



Rhode Island Distributed Generation Standard Contracts Program:

Public Meeting #2

*2nd Draft Proposed
2014 Ceiling Prices*

November 14, 2013

Sustainable Energy Advantage, LLC
(with support from Meister Consultants Group)





Introduction & Agenda

Process:

1. Data requests, research and analysis
2. Distribute initial findings and supporting data to stakeholders
3. Public Meeting #1 – discuss and take comments on initial findings
4. *Distribute MS Excel CREST Models*
5. Distribute revised findings in preparation for Public Meeting #2
6. Public meeting #2:
 - Review stakeholder feedback from/since 1st public meeting
 - Discuss 2nd Draft Proposed 2014 Ceiling Prices
 - Take additional stakeholder comments to inform PUC filing
7. Next Steps



Feedback & Modeling Adjustments

<u>Stakeholder Feedback:</u>	<u>Modeling Change?</u>	
	<u>Yes</u>	<u>No</u>
Interconnection cost estimates increasing	✓	
Difficulty monetizing federal tax benefits	✓	
Actual wind production << estimates	✓	
Wide range of uncertainty in property taxes		✓
Other benefits attributable to DG		✓
<u>Updates independent of feedback:</u>		
Update to forecast of post-contract market value of production (energy, capacity and \$5 RECs)	✓	

SUMMARY RESULTS

Summary Results: Comparison to 2013 & Meeting 1

Tech., class (kW)	2013 CP w/ITC/PTC, No Bonus	Tech., class (kW)	2014 1 st Draft CP w/ITC/PTC, No Bonus	2014 2 nd Draft CP w/ITC/PTC, No Bonus	Net Change from 2013 w/ITC/PTC, No Bonus	Adjustments****
Solar*, 500 +	24.95	Solar*, 500-3,000	23.00	23.50	-6%	Adj. to Interconnect Cost Assumption (+\$50/kW)
Solar*, 251 – 499	28.40	Solar*, 201-499	25.35 (26.75) ⁺	27.30	-4%***	
Solar*, 101 – 250	28.80	Solar*, 50-200	26.55	27.10	-6%***	
Solar*, 50 – 100	29.95					
Wind*, 1,000-1,500	14.80	Wind*, 1,000-3,000	14.80	16.70	+13%	IC: +\$50/kW CF: -1% point
Wind*, 400 – 999	16.20	Wind*, 50-999	16.20	16.20	0%	None
Wind*, 90 – 100	24.65					
AD**, 400 – 500	18.55	AD**, 50-3,000	18.55	18.55	0%	None
Hydro** 500-1,000	17.90	Hydro**, 50-1,000	17.90	17.90	0%	None

* ITC ** PTC

*** Note, changes in selected sub-class definitions prevents a direct comparison in these circumstances.

**** All solar + large wind: ITC/PTC monetization adjusted from 90% to 80%; post-contract market value of production updated per 2013 AESC.

+ Due to computational error, the CP for Solar 251-499 was incorrectly reported at the first public meeting. The correct value is 26.75 ¢/kWh, and was used as the starting point to calculate the 2nd draft ceiling price for that category.

Summary Results: Sensitivity to Federal Incentives

Tech., class (kW)	2014 <i>2nd Draft</i> CP w/ITC/PTC + Bonus	2014 <i>2nd Draft</i> CP w/ITC/PTC, No Bonus	2014 <i>2nd Draft</i> CP No ITC/PTC, No Bonus
Solar*, 500-3,000	22.25	23.50	N/A
Solar*, 201-499	25.90	27.30	N/A
Solar*, 50-200	25.75	27.10	N/A
Wind*, 1,000-3,000	15.60	16.70	19.55
Wind*, 50-999	15.55	16.20	19.95
AD**, 50-3,000	17.70	18.55	19.55
Hydro**, 50-1,000	17.25	17.90	18.85

* ITC

** PTC

SOLAR

Est. of 15-year levelized contract: Solar

Tech., class (kW)	2014 <i>2nd Draft</i> CP <u>w/ITC/PTC + Bonus</u>	2014 <i>2nd Draft</i> CP <u>w/ITC/PTC, No Bonus</u>	2014 <i>2nd Draft</i> CP <u>No ITC/PTC, No Bonus</u>
Solar*, 500-3,000	22.25	23.50	N/A
Solar*, 201-499	25.90	27.30	N/A
Solar*, 50-200	25.75	27.10	N/A

Notes:

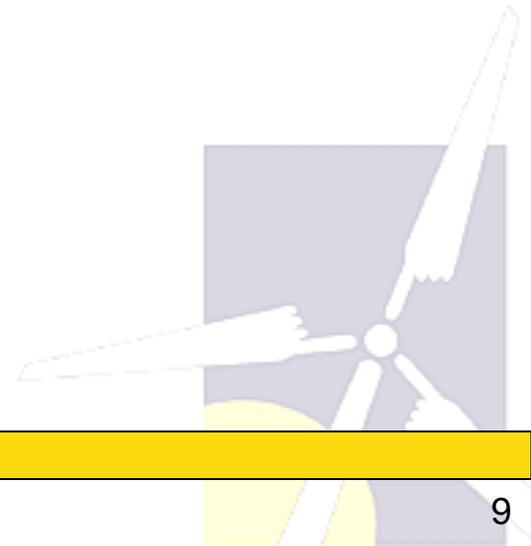
- Competitive market pressure has driven solar PPA bid prices down dramatically.
- Individual cost, financing and performance assumptions that accurately represent the implications of this behavior are difficult to model.
- Aggressive bidding strategies may impact the level of project attrition after selection and before commercial operation.

Incentives

- Federal Investment Tax Credit (ITC) assumed available to all solar projects operational on or before 12/31/2016.
- Ceiling prices evaluated with and without 50% Bonus Depreciation
- Ceiling prices evaluated assuming 80% monetization of federal ITC
- Benefit of Net Operating Loss at state level assessed both as generated and carry-forward. Proposed ceiling prices are an average of these two results.
- No federal, state, local or other grants assumed.



WIND



Est. of 15-year levelized contract: Wind

Tech., class (kW)	2014 2 nd Draft CP w/ITC/PTC + Bonus	2014 2 nd Draft CP w/ITC/PTC, No Bonus	2014 2 nd Draft CP No ITC/PTC, No Bonus
Wind*, 1,000-3,000	15.60	16.70	19.55
Wind*, 50-999	15.55	16.20	19.95

Notes:

❑ There has been a substantial reduction in *community wind* development activity over the past several years. This impairs the ability to obtain meaningful data against which to benchmark Rhode Island wind projects.

❑ The cost gap between community- and commercial-scale wind projects has widened during this time period. Recent bids from large projects < 8 ¢/kWh on 20-year levelized basis. Permitting and project attrition risks still apply.

Incentives

- Current Production Tax Credit (PTC) available to projects under construction as of 12/31/2013.
 - Qualifying wind projects assumed to elect the ITC in lieu of the PTC
 - For 750 kW and 1500 kW wind, ceiling prices calculated both with and without ITC
- Ceiling prices evaluated with and without 50% Bonus Depreciation
- Ceiling prices evaluated assuming 80% monetization of federal ITC
- Benefit of Net Operating Loss at state level assessed both as generated and carry-forward. Proposed ceiling prices are an average of these two results.
- No federal, state, local or other grants assumed.

ANAEROBIC DIGESTION

Est. of 15-year levelized contract: Anaerobic Digestion

Tech., class (kW)	2014 <i>2nd Draft</i> CP <u>w/ITC/PTC + Bonus</u>	2014 <i>2nd Draft</i> CP <u>w/ITC/PTC, No Bonus</u>	2014 <i>2nd Draft</i> CP <u>No ITC/PTC, No Bonus</u>
AD**, 50-3,000	17.70	18.55	19.55

Notes:

- Anaerobic digestion is still a fledgling market in New England.
- The most common opportunity for AD in RI is assumed to be for food waste digesters. Sludge or manure-based applications may also be possible.
- Project design and cost may vary widely by site.
- Consistency in feedstock quantity and quality are important to long-term economics.

HYDRO

Est. of 15-year levelized contract: Hydro

Tech., class (kW)	2014 <i>2nd Draft</i> CP w/ITC/PTC + Bonus	2014 <i>2nd Draft</i> CP w/ITC/PTC, No Bonus	2014 <i>2nd Draft</i> CP No ITC/PTC, No Bonus
Hydro**, 50-1,000	17.25	17.90	18.85

Notes:

- Hydro is a mature market in New England.
- Few new projects, and no new impoundments, are anticipated.
- Expansions and new run-of-river installations are expected, however.
- Project design and cost may vary widely by site.

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APPENDIX

SOLAR

Researched cost, O&M & financing inputs: Solar \approx 150 kW dc (1)

Input category*

Expected Annual Average Net capacity factor, (%) DC

Proposed Input = 14.39%

2013 Input = 14.39%

Annual Production Degradation (%)

Proposed Input = 0.5%

2013 Input = 0.5%

Total installed cost ($\$/\text{kW}_{\text{DC}}$), excluding Interconnection Cost

Proposed Input = \$2,900

2013 Input = \$3,150/kW

Interconnection cost (\$)

Proposed Input = \$50/kW \rightarrow \$100/kW [National Grid project data: \$179/kW]

2013 Input = \$50/kW

O&M expenses (in $\$/\text{kW}_{\text{DC}}\text{-year}$) in Year 1 of operations

Proposed Input = \$20/kW-yr

2013 Input = \$20/kW-yr

*There was no 150kW CP for 2013. The 2013 100 kW inputs are shown here for comparison.



Researched cost, O&M & financing inputs: Solar ≈ 150 kW dc (2)

Input category*

Insurance, Yr 1, (% of total project costs or \$/yr)

Proposed Input = 0.3%

2013 Input = 0.3% of total proj. costs

Project Management, Yr 1 (\$/yr)

Proposed Input = \$1,400/yr

2013 Input = \$1,400/yr

Land Lease, Yr 1 (\$/yr)

Proposed Input = \$2,500/yr

2013 Input = \$2,500/yr

Annual average escalation rate for O&M expenses (%)

Proposed Input = 3%

2013 Input = 3%

Royalties (% of Revenue, or \$/yr)

Proposed Input = 0% (covered in lease)

2013 Input = 0.0% (covered in lease)

Property Taxes (\$ in Yr 1 and annual adjustment factor)

Proposed Input = same methodology/mil rate as 2013

2013 Input = yr 1 = 95% of \$15/1000, basis declines by 5%/yr thereafter to floor of 30%



*There was no 150kW CP for 2013. The 2013 100 kW inputs are shown here for comparison.



Researched cost, O&M & financing inputs: Solar \approx 150 kW dc (3)

Input category*

Debt-to-equity ratio

Proposed Input = 50/50

2013 Input = debt optimized to cash flow

Debt tenor (years)

Proposed Input = 13 yrs

2013 Input = 13 yrs

Interest rate on debt (%)

Proposed Input = 6.0%

2013 Input = 6.5%

Lender's Fee (% of loan amt)

Proposed Input = included in cap. cost

2013 Input = included in cap. cost

Avg. Debt Service Coverage Ratio Target

Proposed Input = 1.40

2013 Input = 1.40

After Tax Return on Equity (e.g. IRR) (%)

Proposed Input = 10%

2013 Input = 12%

Decommissioning Reserve?

Proposed Input = \$0

2013 Input = \$0 (= salvage value)



*There was no 150kW CP for 2013. The 2013 100 kW inputs are shown here for comparison.



Researched cost, O&M and financing inputs: Solar \approx 400 kW dc (1)

Input category

Expected Annual Avg. Net c.f. (%)

Proposed Input = 14.56%

2013 Input = 14.56%

Annual Production Degradation (%)

Proposed Input = 0.5%

2013 Input = 0.5%

Total installed cost ($\$/\text{kW}_{\text{DC}}$), excluding Interconnection Cost

Proposed Input = \$2,550/kW

2013 Input = \$2,650/kW

Interconnection cost (\$)

Proposed Input = \$200/kW \rightarrow \$250/kW [National Grid project data: \$4/kW] [\$1,080 for 260 kW solar installation]

2013 Input = \$300/kW

O&M expenses (in $\$/\text{kW}_{\text{DC}}\text{-year}$) in Year 1 of operations

Proposed Input = \$20/kW-yr

2013 Input = \$20/kW-yr

*There was no 400kW CP for 2013. The 2013 500 kW inputs are shown here for comparison.

Researched cost, O&M and financing inputs: Solar \approx 400 kW dc (2)

Input category

Insurance, Yr 1, (% of total project costs or \$/yr)

Proposed Input = 0.3%

2013 Input = 0.3% of total proj. costs

Project Management, Yr 1 (\$/yr)

Proposed Input = \$6,500

2013 Input= \$6,500/yr

Land Lease, Yr 1 (\$/yr)

Proposed Input = \$10,000

2013 Input = \$15,000

Annual avg. escalation rate for O&M expenses (%)

Proposed Input = 3%

2013 Input = 3%

Royalties (% of Revenue, or \$/yr)

Proposed Input = 0%

2013 Input = 0.0% (covered in lease)

Property Taxes (\$ in Yr 1 and annual adjustment factor)

Proposed Input = same methodology/mil rate as 2013

2013 Input = yr 1 = 95% of \$15/1000, basis declines by 5%/yr thereafter to floor of 30%



*There was no 400kW CP for 2013. The 2013 500 kW inputs are shown here for comparison.



Researched cost, O&M and financing inputs: Solar \approx 400 kW dc (3)

Input category

Debt-to-equity ratio

Proposed Input = 50/50

2013 Input = debt optimized to cash flow

Debt tenor (years)

Proposed Input = 13 yrs

2013 Input = 13 yrs

Interest rate on debt (%)

Proposed Input = 5.5%

2013 Input = 6.0%

Lender's Fee (% of loan amt)

Proposed Input = included in cap. cost

2013 Input = included in cap. cost

Avg. Debt Service Coverage Ratio Target

Proposed Input = 1.35

2013 Input = 1.35

After Tax Return on Equity (e.g. IRR) (%)

Proposed Input = 10%

2013 Input = 11%

Decommissioning Reserve?

Proposed Input = \$0

2013 Input = \$0 (= salvage value)

*There was no 400kW CP for 2013. The 2013 500 kW inputs are shown here for comparison.



Researched cost, O&M and financing inputs: Solar \approx 1,500 kW dc (1)

Input category

Expected Annual Avg. Net capacity factor, (%)

Proposed Input = 14.65%

2013 Input = 14.65%

Annual Production Degradation (%)

Proposed Input = 0.5%

2013 Input = 0.5%

Total installed cost ($\$/\text{kW}_{\text{DC}}$), excluding Interconnection Cost

Proposed Input = \$2,350/kW

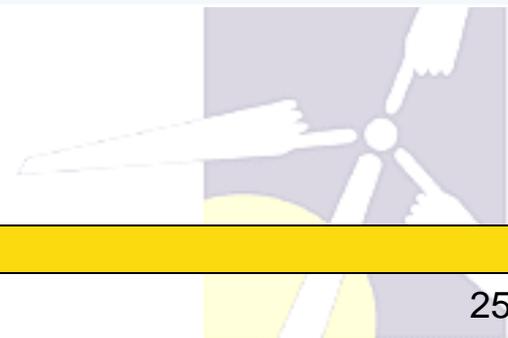
2013 Input = \$2,550/kW

Interconnection cost (\$)

Proposed Input = \$150/kW \rightarrow \$200/kW

[National Grid project data: MA projects average \$107/kW; RI projects average \$153/kW]

2013 Input = \$150/kW





Researched cost, O&M and financing inputs: Solar \approx 1,500 kW dc (2)

Input category

O&M expenses (in $\$/kW_{DC}$ -year) in Yr 1 of operations

Proposed Input = \$15/kW-yr

2013 Input = \$15/kW-yr

Insurance, Yr 1, (% of total project costs or $\$/yr$)

Proposed Input = 0.25%

2013 Input = 0.25%

Project Management, Yr 1 ($\$/yr$)

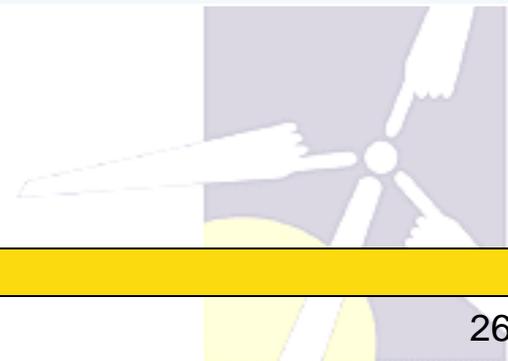
Proposed Input = \$10,000

2013 Input= \$10,000

Land Lease, Yr 1 ($\$/yr$)

Proposed Input = \$30,000

2013 Input = \$34,500 to reflect tax on underlying land



Researched cost, O&M and financing inputs: Solar \approx 1,500 kW dc (3)

Input category

Annual average escalation rate for O&M expenses (%)

Proposed Input = 3%

2013 Input = 3%

Royalties (% of Revenue, or \$/yr)

Proposed Input = 0%

2013 Input = 0.0% (covered in lease)

Property Taxes (\$ in Yr 1 and annual adjustment factor)

Proposed Input = same methodology/mil rate as 2013

2013 Input = 95% of \$15/1000, basis declines by 5%/yr thereafter to floor of 30%

Debt-to-equity ratio

Proposed Input = 50/50

2013 Input = debt optimized to cash flow

Debt tenor (years)

Proposed Input = 13 yrs

2013 Input = 13 yrs;



Researched cost, O&M and financing inputs: Solar \approx 1,500 kW dc (4)

Input category

Interest rate on debt (%)

Proposed Input = 5%

2013 Input = 5.5%

Lender's Fee (% of loan amt)

Proposed Input = included in cap. cost

2013 Input = included in cap. cost

Avg. Debt Service Coverage Ratio

Proposed Input = 1.35

2013 Input = 1.35

After Tax Return on Equity (e.g. IRR) (%)

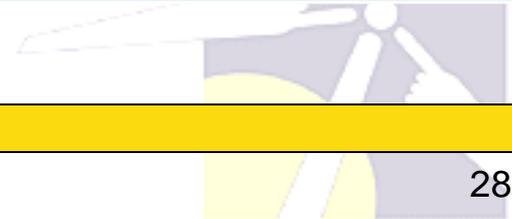
Proposed Input = 10%

2013 Input = 12%

Decommissioning Reserve?

Proposed Input = \$200,000

2013 Input = \$200,000



Additional Assumptions

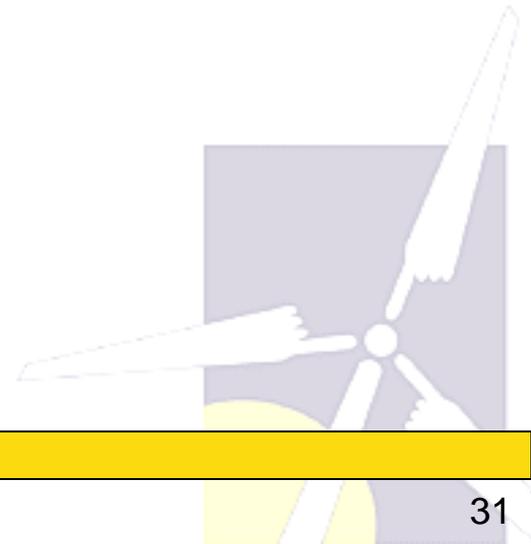
- COD achieved in 2014
- Project Useful Life: 25 years
- 0.5%/yr production degradation
- Debt Service Coverage Ratio Target: 1.35X
- Interconn. Costs depreciated on 15-year MACRS schedule
- All other project costs:
 - 96% depreciated on 5-year MACRS
 - 2% depreciated on 15-year MACRS
 - 2% not depreciable
- Fed. Income Tax rate 35%; State rate 9%
- *Assumed NEPOOL Membership costs either covered by NGRID as lead participant, or spread over many installations and therefore negligible*
- Market value of production (assumed revenue) post-contract = 90% of sum of **solar-weighted** energy and capacity price forecasts from 2013 Avoided Energy Supply Cost Study and \$5/REC (next slide)

Additional Assumptions: Forecast of Market Value of Production

<u>Project Year</u>	<u>Calendar Year</u>	Time-of-Production Weighted Market Value of Production (incl. energy, capacity & RECs) (cents/kWh)
16	2029	12.13
17	2030	12.53
18	2031	12.94
19	2032	13.36
20	2033	13.79
21	2034	14.24
22	2035	14.7
23	2036	15.18
24	2037	15.67
25	2038	16.17



WIND





Researched cost, O&M and financing inputs: Wind 1,500 kW (1)

Input category

Expected Annual Average Net capacity factor, (%)

Proposed Input = 27.5% → 26.5%

2013 Input = 27.5%

Annual Production Degradation

Proposed Input = 0.5%

2013 Input = 0.5%

Total installed cost (\$/kW), **excluding** Interconnection Cost

Proposed Input = \$3,200/kW

2013 Input = \$3,200/kW (excl. interconnection costs)

Typical Interconnection cost (\$/kW)

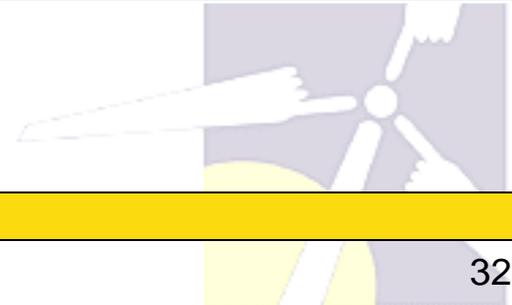
Proposed Input = \$100/kW → \$150/kW [National Grid project data: MA avg = \$99/kW; RI project = \$120]

2013 Input = \$100/kW

O&M expenses in Year 1 of operations

Proposed Input = \$30/kW-yr

2013 Input = \$30/kW-year





Researched cost, O&M and financing inputs: Wind 1,500 kW (2)

Input category

Insurance Expense (as % of total proj. cost, or in \$/yr)

Proposed Input = 0.3% of total project cost

2013 Input = 0.3% of total project cost

Project Management

Proposed Input = \$15,000/yr

2013 Input = \$15,000/yr

Land Lease, Year 1 (\$/year)

Proposed Input = \$20,000/yr

2013 Input = \$20,000/yr

Annual avg. escalation rate for O&M expenses (%)

Proposed Input = 2.5%

2013 Input = 2.5%

Royalties

Proposed Input = included in lease exp.

2013 Input = included in lease exp.

Property Taxes (\$ in Yr 1 and annual adjustment factor)

Proposed Inputs: Cost basis = 95% of \$15/1000, basis declines by 5%/yr thereafter to floor of 30%

Length of construction period (months)

Proposed Input = included in installed costs;

2013 Input = included in installed costs



Researched cost, O&M and financing inputs: Wind 1,500 kW (3)

Input category

Source and Cost of Construction Financing

Proposed Input = included in installed costs;

2013 Input = included in installed costs

Debt-to-equity ratio

Proposed Input = 50/50

2013 Input = debt optimized to cash flow

Debt tenor (years)

Proposed Input = 15 yrs

2013 Input = 15 Yrs.

Interest rate on debt (%)

Proposed Input = 5.5%

2013 Input = 5.5%

Lender's Fee

Proposed Input = included in cap. cost

2013 Input = included in cap. cost

After Tax Return on Equity (e.g. IRR) (%)

Proposed Input = 12%

2013 Input = 12%

Decommissioning Reserve

Proposed Input = \$0 (= salvage value)

2013 Input = \$0 (= salvage value)

Additional Assumptions

- Commercial operation achieved in 2014
- Project Useful Life: 20 years
- Average Debt Service Coverage Ratio Target: 1.35X
- Interconnection Costs depreciated on 15-year MACRS schedule
- All other project costs:
 - 96% depreciated on 5-year MACRS
 - 2% depreciated on 15-year MACRS
 - 2% not depreciable
- Federal Income Tax rate 35%; State rate 9%
- Market value of production (assumed revenue) post-contract = 90% of sum of **wind-weighted** energy and capacity price forecasts from 2013 Avoided Energy Supply Cost Study and \$5/REC (see next slide)

Additional Assumptions: Forecast of Market Value of Production

Project Year	Calendar Year	Time-of-Production Weighted Market Value of Production (incl. energy, capacity & RECs) (cents/kWh)
16	2029	11.01
17	2030	11.39
18	2031	11.78
19	2032	12.19
20	2033	12.61

ANAEROBIC DIGESTION

Incentives

- Current Production Tax Credit (PTC) available to projects under construction as of 12/31/2013.
 - Anaerobic digesters eligible for 50% of face value
 - Ceiling prices calculated both with and without PTC extension.
- Ceiling prices evaluated with and without 50% Bonus Depreciation
- Ceiling prices evaluated assuming 90% monetization of federal PTC
- Benefit of Net Operating Loss at state level assessed both as generated and carry-forward. Proposed ceiling prices are an average of these two results.
- No federal, state, local or other grants assumed.

Additional Assumptions

- Commercial operation achieved in 2014
- Project Useful Life: 20 years
- Average Debt Service Coverage Ratio Target: 1.50X
- Interconnection Costs depreciated on 15-year MACRS schedule
- All other project costs:
 - 96% depreciated on 5-year MACRS
 - 2% depreciated on 15-year MACRS
 - 2% not depreciable
- Federal Income Tax rate 35%; State rate 9%
- Market value of production (assumed revenue) post-contract = 90% of sum of energy and capacity price forecasts from 2013 Avoided Energy Supply Cost Study and \$5/REC (see next slide)

Additional Assumptions: Forecast of Market Value of Production

Project Year	Calendar Year	Market Value of Production (incl. energy, capacity & RECs) (cents/kWh)
16	2029	11.35
17	2030	11.72
18	2031	12.10
19	2032	12.49
20	2033	12.90

HYDRO

Incentives

- Current Production Tax Credit (PTC) available to projects under construction as of 12/31/2013.
 - Hydro is eligible for 50% of face value
 - Ceiling prices calculated both with and without PTC extension.
- Ceiling prices evaluated with and without 50% Bonus Depreciation
- Ceiling prices evaluated assuming 90% monetization of federal PTC
- Benefit of Net Operating Loss at state level assessed both as generated and carry-forward. Proposed ceiling prices are an average of these two results.
- No federal, state, local or other grants assumed.

Additional Assumptions

- Commercial operation achieved in 2016
- Project Useful Life: 30 years
- Interconnection Costs depreciated on 15-year MACRS schedule
- All other project costs:
 - 96% depreciated on 5-year MACRS
 - 2% depreciated on 15-year MACRS
 - 2% not depreciable
- Federal Income Tax rate 35%; State rate 9%
- Market value of production (assumed revenue) post-contract = 75% of sum of energy and capacity price forecasts from 2013 Avoided Energy Supply Cost Study and \$5/REC (see next slide)

Additional Assumptions: Forecast of Market Value of Production

Project Year	Calendar Year	Market Value of Production (incl. energy, capacity & RECs) (cents/kWh)
16	2029	11.49
17	2030	11.83
18	2031	12.18
19	2032	12.54
20	2033	12.90
21	2034	13.28
22	2035	13.67
23	2036	14.07
24	2037	14.49
25	2038	14.91
26	2039	15.35
27	2040	15.80
28	2041	16.26
29	2042	16.74
30	2043	17.23