



Generic Capital Costs of Supply-Side Resources

Planning Advisory Committee

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RESOURCE ADEQUACY



Background

Objective: Provide an update on generic capital costs for new supply-side resources to support Regional System Plan studies

- Following stakeholder requests, ISO-NE has provided generic capital costs of generation technologies since 2009
- An annual update of these costs is useful to reflect any changes in conditions affecting capital costs
- This information could be used for some regional planning studies

Different Ways Capital Costs are Presented

- Total plant costs (TPC)
 - Also referred to as “Overnight Construction Costs” or “Overnight Capital Costs”
 - Developed on the theoretical basis of construction occurring at a single point of time
 - Includes materials, equipment and labor for all process facilities, fuel handling and storage, water intake structure and wastewater treatment, offices, maintenance shops, warehouses, step-up transformer and transmission interconnection, etc.
- Total capital requirement (TCR)
 - Also referred to as “All-In Costs”
 - Includes TPC plus owner’s cost and interest expenses during construction (often referred to as Allowance for Funds Used During Construction, or AFUDC)
 - Larger disparity between TPC and TCR when comparing technologies with prolonged construction periods
- All costs presented in this presentation reflect TPC or overnight costs



Factors Affecting Total Plant Cost

Specific project costs may differ from generic costs due to different reasons, including:

- Technology development
- Unit size
- Costs of materials, labor and overhead
- Inflation and interest during construction
- Regulation and other policy interventions
- Specific site requirements
- Regional costs differences

Data Sources

1. US EIA, "Assumptions to the Annual Energy Outlook 2014," 2014. [Online]. Available: www.eia.gov/forecasts/aeo/assumptions/pdf/electricity.pdf.
2. EPRI, "Program on Technology Innovation: Integrated Generation Technology Options 2012," 2013. [Online]. Available: www.epri.com/abstracts/Pages/ProductAbstract.aspx?productId=000000000001026656.
3. ISO-NE, "Net CONE Estimates for Potential Reference Technologies," 2014. [Online]. Available: www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/mrkets_comm/mrkets/mtrls/2014/mar192014/a02_iso_net_cone_capital_budgeting_model_03_14_14.xlsx.
4. ISO-NE, "ISO-NE ORTP 2013 Study," 2013. [Online]. Available: www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/mrkets_comm/mrkets/mtrls/2013/oct892013/a06_iso_ortp_analysis_final_results_10_02_13.xlsx.
5. US EIA, "Capital Cost for Electricity Plants," 2013. [Online]. Available: www.eia.gov/forecasts/capitalcost/.
6. WECC, "Capital Cost Review of Power Generation Technologies," 2014. [Online]. Available: www.wecc.biz/Reliability/2014_TEPPC_Generation_CapCost_Report_E3.pdf.

Generic Overnight Capital Costs

Technology Types in the Interconnection Queue as of 4/1/15

Technology Type	Plant Size (MW)	Heat Rate (Btu/kWh)	Total Plant Cost (\$/kW)
Advanced CC	340 – 400	6,430 – 7,525	1,020 – 2,085
Advanced GT	170 – 210	9,090– 9,750	675 – 1,430
Biomass	20 – 100	12,350 – 13,500	3,600 – 8,180
Conventional CC	550 – 730	7,000 – 7,525	825 – 1,150
Conventional GT	85 – 420	10,575 – 10,815	630 – 970
NG Fuel Cells	10	9,500	7,045
Offshore Wind	200 – 400	N/A	3,100 – 6,190
Onshore Wind	50 – 200	N/A	1,750 – 2,400
Solar Photovoltaic	5 – 150	N/A	2,000 – 3,565

2011/12/13\$

Note 1: EIA (Source 1 & 5), EPRI (Source 2) and the Brattle Group (Source 3 & 4) capital cost values are used as assumptions. These are the most recent reports available.

Note 2: Ranges or values indicate the highest, lowest or only values observed in select data sources.

Note 3: Values may be rounded to the nearest increment of 5.

Generic Overnight Capital Costs (Cont.)

Other Technology Types Not in Interconnection Queue as of 4/1/15

Technology Type	Plant Size (MW)	Heat Rate (Btu/kWh)	Total Plant Cost (\$/kW)
Conventional Hydro	500	N/A	2,435
Geothermal	15 – 50	N/A	4,495 – 8,400
IGCC (Single Unit)	520 – 600	8,700 – 8,900	2,800 – 4,400
Municipal Solid Waste	50	18,000	8,295
Nuclear	1,400 – 2,235	10,000 – 10,465	4,000 – 5,500
Pulverized Coal	650 – 750	8,750 – 8,800	2,000 – 3,245
Pumped Storage	250 – 1,000	N/A	1,500 – 5,290

2011/12/13\$

Note 1: EIA (Source 1 & 5), EPRI (Source 2) and E3 (Source 6) capital cost values are used as assumptions. These are the most recent reports available.

Note 2: Ranges or values indicate the highest, lowest or only values observed in select data sources.

Note 3: Values may be rounded to the nearest increment of 5

Questions

