Item 5.2: Real-Time Co-Optimization Implementation Update

Jayapal Parakkuth
Senior Vice President and Chief Digital Officer

Technology and Security Committee Meeting

ERCOT Public
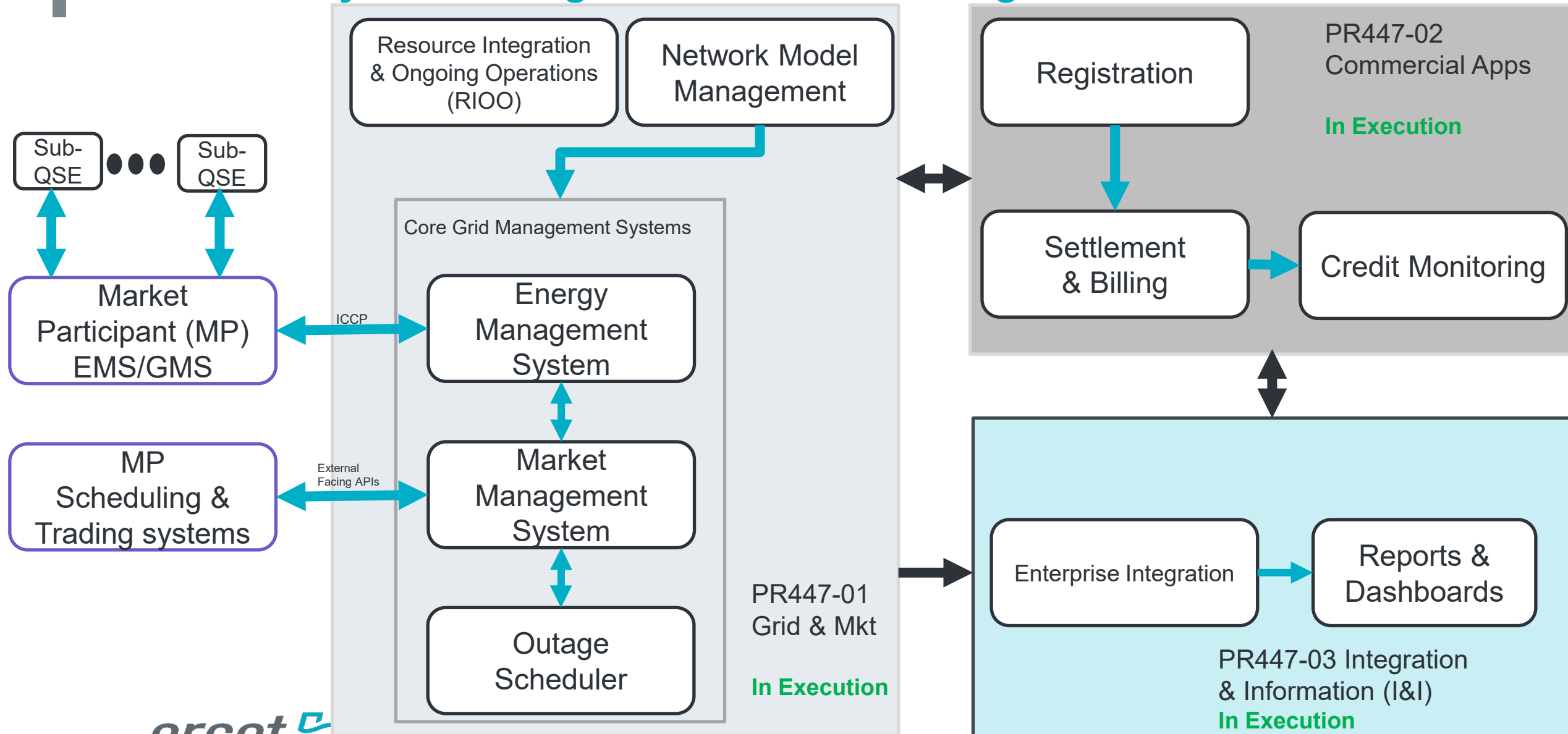April 7, 2025

Overview

- **Purpose**

  Periodic Update on RTC+B project status

- **Voting Items / Requests**

  No action is requested of the ERCOT Board; for discussion only

Key Takeaways:

- We are continuing to make good progress on RTC+B. Projects are in Execution Phase.
- We are on track for our first major milestone related to Operating Day testing in our integrated test environment.
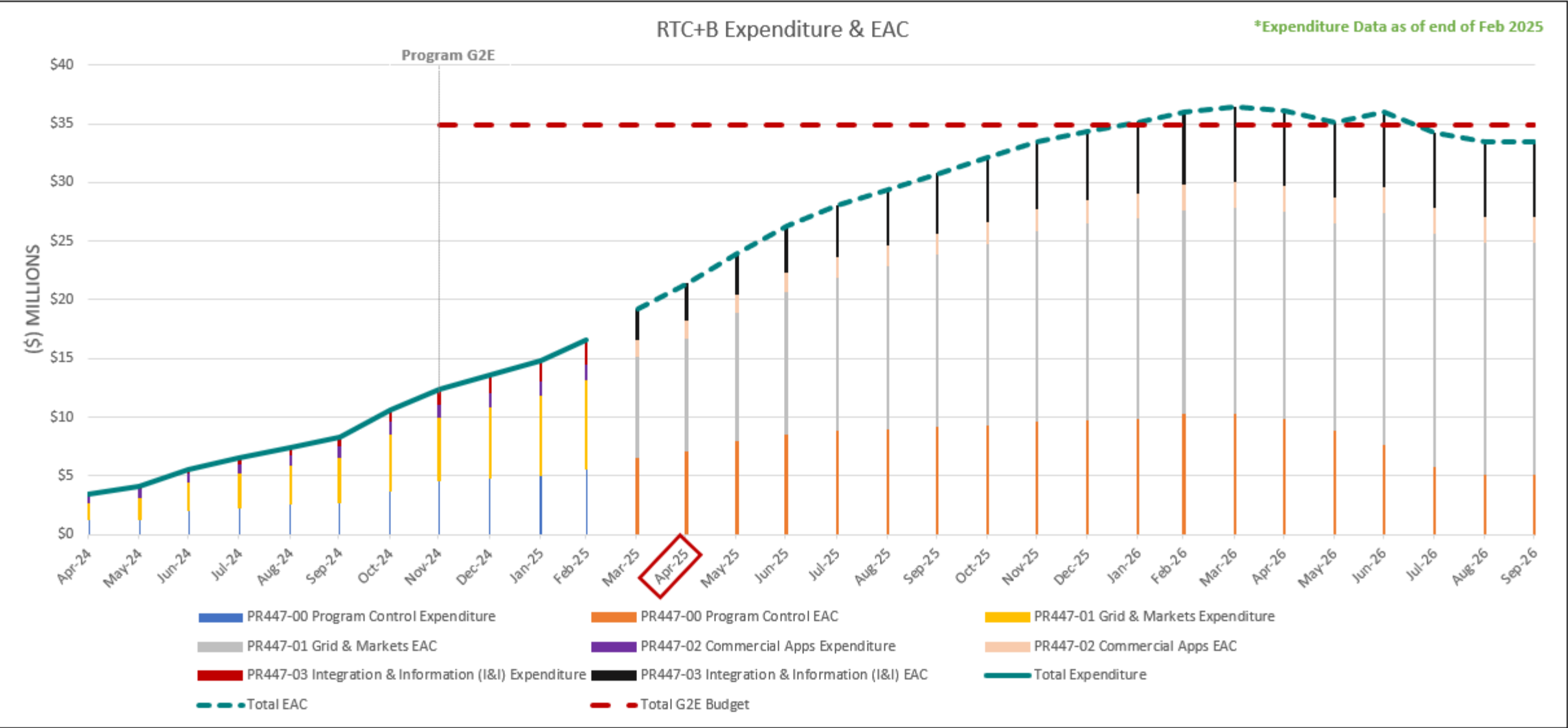
Overview of System Changes – RTC+B+SOC Program

Sub-QSE ● ● ● Sub-QSE

Core Grid Management Systems (PR447-01 Grid & Mkt, In Execution)
- Resource Integration & Ongoing Operations (RIOO)
- Network Model Management
- Energy Management System
- Market Management System
- Outage Scheduler

Market Participant (MP) EMS/GMS — ICCP → Energy Management System

MP Scheduling & Trading systems — External Facing APIs → Market Management System

PR447-02 Commercial Apps (In Execution)
- Registration
- Settlement & Billing
- Credit Monitoring

PR447-03 Integration & Information (I&I) (In Execution)
- Enterprise Integration
- Reports & Dashboards

Item 5.2
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RTC+B+SOC Program Structure

Project	IA Budget	G2E Budget	Estimate at Completion (EAC)	Expenditure to Date	Trend	Description
PR447-00 Program Control	$13.9M	$5.4M	$5,092,897	$5,545,432	🟢	Includes Hardware, Software
PR447-01 Grid & Markets	$24.8M	$20.8M	$19,819,442	$7,710,165	🟢	MMS/EMS/OTS/NMMS/RIOO/PI/OS/Grid-Geo
PR447-02 Commercial Apps	$5.8M	$2.3M	$2,234,809	$1,246,497	🟢	S&B/CMM/Registration
PR447-03 Integration & Information (I&I)	$5.3M	$6.4M	$6,353,662	$2,119,730	🟢	Middleware, dashboards, reports, data warehouse
Total	**$49.9M**	**$34.9M**	**$33,500,810**	**$16,621,824**		

- Total budget may not foot due to rounding
- Expenditure to Date as of end of Feb 2025
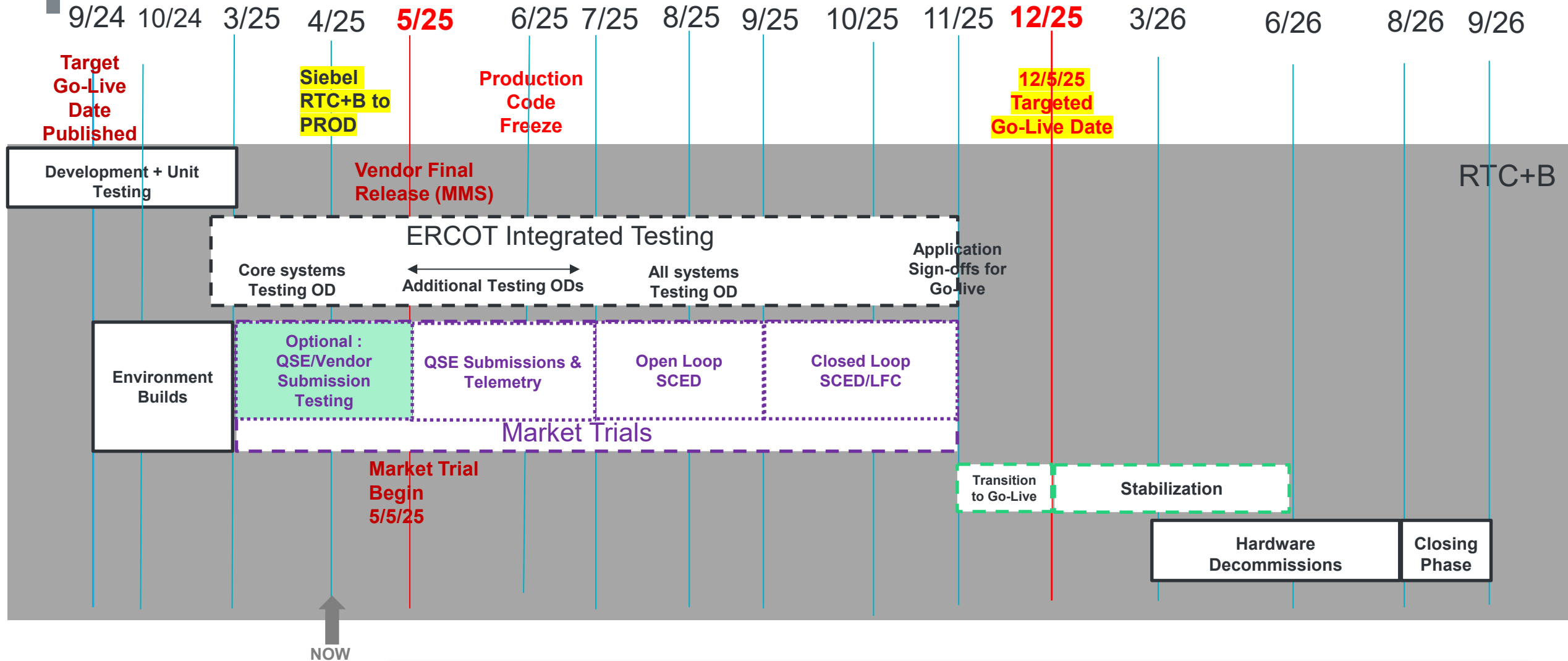
🔴	Not Tracking to Plan
🟡	At Risk
🟢	Tracking to Plan

Key Takeaway: Centralized Program Control structure with 3 project tracks are all on track.

RTC+B Overall Expenditure & EAC

RTC+B Expenditure & EAC

*Expenditure Data as of end of Feb 2025

Program G2E

Legend:
- PR447-00 Program Control Expenditure
- PR447-00 Program Control EAC
- PR447-01 Grid & Markets Expenditure
- PR447-01 Grid & Markets EAC
- PR447-02 Commercial Apps Expenditure
- PR447-02 Commercial Apps EAC
- PR447-03 Integration & Information (I&I) Expenditure
- PR447-03 Integration & Information (I&I) EAC
- Total Expenditure
- Total EAC
- Total G2E Budget

Key Takeaway: RTC+B Program (and the 3 projects) are tracking to plan.

Major Dependencies in our critical path

Timeline markers: 9/24 10/24 3/25 4/25 **5/25** 6/25 7/25 8/25 9/25 10/25 11/25 **12/25** 3/26 6/26 8/26 9/26

Target Go-Live Date Published

Siebel RTC+B to PROD

Production Code Freeze

12/5/25 Targeted Go-Live Date

Development + Unit Testing

Vendor Final Release (MMS)

RTC+B

ERCOT Integrated Testing
- Core systems Testing OD
- Additional Testing ODs
- All systems Testing OD
- Application Sign-offs for Go-live

Environment Builds

Optional : QSE/Vendor Submission Testing

QSE Submissions & Telemetry

Open Loop SCED

Closed Loop SCED/LFC

Market Trials

Market Trial Begin 5/5/25

Transition to Go-Live

Stabilization

Hardware Decommissions

Closing Phase

NOW

Key Takeaway: RTC Program targets to go-live on 12/5/2025, stabilization period to follow.

Major Program Milestones for 2025

Task	Due by	Status
PR447-00 RTC+B ITEST Environment Readiness (Server Builds/Data refreshes)	Jan 31, 2025	Complete
PR447-01 Vendor SCED Delivery	Feb 25, 2025	Complete
PR447-00 RTC+B Market Trials EMS/MMS Server Readiness	Feb 28, 2025	Complete
PR447-02 Commercial Applications ITEST Entry	Mar 03, 2025	Complete
PR447-00 Sandbox Deployment for QSEs/Vendors Market Submissions Testing	Mar 03, 2025	Complete (March 07, 2025)
PR447-00 First ITEST Operating Day (OD) Test for core systems (EMS/MMS/S&B)	**Apr 16, 2025**	On-Track (week of March 24, 2025)
PR447-03 Sign-off Reports Needed for Open-Loop Market Trials	Apr 21, 2025	Upcoming
PR447-00 Open Market Trials for QSE Testing	**May 05, 2025**	Upcoming
PR447-01 Vendor Final Release (all applications)	May 13, 2025	Upcoming
PR447-00 Begin Open-Loop RTC SCED	July 07, 2025	Upcoming
PR447-03 Sign-off Reports Needed for Closed-Loop Market Trials	Aug 13, 2025	Upcoming
PR447-00 First ITEST Operating Day (OD) Test for all Systems	**Aug 27, 2025**	Upcoming
PR447-00 Achieve Successful Closed-Loop Test	**Oct 29, 2025**	Upcoming
PR447-00 ITEST Application Sign-off	Nov 21, 2025	Upcoming
PR447-00 Go-live with RTC+B	**Dec 05, 2025**	Upcoming

Key Takeaway: Select Key milestones for Committee updates (2025 KRs are noted in bold).

RTC+B Program Risk Assessment

- Risks tracked at Program Level and at individual Project level:
  - Internal & External stakeholder forums (RTCBTF, TWG,…)

- Categories of Risk:
  - Budget, Communication, Legal/Regulatory, Organization/Staffing, Quality, Scheduling, Scope, Technological, Vendor.

- Evaluated weekly by Program Leadership:
  - Participants: PMs, Program Director, Tech Leads, Dept Directors
  - Activity:
    - Entry/acceptance of new risks, close-out of expired risks
    - Ownership & Due date assignment for each risk monitoring/mitigation
    - Review/Reassignment of Probability & Impact for each Active risk
    - Exposure = Probability x Impact

- Review of Vendor produced Monthly Risk Assessment report

- High/Medium Exposure risks reviewed Monthly with Steering Committee (VPs)

- RTC+B risks reviewed periodically at Executive level in Risk Management Committee as well as ad hoc

- Consolidated into Risk Themes for T&S Committee Updates (Risk Map)

Sample Risk Entry Template

Key Takeaway: Periodic risk review cycles help identify, evaluate & escalate risks through the RTC+B Program Steering Committee.

RTC+B Program Risk Map

RISK RATING KEY	INSIGNIFICANT Acceptable OK TO PROCEED	LOW Acceptable OK TO PROCEED	MEDIUM Exercise Caution TAKE MITIGATION EFFORTS	HIGH Generally Unacceptable TAKE MITIGATION EFFORTS	EXTREME Intolerable SEEK SUPPORT

IMPACT

	1 - Rare (0 - 10%)	2 - Unlikely (10-35%)	3 - Possible (35-65%)	4 - Likely (65-90%)	5 - Almost Certrain (90-100%)

Impact levels (top to bottom): 5 - Critical, 4 - Significant, 3 - Moderate, 2 - Minor, 1 - Insignificant

Plotted risks:
- R05-External Event Disruption
- R01-Regulatory/Policy
- R02-Market Readiness
- R03-QSE Battery Data Quality
- R04-Loss of Key Resources

LIKELIHOOD

Key Takeaway: Identify, quantify, communicate & mitigate RTC+B risks in a timely manner.

RTC+B Program Risks

ID	Risk Title	Risk Description	Mitigation
R01	Regulatory/Policy	Potential of stakeholder legal or regulatory concerns to stop implementation (examples, stakeholder pressure or lawsuits around loss of revenue, AS Demand Curves, or battery state of charge issues	All know issues being addressed by RTCBTF and report up through every TAC and ERCOT Board meeting in 2025.
R02	Market Readiness	Potential of one or many significant vendors or companies not having their systems ready for go-live.	Early releases of market interface documentation and live systems to IT/vendors, and ERCOT scorecards for each QSE to provide transparency on success rate provided to ERCOT Board.
R03	QSE Battery Data Quality	Market submission data quality of batteries related to Telemetry, COP, and Bid/Offer Curves	Implement additional Model Build Environment and ERCOT scorecards for each QSE to provide transparency on success rate provided to ERCOT Board.
R04	Loss of Key Resources	Retention of highly specialized SMEs. Impact of potential loss of key resources creates a knowledge loss and schedule disruption.	Executive awareness to build depth of defense in Execution schedule (particularly testing).
R05	External Event Disruption	Possibility for disruption due to External event out of ERCOT control.	Monitor out of our control items that may present risk: - Cyber Vulnerabilities, Tech health, Significant Weather Event

Key Takeaway: Program Control continuously determines and implements mechanisms for effective oversight and risk mitigation for all RTC+B delivery.

Appendix

Links to educational material on the mechanics of RTC, Single Model and State of Charge:

- [RTC Updates to Reliability and Markets Committee - Overview of market design concepts & benefits](#)
- [RTCBTF - Refreshers on RTC Key Principles, Single Model and SOC](#)
- [RTCBTF](#)
- [RTC+B Training Videos](#)

Links to associated key documents:

- [RTC Key Principles](#)
- [NPRR1186 Interim SOC - Key Documents](#)
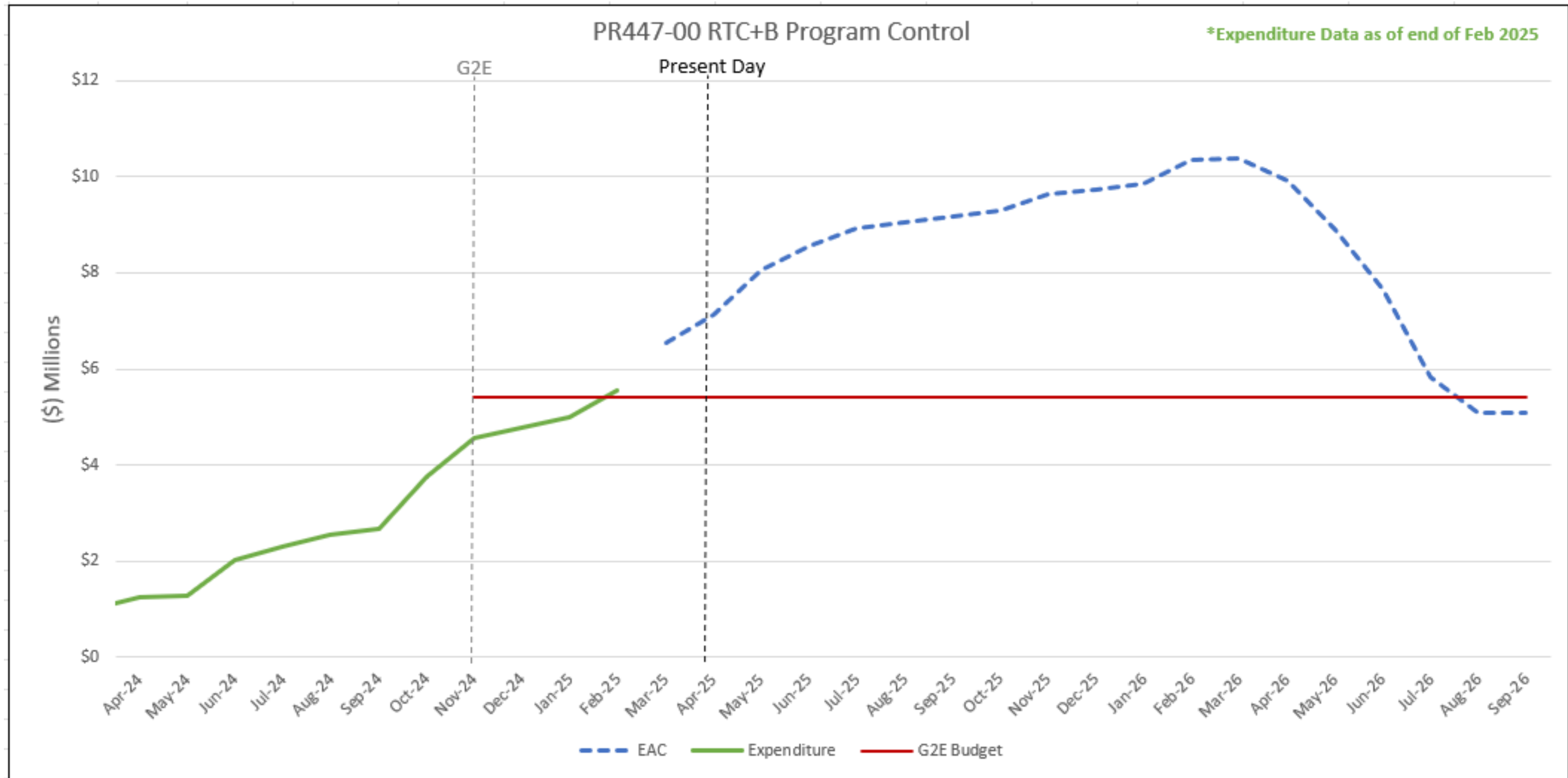- [NPRR1204 SOC Considerations with RTC - Key Documents](#)

Acronyms used in this slide deck

CIM	Common Information Modeling
CMM	Credit Monitoring & Management
DSA	Dynamic Stability Analysis
EMS	Energy Management System
GMS	Generation Management System
I&I	Integration and Information
ICCP	Inter control Center Protocol
LFC	Load Frequency Control
MMS	Market Management System
MP	Market Participant
NMMS	Network Model Maintenance System

Acronyms used in this slide deck

|	
OD	Operating Day Testing
OS	Outage Scheduler
OTS	Operator Training Simulator
RIOO	Resource Integration and Ongoing Operations
RLC	Resource Limit Calculator
RTC	Real-Time Co-Optimization
RTCA	Real-Time Contingency Analysis
S&B	Settlements & Billing
SCADA	Supervisory Control and Data Acquisition
SE	State Estimator
SOC	State of Charge
VSA	Voltage Stability Analysis
G2E	Gate to Execution

RTC+B Program Control Expenditure & EAC

PR447-00 RTC+B Program Control

*Expenditure Data as of end of Feb 2025

RTC+B Grid & Markets Expenditure & EAC

PR447-01 RTC+B Grid & Markets

*Expenditure data as of end of Feb 2025
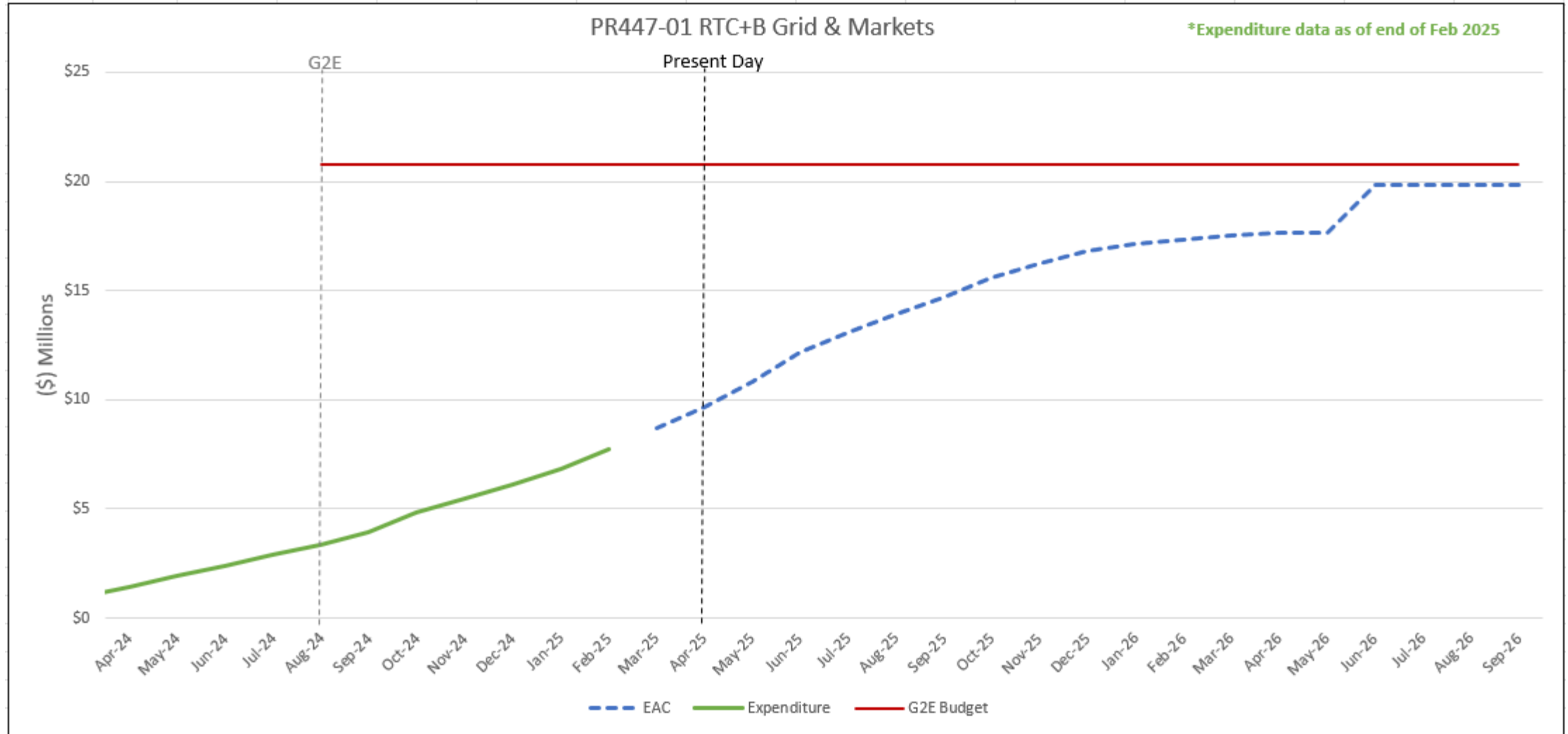
RTC+B Commercial Applications Expenditure & EAC

RTC+B Integration & Information (I&I) Expenditure & EAC

PR447-03 RTC+B Integration & Information (I&I)

*Expenditure data as of end of Feb 2025

Legend: EAC, Expenditure, G2E Budget
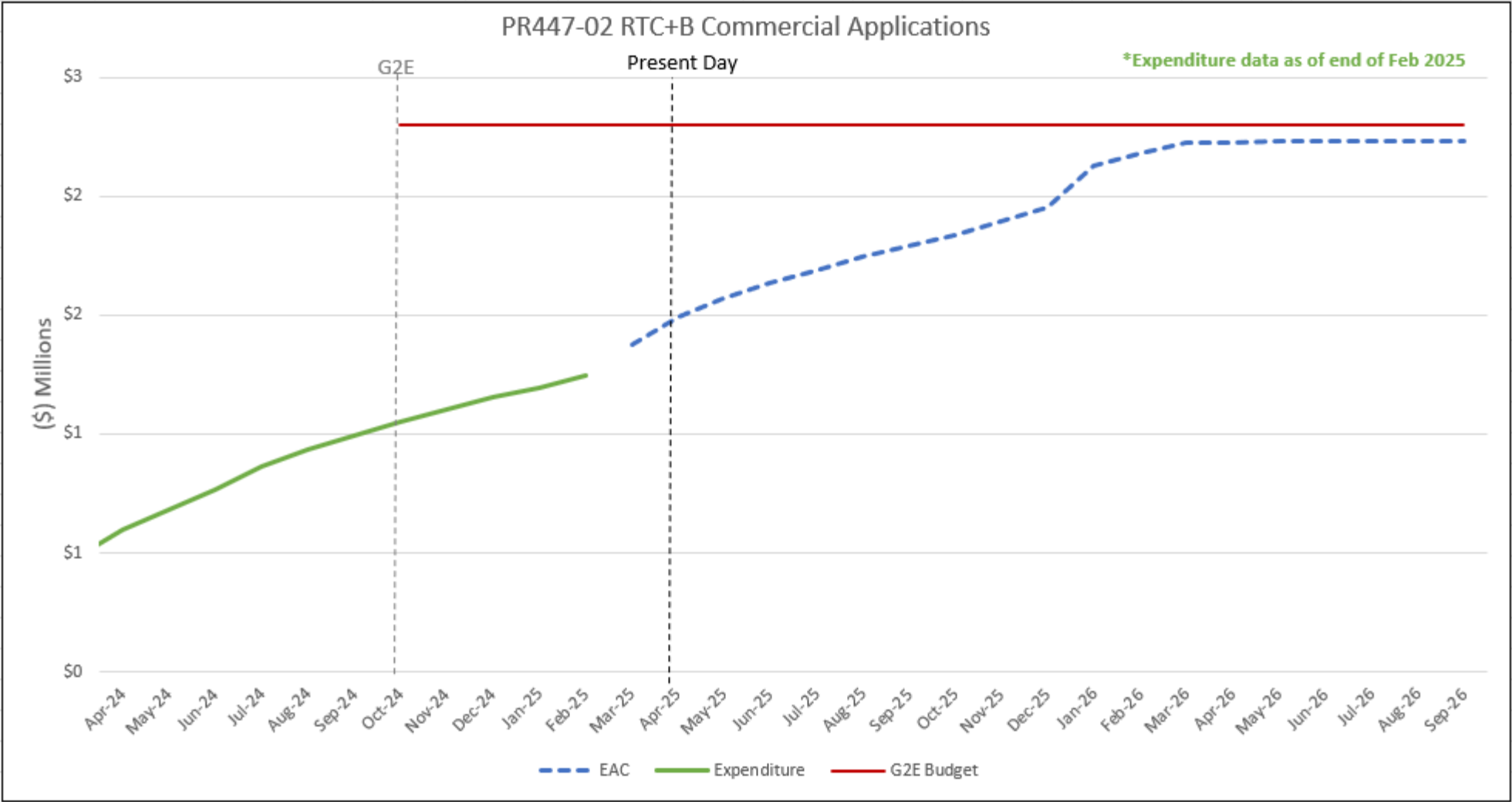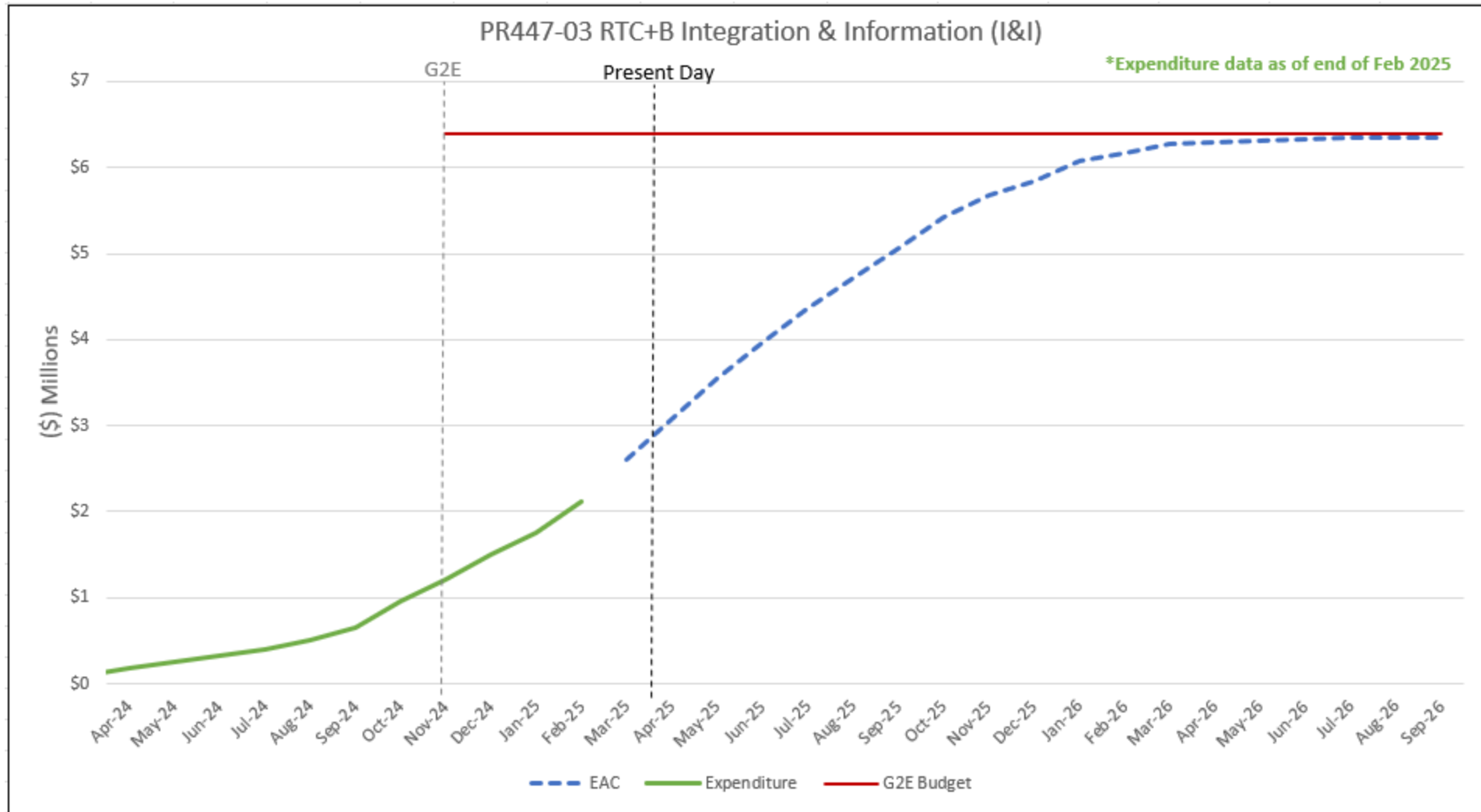
Reasons for Underrun

Labor improvements ($8.2M)

    Acceleration of schedule from a 6/2026 go-live to 12/2025
        Designation of RTC as #1 priority project
        Clarity of scope with RTC+B Task Force
        Early delivery of FFRA,ECRS,EMS upgrade eliminated dependencies compared to Passport
        Timely and quality releases from the vendor over time has lowered risks

    Confidence of delivery team with successful delivery of FFRA, ECRS, EMS upgrade

    Being able to retain the team that delivered FFRA/ECRS/EMS upgrade

Hardware improvements ($5.5M)

    Migration of hardware platform from expensive to cheaper servers

    Timing the project between Data Center refresh so that we can get full credit for decommissioned servers

Software improvements ($3.2M)

    Key License structure renegotiated to unlimited license model so that projects are spared
    Optimization of delivery environment

Key Takeaway: Accelerated schedule and improved efficiencies drive cost savings.

(From Previous Update) Major Dependencies in our critical path

Key Takeaway: RTC Program targets to go-live on 12/5/2025

Timeline markers: 11/23, 1/24, 4/24, 7/24, 9/24, 10/24, 3/25, **5/25**, 6/25, 7/25, 9/25, 11/25, 12/25, 3/26, 6/26

- Target Go-Live Date Published
- Production Code Freeze
- **12/5/25 Targeted Go-Live Date**
- Vendor Final Release

Phases:
- Requirements
- Planning & Design
- CIM / RUC / DAM / SCED
- Development + Unit Testing
- ERCOT Integrated Testing
- Market Trials Environment Build
- Develop & Publish External Interface Specs
- Market Participant System Updates
- Optional: QSE/Vendor Submission Testing
- QSE Submissions & Telemetry
- Open Loop SCED
- Closed Loop SCED/LFC
- Market Trials
- Transition to Go-Live & Stabilization
- RTC

Legend:
- Vendor Deliverables
- Market Trials Plan