



Critical Success Factors for Interregional Transmission Planning & Projects

ESIG Fall Technical Workshop – Session 7: Interregional Transmission

Jason MacDowell
GE Energy Consulting

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NON-GAAP FINANCIAL MEASURES:

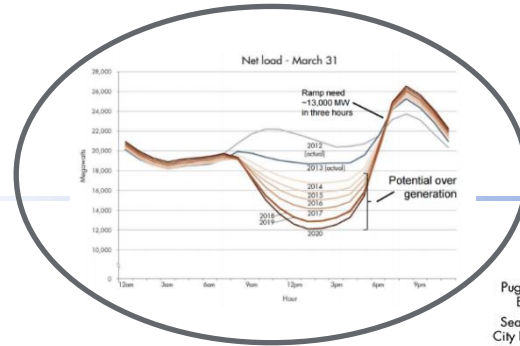
In this document, we sometimes use information derived from consolidated financial data but not presented in our financial statements prepared in accordance with U.S. generally accepted accounting principles (GAAP). Certain of these data are considered "non-GAAP financial measures" under the U.S. Securities and Exchange Commission rules. These non-GAAP financial measures supplement our GAAP disclosures and should not be considered an alternative to the GAAP measure. The reasons we use these non-GAAP financial measures and the reconciliations to their most directly comparable GAAP financial measures are posted to the investor relations section of our website at www.ge.com. [We use non-GAAP financial measures including the following:

- Operating earnings and EPS, which is earnings from continuing operations excluding non-service-related pension costs of our principal pension plans.
- GE Industrial operating & Verticals earnings and EPS, which is operating earnings of our industrial businesses and the GE Capital businesses that we expect to retain.
- GE Industrial & Verticals revenues, which is revenue of our industrial businesses and the GE Capital businesses that we expect to retain.
- Industrial segment organic revenue, which is the sum of revenue from all of our industrial segments less the effects of acquisitions/dispositions and currency exchange.
- Industrial segment organic operating profit, which is the sum of segment profit from all of our industrial segments less the effects of acquisitions/dispositions and currency exchange.
- Industrial cash flows from operating activities (Industrial CFOA), which is GE's cash flow from operating activities excluding dividends received from GE Capital.
- Capital ending net investment (ENI), excluding liquidity, which is a measure we use to measure the size of our Capital segment.
- GE Capital Tier 1 Common ratio estimate is a ratio of equity

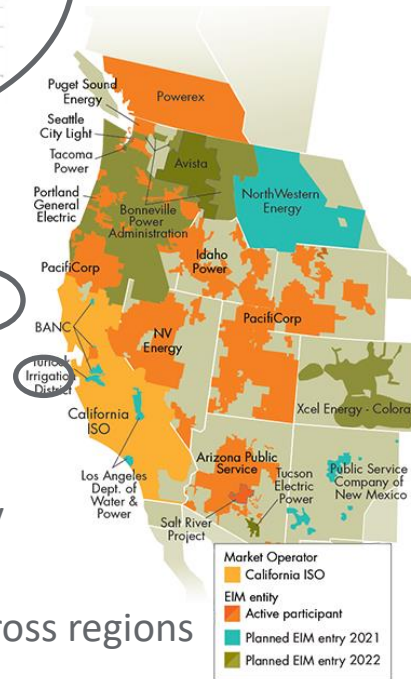
How do we think differently to
unlock the benefits that
interregional transmission planning
& projects can bring?



Sharing needs & capabilities across regions is critical to success



- Earlier WWSIS studies showed the need and value of interregional cooperation
- Growing solar in CA makes morning/evening ramps steeper and belly fatter – what happens when net load crosses zero??
- Interregional transmission projects play increasingly important role to manage variability & uncertainty and promote flexibility and resiliency... but who pays?
- EIM is one great example of where sharing balancing needs across regions in Western US can be cost-effective... particularly as VERs grow.
- Should we consider new mechanisms to incentivize flexibility, supply & load diversity, visibility & control, frequency support and stability across a wider footprint?
- Change in mindset needed? Look beyond cost recovery - focus on **value** of services that interregional transmission brings? Different business model needed? ...including structure that incentivizes more private investment, participation in markets?



Western Energy Imbalance Market Benefits

Benefits

\$1 billion - from November 2014 to July 3, 2020
\$998.69 million - as of Q2 ending June 30, 2020

EIM PARTICIPANTS	2014	2015	2016	2017	2018	2019	2020		TOTAL
							Q1	Q2	
Arizona Public Service Entered 10/2016			\$5.98	\$34.56	\$45.30	\$54.48	\$11.26	\$6.40	\$157.98
BANC Entered 04/2019						\$15.86	\$7.07	\$9.17	\$32.10
California ISO Entered 11/2014	\$1.24	\$12.66	\$28.34	\$36.96	\$67.94	\$44.74	\$9.57	\$21.25	\$222.70
Idaho Power Company Entered 04/2018					\$26.88	\$28.23	\$5.15	\$6.08	\$66.34
NV Energy Entered 12/2015		\$0.84	\$15.57	\$24.20	\$25.55	\$22.87	\$5.36	\$4.73	\$99.12
PacifiCorp Entered 11/2014	\$4.73	\$26.23	\$45.47	\$37.41	\$61.68	\$59.77	\$7.80	\$8.46	\$251.55
Portland General Electric Entered 10/2017				\$2.83	\$27.57	\$42.87	\$6.93	\$9.15	\$89.35
Powerex Entered 04/2018					\$7.84	\$11.94	\$1.09	\$2.84	\$23.17
Puget Sound Energy Entered 10/2016			\$1.56	\$9.86	\$13.68	\$16.15	\$3.67	\$1.15	\$46.07
Seattle City Light Entered 04/2020								\$1.63	\$1.63
Salt River Project Entered 04/2020									
TOTAL	\$5.97	\$39.73	\$96.92	\$145.82	\$276.44	\$296.91			

\$998.69MM!!

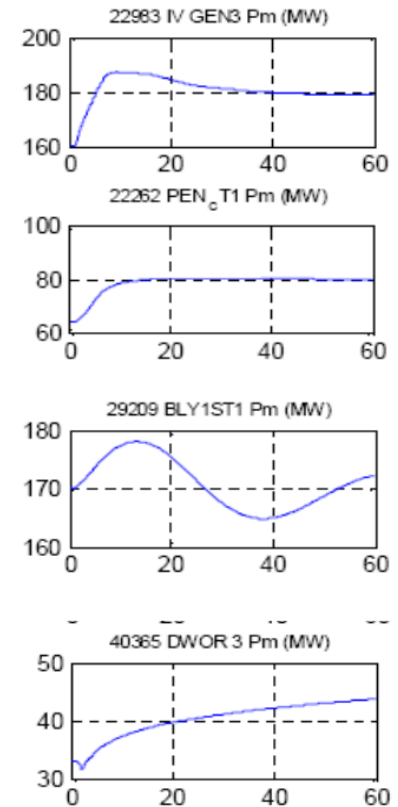
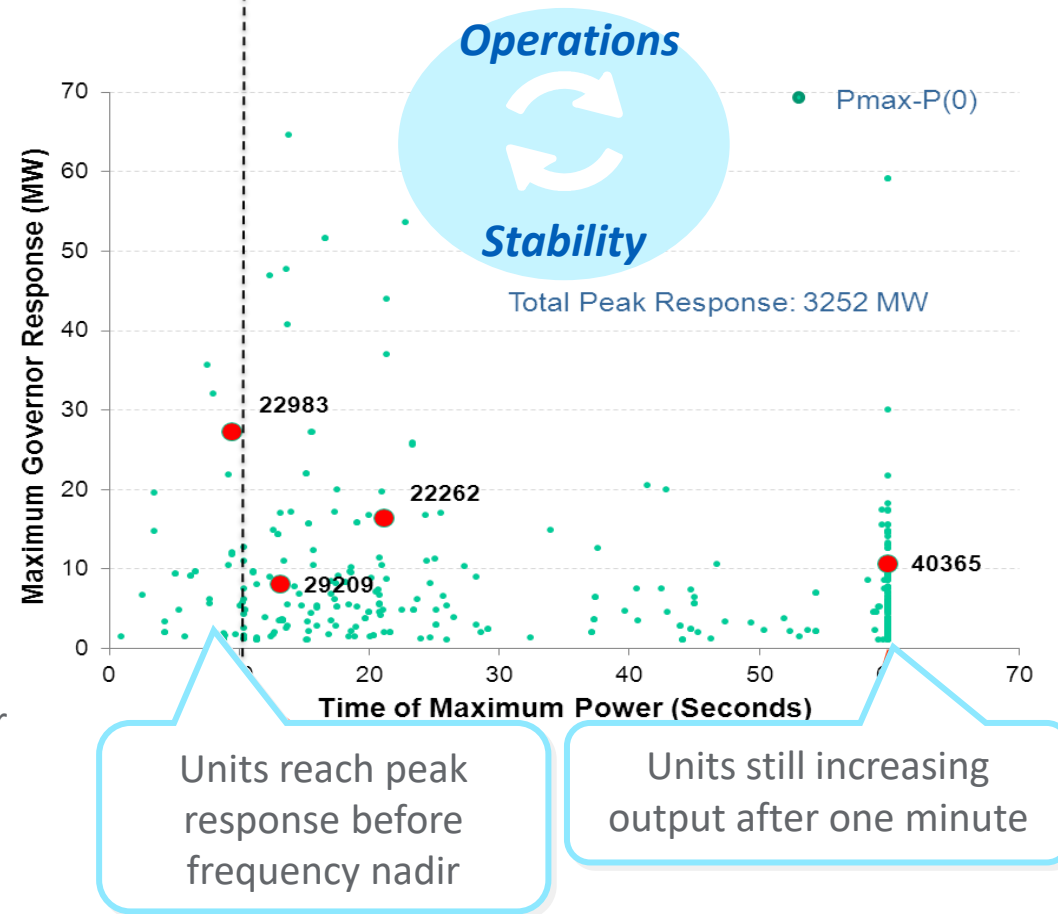
<https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx>



Practices to assess system needs & benefits are evolving

- One example – primary frequency response
- PFR performance depends on...
 - Unit type
 - Headroom (unit dispatch)
 - MW Contribution
 - Speed / governor tuning
 - How neighbors behave
- Unit commitment & dispatch determine PFR performance – which operating conditions are most stressful? How much headroom is left?
- Determine which conditions to study based on plausible economic dispatch and production cost as input to load flow/stability modeling
- What is the impact that interregional transmission will have on unit commitment and dispatch, grid strength and inertia and provision of PFR over a larger area?
- Can HVDC controls play a bigger role to augment PFR across asynchronous regions?

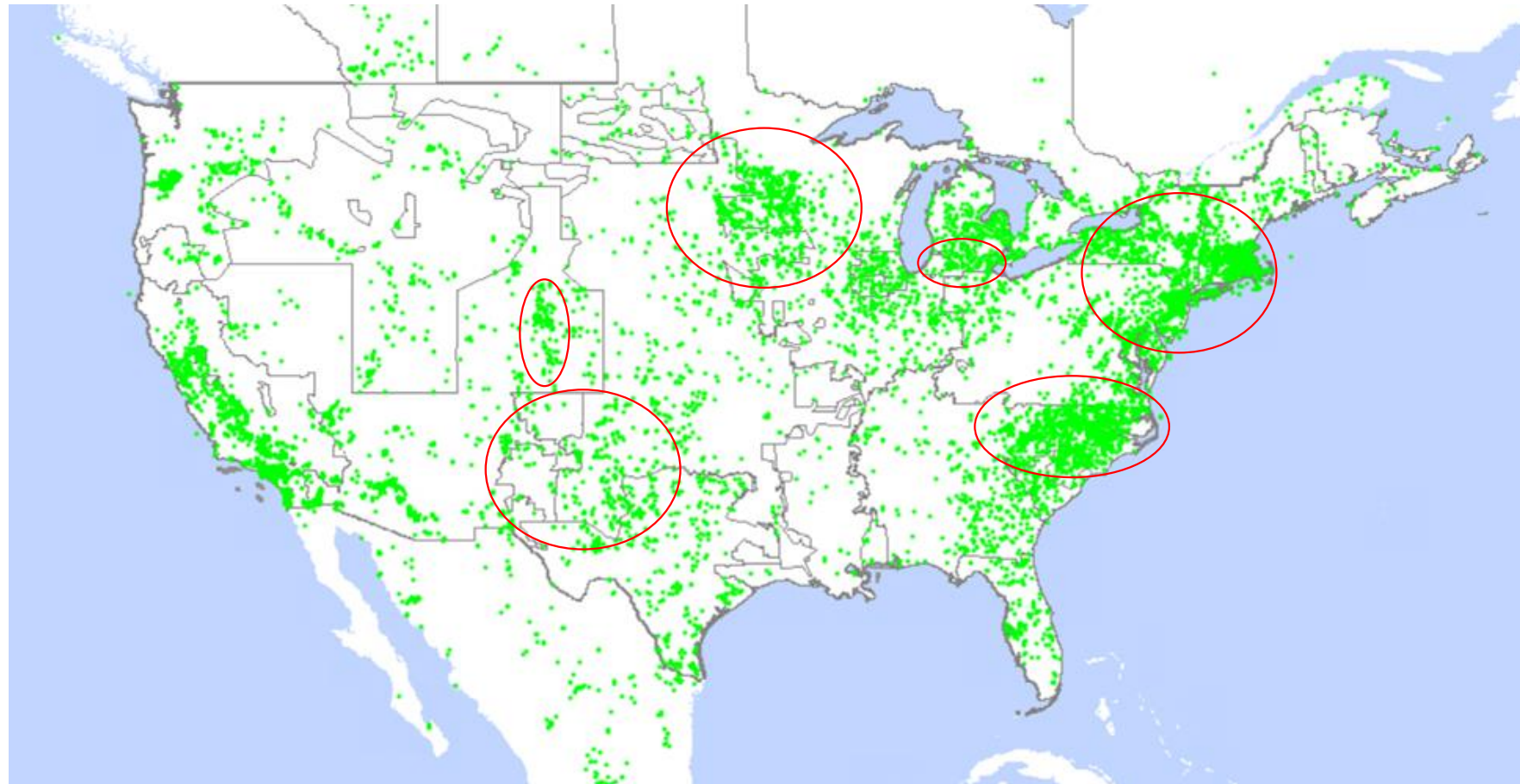
Winter Low Load – High Wind Base Case in one region of Western US



Interregional transmission planning & projects enhance grid resiliency

- Pockets of IBRs (wind and solar) continue to grow where resources are richest, including at seams of RTOs/ISOs and interconnections
- Control stability of IBRs in these pockets continues to get more challenging
- Interregional assessment is becoming more important to determine control stability as IBRs grow, especially with pockets close to seams
- Interregional AC Transmission can help strengthen grids and improve SCR
- Control stability of DC ties & transmission also critically important...
- Grid forming will play important role

Operating & planned utility-scale wind and solar projects in US through 2020



Considerations and Conclusions



- Expanded metrics are needed to help promote balancing, flexibility and stability needs across regions and utilities
- Coordination over larger footprint can help manage variability and uncertainty. Visibility and control across regions and interconnections is key! Access to data across regions is paramount!
- Interregional transmission promotes sharing of flexibility, helps diversity and can increase system strength & resiliency.
- Integrated techno-economic planning analysis, accounting for operations & stability across regions is highly important to understand most stressful system conditions, reliability needs and costs... Peak/light load isn't the only concern.
- Control stability matters everywhere, even across seams! Know what is happening with your neighbor. Interregional transmission can strengthen grids to promote growing pockets of IBRs and spreads new tech capabilities (like GFM).
- Markets and incentives play an increasingly important role to cost-effectively unlock the performance, resiliency and benefits across regions...
 - EIM, capacity & A/S markets effectively link balancing & reliability needs/capabilities across boundaries... how can transmission contribute?
 - Increased market granularity (time between trading gate closure and delivery of power) further increases flexibility



