ASSESSING THE VALUE OF DEMAND-SIDE RESOURCES

Country/region	**USA**
Type of E1st approach	B – In front / Investment 3 – Requiring E1st-proof assessments
Energy carrier(s) targeted	Electricity
Sector(s) / energy system(s) or end-uses targeted	All end users Generation / transmission / distribution
Implementing bodies	ConEd (integrated utility)
Decision makers involved	NY Public Service Commission
Main objective(s)	Benefit Cost Framework to assess demand-side resources
Implementation period	Ongoing since 2016

U.S. utilities are required to develop appropriate methodologies for evaluating non-wire solutions. Designing appropriate methodologies is essential for the integration of NWSs to pressing grid problems. ConEd's BCA Handbook includes many critical elements required for the assessment of demand-side resources.

1. Background

Non-wire solutions portfolios of distributed energy resources (DER) like solar photovoltaics, energy storage, energy efficiency and demand response often offer more cost-efficient solutions to grid capacity/congestion problems than traditional investments in networks. However, despite the various benefits associated with NWSs, several barriers hamper their widespread use (Prince et al., 2018):

- Ill-designed regulations (e.g., the lack of incentives for utilities to use these solutions).
- Utility standard procedures that neglect NWSs (e.g., internal corporate professional structure able to deal with both supply and demand issues).
- Difficulties related to the procurement of these resources.

Procurement is typically associated with consumer programmes (when consumers offer their demand response to the utility, often via aggregators), pricing mechanisms (all forms of dynamic pricing that can shift consumption away from peak periods) or public procurements. Procurement of NWSs requires a well-considered assessment methodology that considers both the technical ability of NWSs to meet grid needs and the cost-effectiveness of these solutions. As NWS includes distribution resources spanning across supply (distributed generation), network (smart network operation) and demand resources with varying associated cost and benefits, methodologies need to be developed and used that are specific to NWSs. The analyses of how demand resources are evaluated by U.S. utilities that have the most experience with employing these

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 839509. The sole responsibility for the content of this website lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.

solutions highlights some of the challenges European distribution system operators face now as the Electricity Regulation requires them to consider these alternatives to traditional network investments.

2. How has the E1st principle (or similar concept) been implemented?

The New York Public Service Commission prepared a BCA framework (NY PUC, 2016) that the utilities have to consider when preparing their own BCA methodology. The framework developed is considered to be a complex but robust benefit-cost methodology encompassing most of the best practices in NWS assessment. The development of the BCA framework is best understood in the broader context of the overall Reforming Energy Vision (REV) effort of New York State by contributing to the target of consuming 70% of electricity from renewable resources by 2030.

The BCA Order must be applied to the following utility expenditure categories:

- Investments in distributed system platform (DSP) capabilities.
- Procurement of DER through competitive selection.
- Procurement of DER through tariffs.
- Energy efficiency programmes.

The fundamental principles of the NY BCA framework are:

"*1) be based on transparent assumptions and methodologies; list all benefits and costs including those that are localised and more granular;*

2) avoid combining or conflating different benefits and costs;

3) assess portfolios rather than individual measures or investments (allowing for consideration of potential synergies and economies among measures);

4) address the full lifetime of the investment while reflecting sensitivities on key assumptions; and,

5) compare benefits and costs to traditional alternatives instead of valuing them in isolation."

ConEdison developed its own BCA Handbook on these fundamentals. Alongside cost avoidance and system efficiency benefits, the BCA framework reflects the consideration of social values (externalities) quantifiably when feasible and qualitatively when not. The Public Utility Commission (PUC) hence ordered the use the Societal Cost Test (SCT) as the primary test in the framework. The role of the Utility Cost Test (UCT) and Ratepayer Impact Measure (RIM) is to assess the impact on utility cost and consumer bill from projects that pass the SCT. STC considers the cost and benefits from the wider social perspective.

Table 1 – Cost effectiveness tests

Cost test	Perspective	Key Questions Answered	Calculation Approach
SCT	**Society**	**Is the State of NY better off as a whole?**	**Compares the costs incurred to design and deliver projects, and customer costs with avoided electricity and other supply-side resource costs (e.g., generation, transmission, and natural gas); also includes the cost of externalities (e.g., carbon emissions and other net non-energy benefits)**
UCT	**Utility**	**How will utility cost be affected?**	**Compares the costs incurred to design, deliver, and manage projects by the utility with avoided electricity supply-side resource costs**
RIM	**Ratepayer**	**How will utility rates be affected?**	**Compares utility costs and utility bill reductions with avoided electricity and other supply-side resource costs**

(Source: Con Edison BCA Handbook – v2.0 (7/31/2018))

The SCT covers all of the costs and benefits defined in the PUC framework, with the exception of lost utility revenue and shareholder incentives as these are only transfers between stakeholder groups, similar to the wholesale market price impact as the price suppression is also considered a transfer from large generators to market participants (Table 2). More importantly, this test includes externalities related to pollution and resource use. While wholesale markets reflect the value of existing programmes for controlling air emissions, they do not reflect the full external value of those emissions.

For instance, avoided CO_2, SO_2 and NO_x emissions are monetised; avoided water and land use impact and the net non-energy benefits to utility or grid operation are to be assessed qualitatively. As utilities in New York do not receive incentives for decreased CO2 or other environmental impacts and the benefits related to avoided outages go to customers and not utilities, they are not included in the UCT and the RIM.

The net marginal damage cost of CO2 is based on the cost of carbon set by the Regional Greenhouse Gas Initiative (RGGI). This is a $/MWh adder based on the U.S. Environmental Protection Agency damage cost estimates.

Net Avoided SO2 and NOx includes the incremental value of avoided or added emissions. The (avoided) LBMP[1] already internalises the cost of these pollutants via the carbon cap-and-trade programmes. Hence, only those generation units <25 MW that are not covered in these programmes will be included here.

The discount rate used for comparing utility investment in resource alternatives is the weighted average cost of capital (WACC) that is 6.8% for ConEd. There is one exception to this default rate, and that is the discount for calculating the cost of carbon (CO2 emissions) where the framework requires the use of a 3% social discount rate.

[1] Avoided LBMP is avoided energy purchased at the Locational Based Marginal Price (LBMP), including all three components (i.e., energy, congestion and losses).

Table 2 – The costs and benefits in the various applied tests

	STC	UTC	RIM
Benefit	✓	✓	✓
Avoided Generation Capacity Costs	✓	✓	✓
Avoided LBMP	✓	✓	✓
Avoided Transmission Capacity Infrastructure	✓	✓	✓
Avoided Transmission Losses	✓	✓	✓
Avoided Ancillary Services	✓	✓	✓
Wholesale Market Price Impacts		✓	✓
Avoided Distribution Capacity Infrastructure	✓	✓	✓
Avoided O&M	✓	✓	✓
Avoided Distribution Losses	✓	✓	✓
Net Avoided Restoration Costs	✓	✓	✓
Net Avoided Outage Costs	✓		
Net Avoided CO2	✓		
Net Avoided SO2 and NOx	✓		
Avoided Water Impacts	✓		
Avoided Land Impacts	✓		
Net Non-Energy Benefits	✓	✓	✓
Cost			
Program Administration Costs	✓	✓	✓
Added Ancillary Service Costs		✓	✓
Incremental T&D and DSP Costs	✓	✓	✓
Participant DER Cost	✓		
Lost Utility Revenue			✓
Shareholder Incentives			✓
Net Non-Energy Costs	✓	✓	✓

(Source: Con Edison BCA Handbook – v2.0 (7/31/2018))

3. Effects / impacts

The New York BCA Framework and the ConEd BCA Handbook - v1.0 were developed in 2016 when ConEd already had substantial experience with public solicitations for NWSs. Having a detailed guidance increases transparency on how projects are valued. This provides incentives for potential providers, i.e., the customers of the utility to come forward with projects for the procurements announced by ConEd (current open tenders can be found here).

4. Changes over time, if any

The 2018 BCA Handbook Template 2.0 was developed in 2018 and reflects revisions to the 2016 filing.

5. Barriers and success factors

The utility Con Edison – jointly with other New York utilities – organises stakeholder involvement on a continuous basis; the wider the pool of future solution providers, the lower the resource acquisition cost is. Fundamental to the success of NWSs in New York is the state level sets ambitious sustainable targets and the regulation of the utilities incentivise them to use these alternative approaches to traditional network investment (see example **Error! Reference source not found.** ***Error! Reference source not found.***).

6. Replicability and scalability potential

Even though New York is often quoted as a pioneer in employing NWSs, many other U.S. states are already in the process of eliminating the barriers, including developing future-proof evaluation methodologies (Prince et al., 2018). European network companies have to deal with the NWSs in the near future as the Electricity Market Directive (2019/944/EU) calls for national regulators to require DSOs and TSOs to consider alternative solutions to network investment and, because of the least-cost principle, to substitute them whenever is it cost-efficient. More specifically (Art 32):

- Distribution network development plans shall be published and submitted to the National Regulatory Authorities every two years.
- These plans shall identify the needed medium- and long-term flexibility services that must include the use of demand response, energy efficiency, energy storage facilities or other resources as an alternative to system expansion.

7. Sources and references

Web sources:

Reforming the Energy Vision (REV) - on the comprehensive energy strategy for New York. Official website of the New York State.

ConEd current RFPs: https://www.coned.com/en/business-partners/business-opportunities/non-wires-solutions

Joint Utilities of NY Stakeholder information: https://jointutilitiesofny.org/stakeholder-engagement/

References:

Prince, J., Waller, J., Shwisberg, L., and Dyson, M. (2018). *The non-wires solutions implementation playbook: A practical guide for regulators, utilities, and developers*. Basalt, CO: Rocky Mountain Institute, December 2018.

State of New York Public Utility Committee (2016). Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. Order Establishing the Benefit Cost Analysis Framework. Case number 14-M-0101, 21 January 2016.

ConEd (2018). Benefit-Cost Analysis Handbook v2.0. 31 July 2018.

ABOUT ENEFIRST

ENEFIRST is a 3-year project funded under the Horizon2020 programme, which gathers a consortium of partners from across sectors and regions: IEECP, BPIE, Fraunhofer ISI, CEU, RAP, IREES, TU Wien.

From definition to implementation, ENEFIRST aims at making the “Efficiency First” (E1st) principle more concrete and operational, better understand its relevance for decision processes related to energy demand and supply, its broader impacts across sectors and markets, focusing on the building sector and related energy systems in EU Member States.

> ***E1st gives priority to demand-side resources whenever they are more cost-effective from a societal perspective than investments in energy infrastructure in meeting policy objectives. It is a decision principle that is applied systematically at any level to energy-related investment planning and enabled by an “equal opportunity” policy design.***

ENEFIRST combines policy analysis and quantitative assessments of E1st impacts to develop policy guidelines and recommendations, following a process with continuous exchanges with stakeholders.

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