Emerging Ideas Workshop: No- and Low-Water Power Plant Cooling

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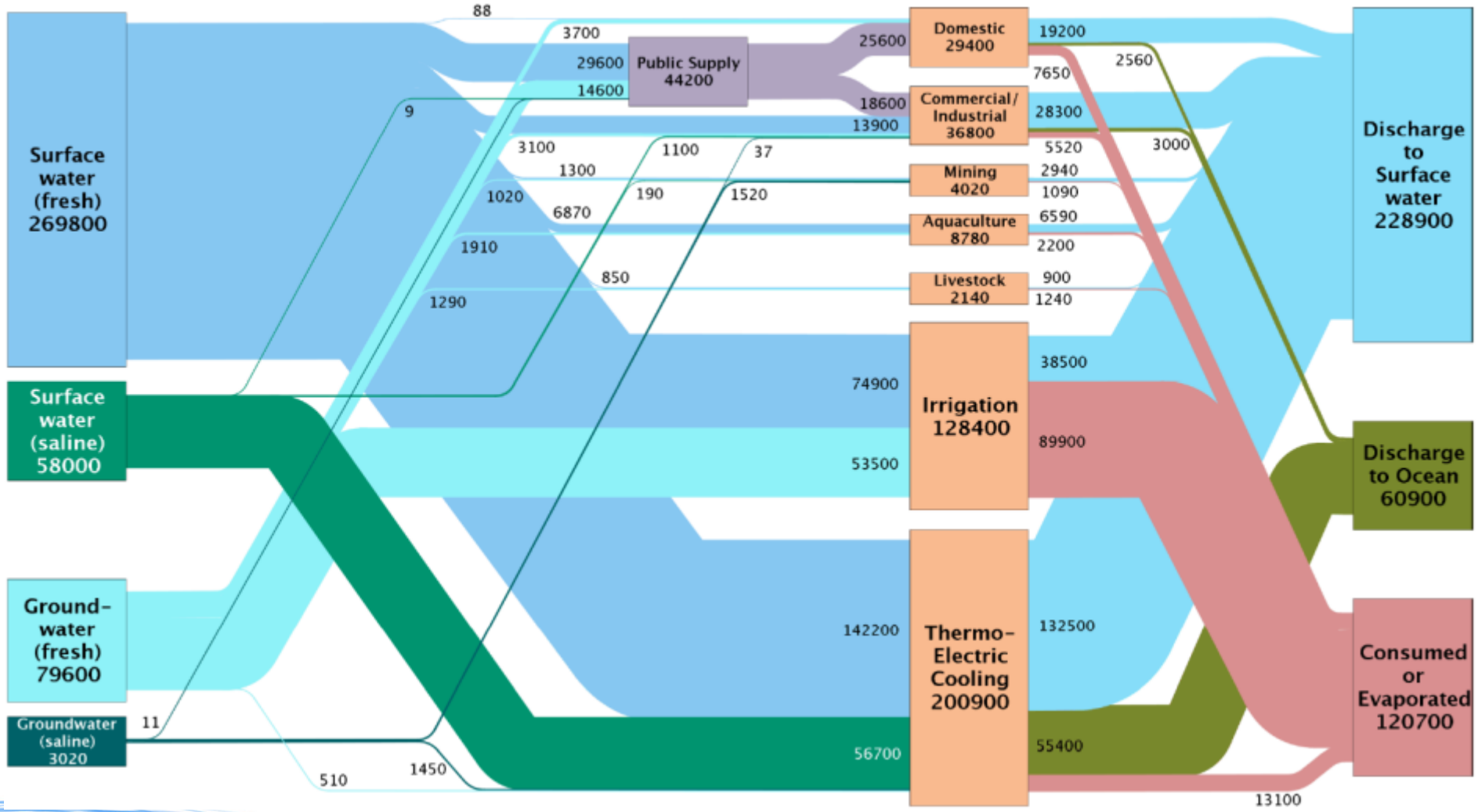
March 28, 2012

Estimated US Water Flows 2005 (MGD), Total: 400 BGD



AJ Simons (LLNL and USDOE), 2010. Based on J Kenny (USGS), 2009

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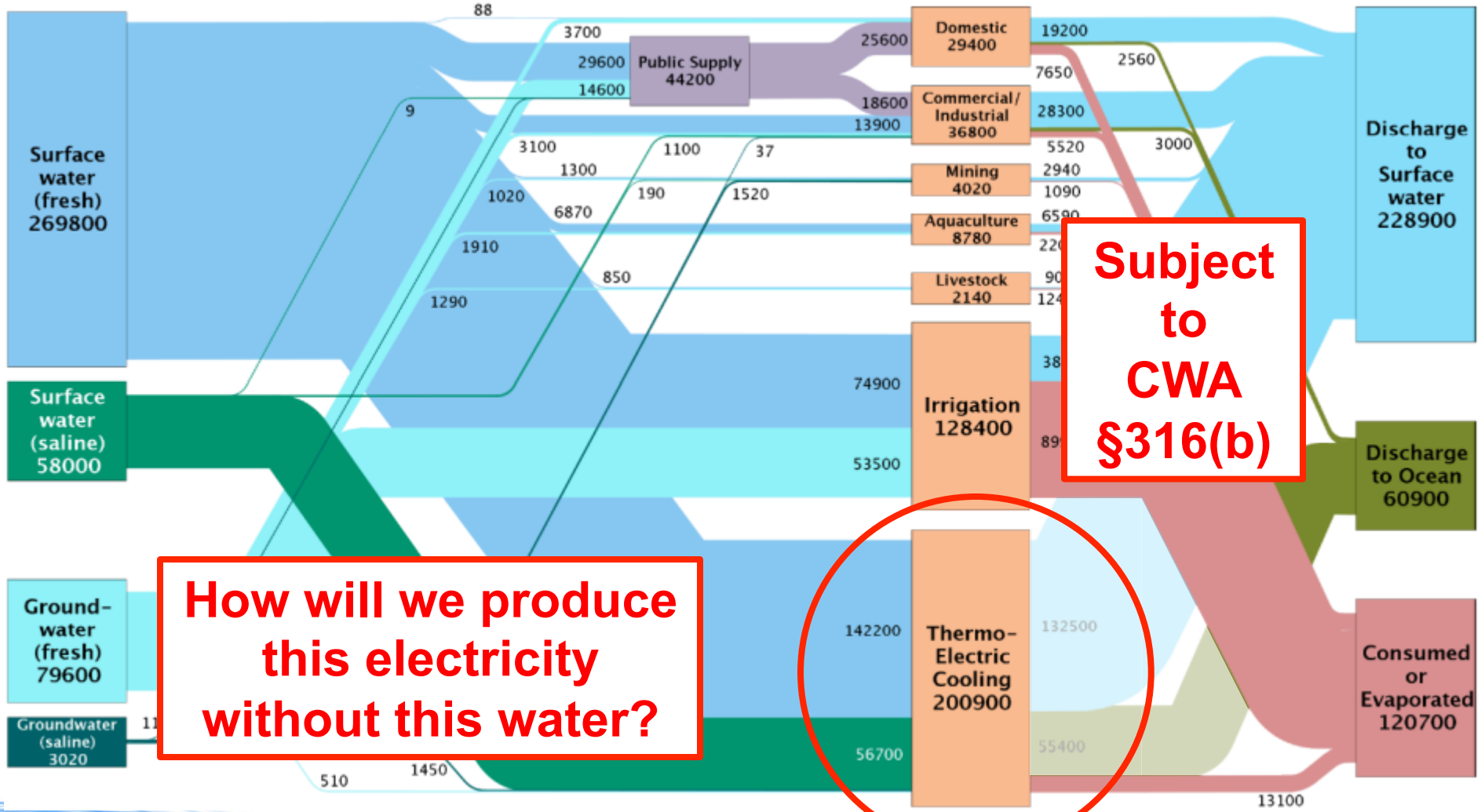

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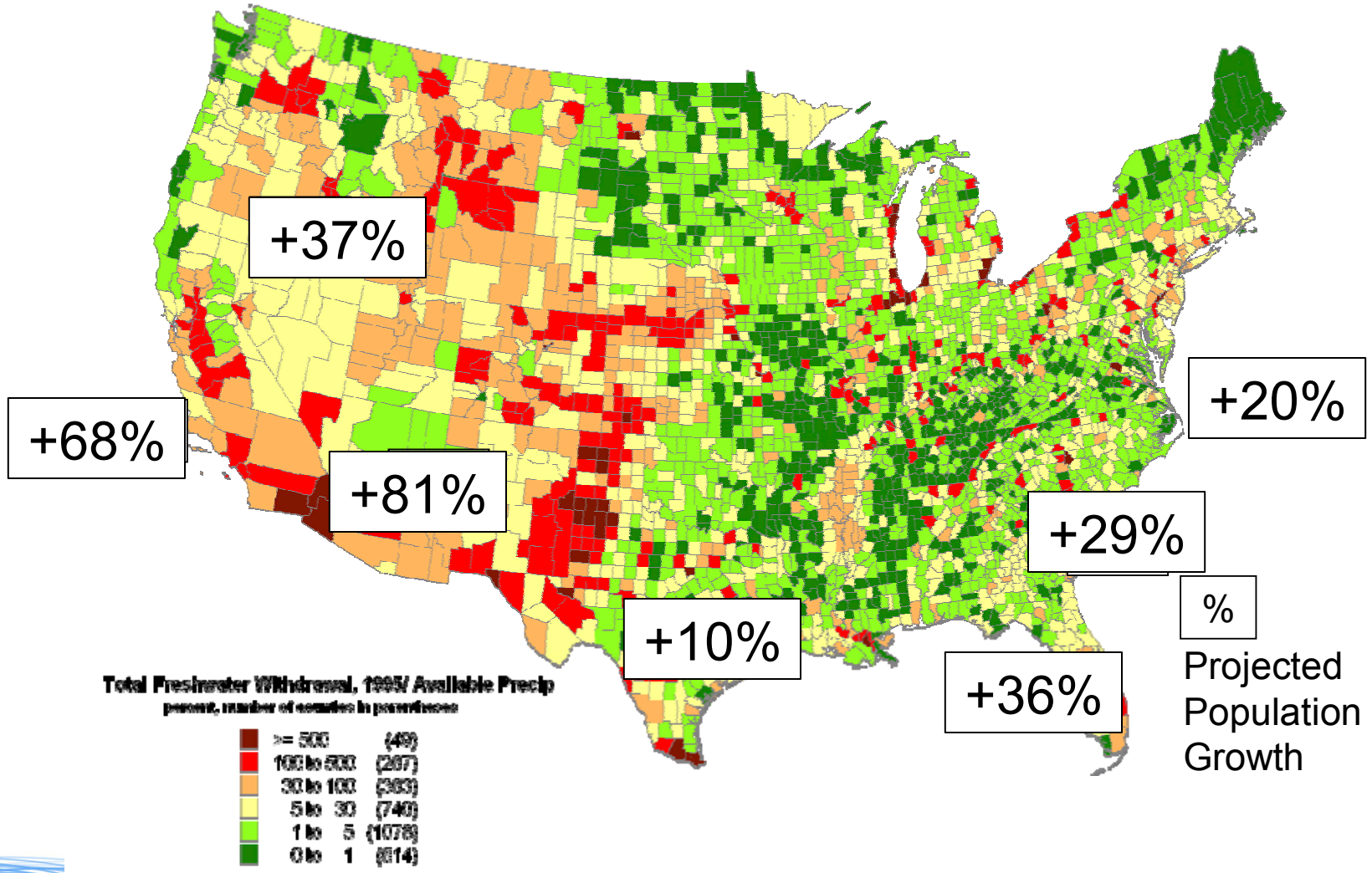
30% Population Increase by 2030, Mostly in DRY PLACES



Solley (USGS), 1998; EPRI, 2003; Campbell (US DOC), 1997

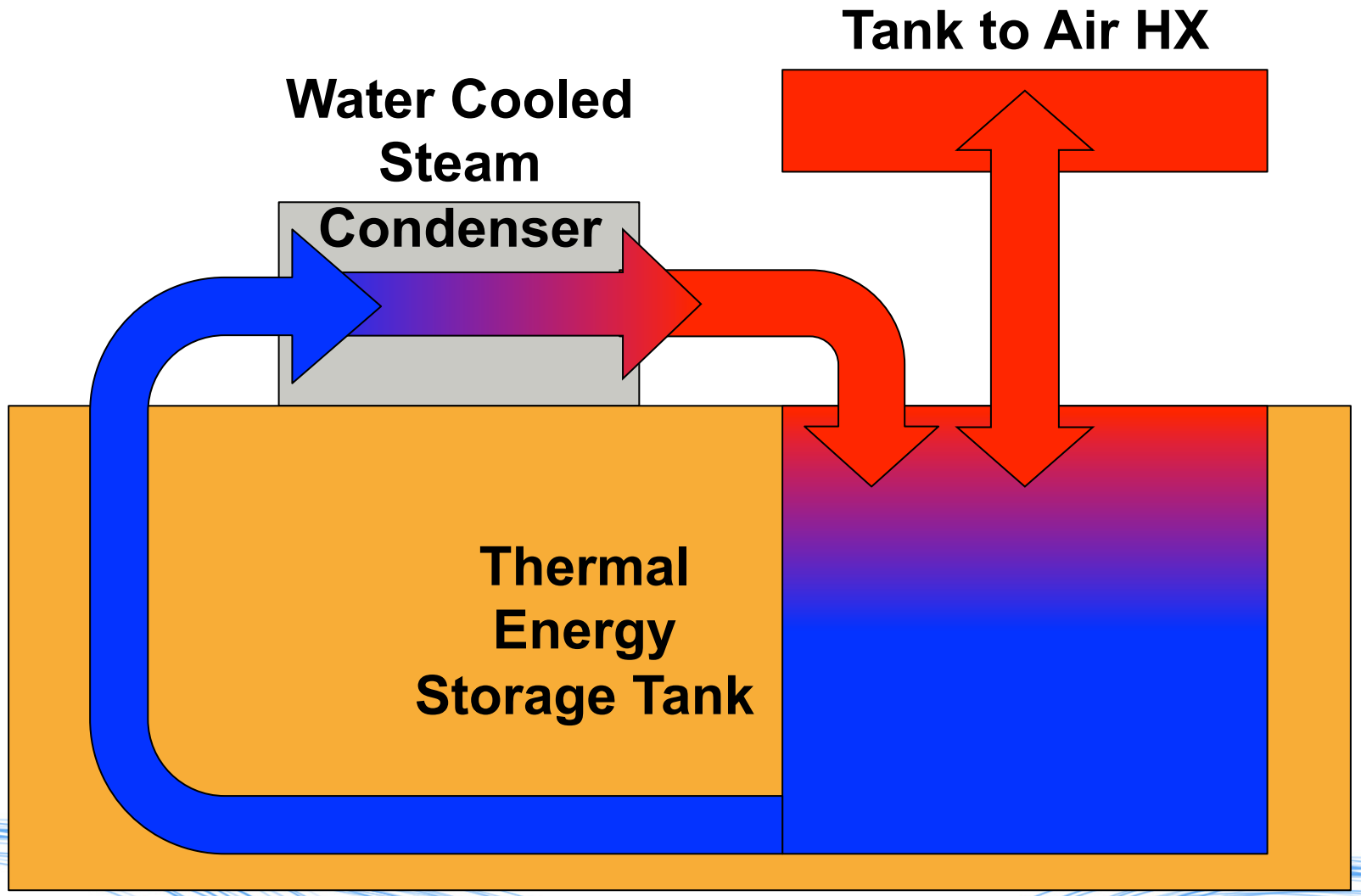
Objectives

Identify needs and transformational technological approaches for

- Enabling dry cooled power plant efficiency ≥ wet cooled power plant efficiency **AM Brainstorm**
- Enabling GW-scale dissipation of low grade heat (35° C) to air without evaporating water or raising surface water temperature. **PM Brainstorm**

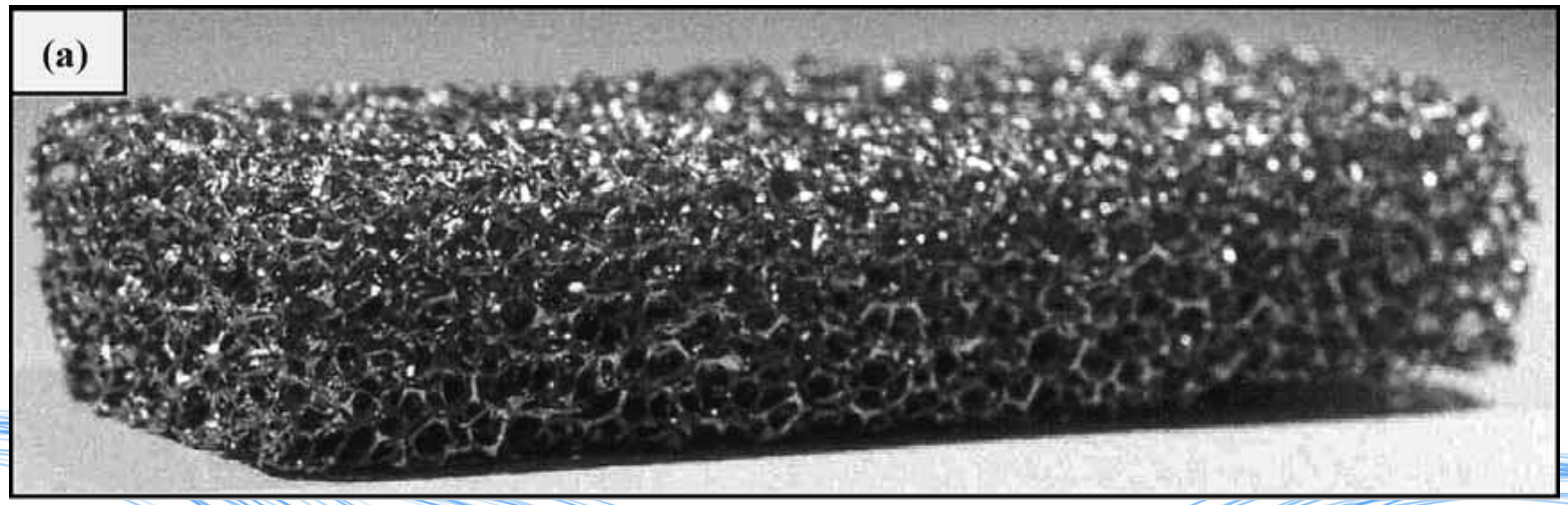
Identify metrics

Dry Cooled Power Plant with Thermal Storage



Dissipating GW of 35° C Heat to Air

- Increase surface area
- Increase heat transfer coefficient
- Increase passive or forced convective air flow rate
- Decrease parasitic load



Boomsma, *et al*, Mechanics of Materials, 2003

Power Plant Dry Cooling Techno-Economic Goal

LCOE ≤ 5¢/kWh

One Route:
Installed Price ≤ 2¢/W
No Efficiency Loss

Topics Not For Discussion

In the interest of time, the following topics <u>will not be discussed:</u>

- Regulations, policies, subsidies
- Incremental improvements
- Demonstration projects

Agenda

Start	End	Activity
8:00	8:15	Registration & Breakfast
8:15	8:30	Welcome & Opening Remarks – Nicholas Cizek, ARPA-E
8:30	8:50	Power Plant Cooling – Olivier Le Galudec, Alstom
8:50	9:10	Dry Power Plant Cooling State of the Art – John Maulbetsch, Maulbetsch Consulting
9:10	9:30	Electronics Cooling State of the Art – Howard Davidson, Consultant
9:30	9:45	BREAK
9:45	11:45	Brainstorm – Technologies Enabling Dry Cooled Power Plants with Wet Cooled Power Plant Efficiencies or Better
11:45	12:45	Lunch & Review Morning Brainstorm
12:45	2:45	Brainstorm – Dissipating GW-scale Low-grade (35° C) Heat to Air Without Evaporating Water or Raising Surface Water Temperature
2:45	3:00	BREAK
3:00	3:30	Review Afternoon Brainstorm & Wrap-Up

Questions