Energy Benefits

June 15, 2018

Energy Benefits Key Elements

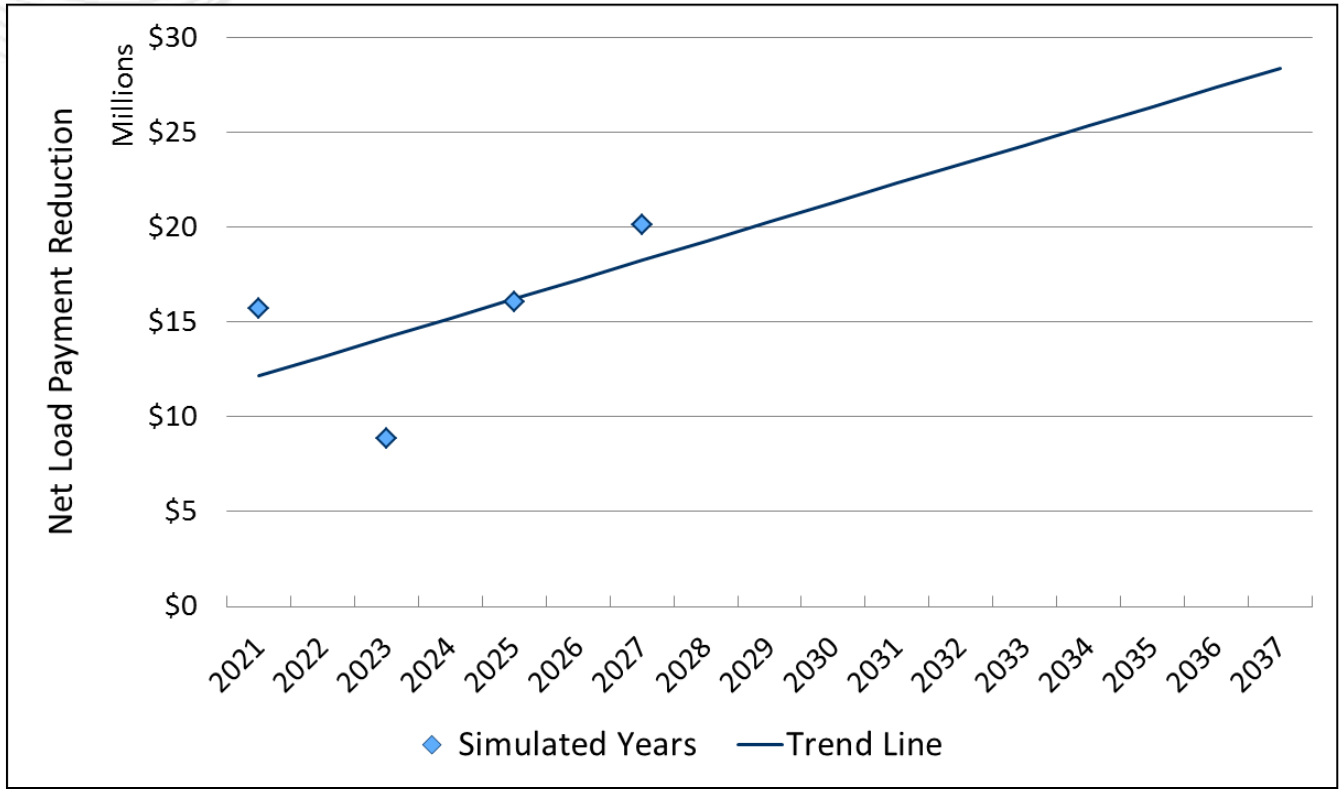
- Simulated Years: RTEP-2, RTEP, RTEP+2 and RTEP+4
  - The decrease of the simulation horizon by 4 years (from 10 years currently down to proposed 6 years) helps decrease the uncertainties related to various forecasts.
  - In all simulated years, generation and transmission topology are set at RTEP year level.
  - Each simulated year uses the appropriate load forecast and fuel price forecast.
  - Each simulated year has its own nuclear refueling, automatic maintenance and forced outage patterns.

- Trend
  - Trend is established based on all 4 simulated years.
  - Project benefits for each year are calculated using the trend values (no interpolations between simulated years).

Energy Benefits Example

Simulated Year	Simulated NLP Reduction
2021	$15.7
2023	$8.9
2025	$16.1
2027	$20.1

	Trend Year	Forecasted NLP Reduction
R-2	2021	$12.1
R-1	2022	$13.2
R	2023	$14.2
R+1	2024	$15.2
R+2	2025	$16.2
R+3	2026	$17.2
R+4	2027	$18.2
R+5	2028	$19.2
R+6	2029	$20.3
R+7	2030	$21.3
R+8	2031	$22.3
R+9	2032	$23.3
R+10	2033	$24.3
R+11	2034	$25.3
R+12	2035	$26.4
R+13	2036	$27.4
R+14	2027	$28.4



Project Annual Revenue Requirement Calculation

- Transmission Cost Information Center (TCIC)
  - http://www.pjm.com/planning/rtep-upgrades-status/cost-allocation-view.aspx

- For an individual project:
  - Annual Revenue Requirement = Annual Depreciation Expense + (Carrying Value + CWIP) x Carrying Charge
  - Annual Depreciation Expense = Cost Estimate / Average Useful Life of Assets*
  - Carrying Value (Remaining useful value) = Cost Estimate – Accumulated Depreciation
  - Accumulated Depreciation = Annual Depreciation Expense x # Years In Service

*RTO-level average useful life of assets across PJM TO's

Project Cost - Annual Revenue Requirement Example

Input Variables	Value
Project Capital Cost ($M)	$50.0
RTO-Level Average Useful Life of Assets	45
Annual Depreciation % (1/Useful Life)	2.2%
RTO-Level Average Carrying Charge	13.8%

Yearly Annual Revenue Requirements

Simulated Year	Year	Annual Depreciation Expense ($M)	Accumulated Depreciation ($M)	Carrying Value ($M)	Revenue Requirement ($M)
RTEP	1	$1.1	$1.1	$48.9	$7.84
	2	$1.1	$2.2	$47.8	$7.69
RTEP+2	3	$1.1	$3.3	$46.7	$7.54
	4	$1.1	$4.4	$45.6	$7.38
RTEP+4	5	$1.1	$5.6	$44.4	$7.23
	6	$1.1	$6.7	$43.3	$7.08
	7	$1.1	$7.8	$42.2	$6.93
	8	$1.1	$8.9	$41.1	$6.77
	9	$1.1	$10.0	$40.0	$6.62
	10	$1.1	$11.1	$38.9	$6.47
	11	$1.1	$12.2	$37.8	$6.31
	12	$1.1	$13.3	$36.7	$6.16
	13	$1.1	$14.4	$35.6	$6.01
	14	$1.1	$15.6	$34.4	$5.85
	15	$1.1	$16.7	$33.3	$5.70

Energy Benefits Key Elements (Cont'd)

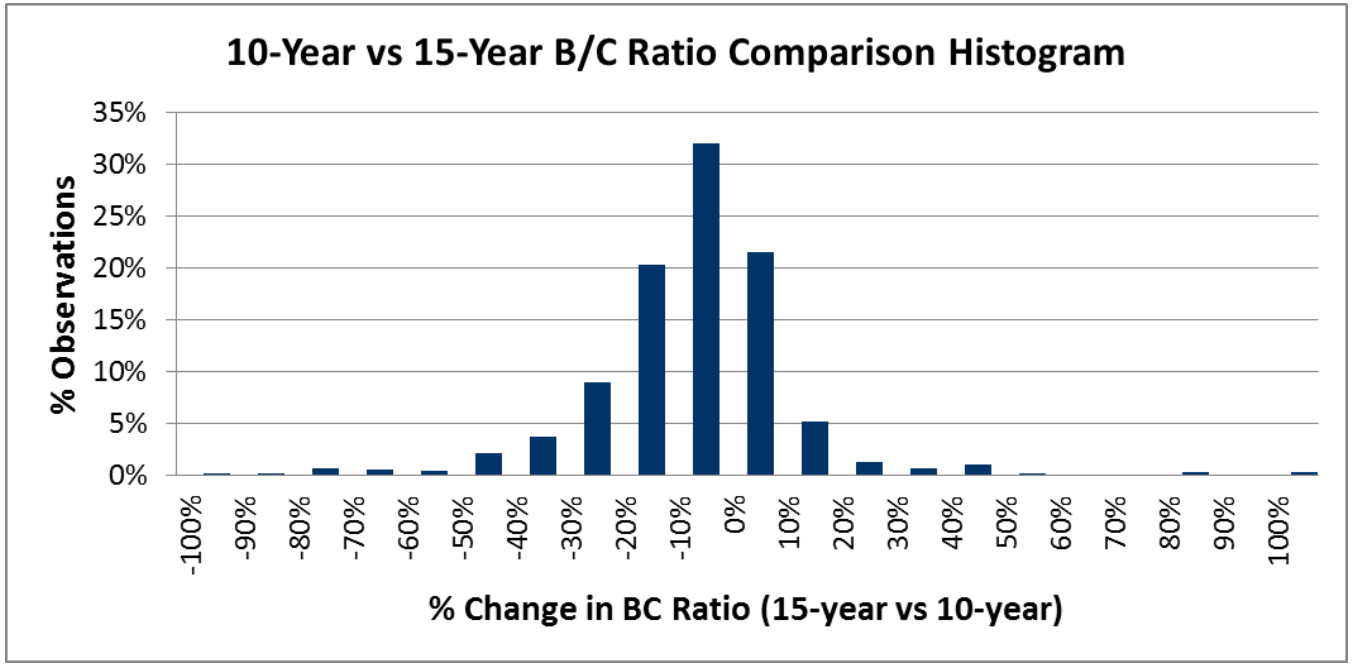
- Energy Benefit Calculation Period
  - 15 years starting from project in-service date, capped at RTEP+15
  - B/C ratio should exceed 1.25 threshold.

- Additional 10-Year B/C Ratio Check
  - 10-year B/C ratio should exceed 1.25 threshold.
  - 10-year B/C ratio is calculated based on 10 years of annual benefit and 10 years of annual revenue requirement, starting from project in-service date, capped at RTEP+10.

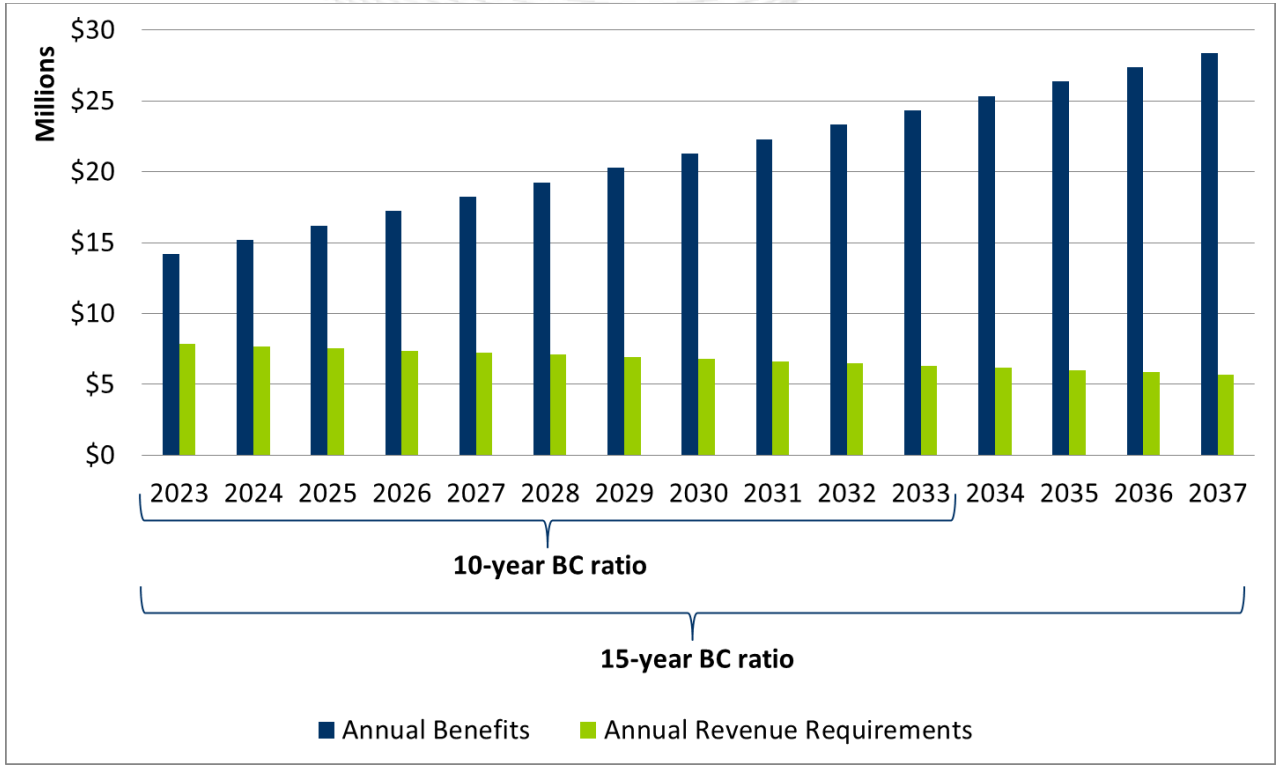
- Sensitivities
  - Status Quo (sensitivities are informational only, and used to compare competitive projects during the selection phase).

10-Year B/C Ratio for Past Projects

- Calculated 15-year and 10-year B/C ratios for a number of past projects.
- 65% of projects passed 1.25 threshold with 15-year B/C ratio.
- 59% of projects passed 1.25 threshold with both 10-year and 15-year B/C ratios.
- 6% of projects did not pass 1.25 threshold with 10-year B/C ratio.



Energy Benefit Calculation Period Example



15-year B/C ratio = 2.86 ✔

10-year B/C ratio = 2.37 ✔

Energy Benefits Key Elements (Cont'd)

- Energy Benefit Adjustment for In-Service Date
  - It is PJM's goal to address energy constraints by the RTEP year, and to incentivize projects that are designed and proposed to be in service by RTEP year.
  - PJM will adjust energy benefits of projects that are proposed to be in service later than RTEP year to account for any savings forgone due to later in-service date.
  - Projects with an in-service date earlier than RTEP will be equally treated as projects with an RTEP in-service date.
  - Earlier in-service date will be considered in a qualitative manner when comparing the projects.

Benefit Adjustment for In-Service Date Example

In-Service year = RTEP

B/C Ratio = 2.86

	2023	2024	2025	2026	2027	…	2035	2036	2037
Annual benefit	$14.2	$15.2	$16.2	$17.2	$18.2	…	$26.4	$27.4	$28.4
Annual revenue requirement	($7.8)	($7.7)	($7.5)	($7.4)	($7.2)	…	($6.0)	($5.9)	($5.7)
PV of benefits in RTEP	$177.2								
PV of costs in RTEP	($61.9)								
B/C ratio	**2.86**								

In-Service year = RTEP+1

B/C Ratio = 2.70

	2023	2024	2025	2026	2027	…	2035	2036	2037
Annual benefit	-	$15.2	$16.2	$17.2	$18.2	…	$26.4	$27.4	$28.4
Annual revenue requirement	-	($7.8)	($7.7)	($7.5)	($7.4)	…	($6.2)	($6.0)	($5.9)
Lost savings in RTEP	($14.2)								
PV of benefits in RTEP	$150.8								
PV of costs in RTEP	($55.8)								
B/C ratio	**2.70**								