Incorporating Economic Development Benefits into Utility Project Benefit-Cost Analysis

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Modern Utility Investments

Many investments proposed by today's utilities are aimed at electrifying the economy and decarbonizing the grid to enable achievement of state emissions goals. This includes investment in distributed energy resources (DERs), grid modernization and traditional energy efficiency:

- Solar and Wind Projects
- Energy Storage Systems (ESS)
- Advanced Metering Infrastructure (AMI)
- Automated, remote monitoring and control
- Multi-Directional Power Flow Systems
- Voltage Optimization/Conservation (VVO/CVR)
- Energy Efficiency (EE) Programs
- Demand Response (DR)
- Electric Vehicle Service Equipment (EVSE)
- Electric Heat Pump Programs
- Microgrids

Energy Project Benefits and Costs

These investments in new technologies are typically put through a rigorous benefit-cost analysis (BCA) that may include consideration of the following:

- Project Costs, e.g., construction/implementation and on-going O&M
- Customer Benefits
  - Avoided wires or other traditional alternative (if applicable)
  - Reduced energy consumption
  - Market price reductions
  - Avoided T&D infrastructure cost
  - Improved reliability/power quality
  - Other resource or economic sector savings
- Amenities
- Reduced emissions
- Economic activity sustained during extended outages (Microgrids)
- Economic development benefits

BCA SUMMARY		
Test	**Category**	**Total**
SCT	Project NPV acording to applicability selected in "Benefits & Costs Breakdown"	-$33,830.39
	Benefit-Cost Ratio acording to applicability selected in "Benefits & Costs Breakdown"	0.999
UCT	Project NPV acording to applicability selected in "Benefits & Costs Breakdown"	-$156,233.01
	Benefit-Cost Ratio acording to applicability selected in "Benefits & Costs Breakdown"	0.993

Economic Development Benefits

Economic development is increasingly being proposed as a benefit that should be included in energy project BCAs but the following issues can arise:

- Estimated economic development benefits can be so large they make all projects pass:
  - Some economic benefits and costs are already be included in the BCA (double-counting).
  - The planner has over-estimated the project's economic impact.

Because they can be large, economic development benefits are sometimes included only as:

- a "soft" benefit in a BCA side-case with other soft benefits (e.g., reliability improvements reductions); or
- considered qualitatively alongside the formal BCA

Brattle Group Approach -- RI Energy Efficiency (EE) Investments[1]

To avoid double counting and over-estimation of economic benefits and costs in the BCA, add only net (rather than gross) spending impacts and consider the net impact of changes in disposable income and production costs. Use GDP to capture the societal impact of net changes in jobs years, income and regional competitiveness due to the EE investments.

This means the economic development benefit to be added to the BCA is equal to the sum of the following GDP impacts resulting from the EE investments:

- EE program and participant spending ("construction" impact, positive)
- Avoided T&D construction spending due to the investments (T&D infrastructure construction sector impact, negative)
- Avoided power sector spending (local generators, negative)
- Indirect and induced economic impact of EE program benefits and costs

[1] Mark Berkman and Jurgen Weiss, "Review of the RI Test and Proposed Methodology," Prepared for National Grid, by The Brattle Group, February 2019.

Illustration of Brattle Approach – EE Benefits

EE energy cost savings benefit both program participants and all ratepayers/customers; but these savings are an economic loss to the local T&D construction and power sectors.

Summary of 2019 Benefits and Savings ($2018 ths.)															
	Capacity					Energy					Non Electric				
Total Benefits	Summer Generation	Capacity DRIPE	Trans	Dist	Reli-ability	Winter Peak	Winter Off Peak	Summer Peak	Summer Off Peak	Electric DRIPE	Natural Gas	Gas DRIPE	Oil	Other Resource	Non Resource
Electric															
$335,581	$20,254	$37,580	$26,751	$23,260	$132	$38,472	$27,898	$20,503	$12,686	$81,620	-$2,833	$0	$12,907	-$150	$36,502
100%	6%	11%	8%	7%	0%	11%	8%	6%	4%	24%	-1%	0%	4%	0%	11%
Gas															
$64,976	$136	$1,107	$191	$166	$10	$20	$30	$25	$16	$43	$36,798	$921	$0	$502	$25,011
100%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	57%	1%	0%	1%	38%
Total															
$400,557	$20,390	$38,686	$26,941	$23,426	$143	$38,492	$27,928	$20,528	$12,702	$81,662	$33,965	$921	$12,907	$352	$61,513
100%	5%	10%	7%	6%	0%	10%	7%	5%	3%	20%	8%	0%	3%	0%	15%

Notes: From 2019 EEPP Appendix, Tables E-6 and G-6. Excludes Emissions Benefits and some amenities. CHP and Demand Response Programs also excluded.

EE savings benefit customers but…

- Lower market prices (green), T&D capacity cost savings (blue) and improved reliability (purple) benefit **all customers,** residential and C&I.
- Energy bill savings, other resource savings and non resource savings (orange) benefit **participants**.
- **Benefits were input to REMI as reduced energy costs (electricity, gas or oil) to residential and C&I customers with splits based on share of load or type of program.**

reduce construction/energy activity

- Reduced energy consumption and lower market prices (green and orange) are reduced revenue to the **electric generation and natural gas supply industries** – the "commodity" suppliers.
- T&D savings (blue) are reduced demand in **the gas and power line construction industry**.
- **Energy and DRIPE savings were input into REMI as decreased sales to electric generators and gas suppliers. T&D savings were input as decreased RI construction demand.**

Industrial Economics, Incorporated (IEc) Approach – Community Microgrids [2]

Besides the direct benefit of economic activity sustained during an extended outage, consider also the indirect and induced benefits of the microgrid.

During an extended outage, the proposed Rockville, NY Microgrid, located in Nassau County, would be able to sustain the economic activity of :

- Rockville (direct economic benefit, already included in the BCA)
- The Rockville supply chain in Nassau County (indirect economic benefit)
- Rockville-induced economic activity in Nassau County (induced economic benefit)

Exhibit 2. Regional Economic Benefit of Microgrid, One-Day Outage Scenario [3]

Impact Type	Employment (Job-Years)	Labor Income ($)	Total Value Added ($)	Output ($)
Direct Effect	18.5	$1,016,028	$1,801,497	$2,878,631
Indirect Effect	7.0	$416,186	$704,062	$1,188,481
Induced Effect	6.6	$354,718	$618,039	$965,535
Total Effect	32.1	$1,786,932	$3,123,597	$5,032,647

[2] **Brian Morrison, "Estimating the Regional Economic Resiliency Benefits of Community Microgrids," Prepared for New York State Energy Research and Development Authority, by Industrial Economics, Incorporated, Final Report, Report Number 18-32, October 2018.**

[3] **Ibid, Exhibit 2, page 10.**

Summary and Conclusions

Economic development benefits can be included in energy project BCAs if you avoid double-counting, cover all the bases and consider only net changes in spending.

- The IEc study shows that the indirect and induced economic impact of operating a microgrid are real benefits that have been overlooked in other microgrid BCAs.
- The Brattle study lays out an approach that can be applied to any BCA:
  - Include indirect and induced economic impact of all project benefits and costs
  - Include net spending impacts, not gross
    - Construction/implementation spending
    - Other changes in spending related to the project
  - GDP is an appropriate measure of the societal benefit of the net increase in jobs, income and regional competitiveness due to the project.
  - Be aware that the results can be positive or negative!