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Improving Bulk Grid Interconnections

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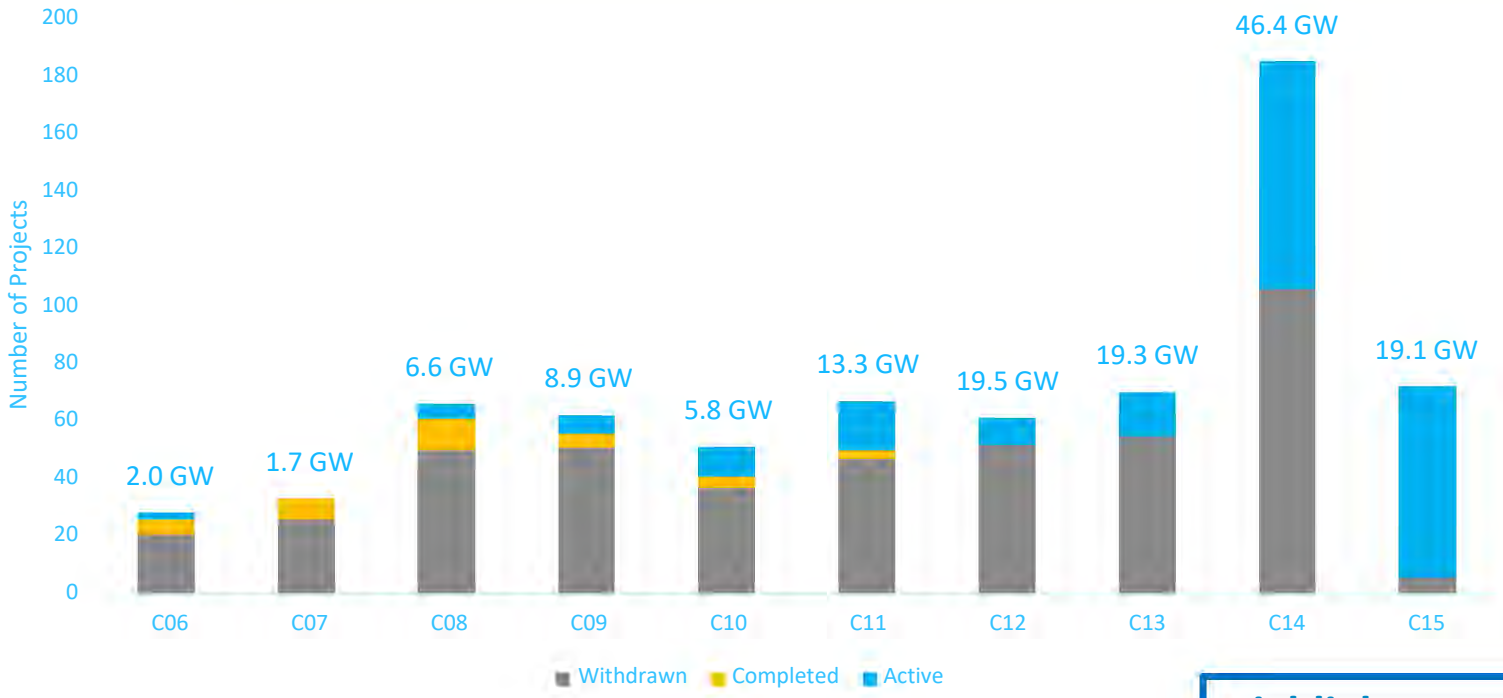
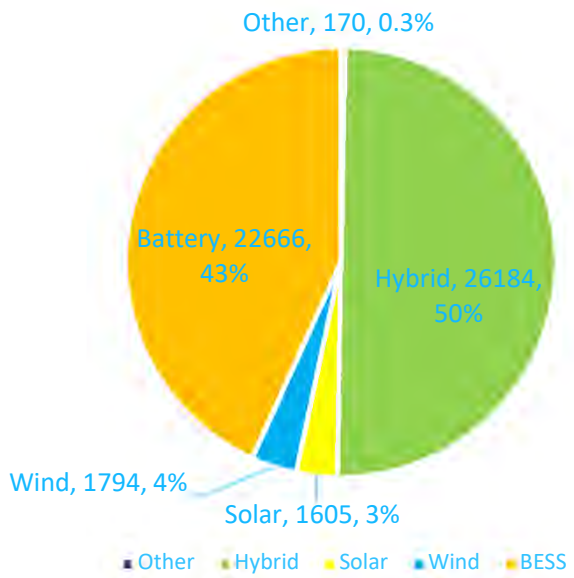
Generation Interconnection Status

Trend of PG&E Cluster Applications by No. of Projects



PG&E Active Queue: Major Technology & MW



PG&E Queue	Active Projects	Completed Projects	Withdrawn Projects
Total GW	52.4	11.4	133.9
Number of Projects	230	114	811

Highlights:

- Withdrawal Rate: from C6 to C14, 445 out of 623 projects, or 71%, have withdrawn. C15 study is ongoing.
- Trend: The new applications peaked in C14 with over 46GW. After reforms made in CAISO's interconnection process enhancement (IPE), C15 size has significantly reduced, but still one of the largest in history.
- Resource Type: 99% of the queue (by MW) is solar, wind, battery, and the hybrid of these resources.

Generation Interconnection Process Improvements

PG&E values new Generation. Here is what we are doing

New Tools and Process Enhancements

- Piloted Grid Unity to streamline the CAISO Intake Process and incorporated as part of the Cluster 15
- Developed new pro-forma contracts for Engineering & Procurement (E&P) agreements to align with changes in the CAISO IPE
- Ensuring 3rd financial securities are being posted 120 days after signing agreements
- Funding projects to completion once they have passed their scoping phase gate removing the start-stop paradigm

Long Lead Materials

- Materials Purchasing Program for demand forecasting, authorizing, and bulk-ordering
- Piloting with suppliers to increase sourcing options for Circuit Breakers
- Utilizing pre-negotiated developer production slots when available

Resourcing

- Established a dedicated Engineering Team to support the Substation Interconnection Engineering Process
- Expanded the generation and load interconnection planning teams
- Aligning Resource Engagement Front Door Processes to gain efficiency on establishing project teams
- Strategic partnering with PG&E's PMO and develops to manage new interconnections end-to-end

Capacity Delivery Center

- Established a monthly Operating review of in-flight generation work to monitor health and delivery status interconnections and their network upgrade dependencies.

Generation Interconnection Process Improvements

Capacity Delivery Center (CDC): The CDC facilitates the on-time delivery of electric capacity for PG&E customers (Distribution and Transmission, Generation and Large Load).

Visualizing the Delivery of Capacity for Customers

- Located at PG&E's Oakland General Office
- Engage key stakeholders to bring visibility to PG&E's Portfolio of Work
- Strategize to address barriers to delivery on customer commitments

A Command Center

- Regular Operating Rhythms on the status of capacity projects
- Identify escalations and develop catch-back plans to mitigate risks
- Monthly report out on status of in-year metrics for capacity projects

A Lean Operations Hub

- Visualize project delivery process
- Analyze data to identify opportunities for improvement
- Implement efficiencies to better serve capacity customers through problem solving

Interconnection improvements to streamline the process, people changes, or technologies

Transparency-enabled Site Selections

- **Heat Maps:** FERC Order 2023's Heat Maps and CAISO's IPE initiatives enhance visibility of available transmission capacity.
- **Developer Forums:** Provide updates on network upgrades, capacity status, and interconnection timelines.
- **Study Results and Technical Files:** Available to developers via the CAISO Market Participant Portal for review and analysis.

Short Circuit Duty Mitigation

- **Circuit Breaker Inspection and Rerate**: PG&E has adopted measures to enhance the interrupting capacity of heavily loaded circuit breakers.
- **Substation Redesign:** Develop innovative solutions to increase fault duty margins at critical transmission substations.

Advanced Technologies

- **Exploring Alternative Transmission Technologies (ATTs):** Advanced conductors, power flow controllers, and tower raises to optimize the existing network, delay new investments, or increase capacity cost-effectively.
- **Investigating Tools and Technologies:** Automate generator model validation, simulation visualizations, and optimum siting of ATTs like power flow controllers.
- **Using Cloud-Based Platforms:** Expedite complex simulation run-times.

What technologies can enable more efficient utilization of transmission capacity and what are the barriers to their deployment?

PG&E is committed to improving interconnection efficiency, reducing delays, and supporting California's clean energy goals.

- PG&E is looking at Alternative Transmission Technologies like advanced conductors, power flow controller and pilot projects to incorporate dynamic line ratings.

- Implementing ATTs in traditional transmission planning studies involves advanced modeling, careful integration of economic and reliability analyses and optimum device placement. This enables planners to quantify both operational and reliability benefits that are fast , flexible, and economic grid solutions to enable renewable integration.

- Unlocking the full potential of Alternative Transmission Technologies requires technical standardization, cost convergence between estimates and actuals, and robust interoperability with legacy grid systems and cybersecurity vulnerabilities.

What are your recommendations for improving bulk transmission interconnections and processes in California?

PG&E is committed to improving interconnection efficiency, reducing delays, and supporting California's clean energy goals.

Eliminate "Parking" in the Queue

- PG&E recommends removing the option for projects to pause progress for up to a year without losing queue position. This practice contributes to speculative congestion and delays.

Enforce Financial Commitment Requirements

- PG&E supports stricter commercial readiness criteria and financial security postings (e.g., $4,000/MW) to ensure only viable projects proceed.

Streamline Study timelines and Prioritize Ready Projects

- PG&E advocates for implementing firm deadlines, withdrawal penalties, and readiness scoring to prioritize projects with demonstrated viability.

Support Zonal Prioritization and Deliverability Scoring

- PG&E endorses CAISO's zonal approach and scoring system to study only 150% of available or planned transmission capacity per zone, helping focus resources on feasible projects.

Enhance Developer-PTO Communication

- PG&E emphasizes the importance of early and consistent engagement between developers and PTOs to resolve issues proactively and avoid missed milestones.