Energy Storage in Federal Buildings:

Advice Letter to GSA

GSA Green Building Advisory Committee
Building Energy Storage Task Group
Approved: November 16, 2021

Green Building Advisory Committee (GBAC)

Non-Federal

- David Kaneda, IDeAs Consulting (Chair)
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- Kevin Bates, Sharp Development Co.
- Chris Castro, City of Orlando
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- Sarah Slaughter, Built Environment Coalition
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- Dee Siegel, CEQ
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GBAC Building Energy Storage Task Group

Committee Members & Designees

- David Kaneda, IDeAs (Co-chair)
- Projjal Dutta, NY MTA (Co-chair)
- Chris Castro, City of Orlando
- Ralph DiNola, NBI
- Tim Tetreault, DOD ESTCP
- Victor Olgyay, RMI
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GSA Participants

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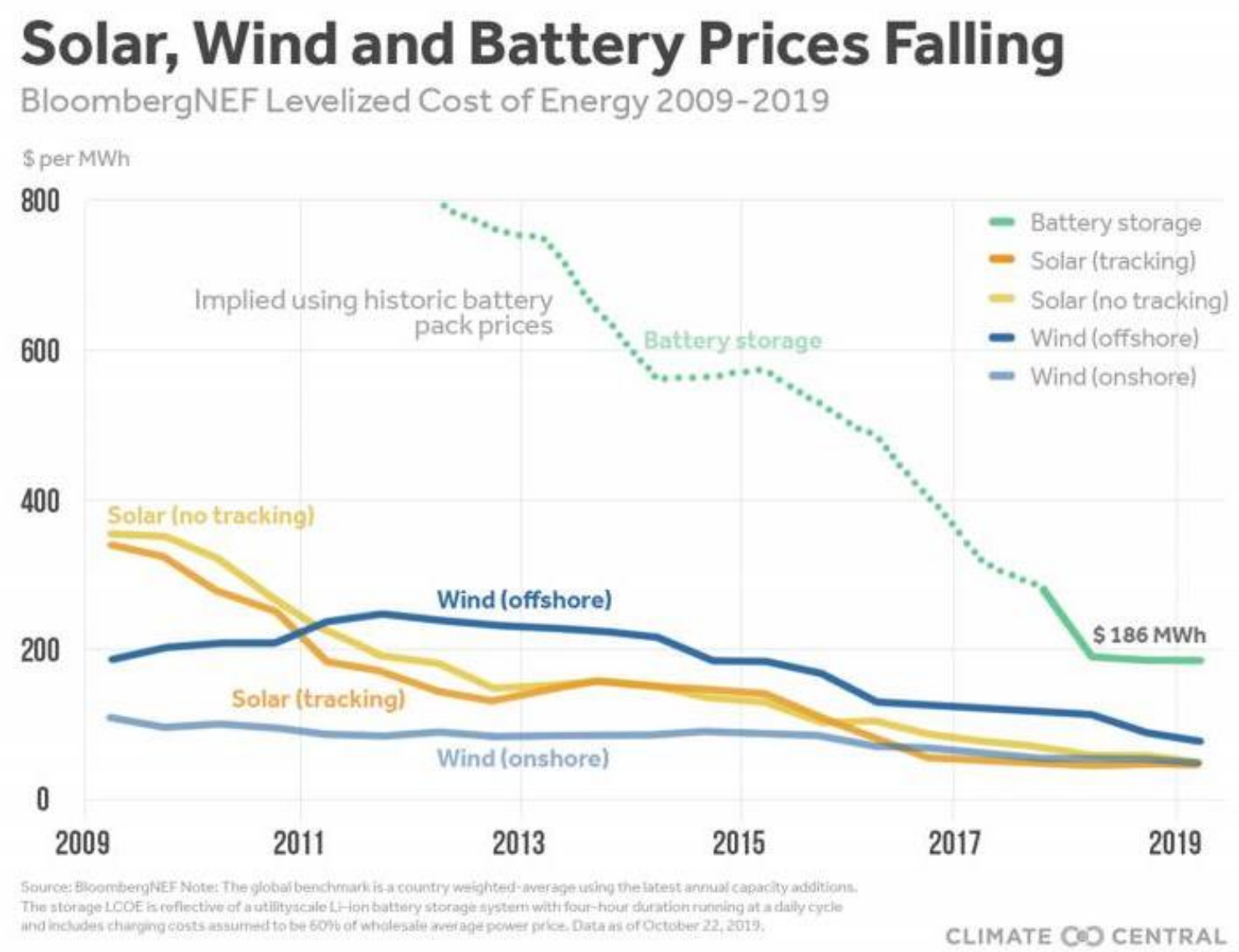
Batteries: Cost Curve



GSA GBAC BES: Task Group Mission

- Study the use of energy storage at federal facilities
- Determine if energy storage should be considered for use at federal facilities
  - Look at building storage systems (behind-the-meter) rather than grid storage
  - Determine the types of storage to be considered.
- Study potential benefits of building energy storage
- Determine procurement/financing options
- Study barriers to deployment
- Develop recommendations

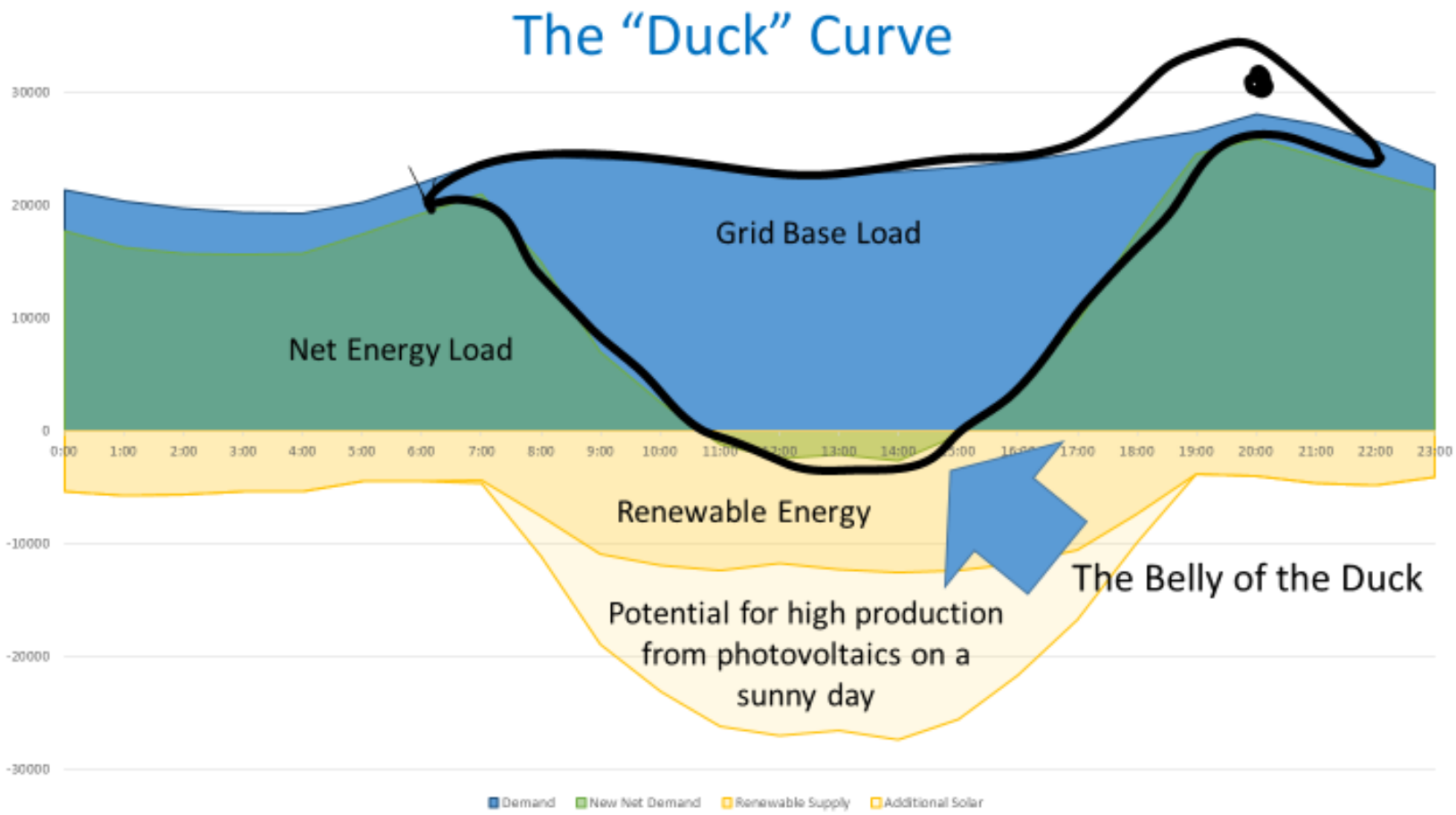
Findings:

Why Energy Storage?

- Grid carbon content varies throughout the day.
- Need to match:
  - renewable energy generation

    and

  - grid energy use
- Grid carbon content varies by region.



Key Technologies:

1. Chilled water storage

- Make and store chilled water (or ice) in tanks when energy has low carbon content.
- Use stored chilled water to cool the building when energy has high carbon content.
- Pros and cons:
  - Low cost but takes lots of space
  - Does not inconvenience users
  - Established technology

Key Technologies:

2. Hot water storage

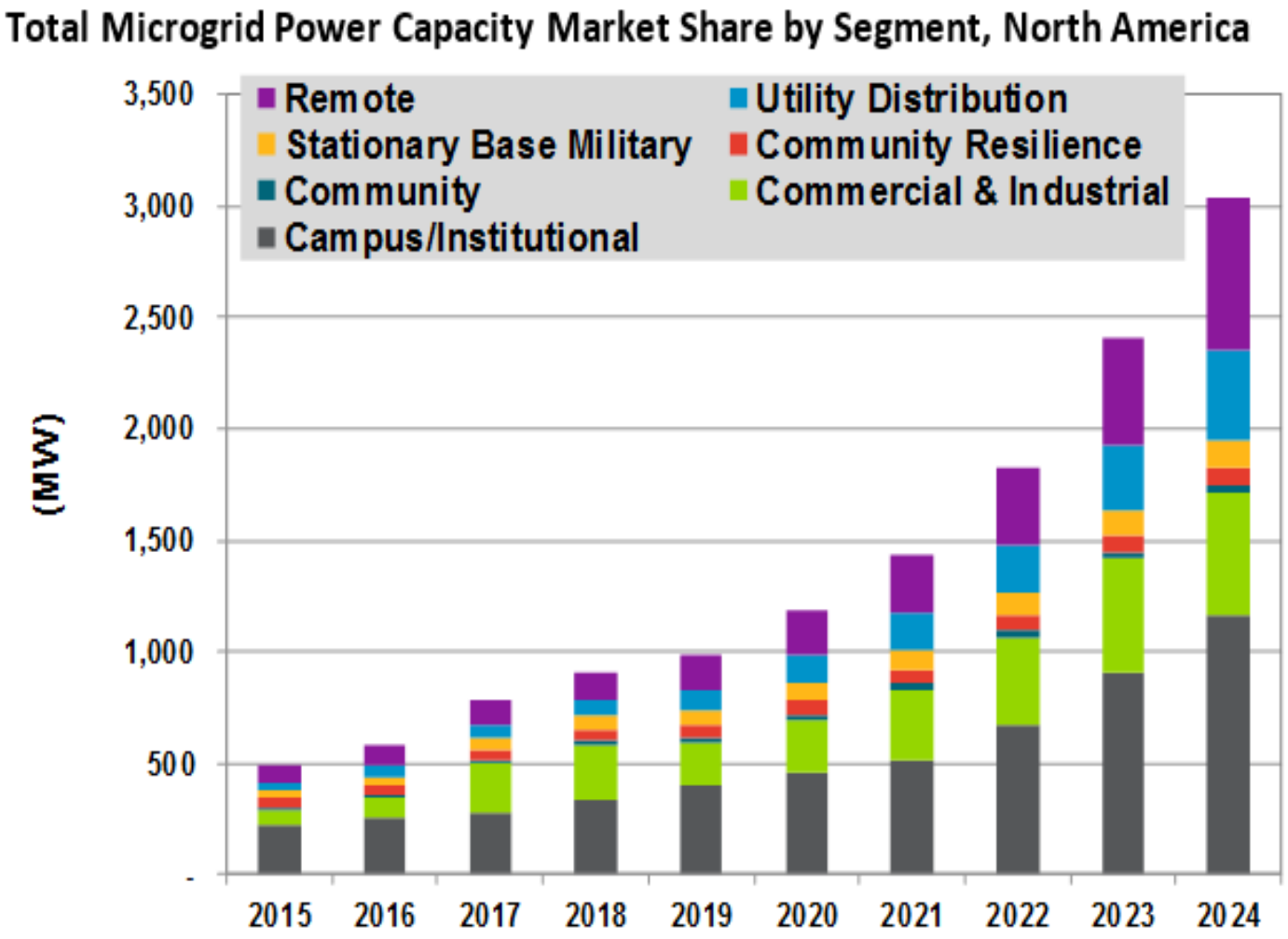
- Make ***hotter*** water or ***more*** water when energy has low carbon content.
- Use stored hot water to when energy has high carbon content.
- Pros and cons:
  - New technology
  - BTO partnering with Advanced Water Heaters Initiative
  - Does not store large amounts of energy

Key Technologies:

3. Lithium ion batteries

- ***By far*** the fastest growing and most versatile type of building energy storage

- Ability to scale from single family residence to utility size



Source: Navigant Research

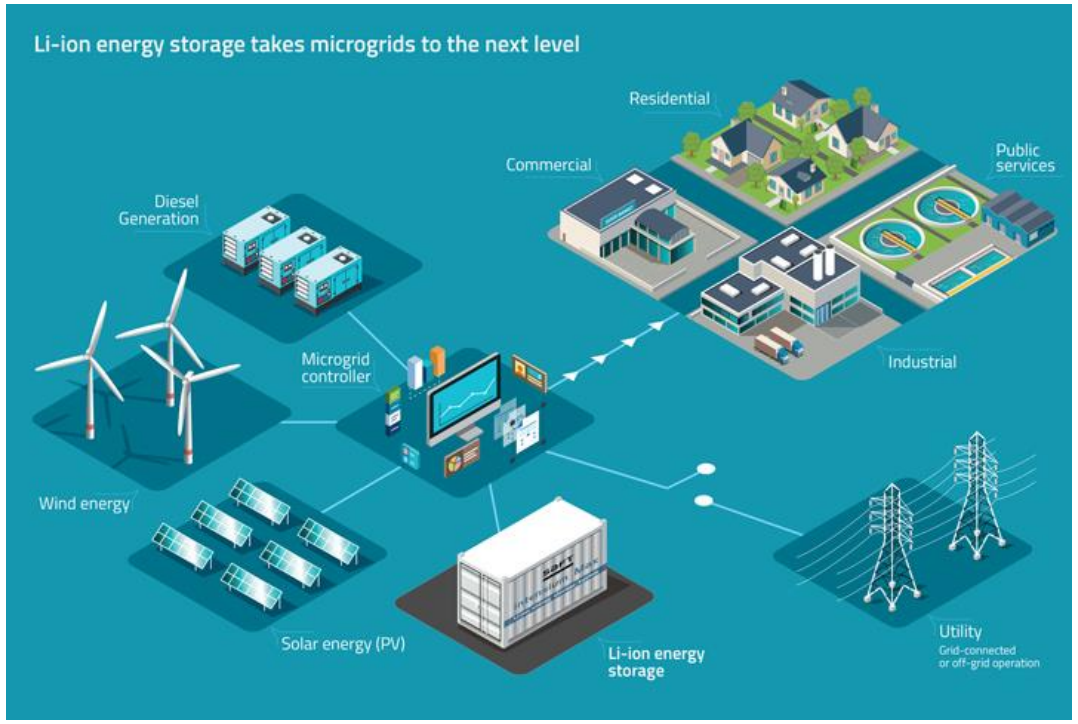
Key Technologies:

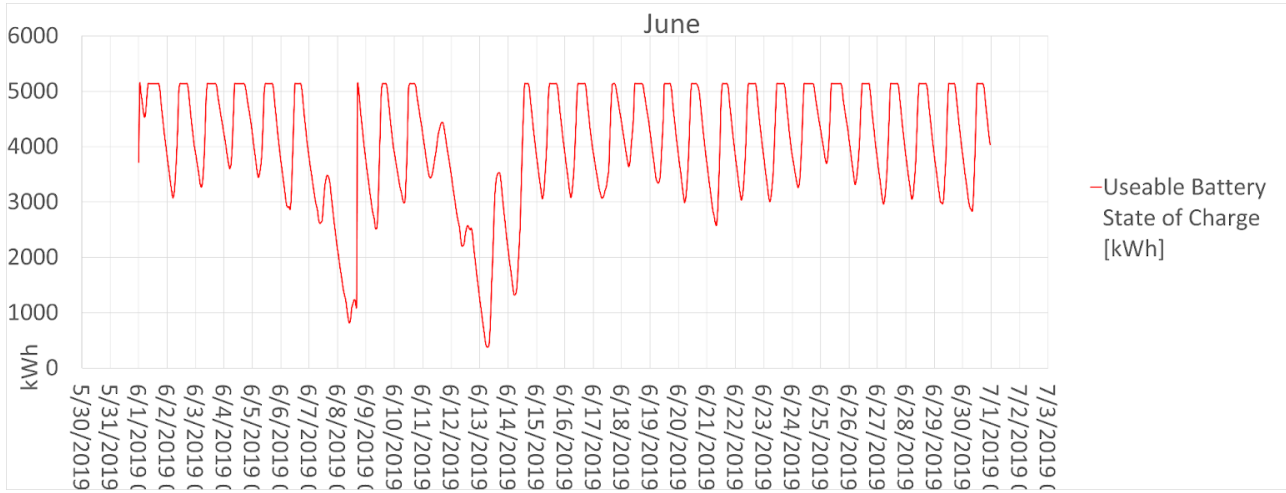
3. **Lithium ion batteries**

- Electric: Can allow an all electric building to run if the grid goes down.

- Coupled with photovoltaic systems can provide microgrids with capabilities for longer duration operation.

- Can reduce the need for standby generators.





Key Technologies:

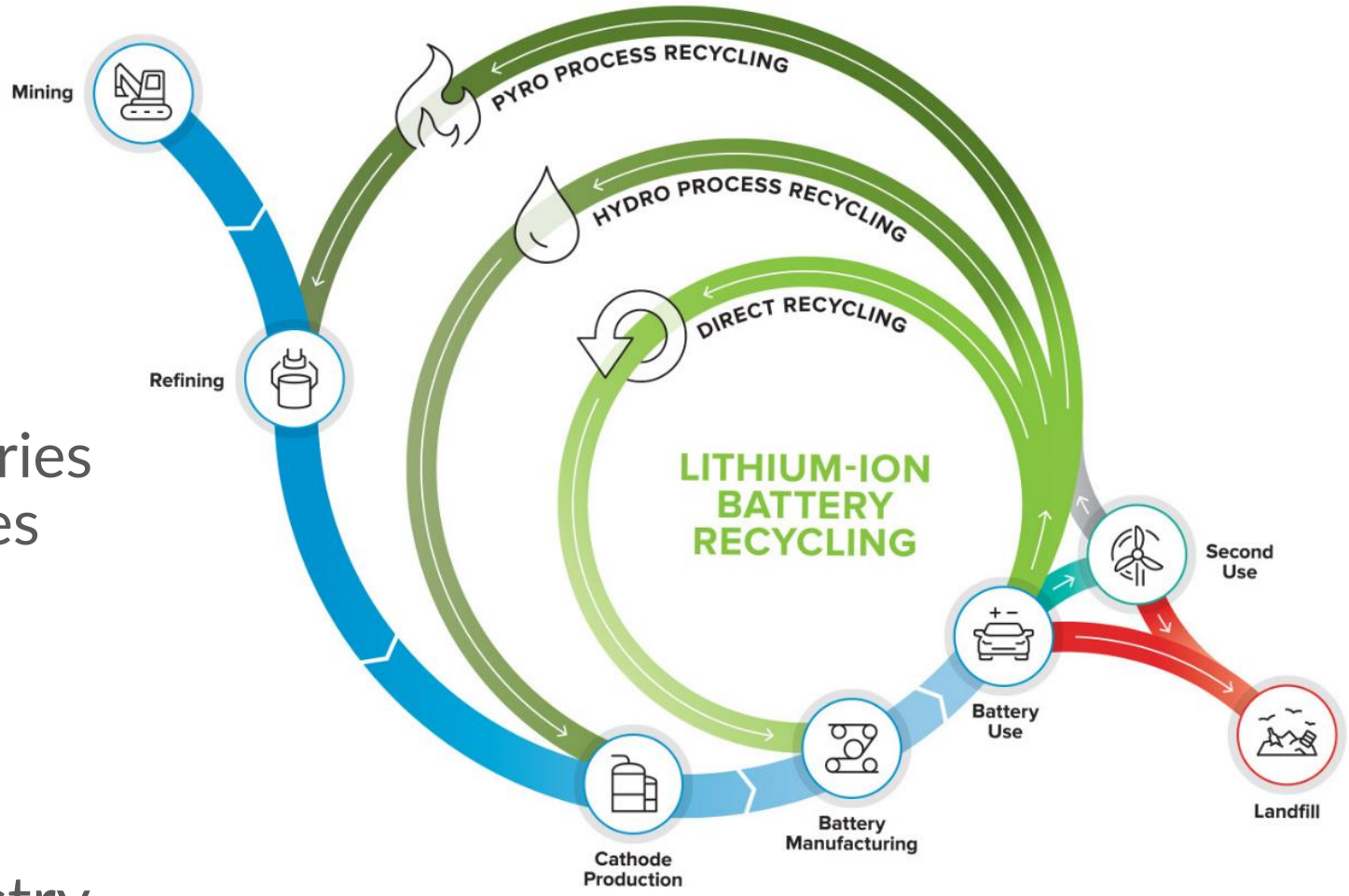
3. **Lithium ion batteries**

- Some applications include:
  - Avoiding infrastructure upgrades
  - Standby power/bill reduction/resilience
  - Community disaster recover center
  - Utility company maintenance center – 7 days no power, water, gas, or sewer

Key technologies:

3. **Lithium ion batteries** concerns:

- Fire safety
  - new codes addressing battery storage
  - Main concern Li batteries “thermal runaway” fires
- Raw material sourcing
  - from environmentally sensitive areas
- Nascent recycling industry



Energy Storage Benefits:

- Reduced electricity bills
- Provides grid support
- Potential to reduce carbon emissions
- Resilience
- Leadership

Energy Storage Challenges:

- Can cause delays in the planning process
- Policies/incentives are inconsistent nationally
- Cybersecurity

Procurement:

- Utility Energy Service Contract (UESC)
- Energy Savings Performance Contract (ESPC)
- Energy Sales Agreements (ESAs)
- Utility Service Contract (USC)
- Power purchase agreements (PPAs)
- Enhanced use lease (EUL)
- Utility privatization (UP)

- Department of Defense has special authority for public-public partnerships

Recommendations:

- Consider the use of energy storage on all projects going forward
- Develop a “roadmap” to assist GSA staff to make decisions on deploying energy storage in buildings
- Conduct further research non-financial benefits to stakeholders
- Develop case studies of successful projects
- Support the nascent lithium ion battery recycling industry
- Continue to track battery technology evolution

Case Studies:

- Department of Defense: US Army Base, Fort Carson, Colorado Springs, CO – completed 2019

- GSA and FDA: White Oak campus, Silver Spring, MD - completed 2013

- U.S. Marine Corps facility , Miramar, San Diego, CA – completed 2019

- Schwartz Federal Building and Courthouse, San Diego, CA – completed 2018

GSA and FDA: White Oak campus, Silver Spring, MD

Questions

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