Beginning a discussion: how do we balance mitigation with adaptation?

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on Transboundary Adaptation
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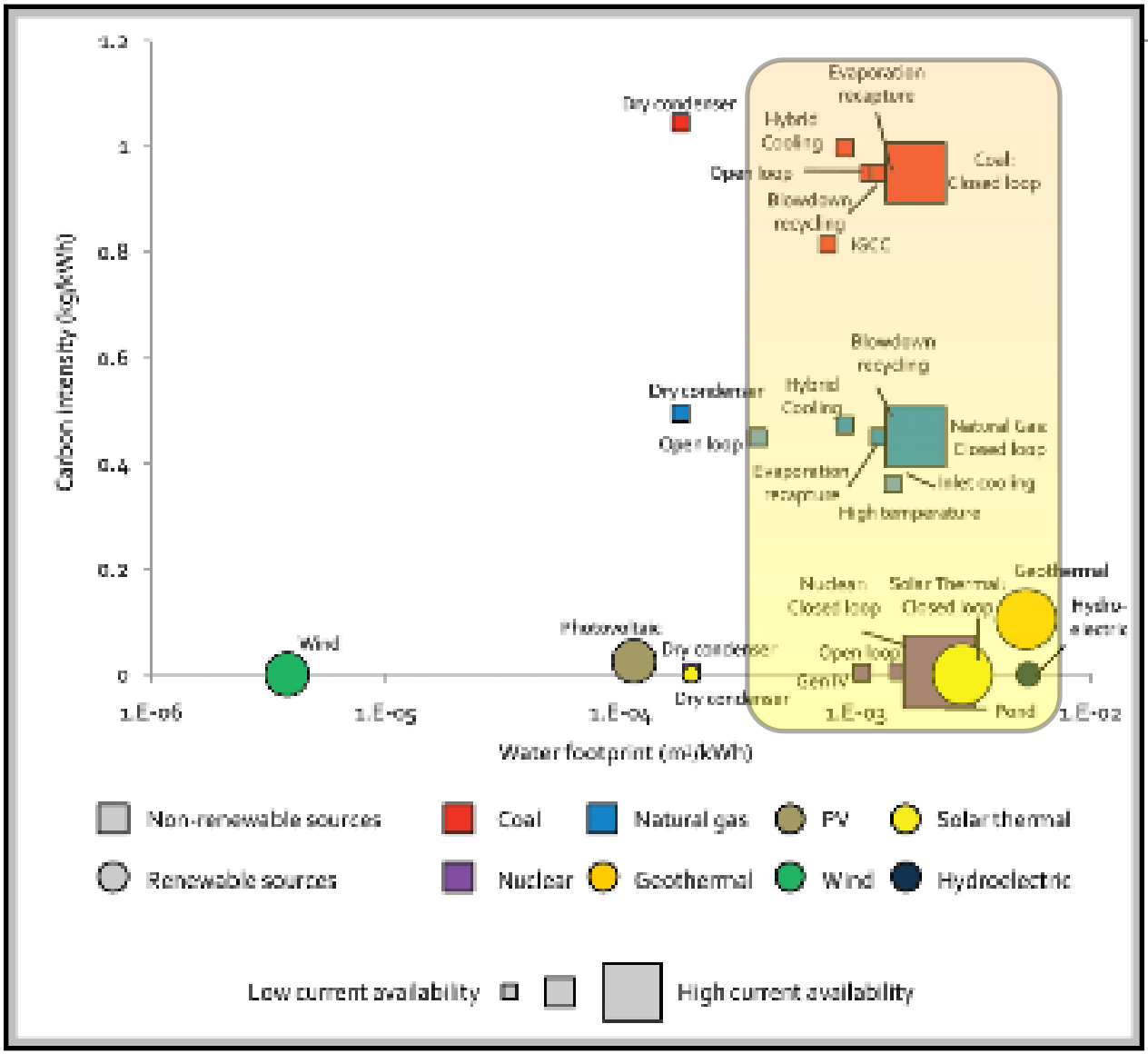
Cleaner energy is our major tool for decreasing atmospheric carbon concentrations

- Since the early 1990s, we have largely defined climate change as a **greenhouse gas** and **clean energy** problem — lower carbon emissions!
- Clean energy: more hydro, biofuels, natural gas, nuclear
- *Clean-energy facilities have been built for long periods but normally depend on significant water supplies*
- A new problem: **mitigation-adaptation coherence.**

How do we *adapt* our clean energy *mitigation* efforts over time so that they remain effective and do not reduce our adaptation actions?

Lexén/Matthews/Eriksson. 2013. "Reducing greenhouse gases while building resilience." In *Cooperation for a Water Wise World.* SIWI report no. 32.

But water is embedded throughout energy



- water use = climate vulnerability
- infrastructure = high climate vulnerability
- some types of water consumption are “neutral” to the mass water balance (hydro, nuclear), but even “non-consumptive” use is associated with water risk
- Sub-annual shifts in water timing are rarely examined

Ebinger/Vergara. 2011. *Climate impacts on energy systems*. World Bank.

What happens when *mitigation* doesn't *adapt*?

Patricia Mulroy, *Las Vegas Sun,* 25 August 2013

• | 1220 ft amsl

now first shortage declaration • | 1075 ft amsl **Arizona drop 5%**

second shortage declaration **No electricity** **Intake 1 stops; Arizona drops 17%**

third shortage declaration • | 1025 ft amsl

• | 1000 ft amsl **Intake 2 stops**

25% loss in power in past 5 years, 25% additional loss by May 2015

• | 895 ft amsl **all water delivery ceases**

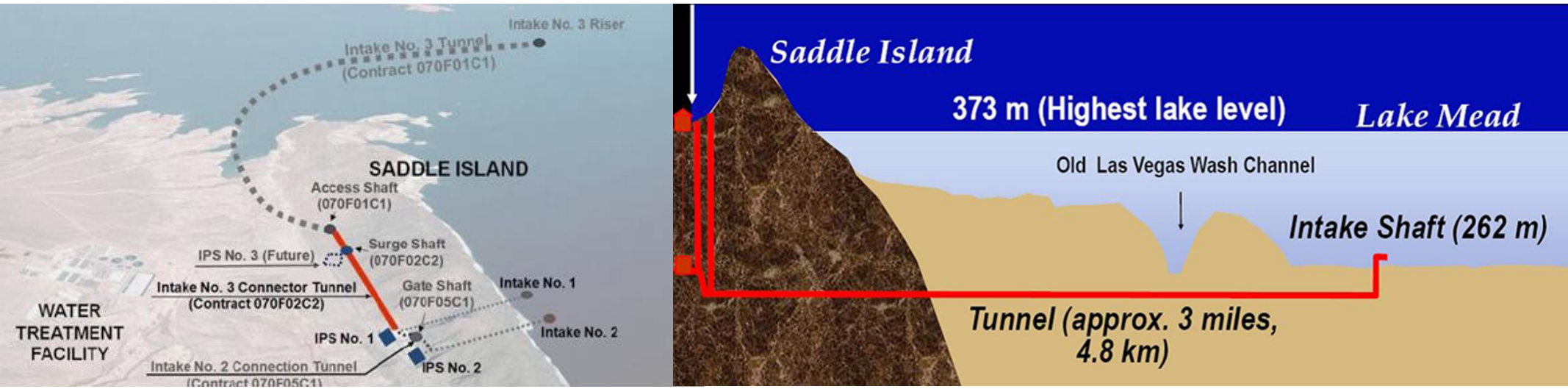
2026

"dead pool" • | 860 ft amsl **Intake 3 — completed late 2014?**

Credit: Bart Wickel

Lake Mead, Hoover Dam, USA

Extending clean energy's useful lifetime: *intake tunnel 3*



Does buying an extra 20 years of production solve the problem if we still run out of water?

Retrofit costs ~1.5 billion USD

And how do we make the energy production–water supply tradeoffs for the cities, farms, and ecosystems downstream?

	Example	Impact / Costs	Places
Mitigation **+** Adaptation	High water efficiency energy investments	Minimizing conflicts except during extreme events	Wind energy, some solar: Texas, USA
Mitigation > Adaptation	Irrigating and processing biofuels in a water-scarce region Developing hydropower that does not maintain coastal sediment flows	Sectors such as energy tend to be more politically influential than agriculture or rural livelihoods, so that vulnerable groups may be more likely to feel climate impacts and water-food-energy conflicts	NE Brazil, Mexico **Potential:** Lower Mekong River
Mitigation < **Adaptation**	Operating a water storage dam to optimize agriculture, flood control, or water supply at the expense of hydropower generation	Probably requires backup or alternative energy sources	Rwanda

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