Trends in HPC Sustainability

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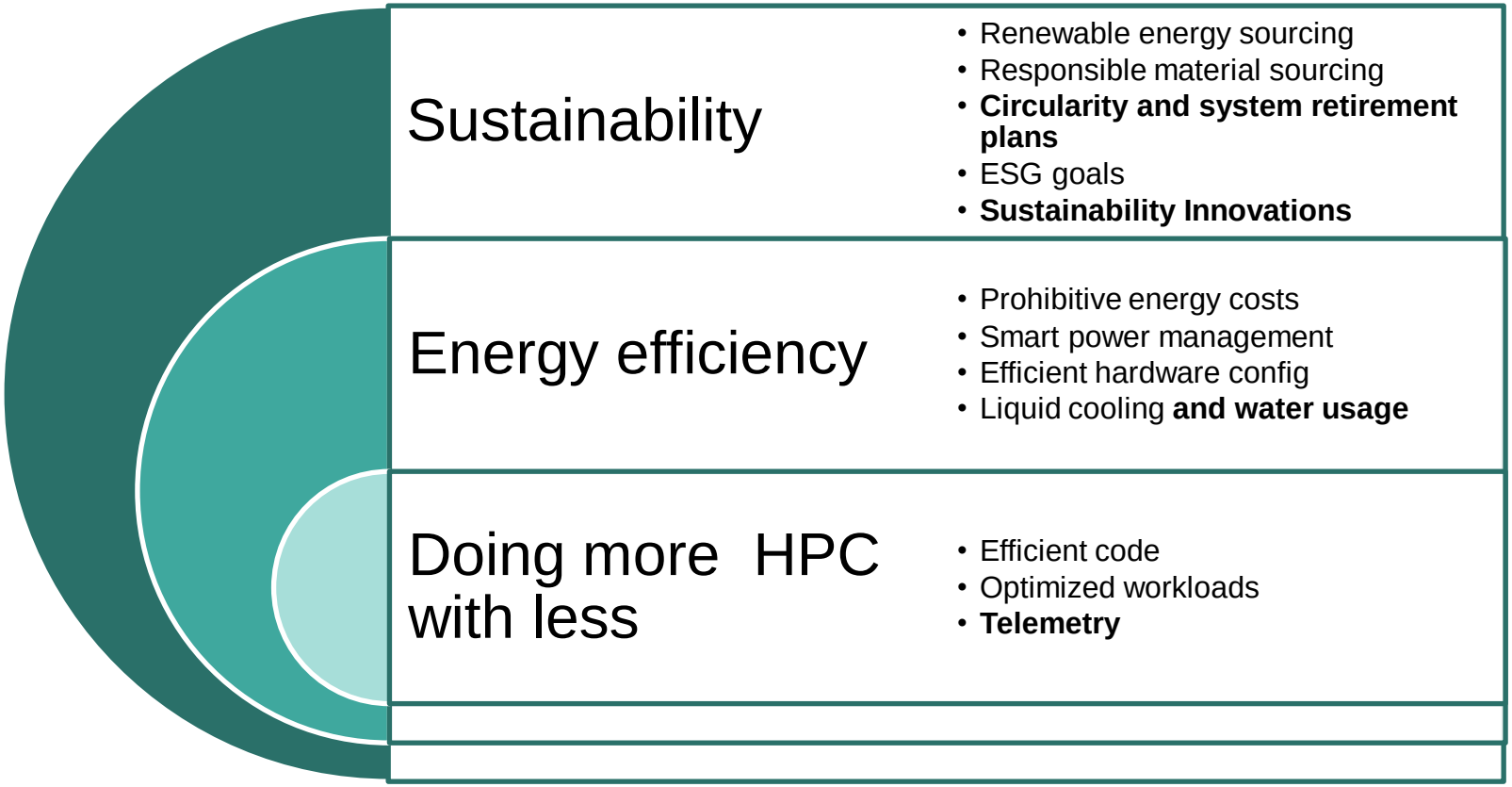
Trends in Sustainability

Sites are sharing their sustainability priorities

- **Sustainability innovations, telemetry, water usage, and circularity are gaining priority at many HPC sites**



Sustainability Innovations

Applying HPC to worldwide environmental concerns

- **Digital twins of the earth for sustainability research**
  - Mapping earth systems
  - Better understanding of natural and human impacts on the environment
- **Using HPC enabled mod/sim allows for better, more accurate designs. This translates to less materials wasted in research and development stages**
- **Reducing environmental impact of oil and gas exploration and extraction**
- **Many datacenters would like for the environmental benefit of their application/innovation to “count” in their assessment of overall site sustainability**

Telemetry

Benefits to measuring the issue at hand

- **Incentivizing Energy Efficient Code**
  - When power consumption of a workload is not measured, the natural motivation of users is to get their answers as fast as possible
  - By measuring energy usage per workload, and making that data available to users, users can be incentivized to get a slower answer that uses less power
  - TACC- considering switching to charging for total energy consumed rather than wall clock hours used
- **Knowledge to inform new purchases**
  - Is it worth porting code to GPUs for energy efficiency?
  - Informed decisions on when to retire equipment
  - Energy use comparisons between on-prem and cloud

Water Usage

Liquid cooling brings with it a new sustainability concern

- **With liquid cooling gaining popularity at datacenters worldwide, water sourcing and efficient water usage are becoming a sustainability area of consideration**
- **Grey Water Systems**
  - Argonne National Lab uses grey water system that is filtered on site, reducing potable water intake by $1.2 million annually
- **Warm Water Systems**
  - Evaporative cooling systems reduce water usage
  - NASA NAS- evaporative cooling system, at a warm water temperature of 90 degrees Fahrenheit, saves 5.5 million gallons of water per year, and 6 million kWh

Circularity

Plans for equipment from procurement to retirement

- **A new focus on datacenter equipment retirement programs and recycling plans has emerged amongst industry leading sites**
- **Retirement programs are being considered during procurement stages**
- **Extending equipment life has also become an area of sustainability consideration**

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Questions?

We welcome questions, comments, and suggestions

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