

The background of the slide features a photograph of a contaminated site. In the foreground, a white sign with red text reads "DANGER CONTAMINATED LAND". The sign is partially obscured by a wooden structure, possibly a ladder or part of a vehicle. In the background, there are large mounds of earth or debris, suggesting a site of environmental remediation or a hazardous waste area. The overall scene is somewhat desaturated and has a slightly grainy texture.

# Exploring the Next Generation of Low-Carbon Technologies for Deployment on Contaminated Lands

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A research agenda and proposal developed during a semester-long NREL rotation at JISEA

# About Me

## **Education:**

Economics (BA), Environmental Science and Policy (MS)

## **Experience:**

15 years working on energy and environmental policy

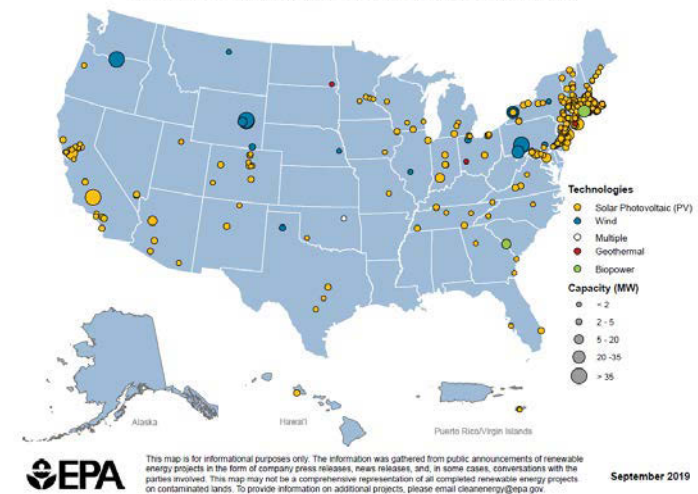
## **Why AES PhD?**



# Why Clean Energy on Contaminated Lands?

- NREL relationship with EPA since 2008 to support the agency's RE-Powering America's Land Initiative.
- Benefits to local communities
  - Health
  - Economic development
- Benefits to clean energy project developers

352 Renewable Energy Projects, Over 1.7 Gigawatt Installed Capacity



U.S. EPA, "Re-Powering America's Lands tracking matrix, September 2009,  
[https://www.epa.gov/sites/production/files/2019-10/documents/re\\_tracking\\_matrix\\_final\\_508\\_100219.pdf](https://www.epa.gov/sites/production/files/2019-10/documents/re_tracking_matrix_final_508_100219.pdf)

Program	Sites	Acres
Superfund Remedial	1,718	3,781,758
RCRA Corrective Action	3,747	17,946,593
Underground Storage Tanks	494,997	494,997
Brownfields	8,000	69,646
<b>Total</b>	<b>508,462</b>	<b>22,292,994</b>

US EPA, "Handbook on the benefits, costs, and impacts of land cleanup and reuse", 2011,  
<https://www.epa.gov/sites/production/files/2017-08/documents/ee-0569-02.pdf>

# What Next Generation Technologies Could be Explored?

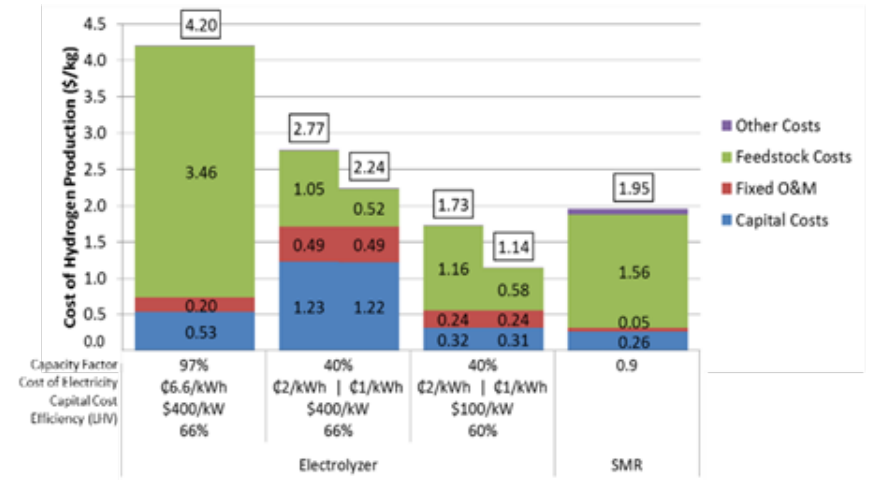
- Preliminary techno-economic feasibility survey:

- Demand growth projections
- Supply and technology costs

- Technologies explored:

- Hydrogen Production, Battery Storage, Renewable Natural Gas Production, Microgrid Enablers (controllers, forecasting, load management), Clean Energy Manufacturing, Combined Heat and Power...
- Not an exhaustive list

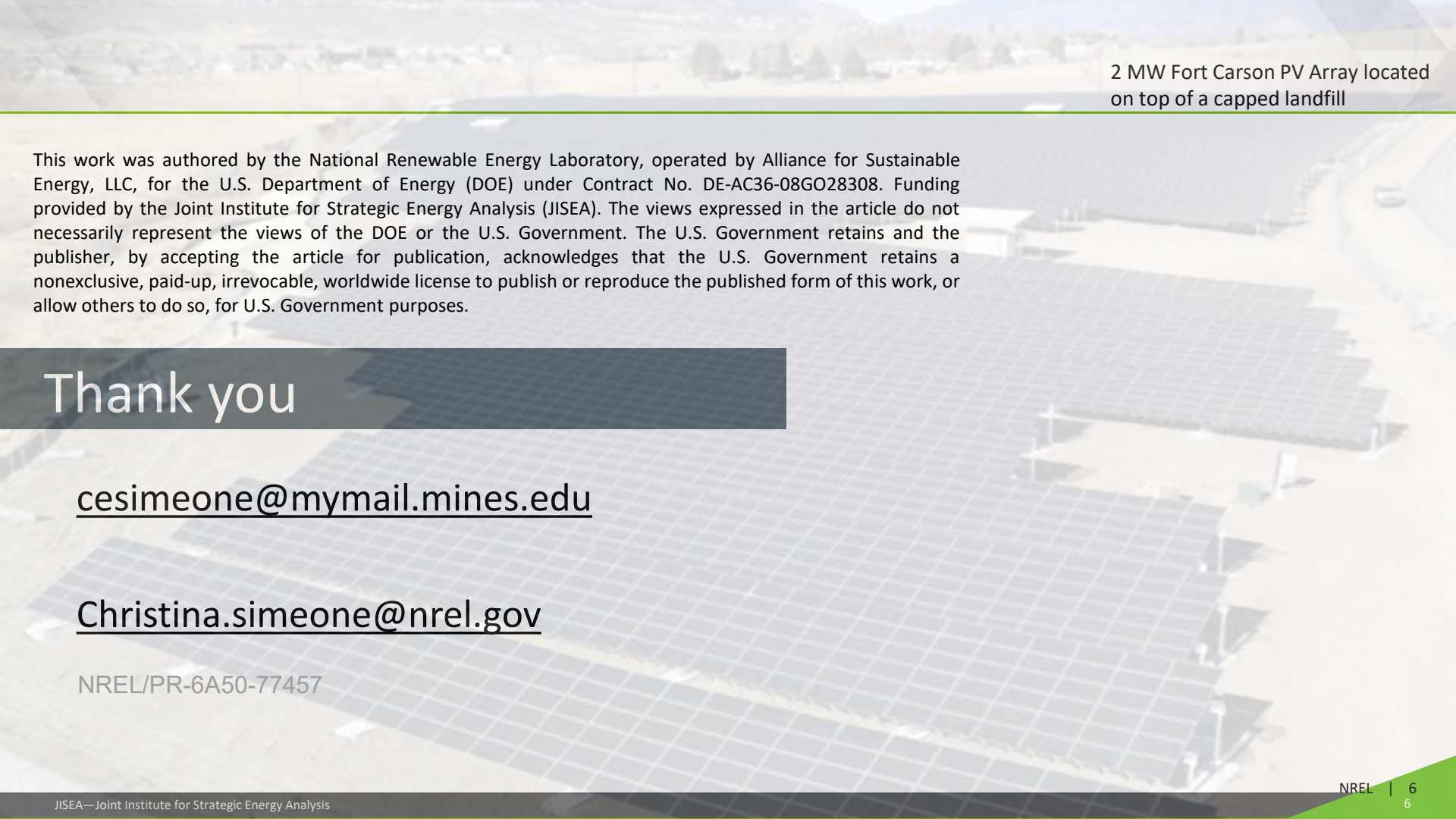
- Review of NREL resources and tools to be expanded



*Projected Levelized Cost Reductions in H2 Production Based on Various Sensitivities (Pivovar, 2017)*

# Opportunities for the Future

- Convene Technical Experts to Select Final Technologies
- Complete Techno-Economic Analysis and Screening Criteria for Five (5) Key Technologies
- Pilot Scale Study
  - E.g. Hydrogen Production Facility Feasibility Study on RCRA Corrective Action Site
- Explore JEDI Model Expansion and Enhancement Scoping



2 MW Fort Carson PV Array located  
on top of a capped landfill

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# Thank you

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