

## Appendix E

FILED WITH  
Executive Secretary

January 25, 2013

### Electric Avoided Costs

IOWA UTILITIES BOARD

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#### 199 IAC 35.9(3)“a”

Please see Table E1, found in Appendix E1 (MISO<sup>1</sup> Module E Summer Reserve Capacity sheet), for the planning reference case prior to any load additions. Table E2, found in Appendix E2 (MISO Module E Summer Reserve Capacity sheet), provides the planning reference case after any load additions. There is no longer a separate winter reserve capacity sheet under MISO Module E. Remaining life is indicated by capacity ratings greater than zero. For resource planning purposes, retirements of capacity resources are a component of the overall resource plan, which includes a new combined cycle natural gas generating unit (natural gas plant) with an in-service date of 2017.

#### 199 IAC 35.9(3)“b”

Currently, IPL has two planned future capacity additions. The first addition is a one-year 50 MW peak power purchase in 2016. The second addition is a nominal 600 MW natural gas plant planned to go in-service in 2017, with an expected life of at least 27 years. IPL estimates projected net capacity for the natural gas plant at 506 Planning Reserve Credits (PRCs). In addition, IPL estimates it will add capacity through ownership or purchase power agreements in the future in the range of eight PRCs to 129 PRCs throughout the time period 2019 – 2027. Please see Table E2, found in Appendix E2. The above capacity

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<sup>1</sup> Midwest Independent Transmission System Operator, Inc.

additions are all predicated upon the Board's approval of the new NextEra Energy Duane Arnold, LLC (NextEra/DAEC) purchase power agreement commencing in 2014 for 400 PRCs, under both scenarios, reference case without plant additions and reference case with plant additions.

**199 IAC 35.9(3)“c”**

Table E3, found in Appendix E3, identifies the total capacity purchase commitments in the planning reference case exclusive of the capacity additions.

**199 ICA 35.9(3)“d”**

IPL currently has no firm sales commitments during the 20-year planning horizon. Please see Table E2, found in Appendix E2.

**199 IAC 35.9(4)“a” and “b”**

For the 20-year planning horizon, IPL's Asset-Based PRCs and PRC Obligations are presented in Table E1, found in Appendix E1 (prior to load additions), and Table E2, found in Appendix E2 (after load additions). Graphical presentations are presented Figure E1, but in Appendix E3 (no load additions), and Table E2, found in Appendix E2 (with load additions).

**199 IAC 35.9(5)**

Under MISO's Module E Resource Adequacy Requirements, and considering IPL's current load projections, IPL has sufficient resource capabilities

through the planned capacity additions to meet its reserve requirements through 2027. On an on-going basis, IPL monitors the market for generating capacity in and out of the MISO region. Cogeneration, renewable generation, wholesale generation and offers from independent power producers are all considered. Depending on the situation, these facilities can either serve as a source of generation or serve to reduce individual loads otherwise served by IPL. However, IPL cannot accurately forecast the availability of capacity purchases and/or sales offers over the 20-year forecast period, since these offers are dependent on unpredictable third-parties and since offers outside IPL's system can be affected by transmission limitations.

#### **199 IAC 35.9(6)“a”**

IPL's 2012 Integrated Resource Plan (IRP) was filed with the Board on November 14, 2012, in Docket Nos. GCU-2012-0001/RPU-2012-0003. IPL also regularly updates its complete IRP approximately every other year for two primary, although not exclusive, reasons:

- IPL considers the extensive data requirements to accomplish a complete cycle in order to make sure it is meeting its resource needs; and
- IPL fulfills Minnesota Public Utilities Commission's (MPUC) regulatory filing requirements for a biennial IRP<sup>2</sup>.

IPL models multiple scenarios in the IRP to cover variations such as load, fuel prices, environmental externalities, and turbine prices to ensure the IRP remains

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<sup>2</sup> IPL provides a courtesy copy of these Integrated Resource Plan filings to the Board as they are submitted to the MPUC.

valid throughout the cycle. The scenario analysis creates a robustness that precludes the results from becoming quickly outdated.

IPL’s current IRP Base Case identified wind, natural gas, and one-year capacity purchases as the best resources to meet IPL’s capacity and energy requirements throughout the study period (assuming the NextEra/DAEC purchase power agreement is renewed). The costs for all future alternatives considered are shown in Tables E4, found in Appendix E4 (Confidential). Table E5 below, Future Supply Options, shows the mix of resources that is currently projected to best meet IPL’s capacity and energy resource needs.

**Table E5. Future Supply Options**

<u>Year</u>	<u>Unit Type</u>	<u>Fuel</u>	<u>Summer Capacity</u>	<u>Nameplate Capacity</u>
2016	One-Year Capacity Purchase	Gas	50	50
2017	Combined Cycle	Gas	506.9	600
2019	Wind Purchases	Wind	17.3	122.25
2022-27	One-Year Capacity Purchases	Gas	50	50
2023	Wind	Wind	25.8	200
2025	Combustion Turbines	Gas	262	242.5
2026	Combined Cycle	Wind	506.9	600

**199 IAC 35.9(6)“b”**

The capacity purchases and the Combined Cycle plant are the most effective means of satisfying any projected capacity shortfalls identified in 199 IAC 35.9(6)“a” above. All of the identified capacity purchases are only one-year purchases with the exception of the wind purchases.

**199 IAC 35.9(6)“c”**

(1) The anticipated life of either a simple cycle natural gas combustion turbine or a combined cycle natural gas combustion turbine is estimated to be 27.6 years.

(2) The installed cost of a simple cycle combustion turbine (SCCT, or CT) is \$766 per kilowatt (kW) in 2012 dollars (2012\$). The assumed unit is a 189 MW CT. See Table E4, found in Appendix E4 (Confidential) for more details. For the development of Table E4, the capacity costs in IPL's IRP were updated from 2010 costs. The result of that update is that the CT capacity costs were escalated by six percent from 2010 to 2012. However, for the economic carrying charge calculation, the nominal inflation rate of 16 percent from 2010 to 2012 is reduced by the assumed rate of technical change of one percent so that the installed cost becomes \$830.30 in 2012\$. This value is seen in Table E6, found in Appendix E5 - *TAB: Generation carrying charge*, column H.

(3) Please see Column J, Table E6, found in Appendix E5 - *TAB: Generation carrying charge*

(4) Please see Column M, Table E6, found in Appendix E5 - *TAB: Generation carrying charge*

(5) As shown in Table E6, found in Appendix E5 - *TAB: Generation carrying charge*, Column O, the anticipated net present value of the revenue requirements for a simple cycle combustion turbine is \$1,231 per net kW.

(6) The anticipated revenue requirement per net kW per year calculated by the utilization of an economic carrying charge is seen in Table E6, found in Appendix E5 - *TAB: Generation carrying charge*, where Column P presents the nominal values and Column Q provides the annual amounts in present value terms. Please note that the data in those columns is before adding Reserve Margin, Losses and Externality Factor.

(7) The after tax discount rate is 6.729 percent.

(8) The inflation rate is 1.5 percent, except for the one-time adjustment noted above.

**199 IAC 35.9(6)“d”**

All capacity costs are allocated to the peak hour of the system peak of the summer peak period.

**199 IAC 35.9(7)“a”**

The avoided electric capacity costs were developed consistent with the formula outlined in this rule and are shown in Table E7 below for the first 10 years of the planning horizon. The year 2014 values in Table E7 are equivalent to the values provided in column P Year 3 of Table E6, found in Appendix E5 - *TAB: Generation carrying charge*, *TAB: Transmission carrying charge*, and *TAB: Distribution carrying charge*, plus the reserve margin (generation only), loss and externality adjustments in column V.

**Table E7. Annual Electric Capacity Avoided Costs (\$/kW-year), including Losses and Externality Factor, 2014-2023**

Year	Generation	Transmission	Distribution	Total
2014	\$128	\$90	\$30	\$248
2015	\$129	\$91	\$30	\$250
2016	\$130	\$92	\$30	\$252
2017	\$130	\$93	\$31	\$254
2018	\$131	\$94	\$31	\$256
2019	\$131	\$95	\$31	\$258
2020	\$132	\$96	\$31	\$260
2021	\$133	\$97	\$32	\$262
2022	\$133	\$98	\$32	\$264
2023	\$134	\$99	\$32	\$265

**199 IAC 35.9(7)“b”**

IPL developed the avoided electric energy costs for the costing periods identified below consistent with the formula outlined in this rule. These avoided electric energy costs are shown in Table E8. Costing periods are as follows (for both summer and winter):

1. Peak period is 8:00 a.m. to 9:00 p.m. Daylight Savings Time (DST) weekdays or 7:00 a.m. to 8:00 p.m. Central Standard Time (CST) weekdays; and
2. Off-peak period is all other hours.

These costing periods are identical to the rate periods in IPL’s Time-of-Day tariffs.

**Table E8. Avoided Electric Energy Costs, including loss and externality factors, \$/MWh, 2014-2023**

Year	Summer		Winter/Shoulder		Annual Average
	Peak	Off-Peak	Peak	Off-Peak	
2014	\$59.20	\$44.24	\$44.42	\$40.58	\$44.65
2015	\$66.26	\$47.19	\$47.50	\$42.59	\$47.76
2016	\$71.47	\$50.25	\$50.78	\$45.38	\$51.05
2017	\$72.94	\$54.57	\$53.01	\$51.47	\$54.98
2018	\$79.26	\$59.23	\$57.14	\$54.84	\$59.14
2019	\$83.14	\$60.40	\$65.13	\$58.58	\$64.08
2020	\$90.40	\$61.73	\$61.87	\$56.75	\$63.24
2021	\$97.91	\$64.23	\$69.64	\$58.67	\$67.99
2022	\$104.50	\$66.19	\$66.74	\$59.10	\$68.16
2023	\$110.23	\$69.12	\$71.21	\$61.26	\$71.67

The avoided energy costs are the values for the hourly incremental energy costs from the base case Electric Generation Expansion Analysis System (EGEAS) run for the IRP identified above averaged over the costing periods identified above. The values in Table E8 above include the application of losses and the externality factor.

IPL's Existing Generating Units, Purchases and Sales  
Planning Resource Credits (PRC's)

Reference Case - Before Resource Additions

Resource Description	2012 Summer Reserve Capacity (PRC's)	2013 Summer Reserve Capacity (PRC's)	2014 Summer Reserve Capacity (PRC's)	2015 Summer Reserve Capacity (PRC's)	2016 Summer Reserve Capacity (PRC's)	2017 Summer Reserve Capacity (PRC's)	2018 Summer Reserve Capacity (PRC's)	2019 Summer Reserve Capacity (PRC's)	2020 Summer Reserve Capacity (PRC's)	2021 Summer Reserve Capacity (PRC's)	2022 Summer Reserve Capacity (PRC's)	2023 Summer Reserve Capacity (PRC's)	2024 Summer Reserve Capacity (PRC's)	2025 Summer Reserve Capacity (PRC's)	2026 Summer Reserve Capacity (PRC's)	2027 Summer Reserve Capacity (PRC's)
Dubuque #3	28.8	28.8	28.8	0	0	0	0	0	0	0	0	0	0	0	0	0
Dubuque #4	31.6	31.6	31.6	0	0	0	0	0	0	0	0	0	0	0	0	0
Fox Lake #3G	81.1	81.1	81.1	81.1	81.1	0	0	0	0	0	0	0	0	0	0	0
Kapp #2	176.4	176.4	176.4	176.4	176.4	176.4	176.4	176.4	171.1	171.1	171.1	171.1	171.1	0	0	0
Montgomery CT	13.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diesels	9	9	9	5.3	5.3	0	0	0	0	0	0	0	0	0	0	0
Lansing #4	223.8	223.8	223.8	223.8	241.5	241.5	241.5	241.5	234.3	234.3	234.3	234.3	234.3	234.3	234.3	234.3
Louisa	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Neal 25 04	160.2	160.2	157.7	162	162	162	162	162	162	162	162	162	162	162	162	162
Lime Creek 1	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8
Lime Creek 2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Wind IPW Cerro Gordo	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	0	0	0	0
Wind IPW Flying Cloud	8.3	8.3	8.3	8.3	8.3	8.3	8.3	0	0	0	0	0	0	0	0	0
Wind IPW Bingham	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0	0	0	0	0	0	0
Wind IPW Adams	1.4	1.4	1.4	1.4	1.4	1.4	1.4	0	0	0	0	0	0	0	0	0
Wind IES Beaver Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emery	509.8	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6	548.6
Burlington CT1	15.1	15.1	15.1	15.1	15.1	0	0	0	0	0	0	0	0	0	0	0
Burlington CT2	12.6	12.6	12.6	12.6	12.6	0	0	0	0	0	0	0	0	0	0	0
Burlington CT3	14.9	14.9	14.9	14.9	14.9	0	0	0	0	0	0	0	0	0	0	0
Burlington CT4	14.5	14.5	14.5	14.5	14.5	0	0	0	0	0	0	0	0	0	0	0
Grinnell CT1	22.5	22.5	22.5	22.5	22.5	0	0	0	0	0	0	0	0	0	0	0
Grinnell CT2	19.2	19.2	19.2	19.2	19.2	0	0	0	0	0	0	0	0	0	0	0
Centerville Diesel	3.4	3.4	3.4	3.4	3.4	0	0	0	0	0	0	0	0	0	0	0
DAEC Purchase	406.1	406.1	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Ottumwa	295.2	295.2	295.2	310.3	310.3	310.3	310.3	310.3	310.3	308.7	308.7	308.7	308.7	308.7	308.7	308.7
Burlington	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	162.6	162.6	162.6	162.6	162.6	0	0	0
Prairie Creek 1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Prairie Creek 3	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
Prairie Creek 4	78.5	78.5	78.5	78.5	78.5	78.5	78.5	78.5	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1
Sutherland 1	28.3	28.3	28.3	28.3	28.3	0	0	0	0	0	0	0	0	0	0	0
Sutherland 3	58.8	58.8	58.8	58.8	58.8	0	0	0	0	0	0	0	0	0	0	0
Sutherland CT1	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3
Sutherland CT2	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5
Sutherland CT3	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6
Centerville 1	12	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0
Centerville 2	20.5	20.5	20.5	20.5	20.5	0	0	0	0	0	0	0	0	0	0	0
Red Cedar Cogen	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Neal #3	140.2	140.2	138	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9	141.9
Whispering Willow East	0	0	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Wind IES Buena Vista	9	9	9	9	9	9	9	0	0	0	0	0	0	0	0	0
Wind IES Hancock	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Wind Hardin Hilltop	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0
MKT EGY Off Peak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MKT EGY On Peak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Reserve Capacity (PRC's)	2875.5	2900.8	2899.7	2858.9	2876.6	2568.4	2568.4	2549.7	2528.9	2525.4	2525.4	2525.4	2518.9	2185.2	1785.2	1784.6

Table E1 - no additions

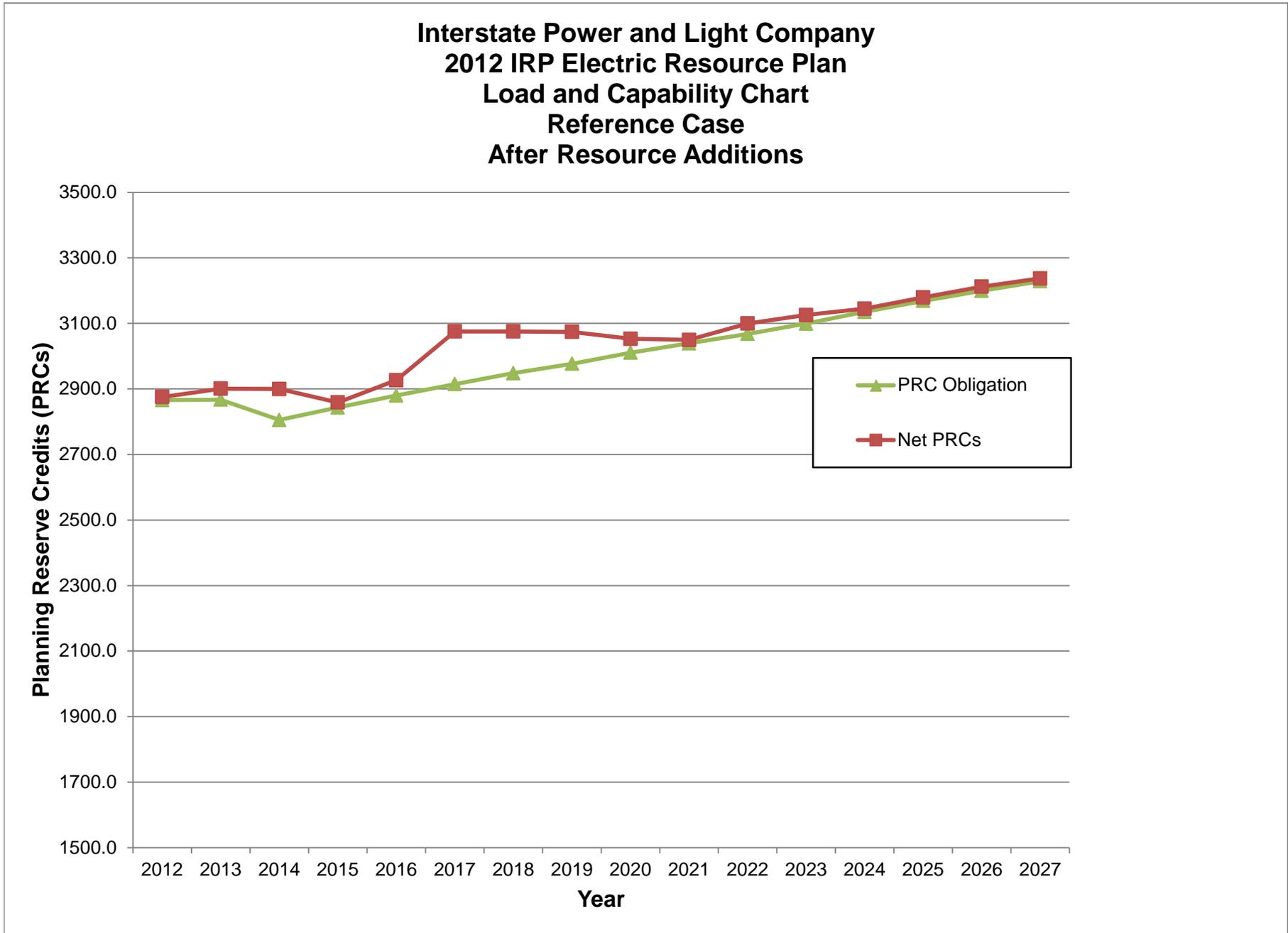


Figure E2

***IPL Projected Load and Generating Capability Data***  
***Reference Case - After Resource Additions***

	Summer 2012	Summer 2013	Summer 2014	Summer 2015	Summer 2016	Summer 2017	Summer 2018	Summer 2019	Summer 2020	Summer 2021	Summer 2022	Summer 2023	Summer 2024	Summer 2025	Summer 2026	Summer 2027
A. Total Internal Demand	3,053.5	3,056.8	2,999.4	3,039.4	3,077.3	3,114.3	3,149.2	3,180.3	3,216.3	3,246.4	3,277.4	3,311.4	3,348.4	3,384.3	3,417.3	3,449.4
B. Demand Resources	292.7	295.0	296.9	300.5	303.1	306.6	309.1	312.7	316.2	318.8	322.2	325.8	328.4	331.9	335.5	339.1
C. Net Internal Demand (A-B)	2,760.8	2,761.8	2,702.5	2,738.9	2,774.2	2,807.7	2,840.1	2,867.6	2,900.1	2,927.6	2,955.2	2,985.6	3,020.0	3,052.4	3,081.8	3,110.3
D. Full Responsibility Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E. Full Responsibility Purchases	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F. Adjusted Net Demand (C + D - E)	2,760.8	2,761.8	2,702.5	2,738.9	2,774.2	2,807.7	2,840.1	2,867.6	2,900.1	2,927.6	2,955.2	2,985.6	3,020.0	3,052.4	3,081.8	3,110.3
G. Planning Reserve Margin	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%
H. PRC Obligation (F * (1 + G))	2,866.0	2,867.0	2,805.5	2,843.3	2,879.9	2,914.7	2,948.3	2,976.9	3,010.6	3,039.1	3,067.8	3,099.4	3,135.1	3,168.7	3,199.2	3,228.8
I. Asset Based PRCs	2,469.4	2,494.7	2,499.7	2,458.9	2,476.6	2,168.4	2,168.4	2,149.7	2,128.9	2,125.4	2,125.4	2,125.4	2,118.9	1,785.2	1,785.2	1,784.6
J. PRC Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K. PRC Purchases	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	0.0	0.0
L. PRC New Additions	0.0	0.0	0.0	0.0	50.0	506.9	506.9	524.2	524.2	524.2	574.2	600.0	625.8	994.2	1,426.9	1,452.7
M. Net PRCs (I - J + K + L)	2,875.5	2,900.8	2,899.7	2,858.9	2,926.6	3,075.3	3,075.3	3,073.9	3,053.1	3,049.6	3,099.6	3,125.4	3,144.7	3,179.4	3,212.1	3,237.3
N. Long/(Short) Position (M - H)	9.5	33.8	94.2	15.6	46.7	160.7	127.0	97.1	42.5	10.5	31.8	26.1	9.7	10.7	12.9	8.5
O. Reserve Percentage (M - F) / F	4.15%	5.03%	7.30%	4.38%	5.49%	9.53%	8.28%	7.20%	5.28%	4.17%	4.89%	4.68%	4.13%	4.16%	4.23%	4.08%

Table E2 - IPL 2012 L C

***IPL Projected Load and Generating Capability Data  
Reference Case - After Resource Additions***

	Summer 2012	Summer 2013	Summer 2014	Summer 2015	Summer 2016	Summer 2017	Summer 2018	Summer 2019	Summer 2020	Summer 2021	Summer 2022	Summer 2023	Summer 2024	Summer 2025	Summer 2026	Summer 2027
<b>Committed Purchases and Sales:</b>																
<b>Firm Purchases:</b>																
Total Firm Purchases:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Firm Sales:</b>																
Total Firm Sales:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Participation Purchases:</b>																
DAEC	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	0.0	0.0
Total Participation Purchases:	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	0.0	0.0
<b>Participation Sales:</b>																
IPL PRC Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Participation Sales:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table E2 - IPL 2012 L C



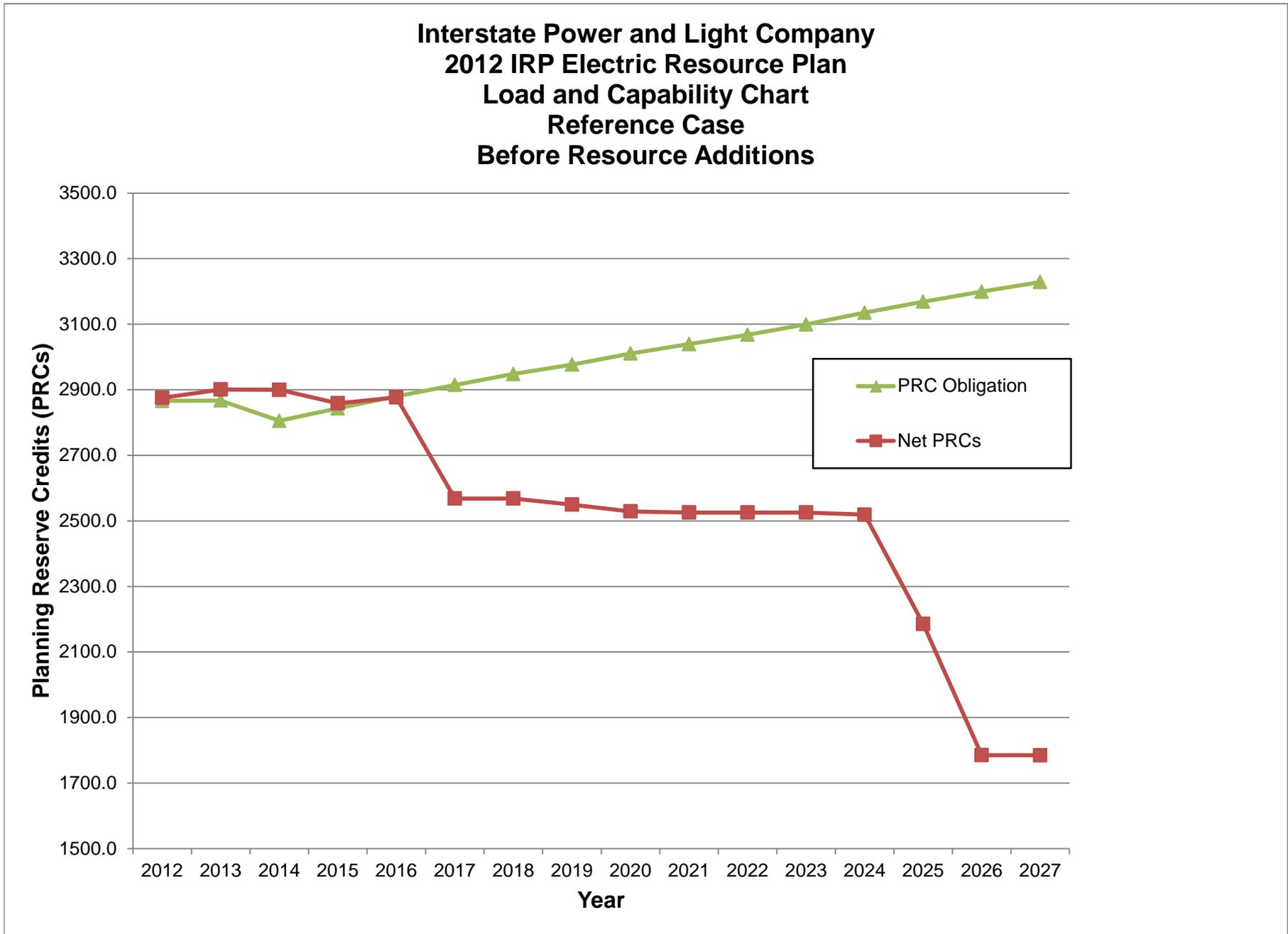


Figure E1

***IPL Projected Load and Generating Capability Data***  
***Reference Case - Before Resource Additions***

	Summer 2012	Summer 2013	Summer 2014	Summer 2015	Summer 2016	Summer 2017	Summer 2018	Summer 2019	Summer 2020	Summer 2021	Summer 2022	Summer 2023	Summer 2024	Summer 2025	Summer 2026	Summer 2027
A. Total Internal Demand	3,053.5	3,056.8	2,999.4	3,039.4	3,077.3	3,114.3	3,149.2	3,180.3	3,216.3	3,246.4	3,277.4	3,311.4	3,348.4	3,384.3	3,417.3	3,449.4
B. Demand Resources	292.7	295.0	296.9	300.5	303.1	306.6	309.1	312.7	316.2	318.8	322.2	325.8	328.4	331.9	335.5	339.1
C. Net Internal Demand (A-B)	2,760.8	2,761.8	2,702.5	2,738.9	2,774.2	2,807.7	2,840.1	2,867.6	2,900.1	2,927.6	2,955.2	2,985.6	3,020.0	3,052.4	3,081.8	3,110.3
D. Full Responsibility Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E. Full Responsibility Purchases	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F. Adjusted Net Demand (C + D - E)	2,760.8	2,761.8	2,702.5	2,738.9	2,774.2	2,807.7	2,840.1	2,867.6	2,900.1	2,927.6	2,955.2	2,985.6	3,020.0	3,052.4	3,081.8	3,110.3
G. Planning Reserve Margin	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%	3.81%
H. PRC Obligation (F * (1 + G))	2,866.0	2,867.0	2,805.5	2,843.3	2,879.9	2,914.7	2,948.3	2,976.9	3,010.6	3,039.1	3,067.8	3,099.4	3,135.1	3,168.7	3,199.2	3,228.8
I. Asset Based PRCs	2,469.4	2,494.7	2,499.7	2,458.9	2,476.6	2,168.4	2,168.4	2,149.7	2,128.9	2,125.4	2,125.4	2,125.4	2,118.9	1,785.2	1,785.2	1,784.6
J. PRC Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K. PRC Purchases	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
L. PRC New Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M. Net PRCs (I - J + K + L)	2,875.5	2,900.8	2,899.7	2,858.9	2,876.6	2,568.4	2,568.4	2,549.7	2,528.9	2,525.4	2,525.4	2,525.4	2,518.9	2,185.2	1,785.2	1,784.6
N. Long/(Short) Position (M - H)	9.5	33.8	94.2	15.6	(3.3)	(346.3)	(379.9)	(427.2)	(481.7)	(513.7)	(542.4)	(574.0)	(616.2)	(983.5)	(1,414.0)	(1,444.2)
O. Reserve Percentage (M - F) / F	4.15%	5.03%	7.30%	4.38%	3.69%	-8.52%	-9.57%	-11.09%	-12.80%	-13.74%	-14.54%	-15.41%	-16.59%	-28.41%	-42.07%	-42.62%

Table E3 -IPL 2012 L&C

***IPL Projected Load and Generating Capability Data  
Reference Case - Before Resource Additions***

	Summer 2012	Summer 2013	Summer 2014	Summer 2015	Summer 2016	Summer 2017	Summer 2018	Summer 2019	Summer 2020	Summer 2021	Summer 2022	Summer 2023	Summer 2024	Summer 2025	Summer 2026	Summer 2027
<b>Committed Purchases and Sales:</b>																
<b>Firm Purchases:</b>																
Total Firm Purchases:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Firm Sales:</b>																
Total Firm Sales:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Participation Purchases:</b>																
DAEC	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	0.0	0.0
Total Participation Purchases:	406.1	406.1	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	0.0	0.0
<b>Participation Sales:</b>																
IPL PRC Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Participation Sales:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table E3 -IPL 2012 L&C

**Generic Alternative Characteristics  
IPL 2012 IRP**

<u>EGEAS Unit</u>	<u>Rated Capacity</u> (MW)	<u>Operating Capacity</u> (MW)	<u>Reserve Capacity</u> (MW)	<u>Forced Outage Rate</u>	<u>Full Load Heat Rate</u> (BTU/KWH)	<u>Fuel Price</u> (\$/MMBTU)	<u>Fixed O&amp;M Cost</u> (\$/KW-Yr)	<u>EGEAS Variable O&amp;M</u> (\$/MWH)	<u>Capital Cost</u> (\$/KW)	<u>Book Life</u> (Years)	<u>Levelized Carrying Charge Rate</u>	<u>ROE</u>
[Redacted Table Content]												

Table E4 [Redacted]

First Year Capacity Cost Table			
(Costs expressed in 2012 \$)			
	Low	Mid	High
Generation capacity (\$/kW-year)	\$116.12	\$126.95	\$137.93
Transmission (\$/kW-year)	\$84.12	\$88.69	\$102.53
Distribution (\$/kW-year)	\$27.64	\$29.06	\$30.48
Sum	\$227.87	\$244.70	\$270.94

Table of Input Assumptions for Carrying Charge Calculations

Generation	Low	Mid	High	All	Price level
Investment per kW of load	\$722.00	\$722.00	\$722.00		2010 \$
O&M per kW-year	\$5.93	5.93	\$5.93		2010 \$
Capital cost escalator	1.50%	1.50%	1.50%	16.00%	2012 only
O&M cost escalator	2.00%	2.00%	2.00%		
Property tax rate	0.00%	0.00%	0.00%		
Property insurance rate (inflated investment)	0.40%	0.40%	0.40%		
Rate of technical progress	0.00%	1.00%	2.00%		
Book life	27	27	27		
Economic life	27	27	27		
Cost of capital for generation	7.861%	7.861%	7.861%		<--- see tab "Cost_of_capital" to change the weighted cost of capital
Discount rate	6.729%	6.729%	6.729%		<---- see tab "Generation carrying charge" cells C65-H72 for derivation of discount rate
Line losses (% adder)	5.06%	5.06%	5.06%		
Reserve margin (factor)	1.150	1.150	1.150		
Externalities (% adder)	10.00%	10.00%	10.00%		
<b>Results for generation</b>					
Economic carry charge	7.043%	7.762%	8.502%		
Value of capacity \$/kW	\$116.12	\$126.95	\$137.93		2012 \$
<b>Transmission</b>	Low	Mid	High		Price level
Investment per kW of load	\$367.00	\$400.00	\$500.00		2012 \$
O&M per kW-year	\$21.72	\$2.17	\$2.17		2012 \$
Capital cost escalator	5.00%	5.00%	5.00%		
O&M cost escalator	6.00%	3.00%	3.00%		
Property tax rate	0.00%	0.00%	0.00%		
Property insurance rate (inflated investment)	0.40%	0.40%	0.40%		
Rate of technical progress	0.00%	0.50%	1.00%		
Book life	35	35	35		
Economic life	40	40	40		
Cost of capital for transmission	9.620%	7.861%	7.861%		<--- see tab "Cost_of_capital" to change the weighted cost of capital
Discount rate	8.712%	8.712%	8.712%		<---- see tab "Transmission carrying charge" cells C80-H86 for derivation of discount rate
Line losses (% adder)	2.00%	2.00%	2.00%		
Reserve margin (factor)	1.000	1.000	1.000		
Externalities (% adder)	10.00%	10.00%	10.00%		
<b>Results for transmission</b>					
Economic carry charge	9.032%	9.032%	7.097%		
Value of capacity \$/kW	\$84.12	\$88.69	\$102.53		2012 \$
<b>Distribution</b>	Low	Mid	High		Price level
Investment per kW of load	\$252.36	\$252.36	\$252.36	\$252.36	2010 \$
O&M per kW-year	\$1.61	\$1.61	\$1.61		
Capital cost escalator	1.50%	1.50%	1.50%		
O&M cost escalator	1.80%	1.80%	1.80%		
Property tax rate	0.00%	0.00%	0.00%		
Property insurance rate (inflated investment)	0.40%	0.40%	0.40%		
Rate of technical progress	0.00%	0.50%	1.00%		
Book life	35	35	35		
Economic life	35	35	35		
Cost of capital for distribution	7.861%	7.861%	7.861%		<--- see tab "Cost_of_capital" to change the weighted cost of capital
Discount rate	6.729%	6.729%	6.729%		<---- see tab "Distribution carrying charge" cells C80-H86 for derivation of discount rate
Line losses (% adder)	3.00%	3.00%	3.00%		
Reserve margin (factor)	1.000	1.000	1.000		
Externalities (% adder)	10.00%	10.00%	10.00%		
<b>Results for distribution</b>					
Economic carry charge	6.318%	6.704%	5.490%		
Value of capacity \$/kW	\$27.64	\$29.06	\$30.48		2007 \$

TAB: Input\_assumptions

## Explanatory notes - please read these notes before using this spreadsheet

This spreadsheet calculates the economic carrying charges for the Interstate Power and Light Company.

There are 8 tabs (worksheets) in this spreadsheet:

Name	Purpose
Readme	Explain the layout and workings of the spreadsheet
Input_assumptions	Holds the input assumptions what can be changed and records the first-year results
Generation econ carrying charge	Calculates the economic carrying charge for generation
Transmission carrying charge	Calculates the economic carrying charge for transmission
Distribution carrying charge	Calculates the economic carrying charge for distribution
Cost_of_capital	Gives the values of the capital structure and costs for generation and for T&D
MACRS_table	Gives the tax depreciation schedules used in the revenue requirements

All the worksheets except the Input\_assumptions and the Cost\_of\_capital are protected to avoid corruption of the formulae. However, the protection is not password protected. Thus, the user can remove the protection to change the logic.

The "Input\_assumptions" tab (worksheet) gives the calculated values in the "Capacity Cost Table" at the top of the page (also given in the "Summary Table" tab). Immediately below that are short explanatory notes on those values. Further below that, in rows 17 through 76, is the "Table of Input Assumptions for Carrying Charge Calculations." That table gives the input values used in the calculation. The following input values are linked to the calculating spreadsheets and can be altered to change the results:

- Investment per kW of load
- O&M per kW-year
- Capital cost escalator
- O&M cost escalator
- Property tax rate
- Property insurance rate (inflated investment)
- Rate of technical progress
- Economic life
- Line losses (% adder)
- Reserve margin (factor)
- Externalities (% adder)

The inputs that can be changed are highlighted in light turquoise like this sentence.

The cost of capital assumptions are given in tab "Cost\_of\_capital" and should be changed there to change the cost of capital values.

The discount rate is listed in the Table of Input Assumptions but in fact is not an input. Rather it is calculated as the after tax discount rate at the bottom of each of the carrying charge sheets using the cost of capital assumptions.

The three calculating worksheets (Generation carrying charge, transmission carrying charge, and distribution carrying charge) have locked and protected cells with the exception of the choice of case cell, U30. The protection is not password protected, and can be removed by selecting Tools/Protection/Unprotect Sheet.

### How to change the input values and update the carrying charge calculations

Changing the input values for the linked cells in the "Table of Input Assumptions for Carrying Charge Calculations" does not update the final table. This is done with the "UpdateValues" macro which can be invoked by clicking on the "Update Capacity Cost Table for input values" button at the top of the "Input\_assumptions" worksheet or by hitting control+L.

Note: the carrying charge worksheets for generation, transmission and distribution are protected except for the case number in cell U30. Several of the input values are fixed in these carrying charge sheets. These include tax life, book life, and start year. To revise these, unlock the sheets and change the appropriate formula. The protection does not have a password and has been invoked to remind the user that the basic inputs should be changed in the "Input\_assumptions" worksheet.

### If you want to view the all the calculations for a particular case

The spreadsheet is designed to produce the carrying charges for generation, transmission and distribution for three inputs in each. If the particular assignment of the low, mid and high case inputs should be changed, these should be changed in the Input\_assumptions worksheet. The input variations in have been organized to show the variation from low to high cost input assumptions, but the spreadsheet will reflect whatever is under the low, mid or high case, respectively numbered 1, 2, and 3.

The UpDateValues macro always ends up with the high case (number 3). If you want to see the intermediate calculations for case 1 or case 2, this needs to be done one at a time. Make whatever changes needed to the case in the Input\_assumptions tab, the go to the carrying charge sheet you are interested in: generation, transmission or distribution. Change the case number in cell U30, which is the only unprotected cell in the sheet. And then hit the F9 key (the "recalc" key). This will calculate the carrying charge in that worksheet. If you want to see results for the other functions, repeat the process one sheet at a time. NOTE: this process will not update the summary tables or the results lines in the Table of Input Assumptions for Carrying Charge Calculations. That requires running the macro by clicking the "Click on this button to update Capacity Cost Table for input values changes (runs UpDateValues macro)" in the Input\_assumptions worksheet. Also note: unless you want to change the logic and formulae, it is not necessary to "unprotect" the carrying charge worksheets.

B C D E F G H I J K L M N O P Q R S T U V

REVENUE REQUIREMENT FOR GENERATION CAPACITY(One kW of Combustion Turbine Capacity)

<b>INPUTS:</b>	Installation Year of Unit	End-2010	Tax Grossup	71.2%	Capital Inflation Rate except in 2012	1.50%	Economic Rate (1st Yr)	7.76%	
	2010 Installed Cost(\$/kW/Yr)	\$ 722.00	\$830.30	Book Life	27	Fxd O&M Inflation Rate	2.00%		
	2010 Fxd O&M Cost(\$/kW/Y)	\$ 5.93	\$ 6.05	Tax Life (3, 5, 7, 10, 15 or 20 Years)	20	Property Tax Rate	0.00%	Cap inflation net techn change	0.50%
	Discount Rate (ATDR)	6.73%		Economic life	27	Property Insurance Rate	0.40%	Equity & Preferred Return Rate	5.14%
	Effective Tax Rate	41.6%				Rate of technical change	1.00%	Debt Cost Rate	2.72%
						(4) Capital Inflation rate in 2012 only:	16.00%		

YR	Rate Base	SL Depr	Tax Depr	Dfrd Inc Txs	Equity Return	Debt Cost	Income Tax	Capital Cost	Present Value Factor	PV Capital Cost	Operating Cost	PV Operating Cost	PV Total Cost	Economic Cost Annual	PV Total
1	830.30	30.75	31.14	0.16	42.66	22.60	30.19	126.37	0.9370	118.41	9.37	8.78	127.19	95.52	89.50
2	799.39	30.75	59.94	12.13	41.08	21.76	17.09	122.81	0.8779	107.81	9.54	8.38	116.19	95.99	84.27
3	756.51	30.75	55.44	10.26	38.87	20.59	17.39	117.87	0.8225	96.95	9.71	7.99	104.94	96.47	79.35
4	715.49	30.75	51.29	8.54	36.77	19.48	17.62	113.16	0.7707	87.21	9.89	7.62	94.83	96.95	74.71
5	676.20	30.75	47.44	6.94	34.75	18.41	17.79	108.63	0.7221	78.44	10.07	7.27	85.72	97.43	70.35
6	638.51	30.75	43.88	5.46	32.81	17.38	17.89	104.29	0.6766	70.56	10.26	6.94	77.50	97.91	66.24
7	602.30	30.75	40.59	4.09	30.95	16.40	17.93	100.12	0.6339	63.47	10.44	6.62	70.09	98.39	62.37
8	567.46	30.75	37.55	2.83	29.16	15.45	17.92	96.11	0.5939	57.08	10.63	6.32	63.40	98.88	58.73
9	533.88	30.75	37.05	2.62	27.43	14.53	16.90	92.24	0.5565	51.33	10.83	6.03	57.36	99.37	55.30
10	500.50	30.75	37.04	2.61	25.72	13.62	15.68	88.39	0.5214	46.09	11.03	5.75	51.83	99.86	52.07
11	467.14	30.75	37.05	2.62	24.00	12.72	14.46	84.55	0.4885	41.31	11.23	5.49	46.79	100.36	49.03
12	433.77	30.75	37.04	2.61	22.29	11.81	13.24	80.70	0.4577	36.94	11.43	5.23	42.17	100.85	46.16
13	400.41	30.75	37.05	2.62	20.57	10.90	12.02	76.87	0.4289	32.97	11.64	4.99	37.96	101.35	43.47
14	367.04	30.75	37.04	2.61	18.86	9.99	10.80	73.02	0.4018	29.34	11.85	4.76	34.10	101.86	40.93
15	333.67	30.75	37.05	2.62	17.15	9.08	9.58	69.18	0.3765	26.05	12.07	4.55	30.59	102.36	38.54
16	300.30	30.75	37.04	2.61	15.43	8.17	8.36	65.33	0.3528	23.05	12.29	4.34	27.38	102.87	36.29
17	266.94	30.75	37.05	2.62	13.72	7.27	7.14	61.50	0.3305	20.33	12.52	4.14	24.46	103.38	34.17
18	233.57	30.75	37.04	2.61	12.00	6.36	5.92	57.64	0.3097	17.85	12.75	3.95	21.80	103.89	32.17
19	200.21	30.75	37.05	2.62	10.29	5.45	4.70	53.81	0.2902	15.61	12.98	3.77	19.38	104.40	30.29
20	166.83	30.75	37.04	2.61	8.57	4.54	3.48	49.96	0.2719	13.58	13.22	3.59	17.18	104.92	28.52
21	133.47	30.75	18.52	-5.09	6.86	3.63	9.96	46.12	0.2547	11.75	13.46	3.43	15.18	105.44	26.86
22	107.81	30.75	0.00	-12.78	5.54	2.93	16.73	43.18	0.2387	10.30	13.71	3.27	13.58	105.96	25.29
23	89.84	30.75	0.00	-12.78	4.62	2.45	16.07	41.11	0.2236	9.19	13.96	3.12	12.31	106.48	23.81
24	71.87	30.75	0.00	-12.78	3.69	1.96	15.42	39.04	0.2095	8.18	14.22	2.98	11.16	107.01	22.42
25	53.90	30.75	0.00	-12.78	2.77	1.47	14.76	36.97	0.1963	7.26	14.48	2.84	10.10	107.54	21.11
26	35.92	30.75	0.00	-12.78	1.85	0.98	14.10	34.90	0.1839	6.42	14.74	2.71	9.13	108.07	19.88
27	17.95	30.75	0.00	-12.78	0.92	0.49	13.44	32.83	0.1723	5.66	15.01	2.59	8.24	108.61	18.72
<b>Total</b>			830.33						#####			137.43	1230.56		1230.56

Capital + O&M econ carrying charge	\$95.52	/kW-year
plus reserve margin	15.00%	
= Reserve adjusted carrying charge	\$109.85	/kW-year
plus marginal line losses	5.1%	
= Reserve + losses adjusted carrying charge	\$115.41	/kW-year
plus environmental adder	10.0%	
<b>= Generation avoided cost</b>	<b>\$126.95</b>	<b>/kW-year</b>

Pick case: low = 1, mid = 2, high = 3

Case = 2  
Mid Case

← PV Checks

- NOTES:** (1) Spreadsheet modified from "Appendix B1 Figure B1.14 pages 1-2 (final).XLS"  
(2) Installed CT Cost and O & M Cost - Source: EPRI Technical Guide and IPL study.  
(3) See page 2 for description of all other rates.  
Column C: Rate Base(t)=Rate Base(t-1)-[SL Depr(t-1)+Dfrd Inc Txs(t-1)]  
Column E: Installed cost x ACRS 15-year rates.  
Column G: Rate Base x Weighted Cost of Equity and Preferred Capital.  
Column I: (SL Depr - Tax Depr + Deferred Taxes + Equity & Preferred Return) x Tax Grossup.  
Column K: Present Value Factor - [ 1/((1+ATDR)^Year) ].  
Column M: O & M, Property Tax and Insurance Cost. O&M and Insurance cost inflated at annual inflation rate, while Property Tax is inflated at one-half of annual inflation rate.  
Column O: PV Capital Cost + PV Operating Cost.  
Column Q: Annual Economic Cost x Present Value Factor.

- Column D: Straight Line(SL) Depreciation is (Installed Cost/27 Years).  
Column F: (Tax Depreciation minus SL Depreciation) x Federal Tax Rate (35%).  
Column H: Rate Base x Weighted Cost of Debt.  
Column J: SL Depr + Equity Return + Debt Cost + Income Taxes + Deferred Taxes.  
Column L: Capital Cost x Present Value Factor.  
Column N: Operating Cost x Present Value Factor.  
Column P: Sum of PV Total Cost x Economic Rate (1st Yr), remaining years at inflation rate.  
Column R: See Exhibit  
Column S: Annual Economic Cost + T & D Cost.

	Ratio	Capital Cost	Wgt Cost	
Debt	45.325%	6.006%	2.722%	SOURCE: See Cost of Capital tab
Preferred	6.481%	8.410%	0.545%	
Common	48.194%	9.531%	4.593%	
Weighted Cost of Capital			7.861%	
After Tax Discount Rate (ATDR)			6.729%	Weighted Cost of Capital - (Weighted Cost of Debt x Composite Tax Rate)

	Actual	Effective	
Federal Tax Rate	35%	31.46%	Actual Federal Rate - (Actual Federal Rate x Effective State Rate)
State Tax Rate	12%	10.11%	Actual State Rate - [Actual State Rate x (Effective Federal Rate/2)]
Composite Tax Rate		41.57%	
Tax Grossup		71.15%	Composite Tax Rate/(1 - Composite Tax Rate)

Economic Rate (1st Yr) (r - e) x (1 + r)^n / ((1 + r)^n - (1 + e)^n), Where - (1) r = After Tax Discount Rate, (2) e = Annual Inflation Rate and (3) n = economic life in years.

TAB: Generation carrying charge

B C D E F G H I J K L M N O P Q R S T U V

REVENUE REQUIREMENT FOR Transmission (Marginal \$/kW of Peak Capacity Growth)

INPUTS:	Installation Year of Unit	End of 2012	Tax Grossup	70.7%	Capital Inflation Rate	5.00%	Economic Rate (1st Yr)	9.03%
	2012 Installed Cost(\$/kW/Yr)	\$400.00	\$ 400.00	Book Life	35	Fxd O&M Inflation Rate	2.60%	
	2012 Fxd O&M Cost(\$/kW/Yr)	\$21.72	\$ 22.28	Tax Life (3, 5, 7, 10, 15 or 20 Years)	20	Property Tax Rate	0.00%	ITC-M Adjustment change
	Discount Rate (ATDR)	8.71%		Economic life	40	Property Insurance Rate	0.00%	Equity & Preferred Return Rate
	Effective Tax Rate	41.4%				Rate of technical change	0.50%	Debt Cost Rate

YR	Rate Base	SL Depr	Tax Depr	Dfrd Inc Txs	Equity Return	Debt Cost	Income Tax	Capital Cost	Present Value Factor	PV Capital Cost	Operating Cost	PV Operating Cost	PV Total Cost	Economic Cost Annual	PV Total
1	400.00	11.43	15.00	1.48	29.71	8.77	19.54	70.93	0.9199	65.24	22.28	20.50	85.74	79.04	72.71
2	387.09	11.43	28.88	7.23	28.75	8.49	13.11	69.01	0.8461	58.39	22.86	19.35	77.74	79.04	66.88
3	368.43	11.43	26.71	6.33	27.37	8.08	13.03	66.23	0.7783	51.55	23.46	18.26	69.81	79.04	61.52
4	350.68	11.43	24.71	5.50	26.05	7.69	12.92	63.59	0.7160	45.53	24.07	17.23	62.76	79.04	56.59
5	333.75	11.43	22.85	4.73	24.79	7.32	12.80	61.07	0.6586	40.22	24.69	16.26	56.48	79.04	52.06
6	317.58	11.43	21.14	4.02	23.59	6.96	12.66	58.67	0.6058	35.54	25.34	15.35	50.89	79.04	47.89
7	302.13	11.43	19.55	3.37	22.44	6.62	12.51	56.37	0.5573	31.41	26.00	14.49	45.90	79.04	44.05
8	287.34	11.43	18.09	2.76	21.34	6.30	12.34	54.17	0.5126	27.77	26.67	13.67	41.44	79.04	40.52
9	273.15	11.43	17.85	2.66	20.29	5.99	11.69	52.06	0.4715	24.55	27.36	12.90	37.45	79.04	37.27
10	259.06	11.43	17.84	2.66	19.24	5.68	10.95	49.96	0.4337	21.67	28.08	12.18	33.85	79.04	34.28
11	244.98	11.43	17.85	2.66	18.20	5.37	10.21	47.87	0.3990	19.10	28.81	11.49	30.59	79.04	31.54
12	230.89	11.43	17.84	2.66	17.15	5.06	9.47	45.77	0.3670	16.80	29.55	10.85	27.65	79.04	29.01
13	216.80	11.43	17.85	2.66	16.10	4.75	8.73	43.68	0.3376	14.75	30.32	10.24	24.98	79.04	26.68
14	202.71	11.43	17.84	2.66	15.06	4.44	7.99	41.58	0.3105	12.91	31.11	9.66	22.57	79.04	24.55
15	188.63	11.43	17.85	2.66	14.01	4.13	7.25	39.49	0.2857	11.28	31.92	9.12	20.40	79.04	22.58
16	174.54	11.43	17.84	2.66	12.96	3.83	6.51	37.39	0.2628	9.82	32.75	8.61	18.43	79.04	20.77
17	160.45	11.43	17.85	2.66	11.92	3.52	5.77	35.29	0.2417	8.53	33.60	8.12	16.65	79.04	19.11
18	146.36	11.43	17.84	2.66	10.87	3.21	5.03	33.20	0.2223	7.38	34.48	7.67	15.05	79.04	17.57
19	132.28	11.43	17.85	2.66	9.83	2.90	4.29	31.10	0.2045	6.36	35.37	7.23	13.60	79.04	16.17
20	118.19	11.43	17.84	2.66	8.78	2.59	3.55	29.01	0.1881	5.46	36.29	6.83	12.29	79.04	14.87
21	104.10	11.43	8.92	-1.04	7.73	2.28	6.51	26.91	0.1731	4.66	37.24	6.44	11.10	79.04	13.68
22	93.71	11.43	0.00	-4.73	6.96	2.05	9.66	25.37	0.1592	4.04	38.20	6.08	10.12	79.04	12.58
23	87.02	11.43	0.00	-4.73	6.46	1.91	9.31	24.37	0.1464	3.57	39.20	5.74	9.31	79.04	11.57
24	80.32	11.43	0.00	-4.73	5.97	1.76	8.96	23.38	0.1347	3.15	40.22	5.42	8.57	79.04	10.65
25	73.63	11.43	0.00	-4.73	5.47	1.61	8.60	22.38	0.1239	2.77	41.26	5.11	7.89	79.04	9.79
26	66.94	11.43	0.00	-4.73	4.97	1.47	8.25	21.38	0.1140	2.44	42.33	4.82	7.26	79.04	9.01
27	60.24	11.43	0.00	-4.73	4.47	1.32	7.90	20.39	0.1048	2.14	43.43	4.55	6.69	79.04	8.29
28	53.55	11.43	0.00	-4.73	3.98	1.17	7.55	19.39	0.0964	1.87	44.56	4.30	6.17	79.04	7.62
29	46.86	11.43	0.00	-4.73	3.48	1.03	7.20	18.40	0.0887	1.63	45.72	4.06	5.69	79.04	7.01
30	40.16	11.43	0.00	-4.73	2.98	0.88	6.85	17.40	0.0816	1.42	46.91	3.83	5.25	79.04	6.45
31	33.47	11.43	0.00	-4.73	2.49	0.73	6.49	16.41	0.0751	1.23	48.13	3.61	4.84	79.04	5.93
32	26.78	11.43	0.00	-4.73	1.99	0.59	6.14	15.41	0.0690	1.06	49.38	3.41	4.47	79.04	5.46
33	20.08	11.43	0.00	-4.73	1.49	0.44	5.79	14.42	0.0635	0.92	50.67	3.22	4.13	79.04	5.02
34	13.39	11.43	0.00	-4.73	0.99	0.29	5.44	13.42	0.0584	0.78	51.98	3.04	3.82	79.04	4.62
35	6.69	11.43	0.00	-4.73	0.50	0.15	5.09	12.42	0.0537	0.67	53.34	2.87	3.53	79.04	4.25
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0494	0.00	54.72	2.71	2.71	79.04	3.91
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0455	0.00	56.15	2.55	2.55	79.04	3.59
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0418	0.00	57.60	2.41	2.41	79.04	3.31
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0385	0.00	59.10	2.27	2.27	79.04	3.04
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0354	0.00	60.64	2.15	2.15	79.04	2.80
<b>Total</b>				-0.0005						546.60		328.59	875.19	875.19	<b>&lt;- PV Checks</b>

Capital + O&M econ carrying charge	\$79.04 /kW-year
plus reserve margin	0.0%
= Reserve adjusted carrying charge	\$79.04 /kW-year
plus marginal line losses	2.0%
= Reserve + losses adjusted carrying charge	\$80.62 /kW-year
plus environmental adder	10.0%
<b>=Transmission avoided cost</b>	<b>\$88.69 /kW-year</b>

2

- NOTES: (1) Spreadsheet modified from "Appendix B1 Figure B1.14 pages 3-6 (final).XLS"  
(2) Investment from analysis of historical data on combined systems  
(3) See page 2 for description of all other rates.

Column C: Rate Base(t)=Rate Base(t-1)-[SL Depr(t-1)+Dfrd Inc Txs(t-1)]  
Column E: Installed cost x ACRS 15-year rates.  
Column G: Rate Base x Weighted Cost of Equity and Preferred Capital.  
Column I: (SL Depr - Tax Depr + Deferred Taxes + Equity + Preferred Return) x Tax Grossup.  
Column K: Present Value Factor - [ 1/((1+ATDR)^Year) ].  
Column M: O & M, Property Tax and Insurance Cost. O&M and Insurance cost inflated at annual inflation rate, while Property Tax is inflated at one-half of annual inflation rate.  
Column O: PV Capital Cost + PV Operating Cost.  
Column Q: Annual Economic Cost x Present Value Factor.  
Column D: Straight Line(SL) Depreciation is (Installed Cost/27 Years).  
Column F: (Tax Depreciation minus SL Depreciation) x Federal Tax Rate(35%).  
Column H: Rate Base x Weighted Cost of Debt.  
Column J: SL Depr + Equity Return + Debt Cost + Income Taxes + Deferred Taxes.  
Column L: Capital Cost x Present Value Factor.  
Column N: Operating Cost x Present Value Factor.  
Column P: Sum of PV Total Cost x Economic Rate (1st Yr), remaining years at inflation rate  
Column R: See Exhibit  
Column S: Annual Economic Cost + T & D Cost.

	Ratio	Capital Cost	Wgt Cost	
Debt	40.00%	5.480%	2.192%	SOURCE: ITC-M 2012 Attachment O
Preferred	0.00%	0.000%	0.000%	
Common	60.00%	12.380%	7.428%	
Weighted Cost of Capital			9.620%	
After Tax Discount Rate(ATDR)			8.712%	Weighted Cost of Capital - (Weighted Cost of Debt x Composite Tax Rate)

	Actual	Effective	
Federal Tax Rate	35%	31.36%	Actual Federal Rate - (Actual Federal Rate x Effective State Rate)
State Tax Rate	11.53%	10.07%	Actual State Rate - [Actual State Rate x (Effective Federal Rate/2)]
Composite Tax Rate		41.43%	
Tax Grossup		70.74%	Composite Tax Rate/(1 - Composite Tax Rate)

Economic Rate(1st Yr) (r - e) x (1 + r)^n / ((1 + r)^n - (1 + e)^n), Where - (1) r = After Tax Discount Rate, (2) e = Annual Inflation Rate and (3) n = economic life in years.

TAB: Transmission carrying charge

B C D E F G H I J K L M N O P Q R S T U V

REVENUE REQUIREMENT FOR Distribution (Marginal \$/kW of Peak Capacity Growth)

INPUTS:	Installation Year of Unit	End of 2011	Tax Grossup	71.2%	Capital Inflation Rate	1.50%	Economic Rate (1st Yr)	6.70%
	2010 Installed Cost(\$/kW/Yr)	\$ 252.36	\$ 257.41	Book Life	35	Fxd O&M Inflation Rate	1.80%	
	2010 Fxd O&M Cost(\$/kW/Yr)	\$ 1.61	\$ 1.67	Tax Life (3, 5, 7, 10, 15 or 20 Years)	20	Property Tax Rate	0.00%	Cap inflation net techn change
	Discount Rate (ATDR)	6.73%		Economic life	35	Property Insurance Rate	0.40%	Equity & Preferred Return Rate
	Federal Tax Rate	35.0%				Rate of technical change	0.50%	Debt Cost Rate

YR	Rate Base	SL Depr	Tax Depr	Dfrd Inc Txs	Equity Return	Debt Cost	Income Tax	Capital Cost	Present Value Factor	PV Capital Cost	Operating Cost	PV Operating Cost	PV Total Cost	Economic Cost Annual	PV Total
1	257.41	7.35	9.65	0.80	13.23	7.01	8.35	36.74	0.9370	34.42	2.70	2.53	36.95	25.65	24.03
2	249.25	7.35	18.58	3.93	12.81	6.79	3.92	34.80	0.8779	30.55	2.74	2.41	32.96	25.90	22.74
3	237.96	7.35	17.19	3.44	12.23	6.48	4.15	33.65	0.8225	27.68	2.79	2.29	29.98	26.16	21.52
4	227.17	7.35	15.90	2.99	11.67	6.18	4.35	32.56	0.7707	25.09	2.84	2.19	27.28	26.42	20.36
5	216.82	7.35	14.71	2.57	11.14	5.90	4.53	31.50	0.7221	22.74	2.88	2.08	24.83	26.68	19.27
6	206.90	7.35	13.60	2.19	10.63	5.63	4.67	30.48	0.6766	20.62	2.93	1.98	22.61	26.95	18.23
7	197.35	7.35	12.58	1.83	10.14	5.37	4.80	29.50	0.6339	18.70	2.98	1.89	20.59	27.22	17.25
8	188.17	7.35	11.64	1.50	9.67	5.12	4.90	28.54	0.5939	16.95	3.03	1.80	18.75	27.49	16.33
9	179.31	7.35	11.49	1.45	9.21	4.88	4.65	27.54	0.5565	15.33	3.08	1.72	17.04	27.76	15.45
10	170.51	7.35	11.48	1.44	8.76	4.64	4.32	26.53	0.5214	13.83	3.14	1.64	15.47	28.04	14.62
11	161.72	7.35	11.49	1.45	8.31	4.40	4.00	25.51	0.4885	12.46	3.19	1.56	14.02	28.32	13.83
12	152.91	7.35	11.48	1.44	7.86	4.16	3.68	24.50	0.4577	11.21	3.24	1.48	12.70	28.60	13.09
13	144.12	7.35	11.49	1.45	7.41	3.92	3.36	23.49	0.4289	10.07	3.30	1.41	11.49	28.88	12.39
14	135.32	7.35	11.48	1.44	6.95	3.68	3.04	22.47	0.4018	9.03	3.35	1.35	10.38	29.17	11.72
15	126.52	7.35	11.49	1.45	6.50	3.44	2.72	21.46	0.3765	8.08	3.41	1.28	9.36	29.46	11.09
16	117.72	7.35	11.48	1.44	6.05	3.20	2.39	20.45	0.3528	7.21	3.47	1.22	8.44	29.76	10.50
17	108.92	7.35	11.49	1.45	5.60	2.96	2.07	19.43	0.3305	6.42	3.53	1.17	7.59	30.05	9.93
18	100.12	7.35	11.48	1.44	5.14	2.73	1.75	18.42	0.3097	5.70	3.59	1.11	6.81	30.35	9.40
19	91.32	7.35	11.49	1.45	4.69	2.49	1.43	17.41	0.2902	5.05	3.65	1.06	6.11	30.65	8.89
20	82.52	7.35	11.48	1.44	4.24	2.25	1.11	16.39	0.2719	4.46	3.71	1.01	5.46	30.96	8.42
21	73.72	7.35	5.74	-0.56	3.79	2.01	3.44	16.03	0.2547	4.08	3.77	0.96	5.04	31.27	7.96
22	66.93	7.35	0.00	-2.57	3.44	1.82	5.85	15.89	0.2387	3.79	3.83	0.92	4.71	31.58	7.54
23	62.15	7.35	0.00	-2.57	3.19	1.69	5.67	15.34	0.2236	3.43	3.90	0.87	4.30	31.89	7.13
24	57.37	7.35	0.00	-2.57	2.95	1.56	5.50	14.79	0.2095	3.10	3.97	0.83	3.93	32.21	6.75
25	52.58	7.35	0.00	-2.57	2.70	1.43	5.32	14.24	0.1963	2.80	4.03	0.79	3.59	32.53	6.39
26	47.80	7.35	0.00	-2.57	2.46	1.30	5.15	13.69	0.1839	2.52	4.10	0.75	3.27	32.85	6.04
27	43.02	7.35	0.00	-2.57	2.21	1.17	4.97	13.14	0.1723	2.26	4.17	0.72	2.98	33.18	5.72
28	38.24	7.35	0.00	-2.57	1.97	1.04	4.80	12.59	0.1615	2.03	4.24	0.68	2.72	33.51	5.41
29	33.46	7.35	0.00	-2.57	1.72	0.91	4.62	12.04	0.1513	1.82	4.31	0.65	2.47	33.84	5.12
30	28.68	7.35	0.00	-2.57	1.47	0.78	4.45	11.49	0.1418	1.63	4.38	0.62	2.25	34.18	4.85
31	23.90	7.35	0.00	-2.57	1.23	0.65	4.28	10.93	0.1328	1.45	4.46	0.59	2.04	34.52	4.58
32	19.12	7.35	0.00	-2.57	0.98	0.52	4.10	10.38	0.1244	1.29	4.53	0.56	1.86	34.86	4.34
33	14.34	7.35	0.00	-2.57	0.74	0.39	3.93	9.83	0.1166	1.15	4.61	0.54	1.68	35.21	4.11
34	9.56	7.35	0.00	-2.57	0.49	0.26	3.75	9.28	0.1092	1.01	4.69	0.51	1.53	35.56	3.88
35	4.78	7.35	0.00	-2.57	0.25	0.13	3.58	8.73	0.1024	0.89	4.77	0.49	1.38	35.91	3.68
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0959	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0899	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0842	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0789	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0739	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>				-0.0005						338.89		43.68	382.57	382.57	<b>← PV Checks</b>

Capital + O&M econ carrying charge	\$25.65	/kW-year
plus reserve margin	0.0%	
= Reserve adjusted carrying charge	\$25.65	/kW-year
plus marginal line losses	3.0%	
= Reserve + losses adjusted carrying charge	\$26.42	/kW-year
plus environmental adder	10.0%	
<b>=Distribution avoided cost</b>	<b>\$29.06</b>	<b>/kW-year</b>

Pick case: low = 1, mid = 2, high = 3

Case = 2  
Mid Case

- NOTES: (1) Spreadsheet modified from "Appendix B1 Figure B1.14 pages 3-6 (final).XLS"  
(2) Investment from analysis of historical data on combined systems  
(3) See page 2 for description of all other rates.

Column C: Rate Base(t)=Rate Base(t-1)-[SL Depr(t-1)+Dfrd Inc Txs(t-1)]	Column D: Straight Line(SL) Depreciation is (Installed Cost/27 Years).
Column E: Installed cost x ACRS 15-year rates.	Column F: (Tax Depreciation minus SL Depreciation) x Federal Tax Rate (35%).
Column G: Rate Base x Weighted Cost of Equity and Preferred Capital.	Column H: Rate Base x Weighted Cost of Debt.
Column I: (SL Depr - Tax Depr + Deferred Taxes + Equity & Preferred Return) x Tax Grossup.	Column J: SL Depr + Equity Return + Debt Cost + Income Taxes + Deferred Taxes.
Column K: Present Value Factor - [ 1/((1+ATDR)^Year) ].	Column L: Capital Cost x Present Value Factor.
Column M: O & M, Property Tax and Insurance Cost. O&M and Insurance cost inflated at annual inflation rate, while Property Tax is inflated at one-half of annual inflation rate.	Column N: Operating Cost x Present Value Factor.
Column O: PV Capital Cost + PV Operating Cost.	Column P: Sum of PV Total Cost x Economic Rate (1st Yr), remaining years at inflation rate.
Column Q: Annual Economic Cost x Present Value Factor.	Column R: See Exhibit
	Column S: Annual Economic Cost + T & D Cost.

	Ratio	Capital Cost	Wgt Cost	
Debt	45.325%	6.006%	2.722%	SOURCE: See Cost of Capital tab
Preferred	6.481%	8.410%	0.545%	
Common	48.194%	9.531%	4.593%	
Weighted Cost of Capital		7.861%		
After Tax Discount Rate(ATDR)		6.729%	Weighted Cost of Capital - (Weighted Cost of Debt x Composite Tax Rate)	

	Actual	Effective	
Federal Tax Rate	35%	31.46%	Actual Federal Rate - (Actual Federal Rate x Effective State Rate)
State Tax Rate	12%	10.11%	Actual State Rate - [Actual State Rate x (Effective Federal Rate/2)]
Composite Tax Rate		41.57%	
Tax Grossup		71.15%	Composite Tax Rate/(1 - Composite Tax Rate)

Economic Rate(1st Yr) (r - e) x (1 + r)^n / ((1 + r)^n - (1 + e)^n), Where - (1) r = After Tax Discount Rate, (2) e = Annual Inflation Rate and (3) n = economic life in years.

TAB: Distribution carrying charge

**Distribution cost of capital**

**Capital Structure from RPU-2010-0001**

	WEIGHT -----	COST -----	WCC -----
Preferred	6.481%	8.410%	<b>0.545%</b>
Equity	48.194%	9.531%	<b>4.593%</b>
Debt	45.325%	6.006%	<b>2.722%</b>
Total	100.00%		<b>7.861%</b>

Figures updated from "Cost of Capital RPU-2010-0001 Compliance filing.pdf"

**Generation cost of capital**

**Capital Structure from RPU-2010-0001**

	WEIGHT -----	COST -----	WCC -----
Preferred	6.481%	8.410%	<b>0.545%</b>
Equity	48.194%	9.531%	<b>4.593%</b>
Debt	45.325%	6.006%	<b>2.722%</b>
Total	100.000%		<b>7.861%</b>

Figures updated from "Cost of Capital RPU-2010-0001 Compliance filing.pdf"

MACRS Table

Year	3	5	7	10	15	20
1	0.33	0.20	0.14	0.10	0.0500	0.0375
2	0.44	0.32	0.24	0.18	0.0950	0.0722
3	0.15	0.19	0.17	0.14	0.0855	0.0668
4	0.07	0.12	0.12	0.12	0.0770	0.0618
5	0.00	0.12	0.09	0.09	0.0693	0.0571
6	0.00	0.06	0.09	0.07	0.0623	0.0529
7	0.00	0.00	0.09	0.07	0.0590	0.0489
8	0.00	0.00	0.04	0.07	0.0590	0.0452
9	0.00	0.00	0.00	0.07	0.0591	0.0446
10	0.00	0.00	0.00	0.07	0.0590	0.0446
11	0.00	0.00	0.00	0.03	0.0591	0.0446
12	0.00	0.00	0.00	0.00	0.0590	0.0446
13	0.00	0.00	0.00	0.00	0.0591	0.0446
14	0.00	0.00	0.00	0.00	0.0590	0.0446
15	0.00	0.00	0.00	0.00	0.0591	0.0446
16	0.00	0.00	0.00	0.00	0.0295	0.0446
17	0.00	0.00	0.00	0.00	0.0000	0.0446
18	0.00	0.00	0.00	0.00	0.0000	0.0446
19	0.00	0.00	0.00	0.00	0.0000	0.0446
20	0.00	0.00	0.00	0.00	0.0000	0.0446
21	0.00	0.00	0.00	0.00	0.0000	0.0223

TAB: MACRS\_table

H-W (distribution North Central Region)

	Plant	Labor
2001	346	
2002		380
2009	567	492
	1.638728	1.294737

2001 installed cost \$ 154.00  
2010 installed cost \$ 252.36

2002 Fixed O&M \$ 1.24  
2010 Fixed O&M \$ 1.61