

# Day 1: Exploration of system technology and performance

Breakout session questions

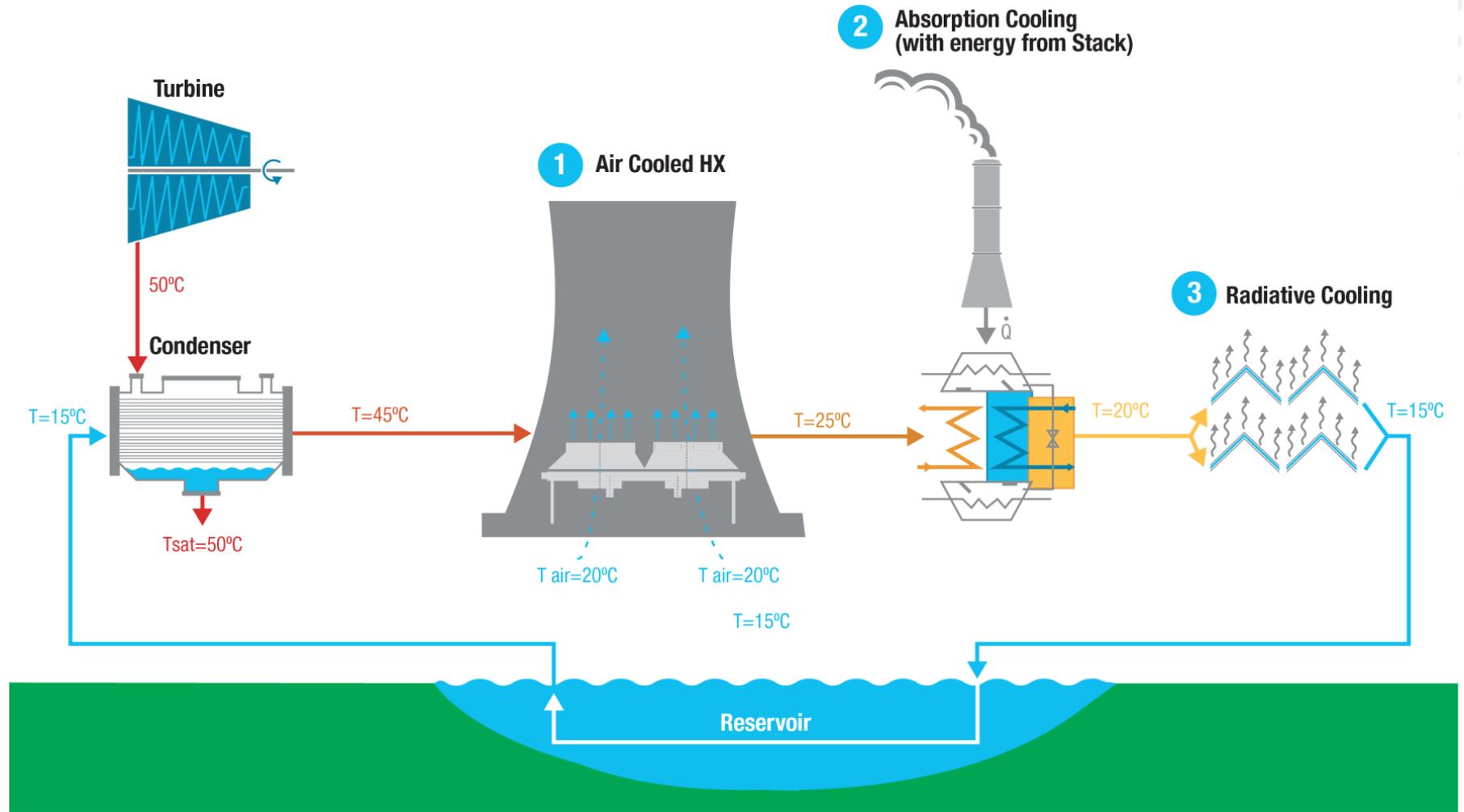
May 23, 2014



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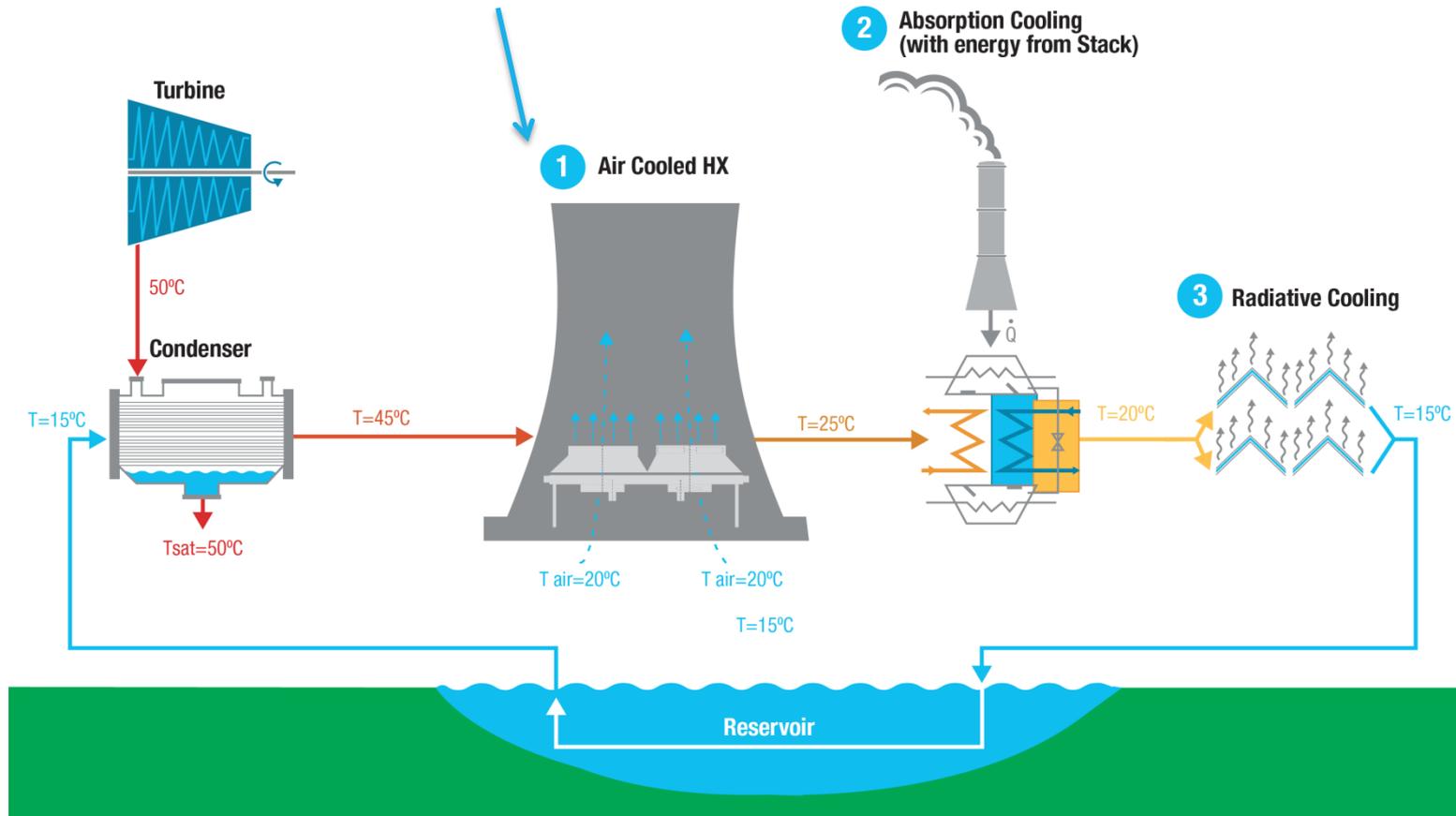
**For today's discussion please constrain ideas only by technical feasibility with less emphasis on commercial viability and manufacturability, as these will be the focus of day 2**

# ARPA-E Program Vision Overview



# Transformational Air Cooled HX Concepts

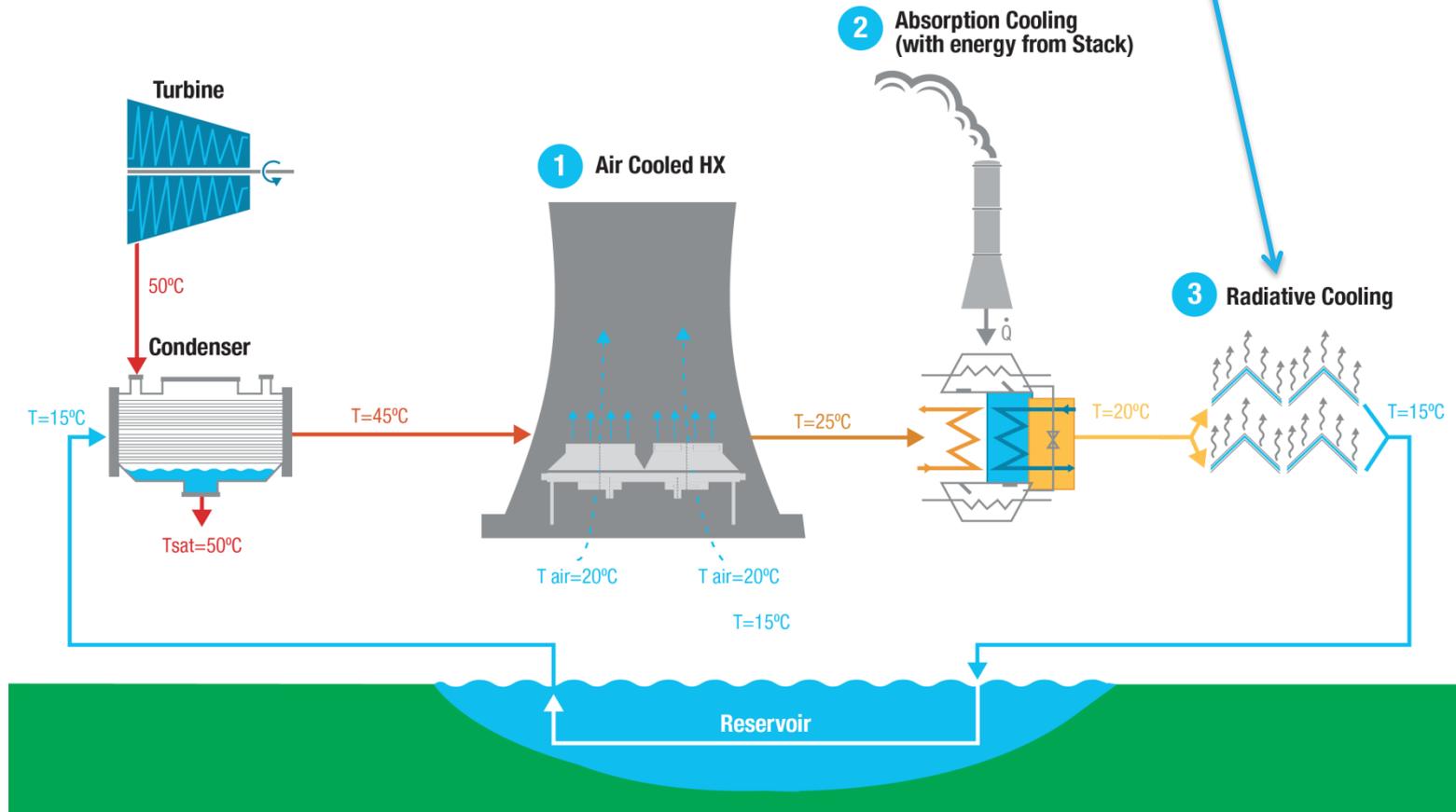
- Low cost air cooling strategies that significantly increase air side heat transfer coefficient without increasing pressure drop
- Efficient forced draft technologies coupled to natural draft





# Transformational Radiative Cooling Concepts

High performance radiant cooling coatings and associated technologies



# Feedback on ARPA-E's proposed system vision

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Are the metrics and ARPA-E's vision technically plausible?

What are the biggest technical challenges to overcome in realization of ARPA-E's vision?

# Feedback on individual components

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Are the 3 cooling technologies compatible with each other so that they can be integrated into one system? What are the challenges?

What are the technology gaps for each of the proposed components (air cooled heat exchangers, adsorption cooling systems, radiative cooling modules, etc.)?

What are some of the materials and design considerations?

Do polymer heat exchangers have a role for this application, and what metrics are appropriate?

# Alternative system designs

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*The purpose of this piece of the discussion is to make sure that a FOA/metrics are written in such a way that doesn't exclude other good concepts*

- ▶ What alternative system designs/strategies could achieve the same objectives?\* (System diagrams are encouraged)
- ▶ What are the biggest technical challenges with these alternative systems?
- ▶ What would the major cost drivers likely be for these systems?

# Other components

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What advanced fan technologies can be used to maintain high efficiency over a wide range of fan speed and flow rate?

Could other components be utilized to mitigate some of the technical challenges?

# Scalability of concepts

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Which of the concepts are highly scalable?

What are the main barriers to scalability?