

Technology Assumptions for Supply Curve Analysis

PROPOSED – January 12th

The following tables depict technology characteristics that drive project economics and supply curve results. This information was derived from public sources and stakeholder input and is based on current commercially viable technologies. While projects can vary widely due to project size, location, labor type, fuel variations and air quality requirements a representative sample of the various technologies is needed to determine relative levelized cost of energy. These 'proxy' technologies will allow the end user to compare areas and technologies relative to one another. However, the model user can change these assumptions based on specific project data if needed.

Biomass Assumptions

- Combustion-based technology (stoker / fluidized bed)

Net Plant Capacity (MW)	10-50
Net Plant Heat Rate (HHV, Btu/kWh)	14,000 to 16,000
Capacity Factor (percent)	85
Economics	
Total Project Cost (\$/kW)	3,500 to 5,000
Consolidated O&M (\$/MWh)	23-40
Fuel Cost (\$/MBtu)	1.39 to 2.41*
Production Tax Credit Value (\$/MWh)	10
Production Tax Credit Term (yrs)	10
Levelized Cost of Energy (\$/MWh)	89 to 153

*Costs are on a dry ton basis and do not include transportation costs. Transportation costs will be assumed to be \$0.15/ton/mile.

Biomass Fuel Cost Assumptions

	Cost per bdt (\$)	Energy content (BTU/lb)	Cost per MMBTU (\$)	Moisture content (%)	Heat rate (BTU/kWH)
Ag residues	30	7,790	1.93	22	14,549
Forest thinnings/slash	41	8,500	2.41	40	15,784
Urban wood waste	20	7,179	1.39	12	14,000
Mill residues	29	8,597	1.69	15	14,275

*Costs are on a dry ton basis and do not include transportation costs. Transportation costs will be assumed to be \$0.15/ton/mile.

Geothermal Assumptions

- Conventional binary or flash technology, depending on resource

Performance	
Net Plant Capacity (MW)	30
Capacity Factor (percent)	80-90
Economics (2009\$)	
Total Project Cost (\$/kW)	4,000 to 6,750
Consolidated O&M (\$/MWh)	31 to 41
Production tax credit value (\$/MWh)	21
Production tax credit term (yrs)	10
Levelized Cost (\$/MWh)	70 to 135

Hydroelectric Assumptions

- Various technologies, site-dependent

Type	US incr. cap. at powered dams	US New cap. at non-pwrdr. dams	Canadian (mult. types)*
Performance			
Net Plant Capacity (MW)	1 to 700	1 to 900	1 to 1,800
Capacity Factor (percent)	40 to 60	40 to 60	40 to 60
Economics (2009\$)			
Total Project Cost (\$/kW)	500 to 3,200	700 to 5,300	500 to 7,500
Consolidated O&M (\$/MWh)	3 to 13	3 to 13	3 to 13
Production Tax Credit Value (\$/MWh)	10**	10**	N/A
Production Tax Credit Term (yrs)	10**	10**	N/A
Levelized Cost of Energy (\$/MWh)	18 to 125	17 to 197	15 to 273

Various technologies are site dependent

** Applicable for sites before certain in-service dates, and which meet certain environmental criteria only.

Canadian Exception

- Canadian hydropower will include incremental additions to powered dams, new power stations at non-powered dams and any feasible new, undeveloped hydropower.

Solar Thermal Assumptions

- Dry-cooled Parabolic Trough, with no storage

Performance

Net Plant Capacity (MW)	200 MW
Capacity Factor (percent)	24 to 32

Economics (\$2009)

Total Project Cost (\$/kW)	4,800 to 5,300
Consolidated O&M Cost (\$/MWh)	24 to 32
Investment Tax Credit (percent)	30
Levelized Cost of Energy (\$/MWh)	142 to 182

- Trough with 6 hours of storage also included

Solar Photovoltaic Assumptions

- Single-Axis Tracking Crystalline

Performance

Net Plant Capacity (MW)	20 MW
Capacity Factor (percent)	23 to 28
Economics (\$2009)	
Total Project Cost (\$/kWe)	7,040 to 7,150
Consolidated O&M (\$/MWh)	19 to 23
Investment Tax Credit (percent)	30
Levelized Cost of Energy (\$/MWh)	200 to 250

Note: all values are on a net ac basis

Wind Assumptions

- Conventional, horizontal-axis, 3-blade machine, 80m hub-height

Performance

Net Plant Capacity (MW)	100
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Capacity Factor (percent)	25 to 40
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Economics (2009\$)

Total Project Cost (\$/kW)	2,100 to 2,500
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Consolidated O&M (\$/MWh)	18 to 25
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Production tax credit value (\$/MWh)	21
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Production tax credit term (yrs)	10
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Levelized Cost of Energy (\$/MWh)	75 to 125
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Future Cost and Performance

1. Default assumption is to assume no significant changes in technologies that would affect relative final REZ rankings.
2. Renewable technologies relatively mature; expect to see same relative improvement in efficiencies across all technologies.
3. Solar technologies are still evolving. However they are still competitive based on the market today.
4. Model users can adjust future costs, or other assumptions, to run alternative scenarios.