

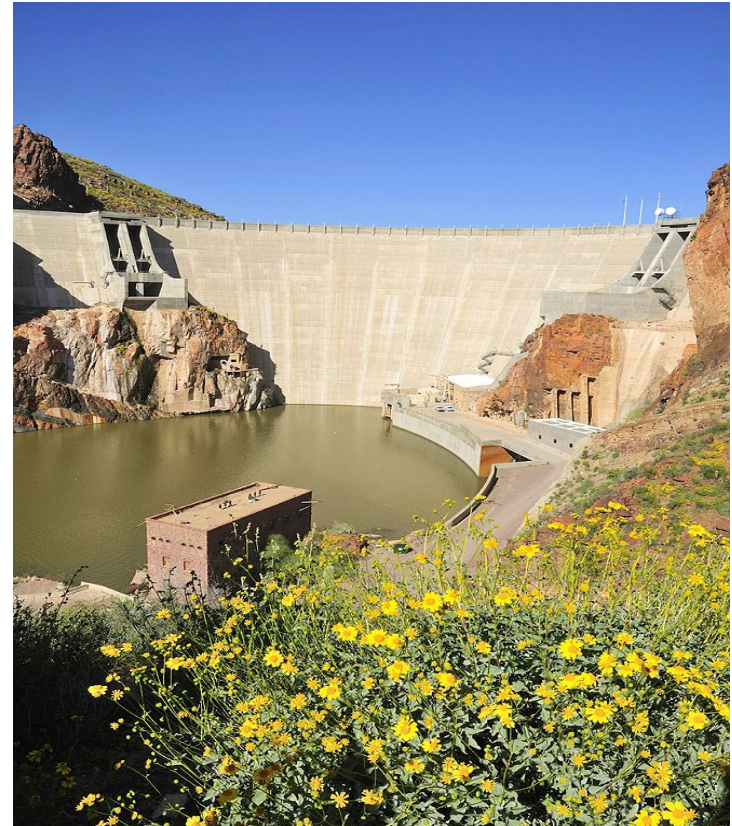
SRP Long Duration Energy Storage Perspective

Chico Hunter, SRP Innovation and Development

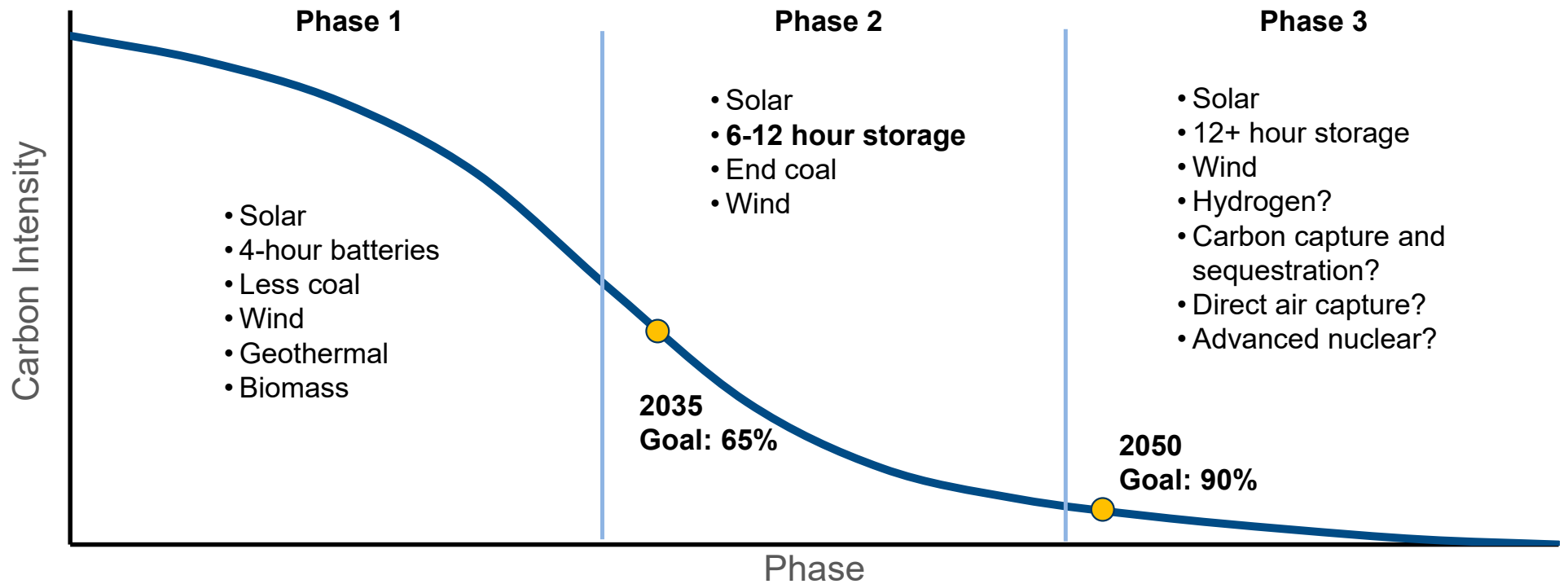
TMCES Workshop - 8/3/22

Who is SRP

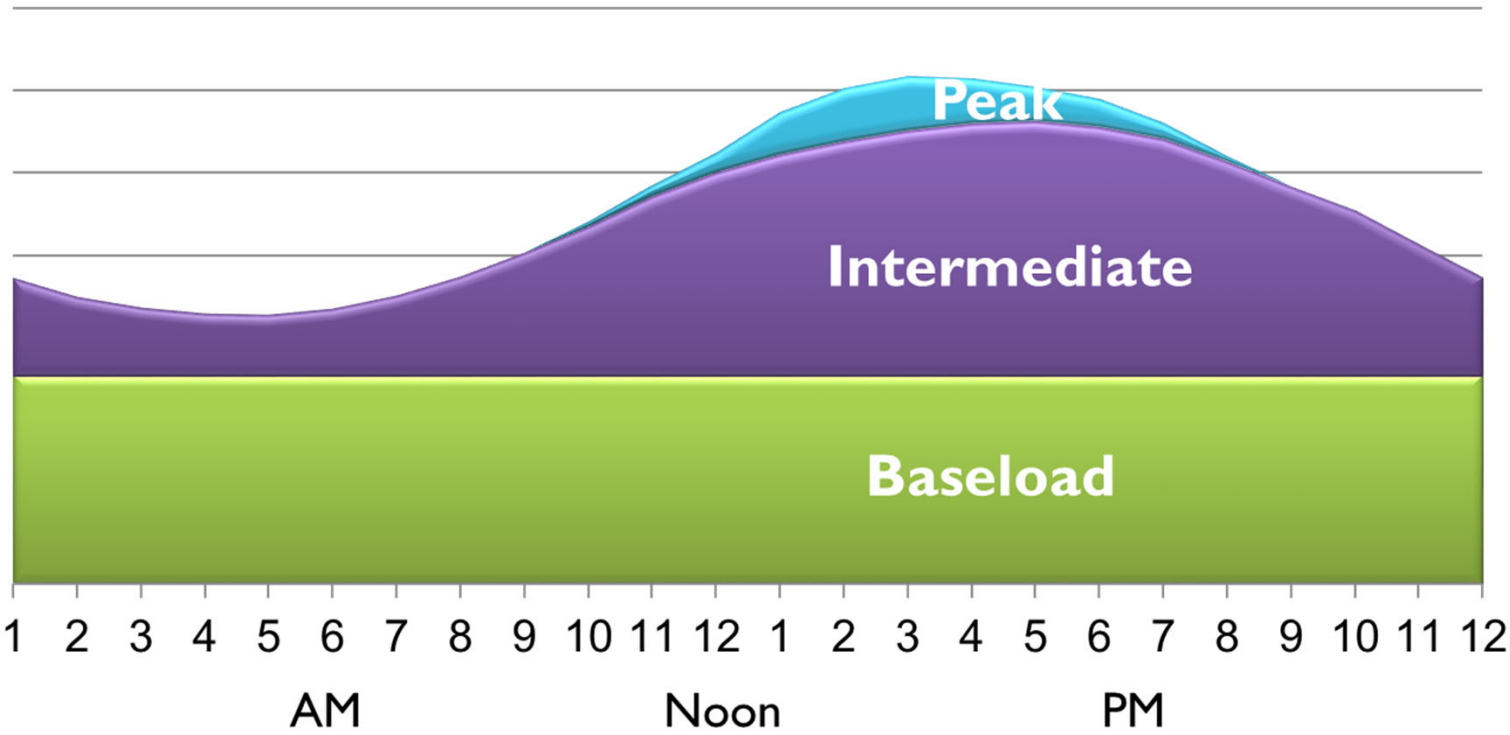
- Established in 1903
- Phoenix area water and power supplier
- 3rd Largest Public Power in US
 - 1.1M customers
 - 7620 MW peak system load
 - 8 reservoirs on Salt and Verde Rivers
- Carbon Intensity Goals
 - 65% by 2035, 90% by 2050



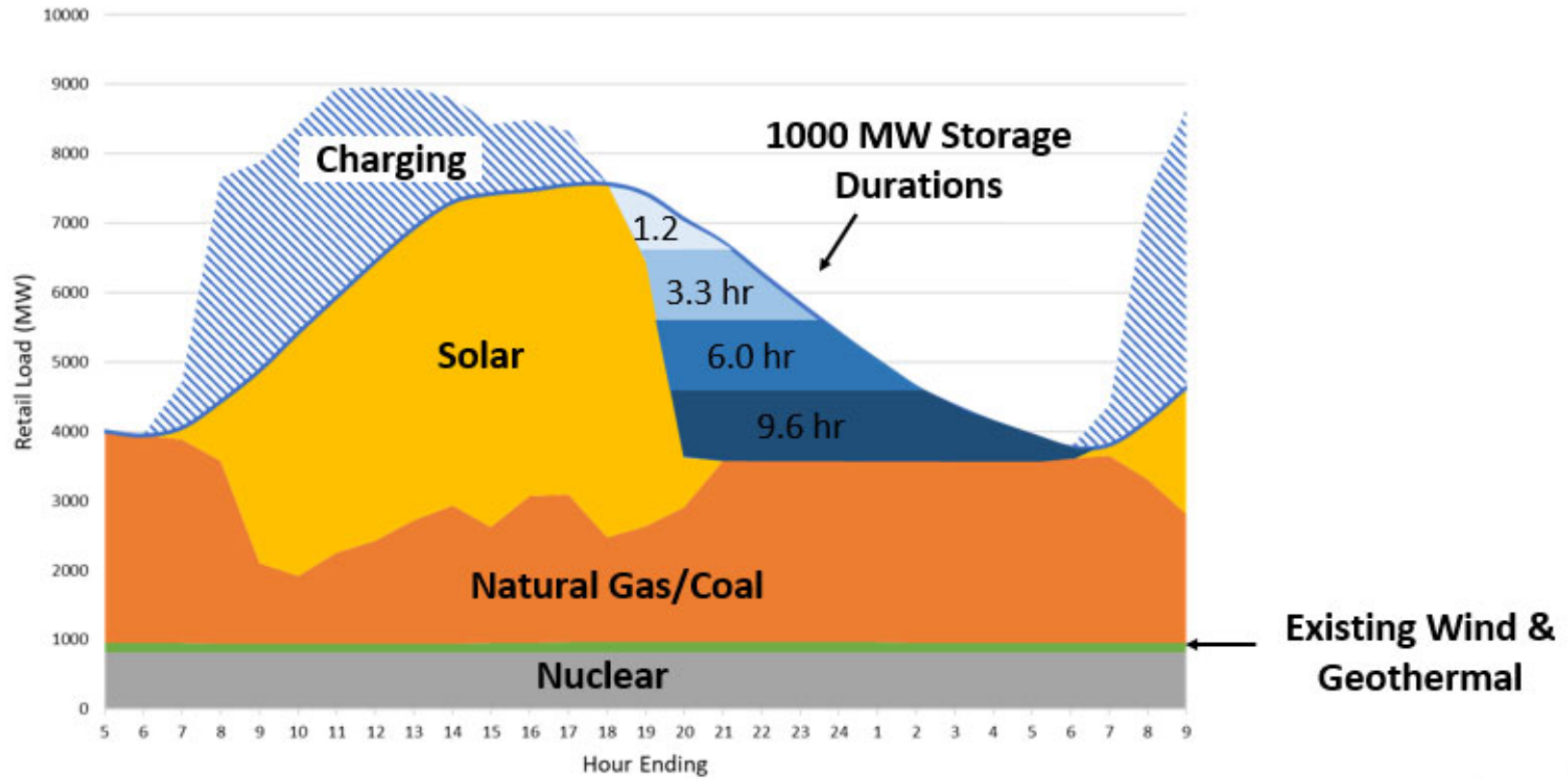
Technology Phases to Low Carbon Future



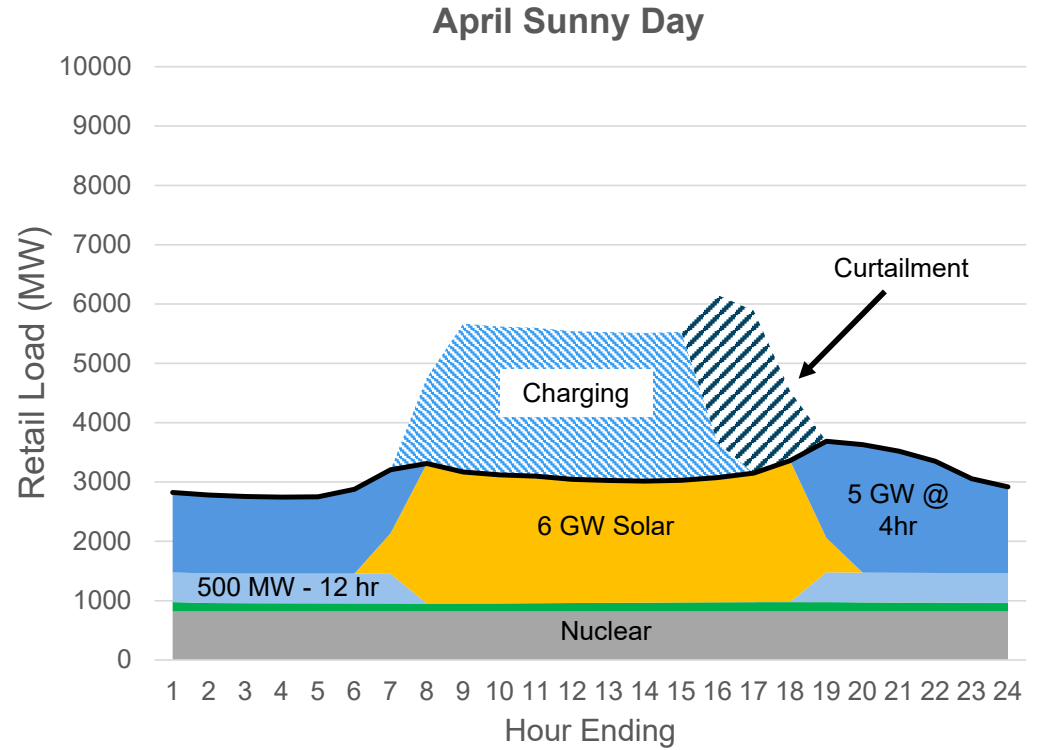
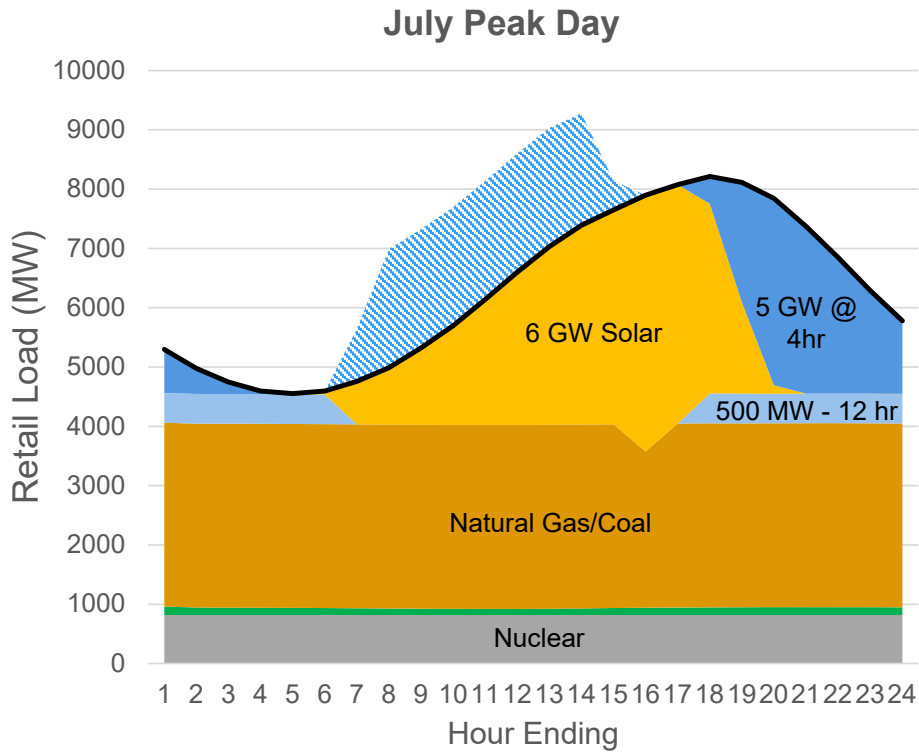
Historical Grid Operation



Need For Long Duration Storage



Seasonal Variation in Storage Needs



Near Term Challenges for Li-ion Batteries

- Limited cost-effective duration
 - 4 hour most common today
- Safety issues
- Lack of operational experience
- Supply chain risks
- 2X Capacity = 2X the Cost



Many Emerging Non-Li-ion Technologies

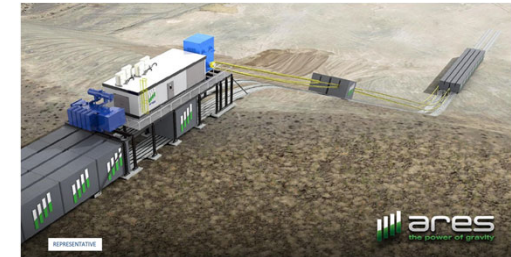
- Phase change: Highview, Energy Dome
- Flow batteries: Many players
- Gravity: ARES, Energy Vault
- Advanced compressed air: Hydrostor
- Thermal: Storworks, Echogen, others



Highview, liquid air energy storage



Storworks, concrete thermal energy storage



ARES, rail car energy storage