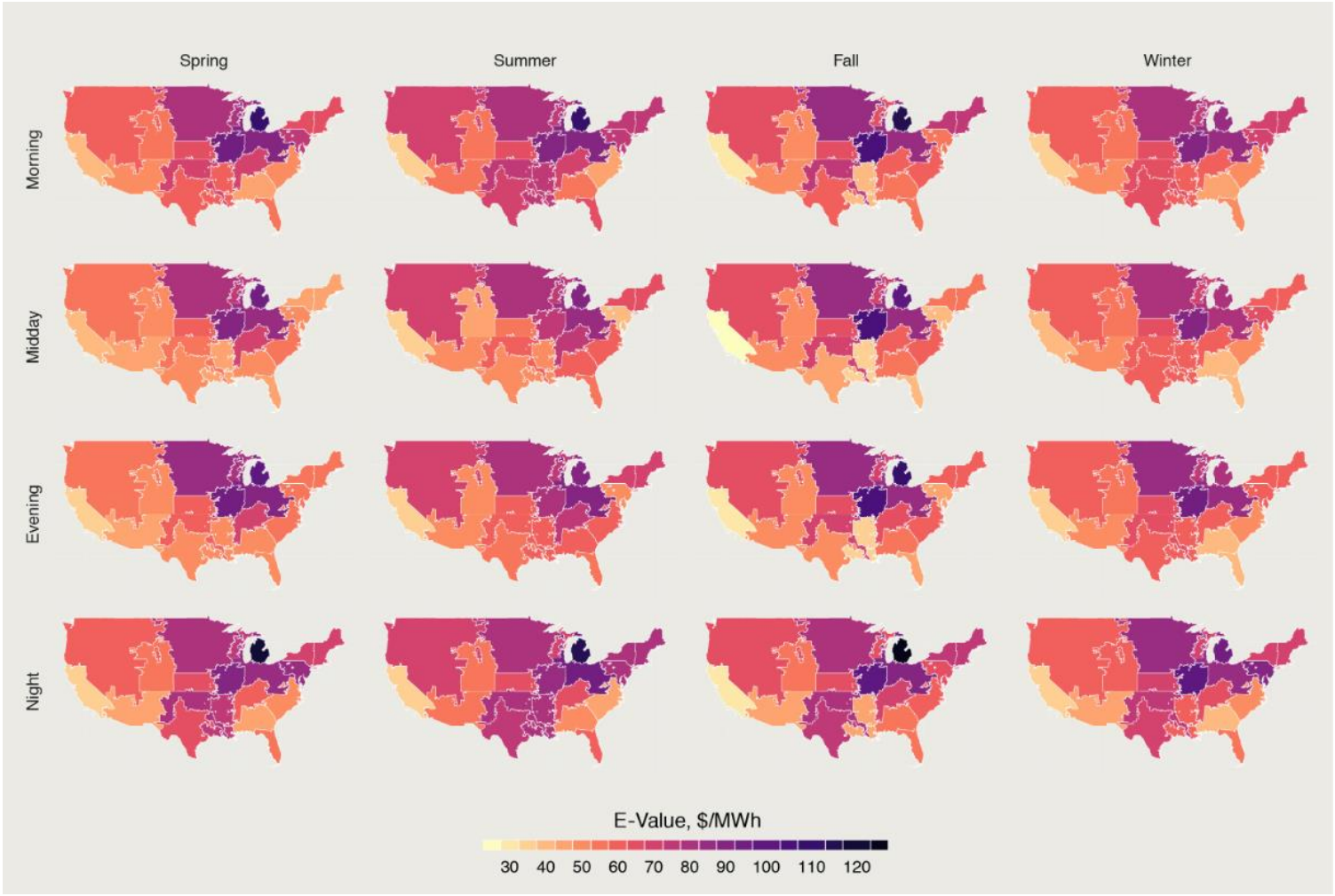
** At least some of this category of costs is often paid by DER developers*

Source: Policy Integrity, Getting the Value of Distributed Energy Resources Right

# DER Compensation – Net Metering vs Value Stacks


Source: Policy Integrity, Getting the Value of Distributed Energy Resources Right

# Environmental Value of DERs




Source: Policy Integrity, Making the Most of Distributed Energy Resources

# Calculating Value Stacks

**Table 7. Value stack components, their underlying dynamic metric(s), and their temporal and locational parameters.**

| Component | Metric and/or Units | Interval | Geography |
|---|---|---|---|
| Wholesale energy (including generation, congestion, and line losses) | LMP [$/MWh] | Hour | Wholesale market node (or zone) |
| Wholesale capacity | Installed capacity or "ICAP"[107] | *Varies by jurisdiction* | |
| Transmission | *Varies by jurisdiction;*[108] *LMP & ICAP capture some but not all capital and O&M costs of transmission* | Six months | |
| Distribution system capacity and line losses | Utilities' marginal costs of service | Decade | As local as possible: primary feeder, lateral feeder, transformer |
| Greenhouse gases | [$CO_2e$ / MWh] | Hour | Wholesale market zone |
| Ambient air pollutants | [PM, SOx, NOx / MWh] | Hour | *As granular as is supported by available tools e.g., EASIUR, InMap* |
| Resilience | *Varies by jurisdiction* | *Varies by jurisdiction* | Distribution utility service territory |

Source: Policy Integrity, Getting the Value of Distributed Energy Resources Right

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# For questions and comments:


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