Potential for Energy Storage in a Network

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Introduction

- Introduction to Enersol
- Reasons why energy storage needs are growing.
- Enersol's partnerships
- Grid code Solutions and energy storage
- Future

Energy Storage

- Energy storage can optimise the existing generation and transmission infrastructures whilst also preventing expensive upgrades. Energy storage devices can manage these irregularities and thus aid the amalgamation of renewable technologies.
- Power fluctuations from renewable resources will prevent their large-scale penetration into the network.
- energy storage devices can reduce emissions by aiding the transition to newer, cleaner technologies such as renewable resources

Energy Storage Applications

1. Load management
2. Spinning reserve
3. Transmission and distribution stabilisation
4. Transmission upgrade deferral
5. Peak generation
6. Renewable energy integration
7. End-use applications
8. Emergency back-up
9. Demand Side Management (DSM)
10. Irish network is effectively an “Island Grid” so faults on any part are see throughout the country.
11. Ability to provide reactive and active power

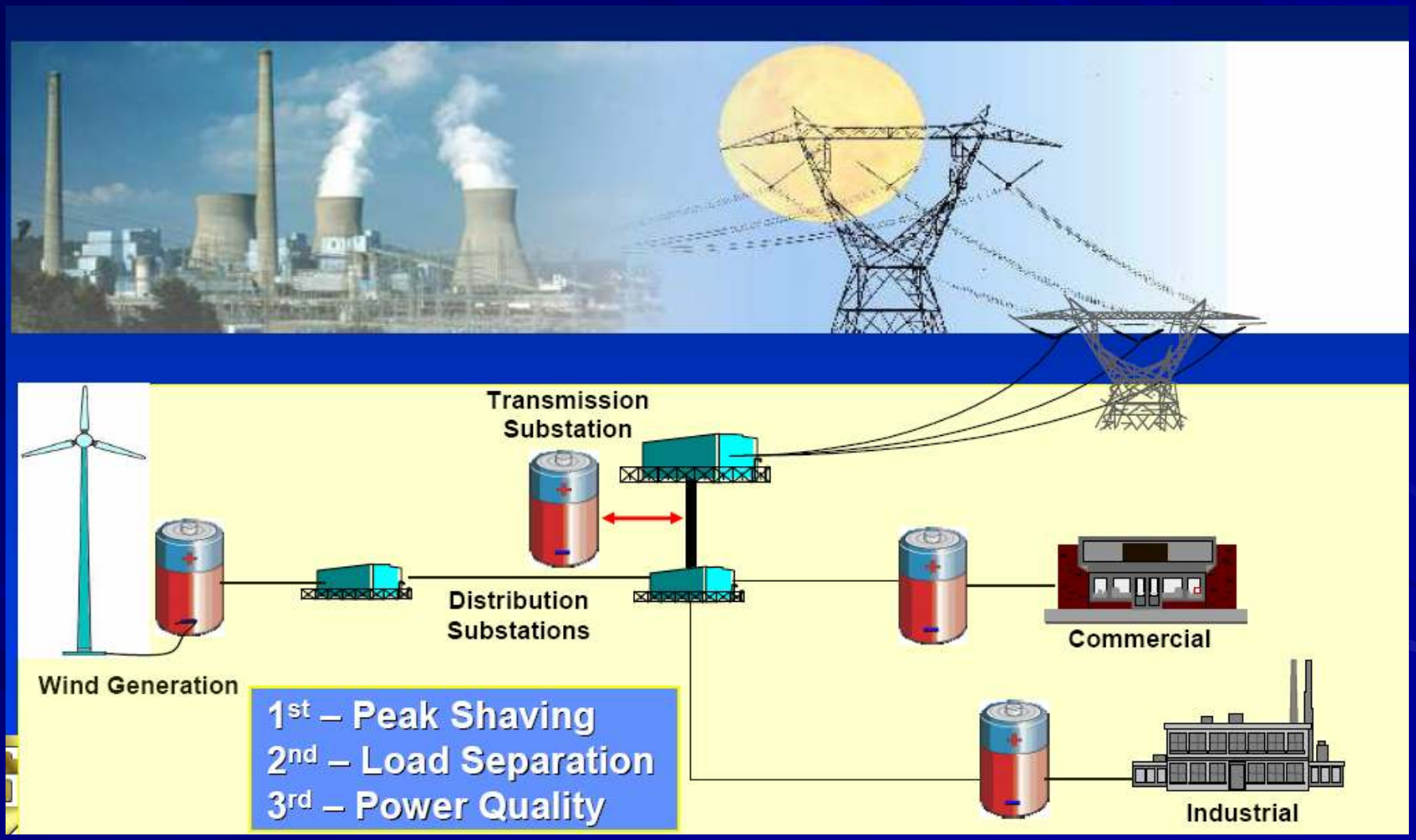
Utility Applications Longer Term Grid Storage

- Active network management for demand
- Renewable energy power storage (off peak)
- “Insure” grid against DG growth
- Asset deferment
- Eases T&D congestion

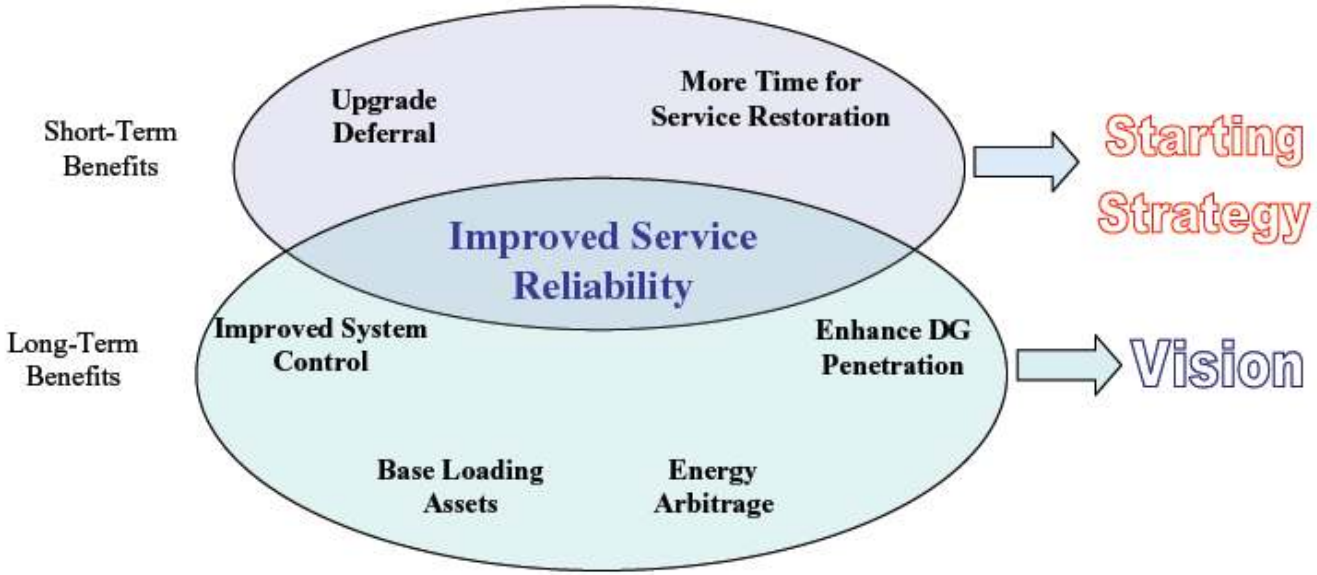
New Grid Level Energy Storage

- Value of storage to the grid is being recognized
- Grid constraints are growing
- Available storage options have increased significantly
- Total costs are improving

AEP – View of the future



Short-Term & Long-Term Benefits



Performance of our solution

- Long life >15 years.
- High Depth of Discharge available with no impact on battery life.
- One of the greatest characteristics of NaS batteries is its ability to provide power in a single, continuous discharge or else in shorter larger pulses (up to five times higher than the continuous rating). It is also capable of pulsing in the middle of a long-term discharge.
- 80% round trip efficiency (75% including auxiliary supplies).
- Environmentally friendly and safe.

NAS Batteries in Japan

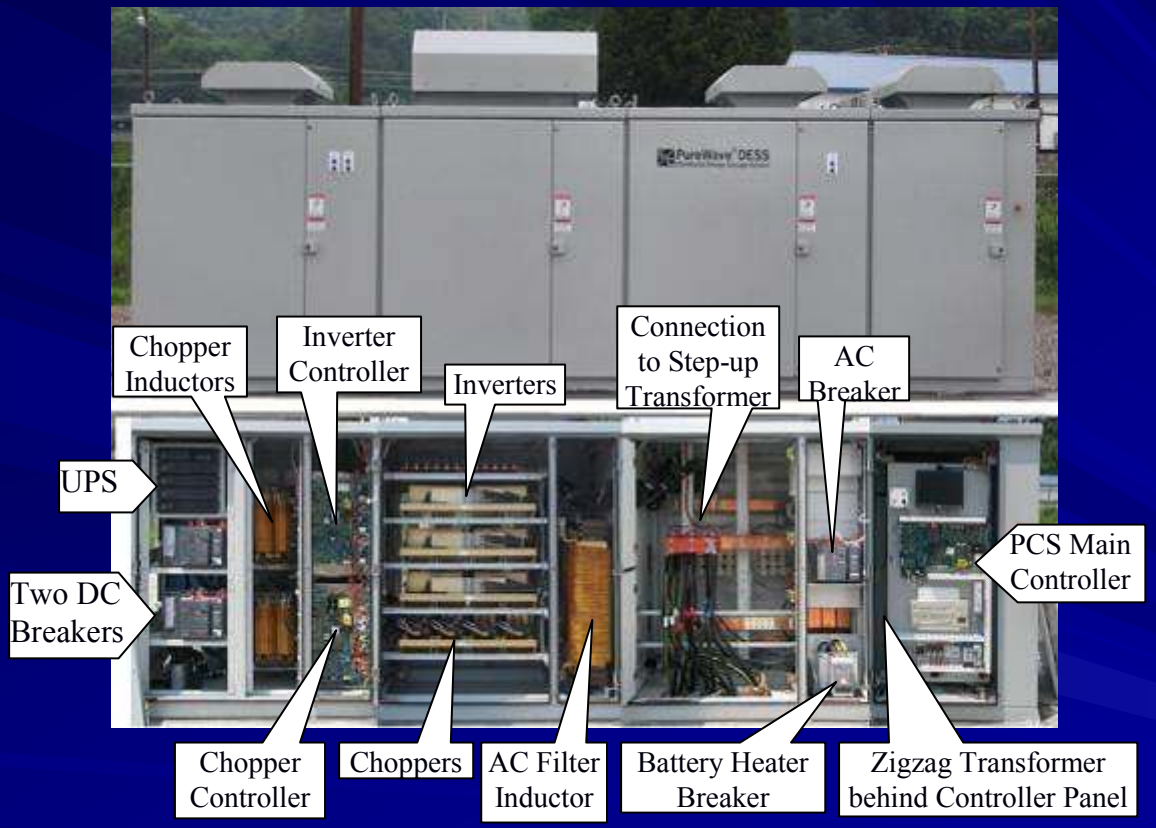
10 MW / 58 MWH

6 MW / 48 MH

1.2 MW / 7.2 MWH

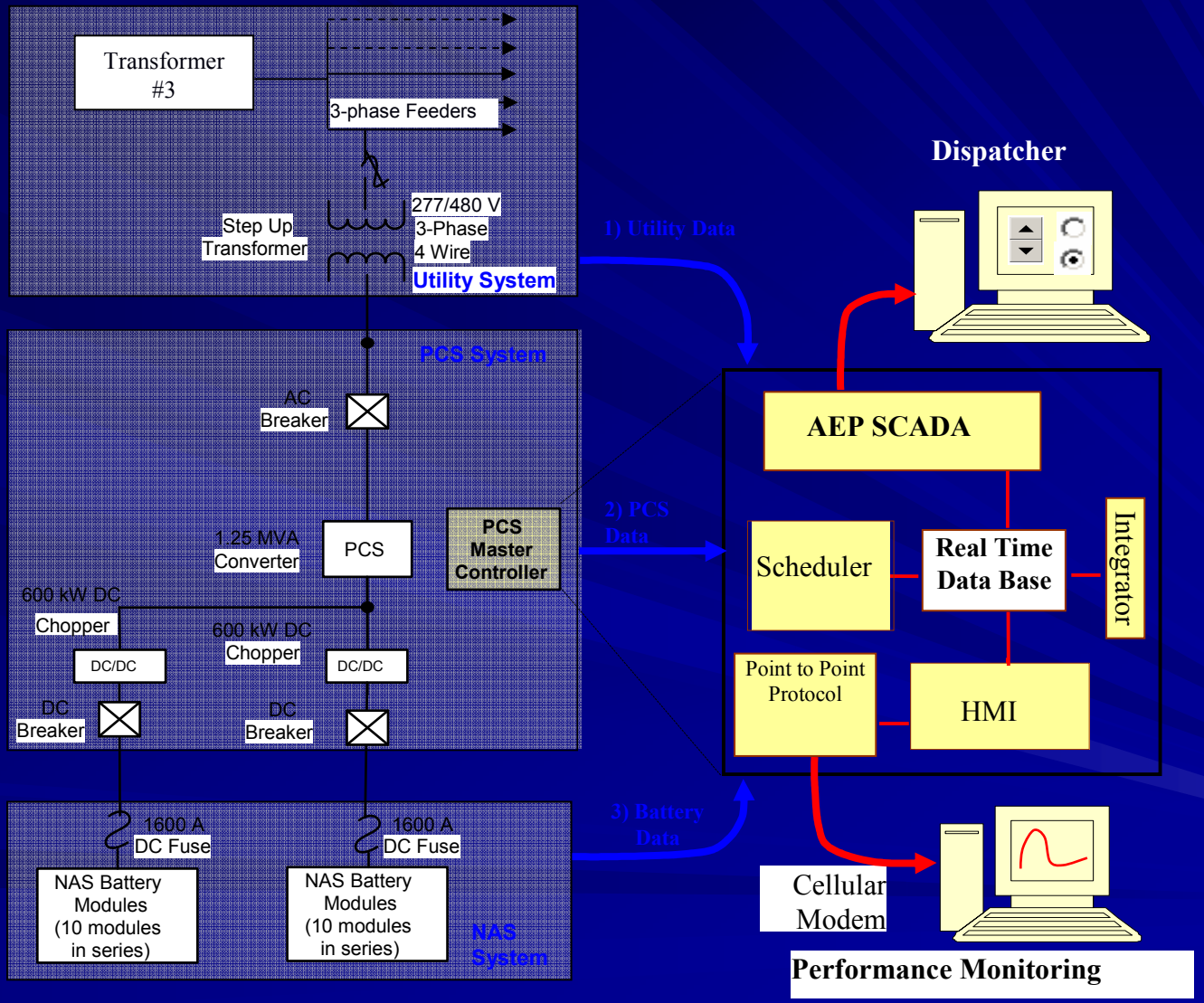
1.0Mw, 7.2MwH NAS Battery

1.25 MW Power Conversion System

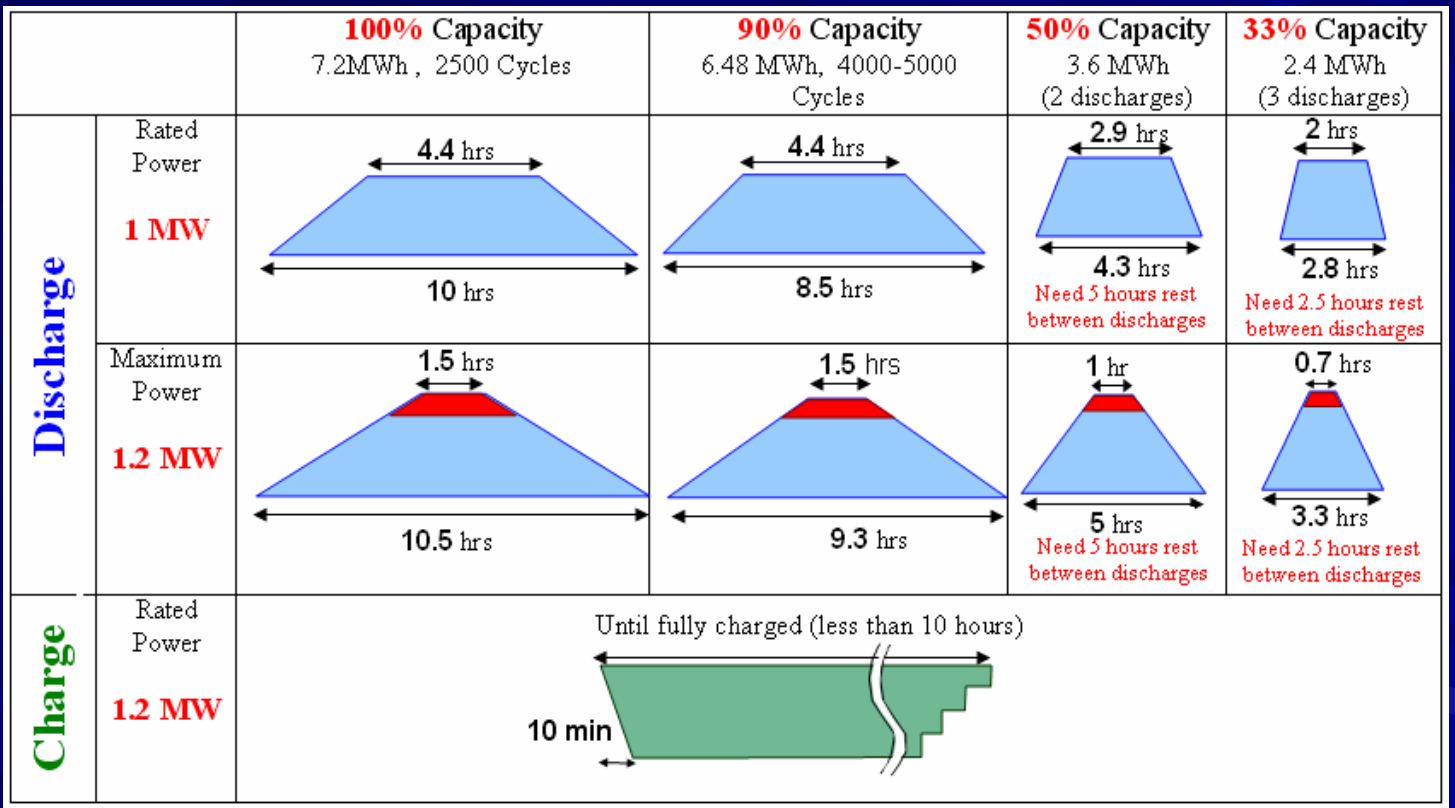


1.25 MVA PCS and its key components

Peak Shaving System Diagram

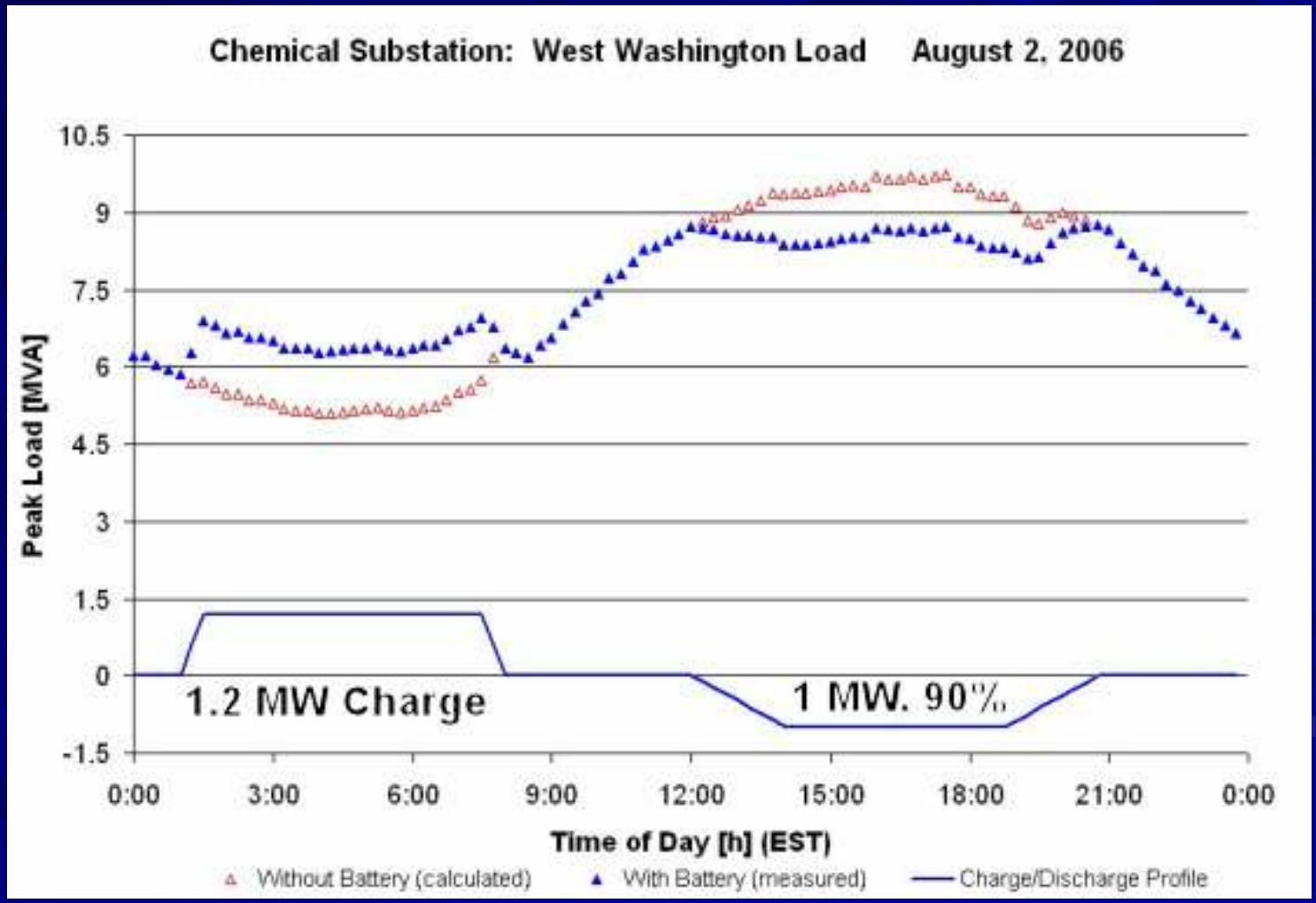


Peak Shaving System Operating Profile



Profiles approved by NGK on 9/14/05

Example of Battery Peak Shaving



Conclusions

- Adding real storage for an island grid is gaining momentum
- Costs are becoming realistic
- Real values to the grid are being studied in greater detail
- Can be used to optimise wind penetration in an island grid
- Can be used as a peaking plant