POWIN ENERGY
MILLIKAN I PROJECT
BATTERY ENERGY STORAGE SYSTEM

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Mike McGuffin, Customized Energy Solutions

Energy Storage and Distributed Energy Resources Workshop
CAISO – 16 January 2018
Full Range of Energy Market Services

- **Market IQ**
  - ISO Reporting
  - Rule Changes
  - Regulatory

- **Wholesale Services**
  - Dispatch
  - Scheduling
  - Monitoring
  - Bidding
  - Telemetry
  - Settlements
  - 24 Hour Desk
  - Market Participant
  - Market Optimization
  - DA / RT Strategies
  - CES|GOLD

- **Retail Services**
  - Market Entry
  - EDI/Billing
  - Forecasting
  - Scheduling
  - Settlements
  - Pricing
  - Congestion Management
  - Headroom Analysis
  - Managed Portfolio Services

- **Demand Response**
  - DR Mgmt
  - CES|GREEN
  - SecureNet
  - Tracking
  - Settlement

- **Congestion Mgmt**
  - ARR Analysis
  - FTR Analysis
  - Congestion Analysis
  - Power Flow Studies

- **Renewable Mgmt**
  - RPS Management
  - Plant Registration
  - REC Optimization
  - Compliance

- **Emerging Technologies**
  - Storage IQ
  - CoMETS Valuation Models
  - Forecasting Storage Market Size
  - Market Entry & Business Strategies
  - Storage Rules
  - Technology Due Diligence
  - Microgrids
CES Offices

Customized Across the Globe
Customized Energy Solutions (CES)

- CES manages approximately 9,000 MWs of capacity across six ISO/RTOs in North America including over 100MWs of Energy Storage.

- CES is a certified CAISO Scheduling Coordinator under the affiliate name of Galt Power.

- CES has been scheduling in the CAISO market since 2010.

  - Currently schedule for Dispatchable Renewables, Direct Access Load, Proxy Demand Resources, and Energy Storage.

CES is objective and independent--not affiliated with any trading, marketing, distribution or transmission companies.
OUTLINE

• Project Owner / Project Information  (3 slides)
• Market Participation Issues  (1 slide each)
  - Infeasible AGC Dispatch
  - Persistent AGC Dispatch
  - Accuracy Scores
## Project Owner: esVolta

esVolta is a leading North American utility-scale energy storage platform

### Highlights

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<th>esVolta launched in 4Q 2017</th>
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<td>• Develop, build, own, operate business model</td>
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<td>• Focus on greenfield development and M&amp;A in the North American utility-scale storage market</td>
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<td>• Contracted project portfolio of 116 MWhs</td>
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<td>• Additional 800+ MWhs in development pipeline</td>
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### Strengths

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<th>Resourced to achieve market scale</th>
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<td>• Dedicated team for project development, financing, management and operations</td>
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<td>• Long-term capital commitment from Blue Sky Alternative Investments, a global infrastructure investor</td>
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<td>• Strategic procurement relationship with Powin Energy Corporation, a leading lithium-ion battery storage technology integrator</td>
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PROJECT INFORMATION

- **Size:** 2 MW/8 MWh
- **Technology:**
  - Powin Energy BP400+ BESS
  - Lixin LiFePO4 cells (lithium iron phosphate)
  - Eaton Energy Xpert 2 MW inverter

- **Operation:** Day Ahead and Real Time Energy, Regulation

- **Interconnection:** SCE medium-voltage grid
  Virgo 12 kV distribution line out of Estrella 66/12 kV substation
PROJECT INFORMATION

- BESS Control
  - Industry exclusive Powin bp-OS
  - Battery Odometer™
  - Warranty Tracker™
  - BMS
  - Patented in US and China
- Modular design
  - Scalability
  - Speed of deployment
- CES Secure|Net Remote Intelligent Gateway (RIG)
INFEASIBLE AGC DISPATCH

- Continuing to receive AGC signals to CHARGE after hitting MAX SOC
- CIDI Ticket filed in August 2017 – Received several iterations of responses, but nothing conclusive
- Observed improvements soon thereafter
- Recently started seeing infeasible dispatches again
- 8 such occurrences of sustained infeasible dispatch week of 1/1/2018
PERSISTENT AGC DISPATCH

• Many occurrences of >1hr constant Reg Down CHARGE signal

• Consistent dispatch pattern occurring in certain hours
ACCURACY SCORES

- ISO Settlement Accuracy data is not what we see in our internal data
ACCURACY SCORES

• How is latency treated?
• Lack of clarity on calculation...
  ➢ 4 Second data used in calculation not published

• Ramp Rate determination – lacks transparency
  ➢ Ramp rates calculated by ISO from Operational Test versus Regulation Test were very different and both were not representative of experience during the test or unit capability.
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