

**Generator
Interconnection –
Developer Perspective**

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- Energy industry entire career
- PGE – 17 years
- PacifiCorp – 7 years
 - Generator Interconnection Queue Management
 - Transmission Service Queue Management
- Independent Power Producer – 8 years – Transmission SME
 - Every region of US except NE and New England
 - Including Puerto Rico and Hawaii
 - Japan
- Current employer, Recurrent Energy, owned by Canadian Solar a panel manufacturer
- Recurrent Energy is one of top 5 solar developers with nearly 2 GW of contracted projects

FEDERAL TRANSMISSION REGULATIONS

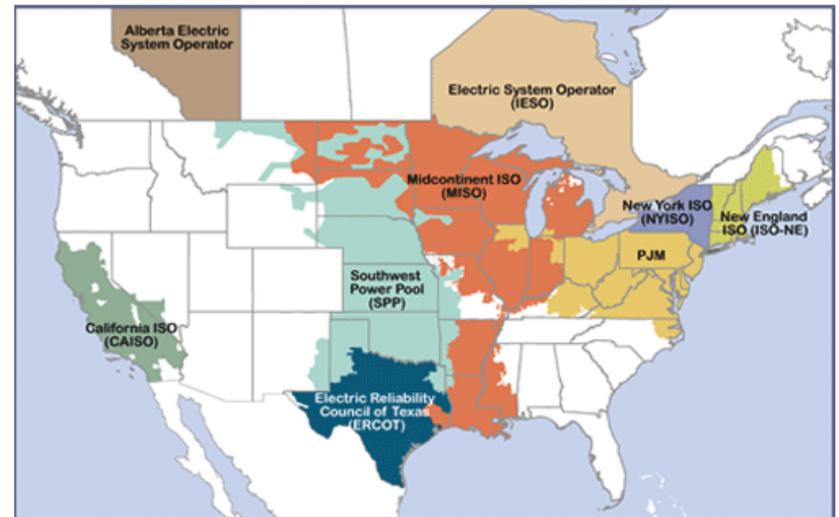


- It's complicated – but necessary
- Wouldn't exist if we still just had regulated monopolies
- FERC presentation simplified
 - Transmission Owners must offer comparable, non-discriminatory transmission access
 - Independent developers and their in house developers – all treated the same
 - Transparency is required

MARKETS AND NOT



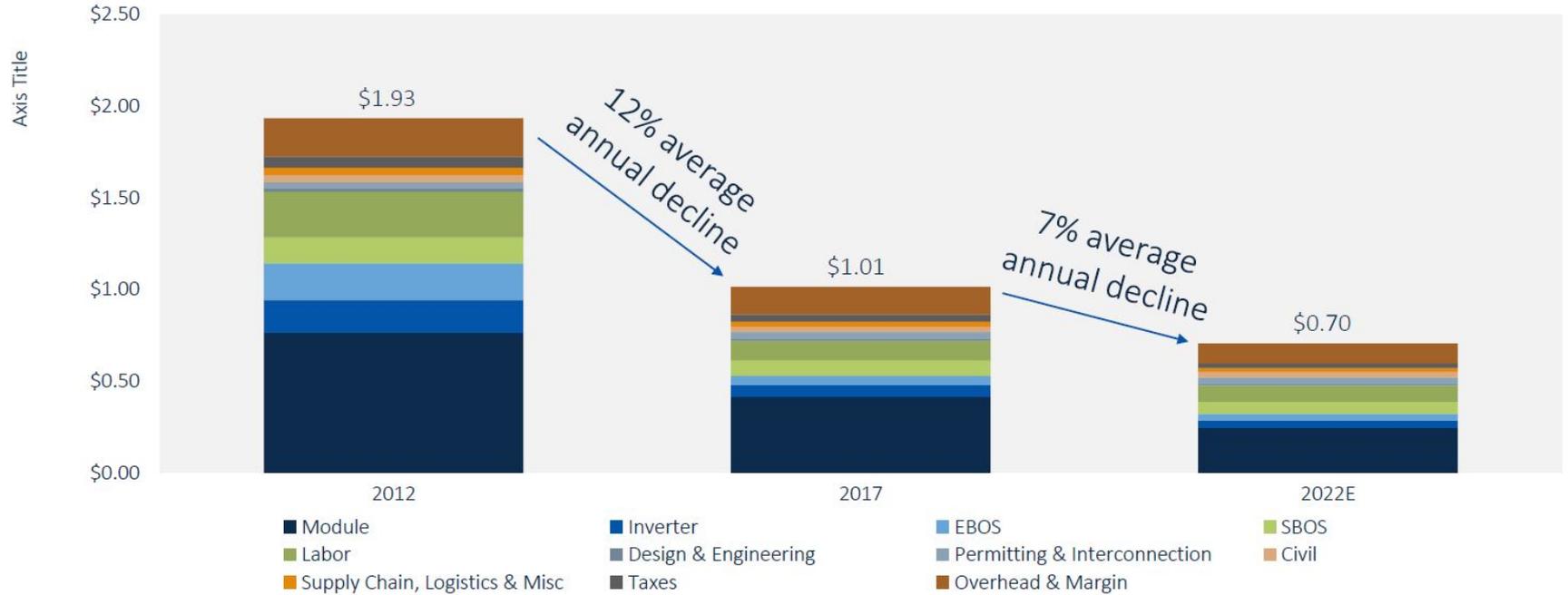
- Competitive Markets with ISOs
 - CAISO, ERCOT, PJM, MISO and SPP
 - Access to:
 - Traditional Investor Owned Utilities
 - Competitive Choice Aggregators
 - Commercial and Industrial Customers
 - Financial Markets
- Non-markets
 - SE USA
 - WECC excluding CAISO
 - Access to IOUs, Co-ops and Munis



EXTREMELY COMPETITIVE MARKET



United States Utility-Scale Fixed-Tilt System Pricing



Source: GTM Research U.S. PV Price Brief

DEVELOPMENT 101



1. Identify a Market with Opportunities for Success

- Diversity of Power Purchasers
 - Utilities
 - Competitive Choice Aggregators
 - Commercial and Industrial Customers
 - Financial Markets – hedges and other financial instruments
- Integrated Resource Plans that include renewable energy
- Renewable Portfolio Standard (RPS)

2. Find Locations for Projects

- Land available at a reasonable cost
- Decent permitting regime and lack of issues – flora, fauna, cultural, etc
- Access to Transmission
- Path to a Generator Interconnection Agreement
 - Competitive Costs
 - Reasonable Schedule

TRANSMISSION COMPLEXITIES



- Generator Interconnection Queue – one to three years
- Transmission Owner built facilities – 18 months to 36 months to ????
- Transmission Service:
 - Point to Point – another queue, adds \$10 to \$15 per MWh, if available
 - Network Transmission – by power purchaser – paid by MW of load on system

DEVELOPMENT PLAN



- We can't be competitive if we don't use our capital very efficiently
- Of course many projects get started and a much smaller number get built
- Goal to spend as little money as possible while still being able to accurately price power and schedule - bid into RFPs and other opportunities
- Anything much longer than 3 years to get interconnection studies completed and transmission owner facilities built is difficult

TRANSMISSION

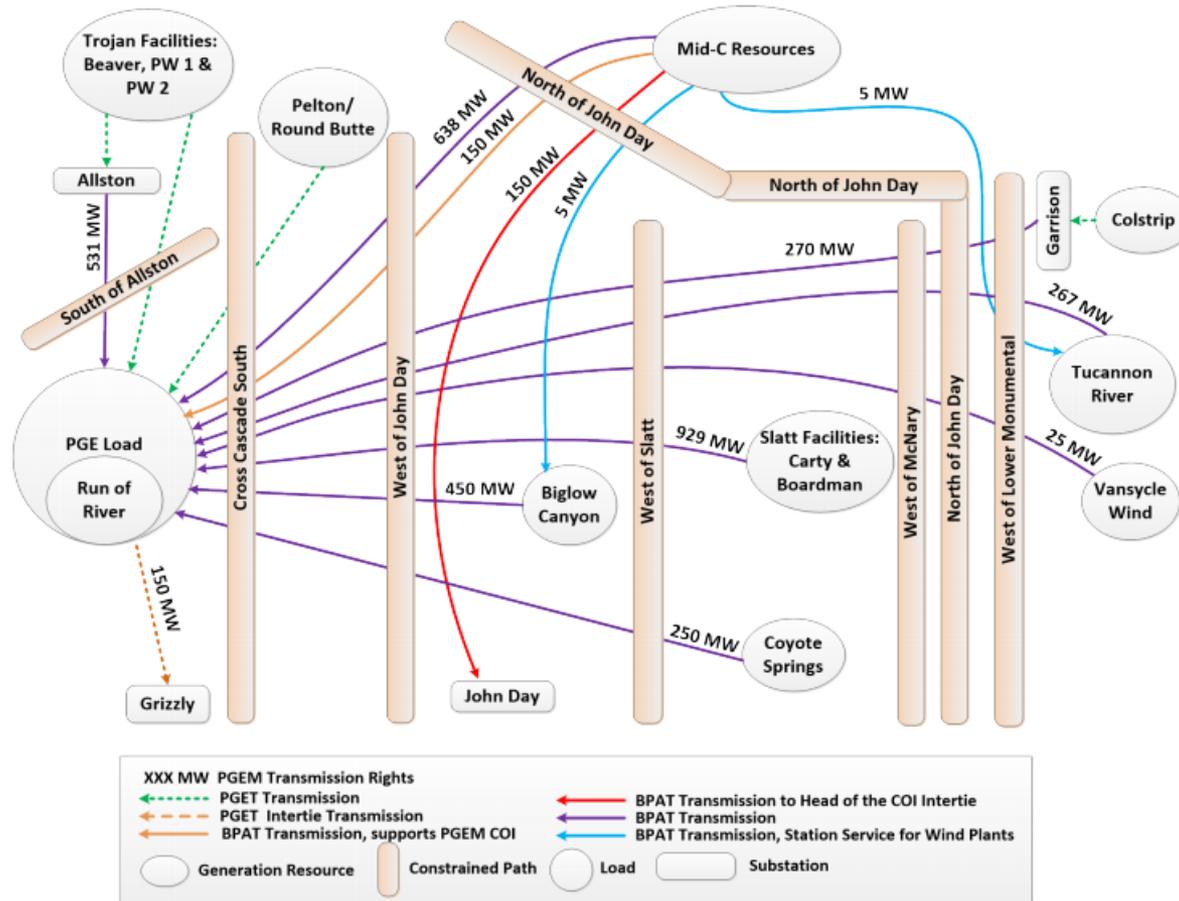


- Transmission is built to serve load
 - Typically by regulated entities
- The lights are staying on so there must be enough!
- Use it efficiently!
- Equal access to all!

EXISTING TRANSMISSION - EXAMPLE



FIGURE 9-2: PGE's market function transmission resources and use with new resources and transmission



WHAT A DEVELOPER NEEDS FROM TRANSMISSION OWNERS



- Transparency – OASIS ✓
 - Access to queues
 - Completed studies
 - Interconnection standards
- Reasonable application requirements ✓
 - Technical data
 - Site control
 - Deposits and Fees
- Reasonable technical requirements ✓
- Timely processing of requests - application to GIA ?
- Timely construction of transmission owners interconnection facilities ?
- Non-discriminate access to transmission ?