

ALCF Sustainability

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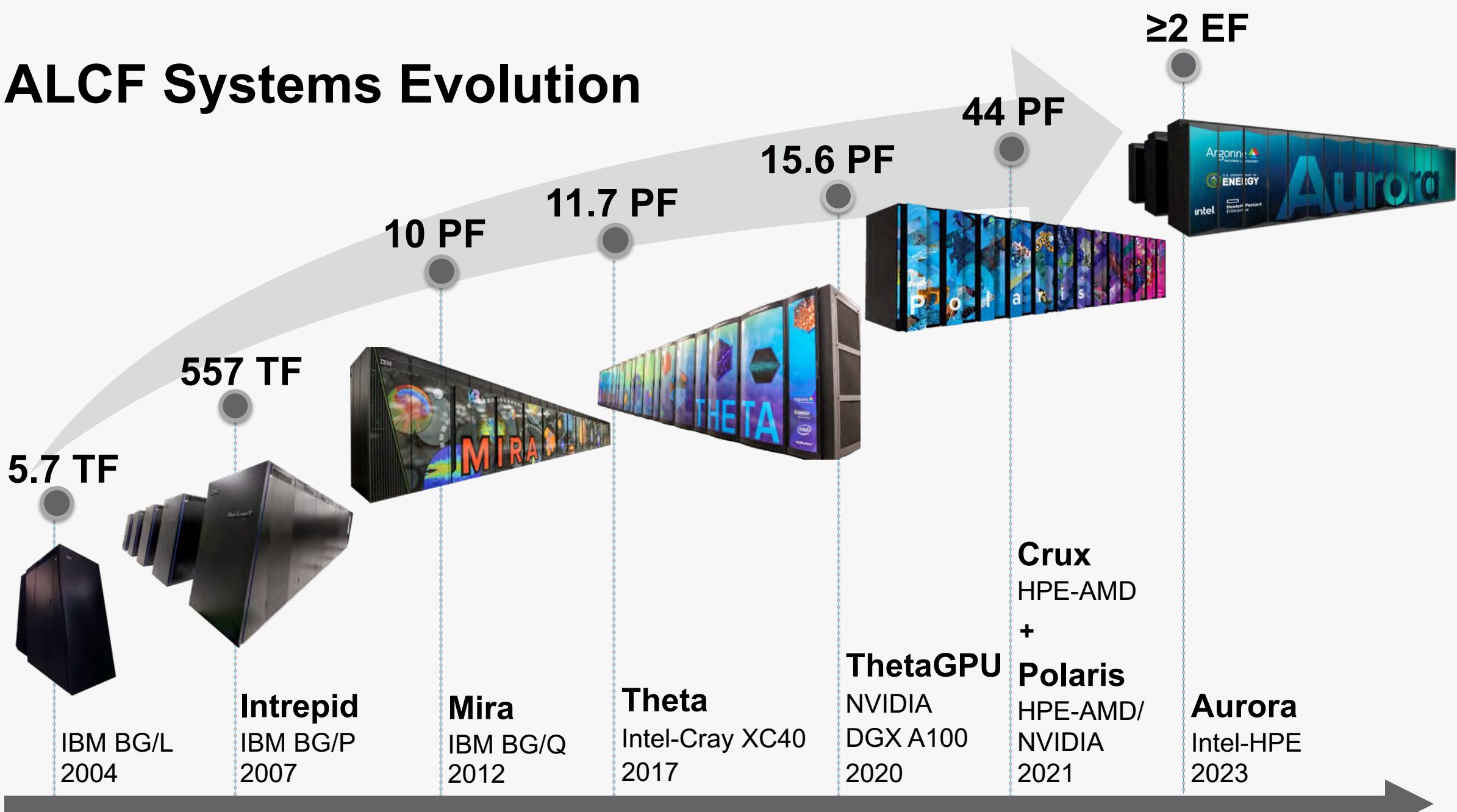
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DOE Leadership Computing Facility

- Established in 2004 as a collaborative, multi-lab initiative funded by DOE's *Advanced Scientific Computing Research* program
- Operates as **one facility** with two centers, at Argonne and at Oak Ridge National Laboratory
- Deploys and operates at least two advanced architectures that are **10-100 times more powerful** than systems typically available for open scientific research
- **Fully dedicated** to open science to address the ever-growing needs of the scientific community



ALCF Systems Evolution

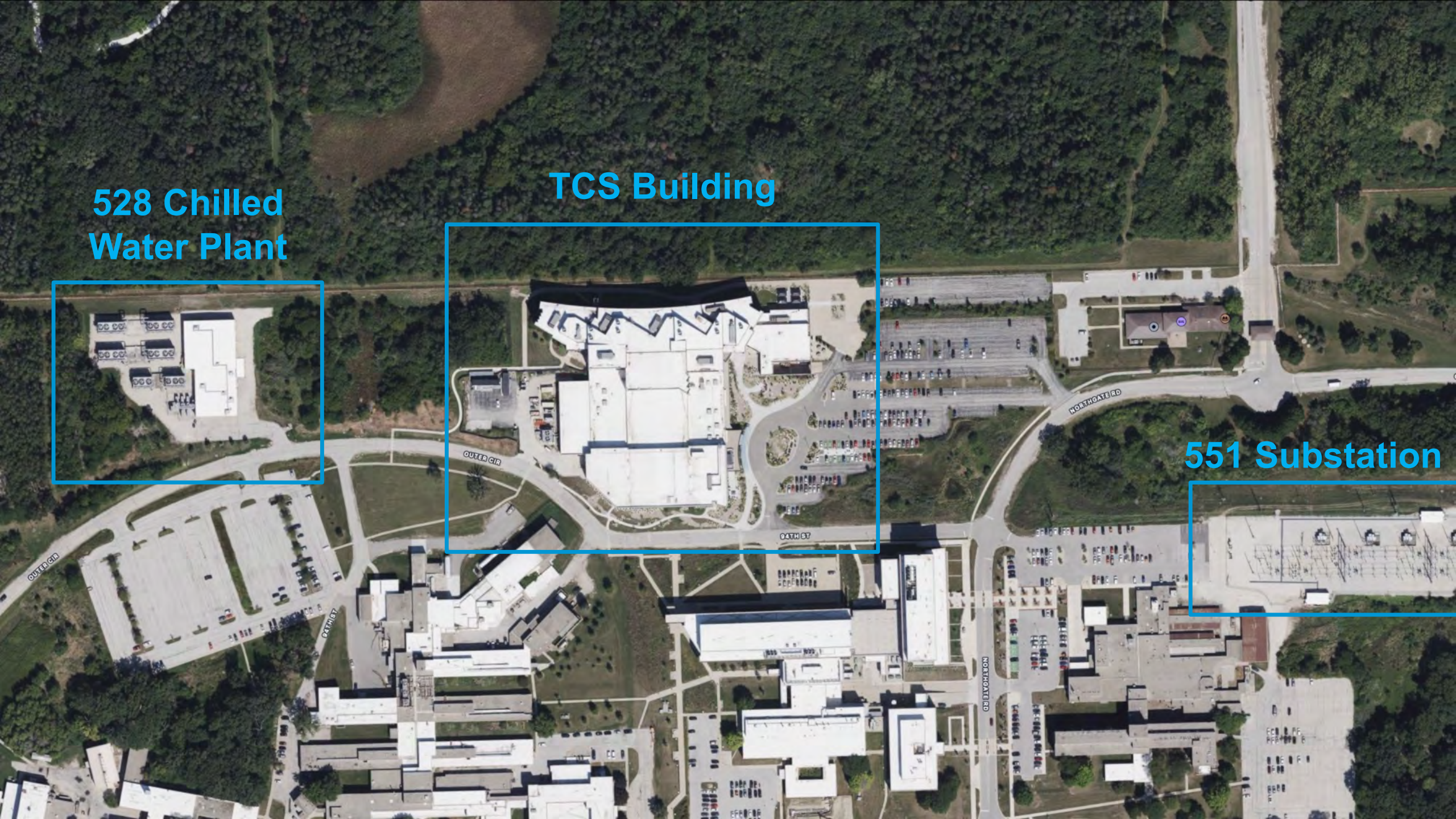




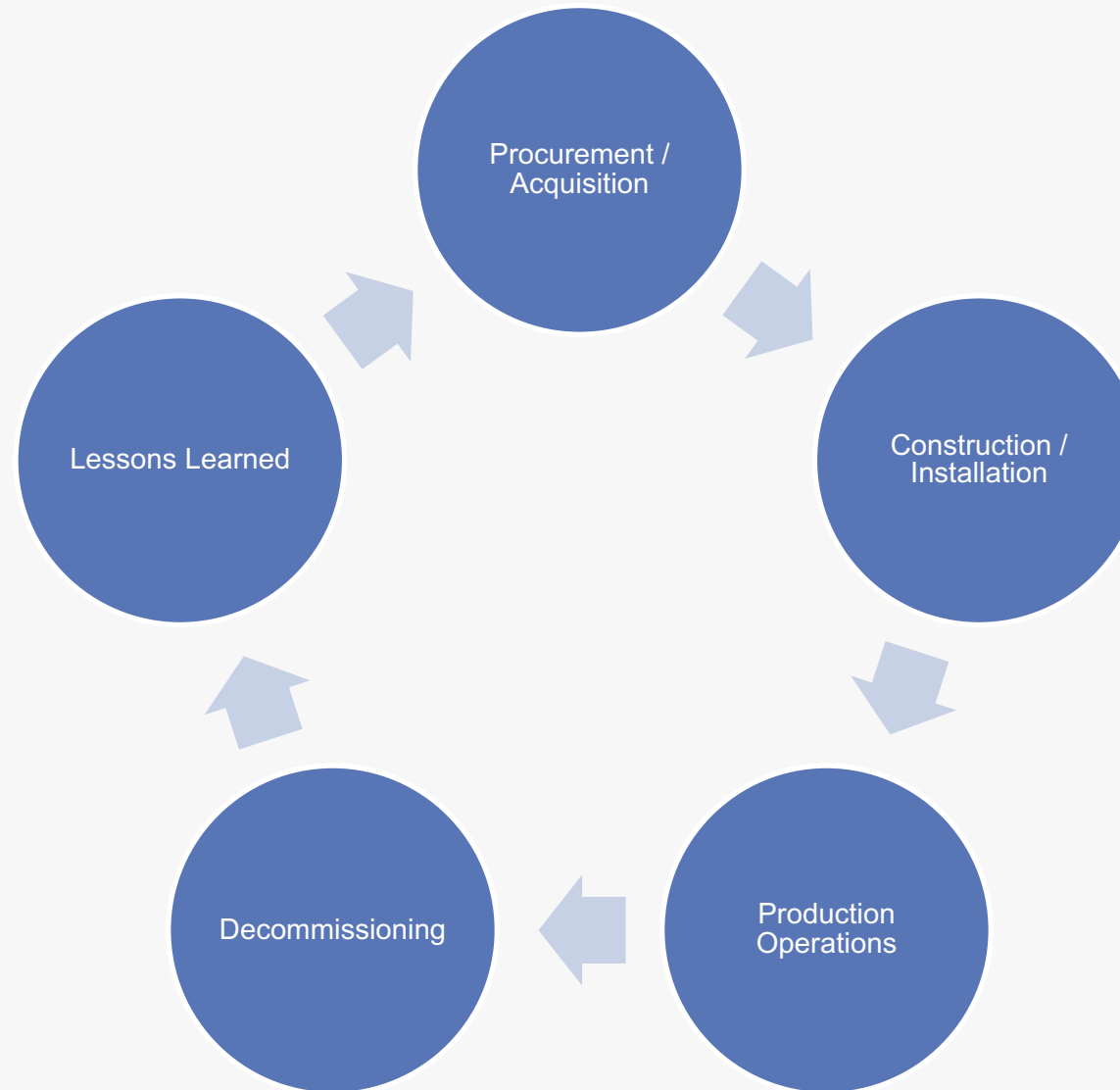
**528 Chilled
Water Plant**

TCS Building

551 Substation

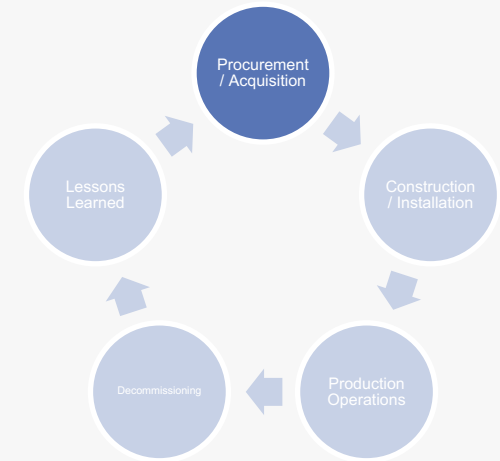


ALCF System Lifecycle



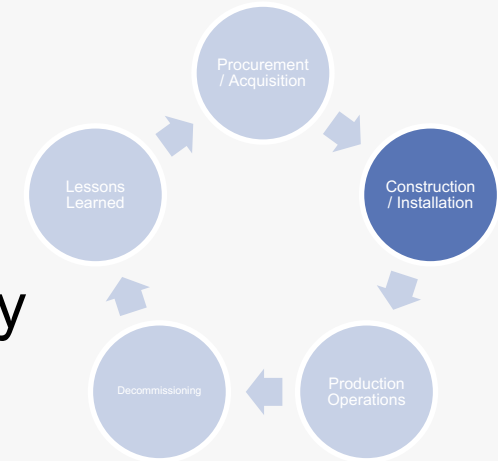
Procurement / Acquisition

- NRE
 - Work with the vendor to identify impactful NRE to reduce energy footprint
- GEOPM
 - Aims to reduce overall job energy usage with very minimal performance impact
 - Promising results already obtained
- mOS
 - While not a primary development goal, investigating ways to leave more cores in C6 states using far less power when not in use
- Vendor Collaboration
 - Continually emphasize the importance of power, cooling, and space management
 - Share lessons learned from previous machines at scale
 - Encourage video conferences or bundling face to face meetings to reduce travel
 - Leverage Argonne's established procurement methods to ensure sustainable products are acquired



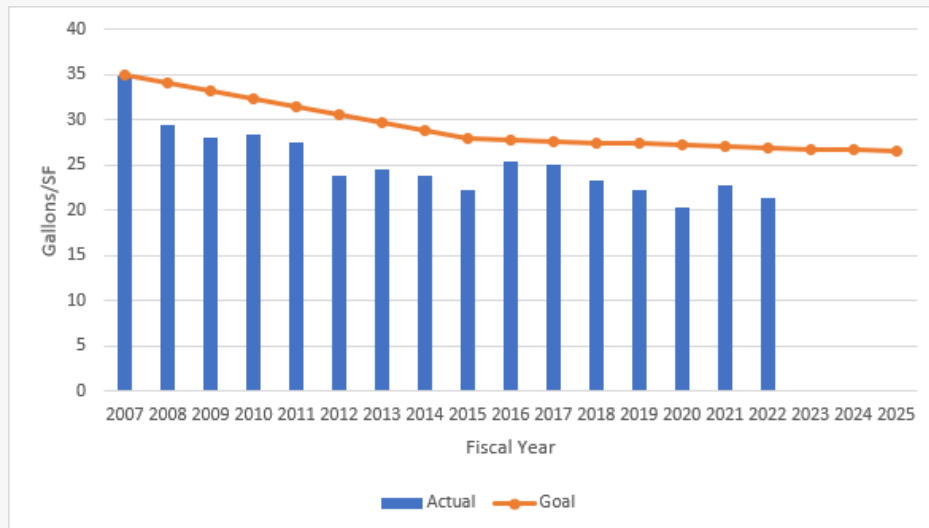
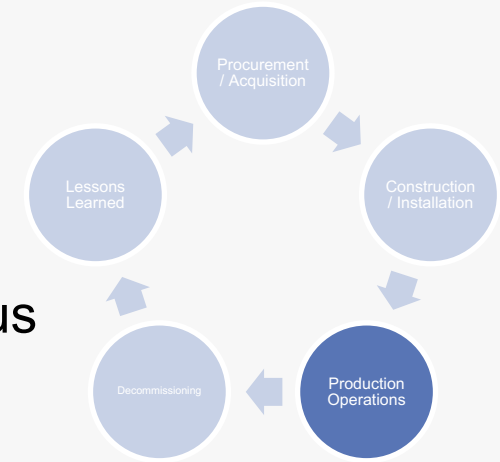
Construction / Installation

- TCS Support Facilities
 - LED lighting designed throughout with zoned occupancy sensors
 - Designed to utilize daylight to reduce electrical lighting
 - Low flow / waterless water closets
 - All rubbish removal companies track waste removed from the construction site; recycling materials where possible
 - Aurora chiller plant addition will have opportunity for free cooling taking advantage of Chicago area winter weather
- Hot Aisle Containment
 - End of aisle containment doors, top of rack baffles and rack blanking panels provide for greater AHU cooling efficiency



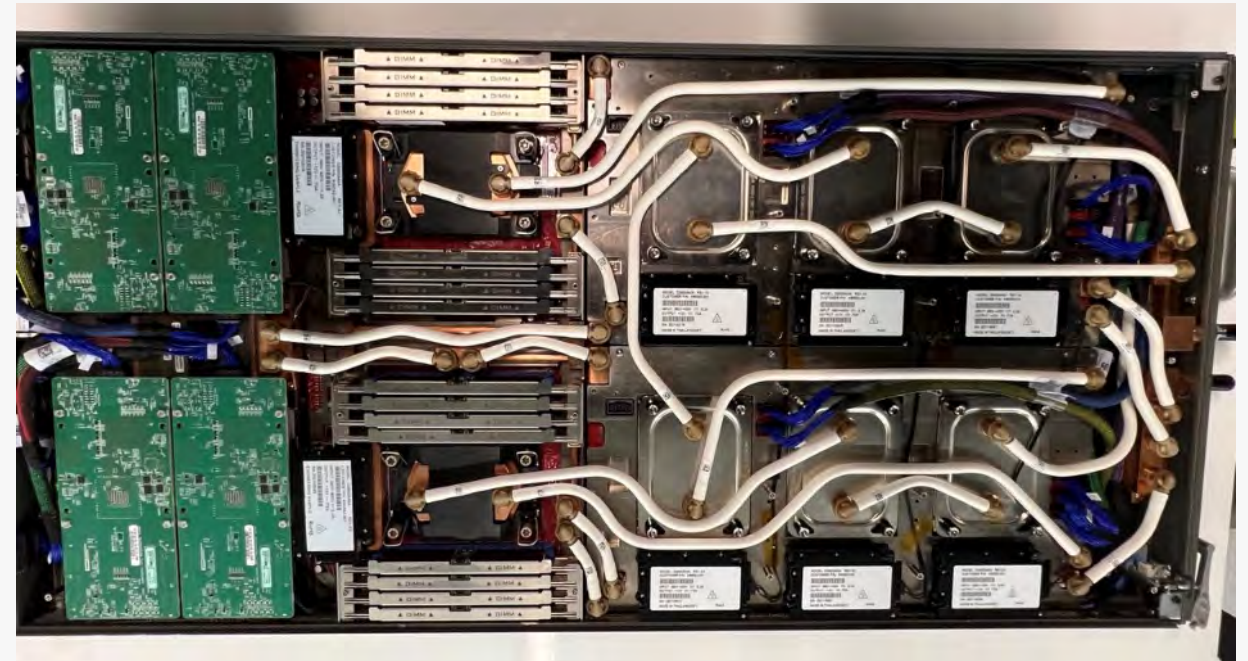
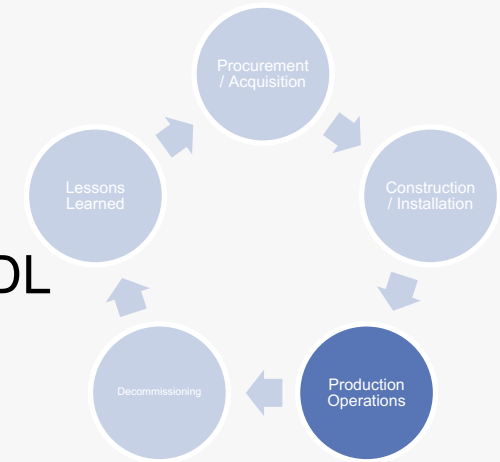
Production Operations (Cooling)

- Sanitary Ship Canal water system
 - Argonne's "grey" water source for cooling south of Argonne campus
 - Filtered and treated onsite to support cooling water supply requirements
 - Treated waste water is returned at a higher quality than the raw Canal water, improving waterway conditions
 - 190 million gallons used annually
 - Reduces potable water usage saving \$1.2M annually



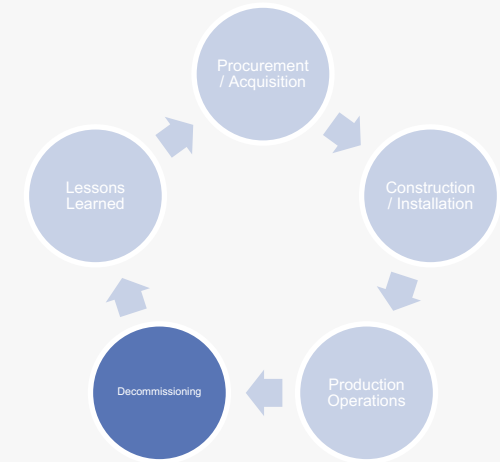
Production Operations (Cooling)

- Heat Recovery from TCS for 200 area
 - Previously, aging equipment and efficiencies in newer ESB and MDL made it cost prohibitive
 - 25-30 year payback estimate at time
 - Currently being re-investigated for viability/cost
- Warmer Cooling Water
 - Mira used ~64°F water
 - Aurora uses ~78°F water
 - Continue striving for even warmer cooling water



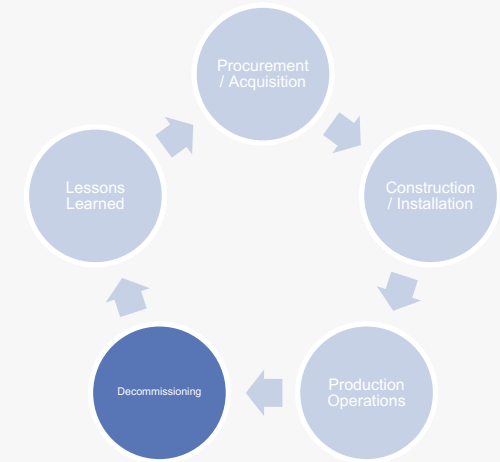
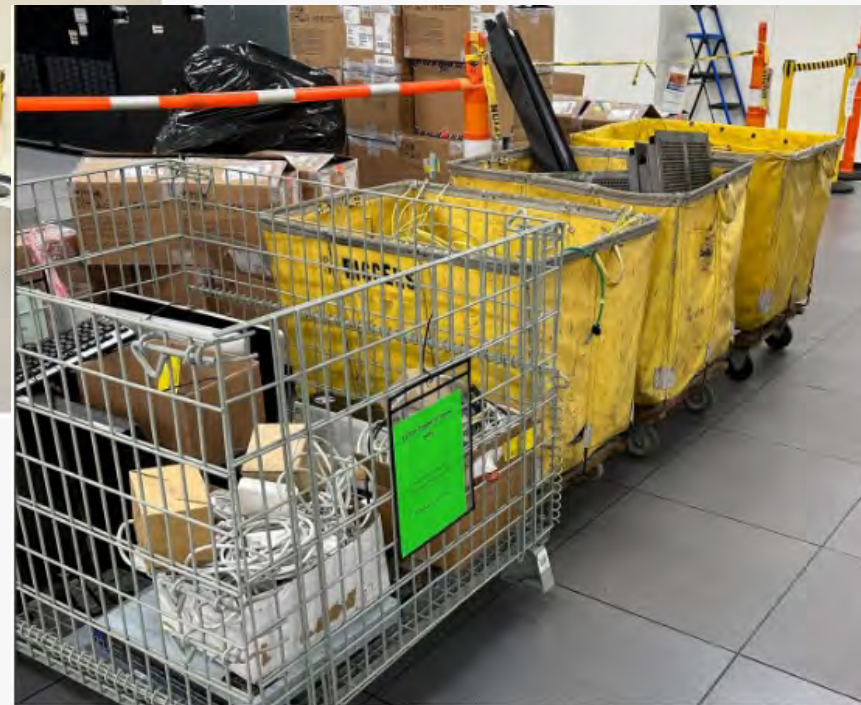
Decommissioning

- Equipment repurposed or made available to the rest of lab
 - APS and LCRC both took DDN storage cabinets no longer useful to ALCF
 - Servers repurposed to JLSE, APS, and LCRC
 - Other assets entered into Energy Asset Disposal System
 - Obsolete equipment, e.g., Mira, sent to R2-certified recycler for safe recycling and disposal
- Support equipment left in place to leverage re-use, if possible



Data Center Recycle

Dedicated data center recycle efforts for scrap steel, network cables, power cables and excess server equipment.



Acknowledgement

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