# A sociotechnical approach to nuclear energy development

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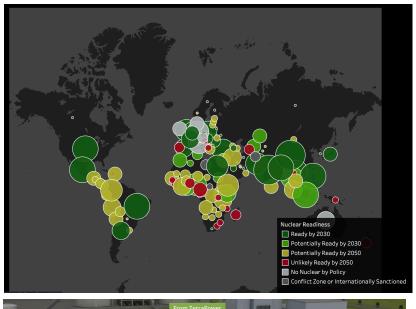
### Commercializing next-generation nuclear energy technology

Oklo's team is using a startup mindset to build novel reactors while meeting federal regulations.

Zach Winn | MIT News Office November 13, 2020



## Nuclear Power in a Clean Energy System



TerraPower selects Kemmerer, Wyoming as the preferred site for advanced reactor demonstration plant

12.01.2021

Commonwealth Fusion Systems Raises \$1.8 Billion in Funding to Commercialize Fusion Energy **Executive summary** 

#### Nuclear power can play an important role in clean energy transitions

Without nuclear investment, achieving a sustainable energy system will be much harder



#### Bloomberg



#### Green Cleaner Tech

**Corporations Join the Nuclear Fusion Craze** 

Investments in the unproven technology are a vote of confidence it can become a viable source of clean energy.

BRIEFING ROOM

#### Parallel Processing the Path to Commercialization of Fusion Energy

White House Sets Sights on Commercial Fusion Energy

#### The race to build a commercial fusion reactor hots up

A Canadian firm plans a demonstration machine in Britain



12.01.2021

Commonwealth Fusion Systems Raises \$1.8 Billion in Funding to Commercialize Fusion Energy

## Road map to U.S. fusion power plant

#### comes into clearer focus—sort of

National academies lay out to-do list to build multibillion-dollar plant by 2035

nature

## The chase for fusion energy

An emerging industry of nuclear-fusion firms promises to have commercial reactors ready in the next decade.

Office of Science White House Summit: Developing a Bold Decadal Vision for Commercial Fusion Energy

MARCH 2 2022

#### SCIENCE

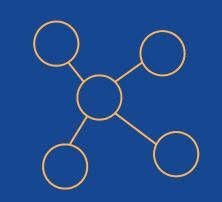
Was 2021 A Breakthrough Year For Fusion Energy?

## FASTEST PATH TO ZERO

Engaging communities to understand their energy needs and preferences **Developing decision support tools** for an equitable energy transition

Designing Energy technologies with users and communities Mapping and repairing energy inequities









# Lessons from fission technology development

# Key takeaways from an advanced fission stakeholder focus group

Design teams should not make assumptions about what communities want		
l.	Many communities actively expressing interest in nuclear energy because of familiarity with nuclear	
11.	Communities seek to clearly understand the intended uses and socio-environmental impacts of any potential facility	
III.	Strong opposition to the decide- announce-defend model	

"Equitable design and development of nuclear energy infrastructure: Recommendations for policymakers, practitioners, and researchers", Aditi Verma, Key findings and recommendations informed by a discussion hosted by Fastest Path to Zero, Good Energy Collective, and the Nuclear Innovation: Clean Energy Future (NICE Future) initiative's RISE3 campaign, held on May 31st, 2022.

# Key takeaways from an advanced fission stakeholder focus group

Design teams should not make assumptions about what communities want		Community expectations vary regionally and have technological design implications	
1.	Many communities actively expressing interest in nuclear energy because of familiarity with nuclear	I.	Communities have some shared preferences but community and preferences also vary significantly
11.	Communities seek to clearly understand the intended uses and socio-environmental impacts of any potential facility	II.	Important to find the right match between a host community, technology developer and technology type
111.	Strong opposition to the decide- announce-defend model	111.	Tension between rapid technological development and need to go slowly to understand community concerns

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# Key takeaways from an advanced fission stakeholder focus group

Design teams should not make assumptions about what communities want	Community expectations vary regionally and have technological design implications	Communities seek agency and meaningful participation in design-related decision making
I. Many communities actively expressing interest in nuclear energy because of familiarity with nuclear	I. Communities have some shared preferences but community and preferences also vary significantly	<ul> <li>I. Designers and developers must be careful not to overpromise and underdeliver</li> <li>II. High performance in early</li> </ul>
<ul> <li>II. Communities seek to clearly understand the intended uses and socio-environmental impacts of any potential facility</li> </ul>	<ul> <li>Important to find the right match between a host community, technology developer and technology type</li> </ul>	<ul><li>projects is especially important</li><li>III. Developers may wish to appoint dedicated community liaisons</li><li>IV. Engage communities in a</li></ul>
III. Strong opposition to the decide- announce-defend model	III. Tension between rapid technological development and need to go slowly to understand community concerns	discussion about risk

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## Sociotechnical readiness level framework

- Actual system operated over the full range of sociotechnical conditions
- **SRL 8** Actual system completed and qualified through sociotechnical test and demonstration
- **SRL 7** Full scale (prototypical) system demonstrated in relevant sociotechnical environment
- **SRL6** Engineering, pilot scale (prototypical) system validation in sociotechnical environment
- **SRL 5** Laboratory scale system validation in representative sociotechnical environment
- SRL 4 Component and/or system validation in representative sociotechnical environment

**SRL 3** Analytical and experimental critical function and/or characteristic proof of concept studies with analytical and experimental studies of the social and environmental impacts of the technology

SRL 2 Technology concept and/or application are formulated in a socially engaged way.

**SRL 1** Basic principles observed and reported. Societal implications and applications of the newly discovered scientific and technological principles are explored.

Aditi Verma and Todd Allen, "A sociotechnical readiness level scale for the development of advanced nuclear technologies". Proceedings of the International High Level Radioactive Waste Management Conference (IHLRWM) 2022.

Engaging Wyoming Communities in an Environmental Justice Approach for Advanced Nuclear Energy Facility Siting



Integrating socially led co-design into consentbased siting of interim storage facilities



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TerraPower selects Kemmerer, Wyoming as the preferred site for advanced reactor demonstration plant

November 16, 2021

From TerraPov

TerraPower

A Nuclear Innovation Com

