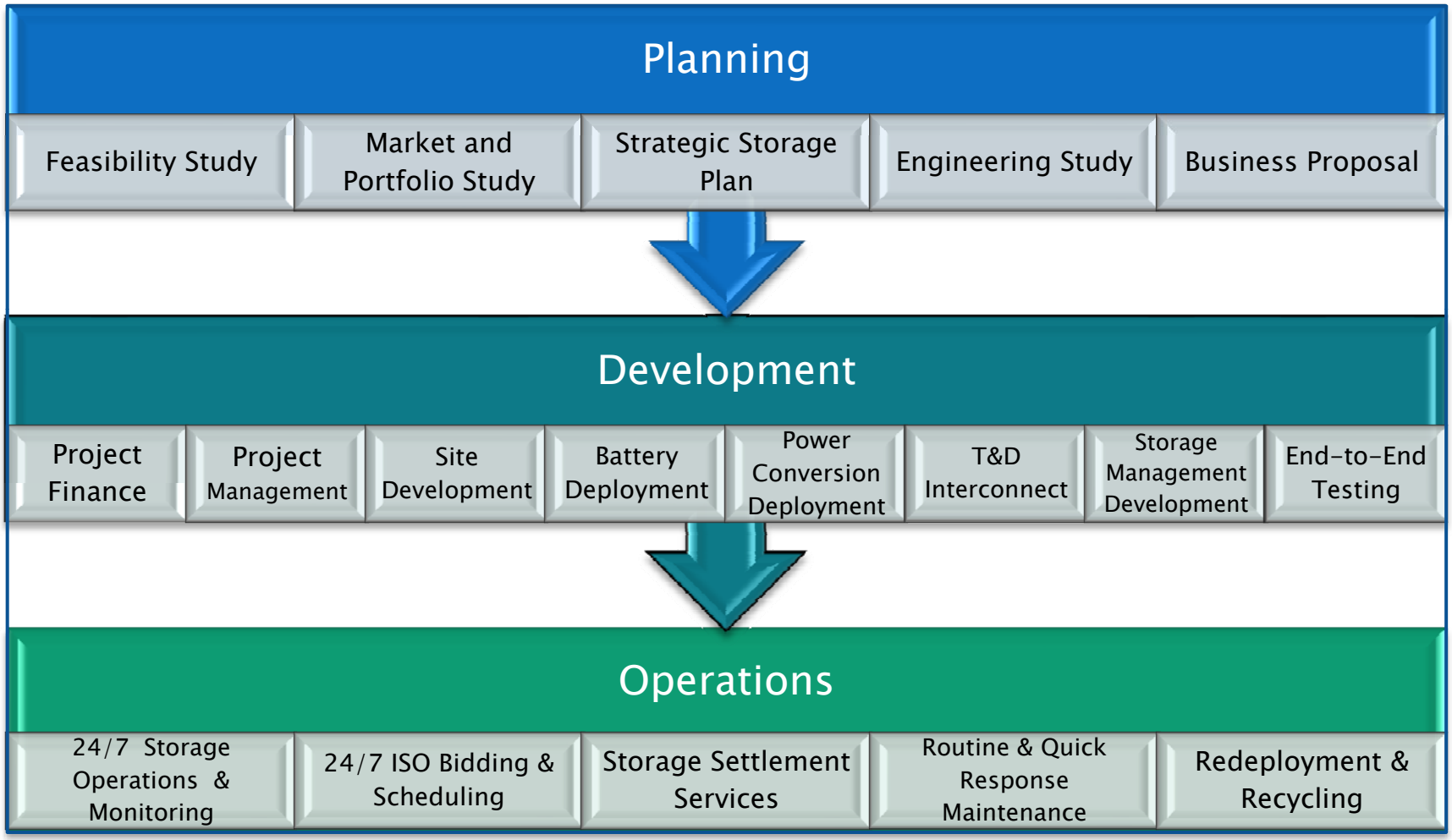
California 2020 Vision:
GigaWatts of Clean, Fast and Deep Electric Storage

Northwest & Intermountain Power Producers Coalitions
Seattle WA

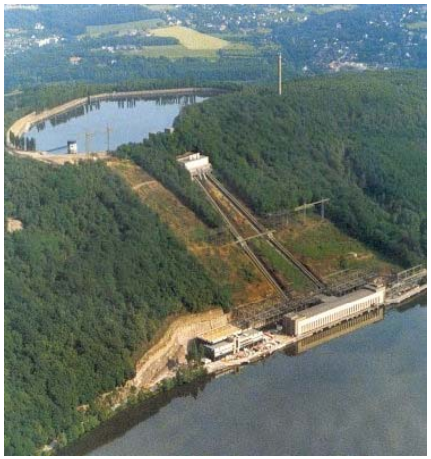
12 March, 2009

Edward G. Cazalet
MegaWatt Storage Farms, Inc
ed@MegaWattSF.com

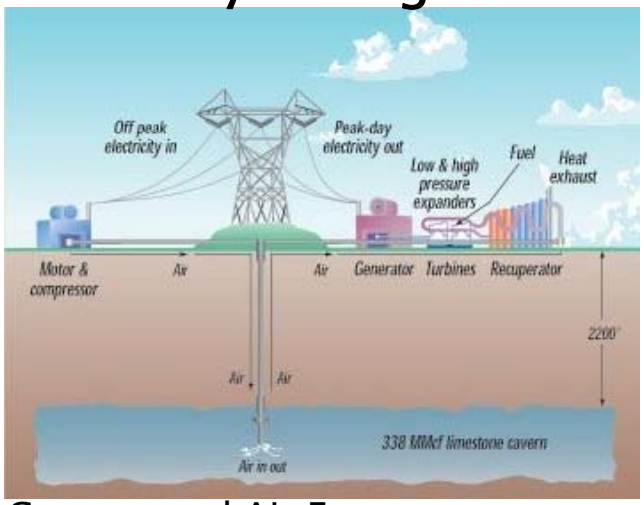
MegaWatt Develops & Operates Storage Farms



Alternative Electricity Storage Technologies

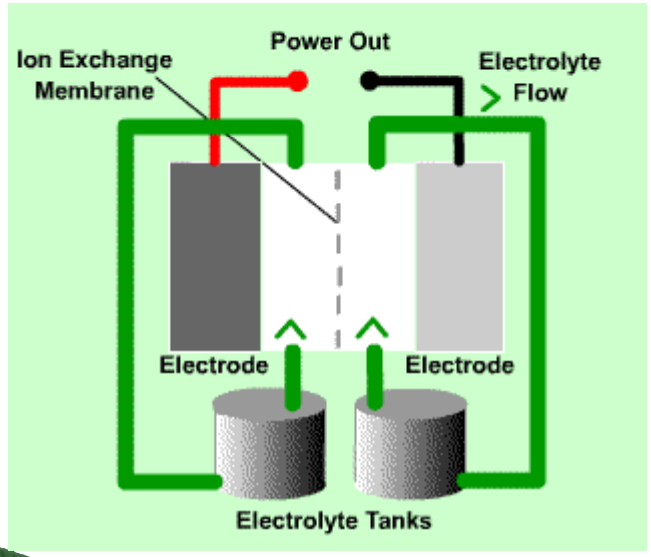


Pumped Storage



Compressed Air Energy Storage

Sodium Sulfur (NAS) Battery



Flow Battery

Lithium Ion Battery Trailers

Flywheel Storage

MegaWatt is storage technology agnostic.

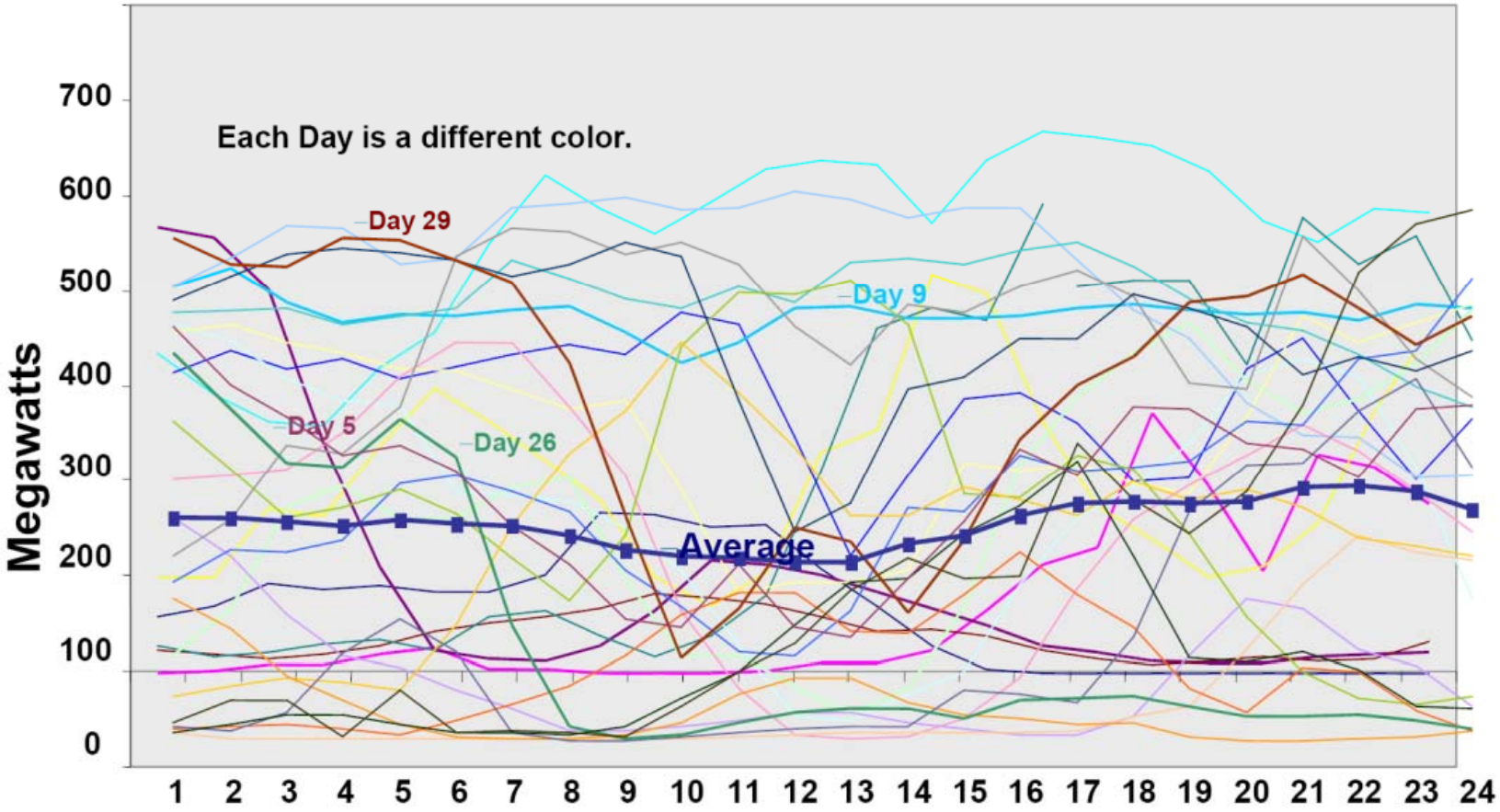
34 MW of NAS for 7 hrs at a Japan Wind Farm

8 MW NAS at Hitachi in Japan (2004)

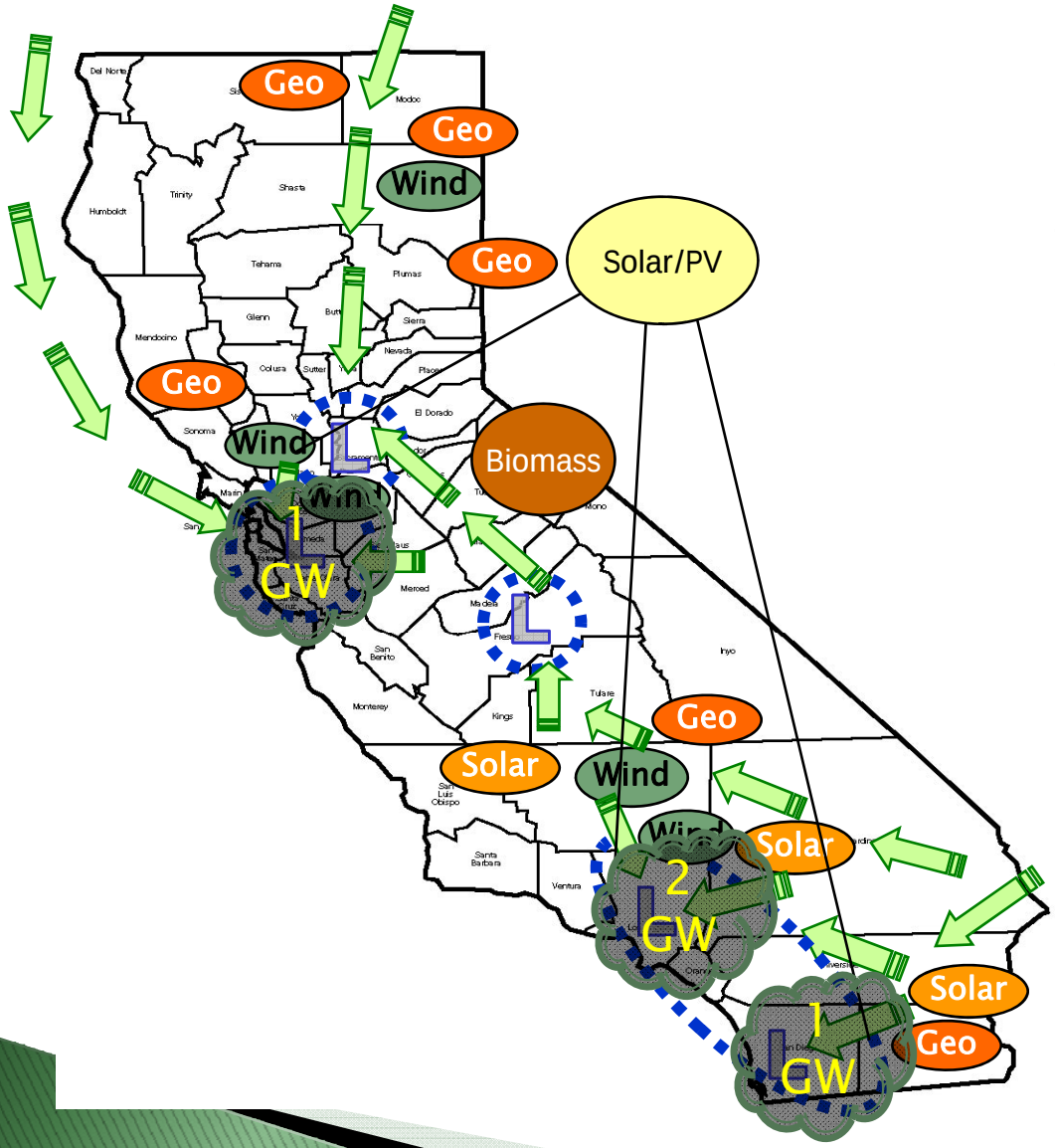
Site above is what a “California Renewables Storage Park” could look like.

.

Only two practical ways to reliably integrate wind:
1) fossil fuel plants running 24x7
2) storage & DR



How Much Storage is Needed in CA?



California 2020 Vision

(33% Renewables)

Storage Target (conservative):
5% Peak = 4 GW

Storage Attributes:
No Emissions, Water, Noise

Displaces 4 GW Transmission & Distribution

Provides 4 GW RA Capacity

Provides 8 GW Dispatchable Ramping, Load Following, and Regulation

Provides 4 GW Over Generation Protection

Provides 4 GW Voltage Support

Need to refocus CA Transmission, Distribution and Generation Planning.

Storage vs. Fossil Dispatchability

- Nameplate Capacity – 1 GW
- Capacity Range 2 GW vs. 1GW
- Spinning Range 2 GW vs. 0.5 GW -- 4x
- Storage is much faster – worth -- 2x

- Storage is 8 times more effective than fossil in providing dispatchability.

- Plus thermal often cannot be sited close to load so competition is storage on storage.

California Electricity Storage Policy Agenda

1) Adjust California ISO markets to fully utilize and fairly compensate storage services (work is in progress)
2) Clarify that clean storage is a DSM resource that is #2 in the procurement loading order
3) Establish a portfolio standard (SPS) of 5% of peak load by 2020 for electric storage that is
   - Clean (no GHG emissions)
   - Fast (less than 1 second response from full charge to full discharge), and
   - Deep (greater than 4-6 hrs of storage)
4) Develop a Feed-in Tariff (FIT) for Storage
5) Resolve State and Federal Storage Regulatory Policy Issues

Electricity Market Structure : Who can own and operate storage?