Research Activities: Center for Energy, Economic and Environmental Policy

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OVERVIEW OF RESEARCH ACTIVITIES

1. CEEEP integrates complex and sophisticated engineering, optimization and economic models to inform public policy regarding the implications of major public policy initiatives involving the electric power sector

2. On going projects include:
   
   1. Assessing the air quality, electricity price, and macroeconomic consequences of building large-scale off shore wind along the New Jersey coast
   
   2. Determining the social and private costs and benefits of distributed energy resources
   
   3. Evaluating the reliability and resiliency and the associated costs and benefits of grid hardening in the context of coastal power systems subject to severe weather
Offshore Wind Analysis: Integration of several technical and economic models

1. Hourly Wind Speeds
   IMCS

2. Hourly Wind Turbine Energy Production (MWh)
   IMCS

3. PJM Energy UC & Dispatch (Dayzer)
   CEEEP

4. PJM Capacity Model ($/MW-day)
   CEEEP

5. Wholesale Offshore Wind Electricity Revenue ($/MWh)
   CEEEP

6. Wholesale Offshore Wind Electricity Cost ($/MWh)
   CEEEP

7. OREC Cost ($/MWh)
   CEEEP

8. NJ State Econ Impact
   CEEEP

9. Reduced Air Pollution Health Impacts
   SEBS

10. Air Emission Non-Market Impacts
    SEBS

11. Market Impacts
    RECON

12. Net Impacts
    RECON & CEEEP

Net Impacts = Market Impacts + Reduced Air Pollution Health Impacts - Air Emission Non-Market Impacts
Cost-Benefit Analysis: Stylized Model for Combined Heat & Power Plant Application Screening

**SOCIETY**

**COSTS**
- CHP Incentives
- Gas T&D costs (for additional supply of gas to CHP)

**BENEFITS**
- Increased Reliability resulting in community benefits such as storm shelter etc.
- Avoided electric T&D costs
- Reduction in air emissions

**OWNER**

**COSTS**
- Capital Costs
- Fuel Costs
- O&M Costs

**BENEFITS**
- Increased Reliability
- Savings on electricity supply bills (after paying for standby charges)

There could be some macroeconomic effects (such as job growth) which could be positive or negative

**Net Benefits to Society (Quantifying Costs & Benefits)**

- Avoided T&D cost benefit to the Society
- Reliability benefit to the Society
- Emissions reduction benefit to the Society
- Reliability benefit to the Owner
- Net Savings to the Owner (CHP – No CHP)
Reliability & Resiliency Studies: Building Data Sets and Quantifying Costs and Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>• Annual Probability of Outage</td>
<td>• Annual Cost of Black Start &amp; islanding ($/MW)</td>
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<tr>
<td>• Duration of Outage (hrs)</td>
<td>• Annual Variable Costs (Fuel + O&amp;M) ($/MWh)</td>
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<tr>
<td>• Project System Size (MW)</td>
<td></td>
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<tr>
<td>• VOLL ($/MWh)</td>
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NPV of this annual expected net benefit can be allocated to project owner and society.