



Item 3: Committee Education on Project Portfolio Management

Troy Anderson

Manager, Portfolio Management

Finance & Audit Committee Meeting

ERCOT Public

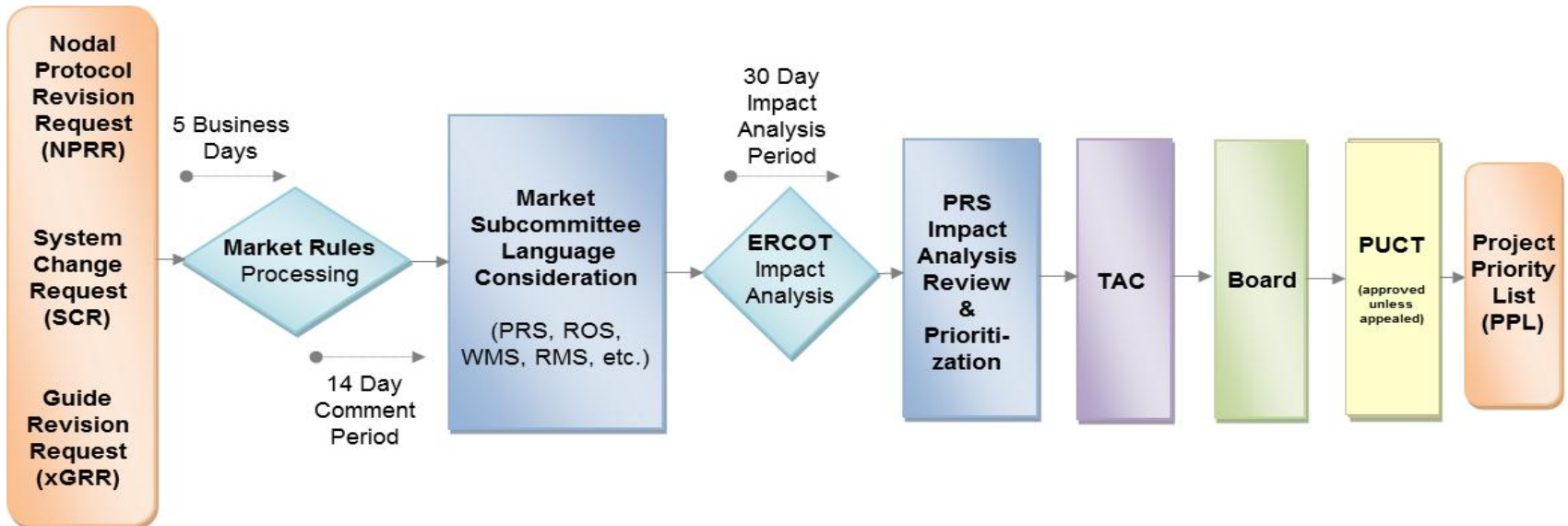
June 11, 2018

Project Portfolio Management – Agenda

- Process Overview
- Project Prioritization
 - Project Priority List (PPL)
 - Prioritization Logic
 - Examples
- Impact Analysis (IA) Process
 - Purpose
 - Report Elements
 - Accuracy

Revision Request Process Timeline

Board members are regularly requested to approve Revision Requests that have associated cost estimates on an Impact Analysis.



Project Prioritization – What is the “PPL”?

A multi-dimensional list of projects which:

- Includes both market and internal ERCOT projects
- Tracks current, prior, and future year project activity
- Is used as a project demand forecasting tool
- Is maintained by ERCOT’s Project Management Office

The screenshot shows the ERCOT website's 'Services' page. The 'Services' menu item is circled in blue. Below it, the 'Projects' page is displayed. In the left-hand navigation menu, the 'Projects' item is circled in blue. The main content area features a 'Projects' section with a diagram illustrating the review process. The diagram shows five types of requests (Nodal Protocol Revision Requests (NPRRs), System Change Requests (SCRs), Nodal Operating Guide Revision Requests (NOGRRs), Retail Market Guide Revision Requests (RMGRRs), and Other Guide Revision Requests) all pointing to the Protocol Revision Subcommittee (PRS). The PRS then points to the Technical Advisory Committee (TAC), which points to the Finance and Audit Committee (F & A), which finally points to the Board of Directors. The 'KEY DOCUMENTS' section lists three documents: '2018 Release Targets' (May 11, 2018 - pptx - 101.8 KB), 'ERCOT Portfolio Gantt' (May 11, 2018 - pptx - 557.8 KB), and 'Project Priority List' (Apr 13, 2018 - xlsx - 1.2 MB), with the latter circled in blue.

Location: <http://www.ercot.com/services/projects/index>

Project Prioritization – A Brief History

- Prior to Nodal implementation in late 2010, the PPL was an itemized list with a cutline to indicate which projects would be funded in the current year.
- 2011 brought the following process improvements:
 - Project Categories were created
 - Allows similar projects to be compared
 - Multiple funding years were introduced
 - Provides for optimizing available project resources
 - Recognizes project work may cross years
 - “Priority” and “Rank” were redefined

Project Priority List (PPL)

		Multiyear PPL - 2012-2024					2017			2018						
Project Category	Priority	Rank	Source Doc	Approval Status	Project Number	Project Name	Release	Project Status	Budget	Budget Range	Spend Forecast	Budget	Budget Range	Spend Forecast	Projected Start Date	Projected End Date
Business Strategy	2013	440	SCR781	PPL	106-01	RARF Replacement	2019-R4	Execution		\$100k-\$200k			\$1M-\$1.5M		Jun-2013	Dec-2019
Business Strategy	2015	580	Various	PPL	183-01	2015 CMM NRRs	Various	Execution		\$1M-\$2M			\$1.5M-\$3M		Oct-2015	Dec-2019
Business Strategy	2016	1660	SCR790	PPL	207-01	Wind Resource Power Production and Forecast Transparency	2017-R2	Complete		\$25k-\$50k					Aug-2016	Jun-2017
Business Strategy	2016	1700	NPBB778	PPL	248-01	Modifications to Date Change and Cancellation Evaluation Window	2017-R6	Complete		\$25k-\$75k			<\$10k		May-2017	Feb-2018
Business Strategy	2017	1810	BMGBB134	PPL	232-01	Allow AMS Data Submittal Process for TDSP-Read Non-Modeled Ge				\$0k-\$40k					Nov-2016	Jun-2017
Business Strategy	2017	1930	NPBB808	PPL	252-01	Three Year CRR Auction				\$0k-\$30k			<\$10k		Jun-2017	Mar-2018
Business Strategy	2017	1945	NPBB833	PPL	264-01	Modify PTP Obligation E				\$0k-\$250k			\$300k-\$600k		Aug-2017	
Business Strategy	2017	1970	NPBB776	PPL	256-01	Voltage Set Point Com				\$25k-\$75k			\$25k-\$50k		Jul-2017	Jul-2018
Business Strategy	2017	1980	NPBB809	EP-RR	233-28	GTC or GTL for New G Interconnection									Jun-2017	Dec-2018
Business Strategy	2017	2010	NPBB830	PPL	270-01	Revision of 4-Coincide				\$5k-\$45k			\$25k-\$75k		Oct-2017	Apr-2018
Efficiencies / Enhancements	2017	480		PPL	274-01	Average Mid-Term Loa				<\$10k			\$75k-\$100k		Nov-2017	Jul-2018
Efficiencies / Enhancements	2018	490		PPL	282-01	Synchronous Condens				\$0k			\$200k-\$300k		Mar-2018	Nov-2018
Efficiencies / Enhancements	2018	500		PPL		2018 OS Enhancement							\$25k-\$50k		Oct-2018	Sep-2019
Regulatory	2018	145	QBDBR002	PPL	277-01	ORDC OBD Revisions for PUCT Project 47199	2018-R3	Execution							Mar-2018	Jul-2018
Regulatory	2017	150	PGBR057	EP-RR	233-45	Responsibilities for Performing Geomagnetic Disturbance (GMD) Vulnerability	2018-R6 off cycle	Execution		<\$10k			\$150k-\$200k		Oct-2017	Jan-2019
Regulatory	2018	170	NPBB843	PPL	285-01	Short-Term System Adequacy and AS Offer Disclosure Reports Additions	2018-R5	Initiation					\$70k-\$90k		May-2018	Nov-2018
Technical Foundation	2012	100		PPL	065-01	NMMS Upgrade	2017-R2	Complete		\$1.5M-\$2.5M					Aug-2012	Oct-2017
Technical Foundation	2016	480	DC4	PPL	167-02	DC4 - Compute DB Inf Install and Migration	Various	Complete		\$250k-\$500k					Oct-2015	Jul-2017
Technical Foundation	2016	482		PPL	183-01	CMM Tech Refresh	2018-R6	Execution							Oct-2015	Dec-2019

PPL Attributes:

- Project Category
- Priority
- Rank
- Budget Years
- Target Release



Project Prioritization – Revision Request Project Funding

In recent years, \$4M has annually been reserved for Revision Request (RR) projects.

- Approximately 20% of the PPL budget
- Acknowledges Revision Requests may not be known when the ERCOT budget is approved
- PRS monitors the sum of Revision Request spending

PPL History	2012	2013	2014	2015	2016	2017	2018
RR Spend	\$3.6M	\$2.6M	\$2.6M	\$2.4M	\$2.4M	\$3.1M	\$2.3M YTD
RR Count by Go-Live Year	33	31	23	28	34	38	30 Projected

Project Prioritization Logic

- Revision Request prioritization begins at the Protocol Revision Subcommittee (PRS)
- “Priority” = Target year to begin work on the project
- “Rank” = Project importance in relation to previously approved items
- Discussion generally takes one of three paths:
 1. Add to end of project queue without disrupting current project plans
 2. Insert ahead of other projects that impact similar systems
 3. Combine with other projects that should be implemented together

Project Prioritization Logic – Priority and Rank

- ERCOT provides Priority and Rank options to PRS based on input from business owners and impacted systems
- Rank numbers are assigned in increments of 10 to allow future items to be added between existing rows
 - Latest 2018 Rank = 2210
- When a Revision Request is to be started in a future year, a gap is left between current year items
 - Latest 2019 Rank = 2530

Example from June Board Agenda

NPRR847, Exceptional Fuel Cost Included in the Mitigated Offer Cap

- Priority 2018, Rank 2210 places it at the end of the 2018 project queue
- If approved, it will be targeted for a start date later in 2018 based on available resources

Business Strategy	2018	2130	NPRR844	Clarification to Outage Report
Business Strategy	2018	2140	SCR794	Update SCED Limit Calculation
Business Strategy	2018	2150	RRGRR015	Additional Guidance for Transformer and Station Data
Business Strategy	2018	2150	RRGRR016	Additional Guidance for Solar Data
Business Strategy	2018	2160	NPRR854	NOIE TDSP Submittal of Meters with Bidirectional Flow Caused by Generation Interconnected at Distribution Voltage
Business Strategy	2018	2170	NPRR858	Provide Complete Current Operating Plan (COP) Data
Business Strategy	2018	2180	NPRR865	Publish RTM Shift Factors for Hubs, Load Zones, and DC Ties
Business Strategy	2018	2190	SCR793	SSR Related Telemetry for Transmission Service Provider (TSP) Operators
Business Strategy	2018	2200	SCR795	Addition of Intra-Hour Wind Forecast to GTBD Calculation

Business Strategy	2018	2210	NPRR847	Exceptional Fuel Cost Included in the Mitigated Offer Cap
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Example from June Board Agenda

NPRR867, Revisions to CRR Auction Credit Lock Amount to Reduce Excess Collateral

- Priority 2018, Rank 580 places it in the same grouping as other Revision Requests that are part of the CMM Upgrade project
- If approved, it will be included in an upcoming release of the in-flight project

Project Category	Priority	Rank	Source Doc	Project Name
Business Strategy	2013	580	NPRR484	Revisions to Congestion Revenue Rights Credit Calculations and Payments - Phase 1b / 2
Business Strategy	2015	580	Various	2015 CMM NPRRs
Business Strategy	2018	580	NPRR867	Revisions to CRR Auction Credit Lock Amount to Reduce Excess Collateral
Business Strategy	2014	970	NPRR519	Exemption of ERS-Only QSEs from Collateral and Capitalization Requirements
Business Strategy	2014	1160	NPRR620	Collateral Requirements for Counter-Parties with No Load or Generation
Business Strategy	2015	1300	NPRR683	Revision to Available Credit Limit Calculation
Business Strategy	2016	1550	NPRR702	Flexible Accounts, Payment of Invoices, and Disposition of Interest on Cash Collateral



Project Prioritization – Additional Notes

- The assigned project Priority assists ERCOT in allocating resources to the most important efforts
- The go-live target can be impacted by:
 - Approved Priority and Rank
 - Amount of labor and availability of key resources
 - Need for vendor development
 - Number of systems impacted (i.e. complexity)
- The usage of the Priority field allows for “aging items” to be identified on the PPL
 - Reviewed regularly at PRS
 - Currently one “aging item”
 - NPRR664, Fuel Index Price for Resource Definition and Real-Time Make-Whole Payments for Exceptional Fuel Cost Events, will be eliminated with the approval of NPRR847

Revision Request Release Matrix – Monthly PRS Report

February 2/6 – 2/8		April 4/5 – 4/9		May 5/29 – 5/31		August 8/7 – 8/9		October 10/23 – 10/25		December 12/11 – 12/13	
CMM Release 1a	NPRR659 ✓	NPRR562(b) ✓ SCR792 ✓	NPRR768 E	NPRR819 E	NPRR843 I	CMM Release 1b	NPRR519 E				
	NPRR683 ✓		NPRR815 E	NPRR825(a)	NPRR854 NS		NPRR620 E				
	NPRR743 ✓		OBDRR002 E	NPRR844 E	SCR793 NS		NPRR741 E				
	NPRR760 ✓			SCR791 E	SCR794 NS		NPRR755 E				
	NPRR800 ✓						PGRR057 E				
	NPRR810 ✓						NPRR809(b) E				
							NPRR842 NS				
1/1 & 2/1			6/1	8/30	10/27 – 10/28 (Retail)		12/15 – 12/16 (Retail)				
1/1 PGRR042 ✓		NPRR776 E	GINR Go-Live								
2/1 NPRR846 ✓		NOGRR167 E									
8	2	5	4	4	7						

TBD Items (and point at which they became "TBD")

2014	2015	2016	2017
NPRR664	None	SCR781 P	NPRR702 P, SCR777, NPRR831(b), NPRR749 E, NPRR833 E, NPRR864 I, RRGR015, RRGR016, NPRR858, NPRR865

Go-live dates can differ from Protocol effective dates
– Please refer to market notices for more details

Release targets are subject to change

Project Status Codes
 NS = Not Started
 I = Initiation
 P = Planning
 E = Execution
 H = On Hold



Impact Analysis (IA) Process

- What is an Impact Analysis?
 - Point in time estimate of ERCOT impacts from a proposed Revision Request
 - Required by Protocol Section 21.4.6
- (2) The Impact Analysis shall assess the impact of the proposed Revision Request on ERCOT staffing, computer systems, operations, or business functions and shall contain the following information:
- (a) An estimate of any cost and budgetary impacts to ERCOT for both implementation and on-going operations;
 - (b) The estimated amount of time required to implement the Revision Request;
 - (c) The identification of alternatives to the Revision Request that may result in more efficient implementation; and
 - (d) The identification of any manual workarounds that may be used as an interim solution and estimated costs of the workaround.

Impact Analysis (IA) Purpose

- Maintain compliance with Section 21 of Protocols (or respective guides)
- Supply consistent information for
 - ERCOT Board of Directors
 - TAC and subcommittees
 - ERCOT management
- Provide ERCOT's Portfolio Management team with project spend forecasting and resource planning data
- Serve as the starting point for the ERCOT project team

Impact Analysis (IA) Report Elements

	NPRR Number	###	NPRR Title	NPRR Name
	Impact Analysis Date			
Cost	Estimated Cost/Budgetary Impact		Between \$k and \$k	
Duration	Estimated Time Requirements		<p>The timeline for implementing this Nodal Protocol Revision Request (NPRR) is dependent upon ERCOT Board prioritization and approval. Please see the Project Priority List (PPL) for additional information.</p> <p>Estimated project duration: X to X months</p>	
Staff	ERCOT Staffing Impacts (across all areas)		<p>Project Labor: X% ERCOT; X% Vendor</p> <p>Ongoing Requirements:</p>	
Systems	ERCOT Computer System Impacts		<p>The following ERCOT systems would be impacted:</p> <ul style="list-style-type: none"> • X% • X% 	
Process	ERCOT Business Function Impacts			
	Grid Operations & Practices Impacts			
Other	Evaluation of Interim Solutions or Alternatives for a More Efficient Implementation			
Comments	Comments			



Impact Analysis (IA) Supporting Detail

NPRR123 - Nodal Protocol Revision Request (NPRR) Sample Impact Analysis							
Task	Dept	Application	Skillset / Function	Resource	Labor Est. (hrs)	Rate	Cost
Initiation							
Initiation tasks	700		Business Area I	Starkey Richard	8	\$80	\$ 640
Project Management	701		Project Management	Bullock Anna Mae	16	\$80	\$ 1,280
Planning							
Requirements defining and other Planning tasks	700		Business Area I	Starkey Richard	80	\$80	\$ 6,400
Requirements defining and other Planning tasks	709		Business Area II	Zimmerman Robert	40	\$80	\$ 3,200
Conceptual and detail design	704	System A	Development	Gumm Francis	160	\$80	\$ 12,800
Conceptual and detail design	704	System B	Development	Furnier Vincent	80	\$80	\$ 6,400
QC prep and test plan	705		Testing	Dwight Reginald	24	\$80	\$ 1,920
Security tasks	708		Security	Sumner Gordon	16	\$80	\$ 1,280
Enterprise Architecture tasks	707		Enterprise Arch.	Judkins Stevland	16	\$80	\$ 1,280
User Experience support	710		UX	Germanotta Stefani	16	\$80	\$ 1,280
Business Analyst support	710		BA	Hudson Saul	80	\$80	\$ 6,400
Project Management	701		Project Management	Bullock Anna Mae	40	\$80	\$ 3,200
Execution							
DEV: Software Development (Vendor)		System A		Vendor I (System A)	400	\$150	\$ 60,000
DEV: Software Dev, Unit Testing, Defect fixes	704	System A	Development	Gumm Francis	420	\$80	\$ 33,600
DEV: Software Dev, Unit Testing, Defect fixes	704	System B	Development	Furnier Vincent	80	\$80	\$ 6,400
TEST: QC prep, load scripts, status reports, etc.	705		Testing	Tallarico Steven	60	\$80	\$ 4,800
Production Support Migrations, defect migrations	703	System A	Production Support	Gaines LaDonna	12	\$80	\$ 960
Production Support Migrations, defect migrations	703	System B	Production Support	Edwards Eilleen	12	\$80	\$ 960
Release Management	702		Release Mgmt	Balzary Michael	12	\$80	\$ 960
Change & Config Management	702		Change Mgmt	Gorelick Kenneth	24	\$80	\$ 1,920
Market Communication	708		Market Services	Bulsara Farrokh	2	\$80	\$ 160
Project Management	701		Project Management	Bullock Anna Mae	80	\$80	\$ 6,400
Closing							
Project Management	701		Project Management	Bullock Anna Mae	4	\$80	\$ 320
Total Est. Project Labor Hours			1,682		1,682		\$ 162,560
Total Est. Project Labor Cost			\$ 162,560				
Other Costs							
Hardware Cost (3 environments needed: Dev, Test, and I-Test)			\$ 45,000				
License Cost (database licenses for new environments)			\$ 12,000				
Finance Fees			\$ 4,877				
Total Estimated IA Cost			\$ 224,437				

Sample for Illustrative Purposes Only



Impact Analysis (IA) Statistics

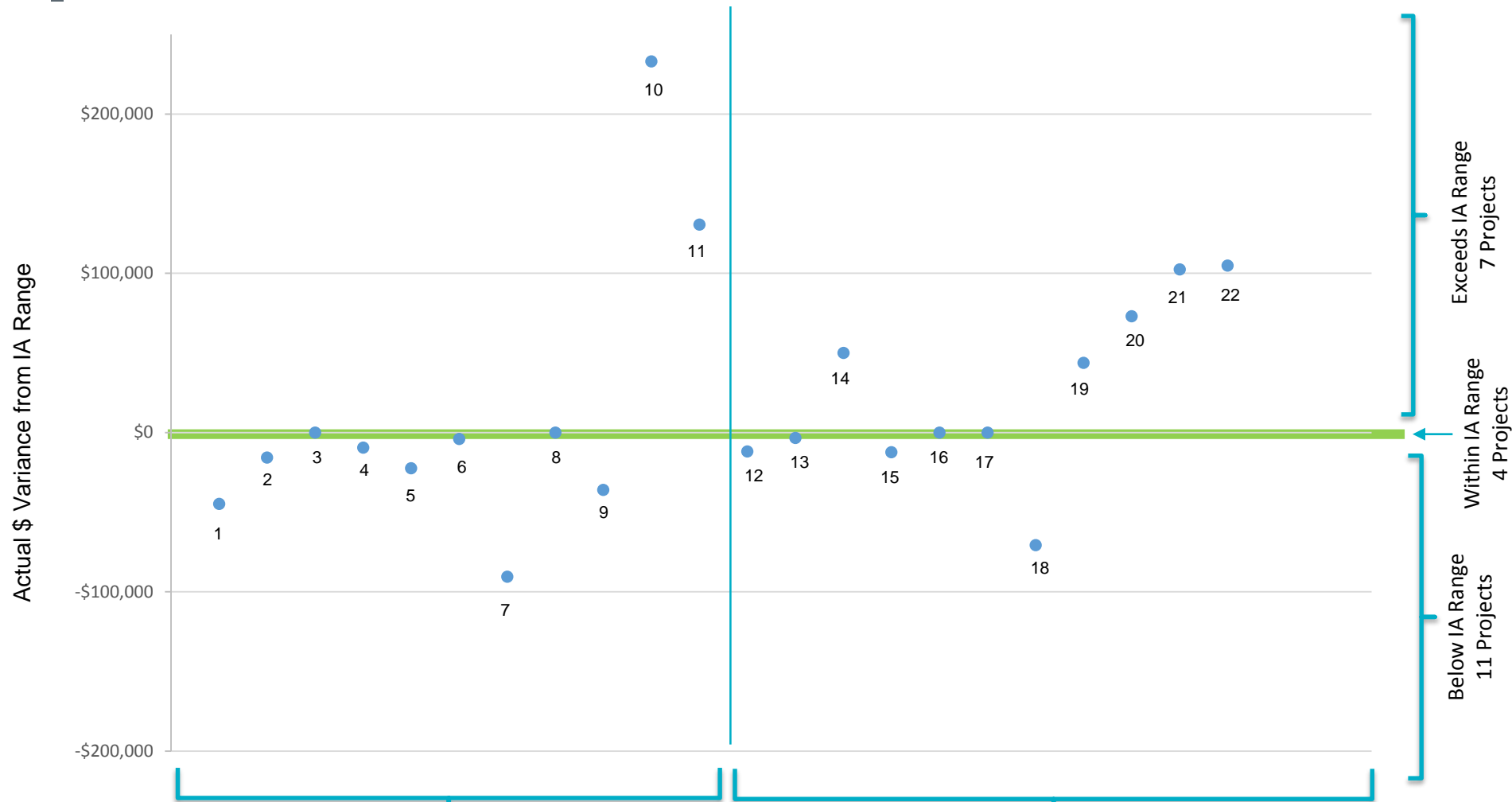
RRs + Guides	2013	2014	2015	2016	2017
Total Submitted	125	140	105	123	83
With Impacts	32	21	24	24	22

Estimate of internal ERCOT staff labor to develop recent IAs

Project Cost Estimate	Hours to Prepare	% of Total IAs
Small (<\$100k)	40 – 60	70%
Medium (\$100k-\$250k)	60 – 120	20%
Large (>\$250k)	>120	10%

Impact Analysis (IA) Cost Estimation Accuracy

Legend located in Appendix



2015: 11 Projects, 21 Revision Requests
 2016: 11 Projects, 18 Revision Requests

Sorted left to right: smallest to largest \$



● Actual Spend Variance
 If actual spend falls within the IA range, the variance is 0

Note: Graph compares the posted IA cost range with the actual project spend

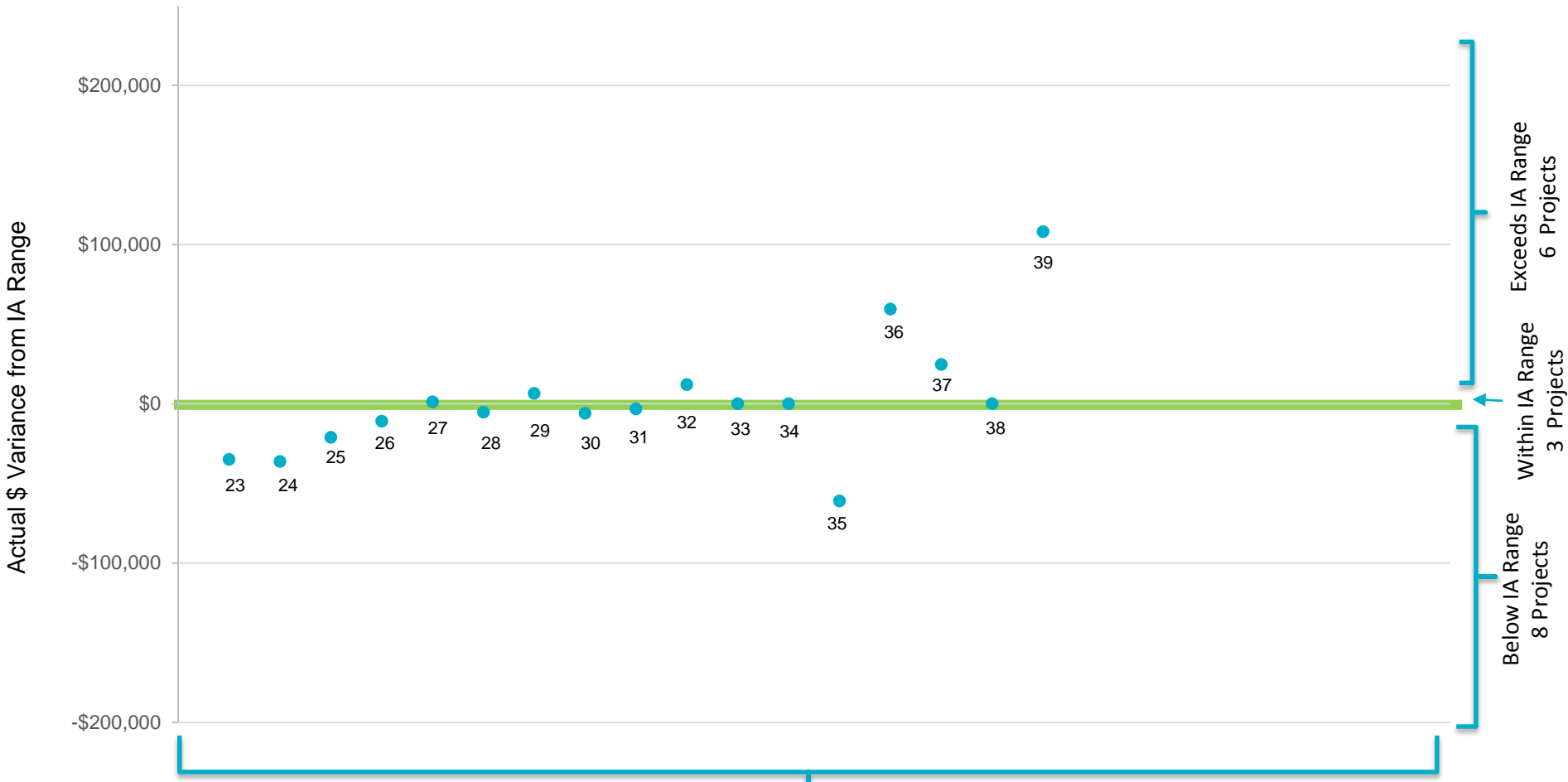
Ongoing Process Improvements

A 2016 internal effort recommended several process enhancements in the following areas:

- IA Cost Estimation
- IA Duration Estimation
- Estimate Gathering Process
- Communication & Education

Impact Analysis (IA) Cost Estimation Accuracy

Legend located in Appendix



2017
17 Projects
22 Revision Requests

Sorted left to right:
smallest to largest \$

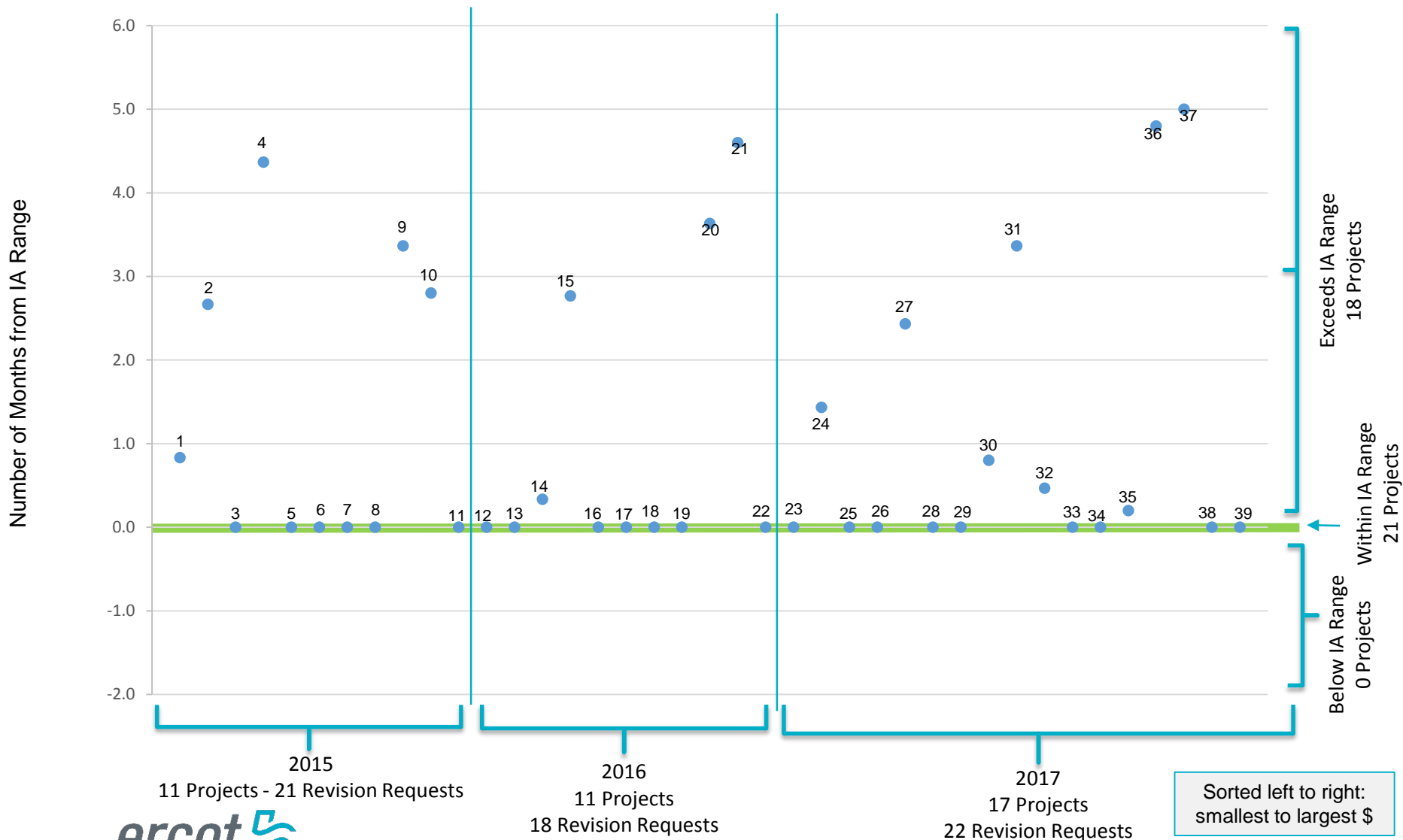


● Actual Spend Variance
If actual spend falls within the IA range, the variance is 0

Note: Graph compares the posted IA cost range with the actual project spend

Impact Analysis (IA) Duration Estimation Accuracy

Legend located in Appendix



Sorted left to right: smallest to largest \$



● Actual Duration Variance If actual duration falls within the IA range, the variance is 0.

Note: Graph compares the posted IA duration range with the actual project duration

Closing Comments / Q & A

- Project prioritization helps maximize value by directing resources to the most important efforts
- Process provides a project demand forecasting tool
- Internal ERCOT projects follow a similar process

Appendix



Impact Analysis (IA) Accuracy Project Legend

(E) ERCOT Sponsored
(M) Market Sponsored
(V) Various

1. NPRR500, Posting of Generation that is Off but Available, (M)
2. NPRR543, Message for Confirmed E-Tags, (M)
3. NPRR680, Allow QSEs to Self-Arrange AS Quantities Greater Than Their AS Obligation, (E)
4. SCR775, Posting Results of Real-Time Data in a Display Format, (M)
5. SCR772, New Extract for Five Minute Interval Settlement Data, (M)
6. NPRR556, Resource Adequacy During Transmission Equipment Outage, (M)
7. NPRR698, NPRR595, NPRR706, NPRR710, Clarifications to NPRR595, RRS Load Resource Treatment In ORDC, (V)
8. NPRR559, NPRR597, NPRR601, NPRR639, SCR778, 2014 CMM NPRRs and SCRs, (V)
9. SCR779, Increase to the CRR Auction Transaction Limit, (E)
10. SCR756, MarkeTrak Enhancements - Remaining SCR756 Items, (M)
11. NPRR665, NPRR626, OBD, NPRR645, Market System Enhancements 2015, (V)
12. SCR788 Addition of Integral ACE Feedback to GTBD Calculation, (M)
13. NPRR754, Revise Load Distribution Factors Report Posting Frequency, (E)
14. NPRR419 Revise Real Time Energy Imbalance and RMR Adjustment Charge, (E)
15. SCR786, Retail Market Test Environment, (M)
16. NOGRR147, SCR787, NOGRR147 and SCR787 NDCRC Enhancement, (M)
17. NPRR662 Proxy Energy Offer Curves, (M)
18. NPRR770, NPRR495 and NPRR736 Changes to Ancillary Services Capacity Monitor, (V)
19. NPRR617 and NPRR700 Implementation, (M)
20. NPRR515 Day-Ahead Market Self-Commitment of Generation Resources, (E)
21. NPRR588, NPRR615, NPRRs 588 and 615, (M)
22. NPNR219, SCR783, NOGRR050, 2015 Outage Scheduler Enhancements, (V)
23. NPNR785, Synchronizing WGR and PVGR COPs with the Short Term Wind and PhotoVoltaic Forecasts, (E)
24. NPNR808, Three Year CRR Auction, (M)
25. NPNR797 & NPNR789 Load Forecast Enhancements, (M)
26. NPNR649, Addressing Issues Surrounding High Dispatch Limit (HDL) Overrides, (E)
27. SCR790, Wind Resource Power Production and Forecast Transparency, (M)
28. NPNR778, Modifications to Date Change and Cancellation Evaluation Window, (M)
29. RMGRR134, Allow AMS Data Submittal Process for TDSP – Read Non-Modeled Generators, (E)
30. NPNR764, QSE Capacity Short Calculations Based on an 80% Probability of Exceedance (P80), (E)
31. NPNR782, Settlement of Infeasible Ancillary Services Due to Transmission Constraints, (E)
32. NPNR746, Adjustments Due to Negative Load, (E)
33. NPNR573, NPNR801, Implementation of NPNR573 & NPNR801, (E)
34. NPNR821, Inclusion of Private Use Networks in Load Zone Price Calculations, (E)
35. RRGRR003, RRGRR006, RRGRR007, RRGRR009, 2016 RARF Enhancements, (V)
36. RMGRR140, Mass Transition/Acquisition Enhancements (MTAQ), (M)
37. NPNR272, Definition and Participation of Quick Start Generation Resources, (E)
38. NPNR744, RUC Trigger for the Reliability Deployment Price Adder and Alignment with RUC Settlement, (E)
39. NPNR758, Improved Transparency for Outages Potentially having a High Economic Impact, (E)

