

Sustainable AI Project Guide

Focus 1: Designing Better Data Centers

Name(s):

Date:

Design Scenario

You and your team run a sustainable design firm that develops innovative technology processes. You are looking more closely at the systems that develop artificial intelligence (AI), the infrastructure that supports them, and the resources that they require. Your team will use your skills as communicators, researchers, collaborators, and creative

Design Problem

Develop an idea for reducing AI's impact on the environment. Your solution could fit into the system at an individual, community, or global level.

As you complete this project you will use the Innovation Design Process.



1. Understand the Design Problem (pg 2-3):

- Read the background information for your focus area.
- Take notes on the problem and the approaches others are taking.



2. Brainstorm and Create (pg 4) :

- Use the template to brainstorm ideas.
- Be creative! Think of as many wild ideas as possible.
- As a team, choose some of your favorite ideas to share.



3. Share Your Ideas (pg 5):

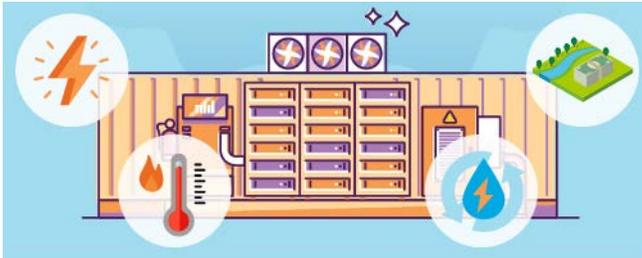
- Share your solution with others and get feedback.



Understand the Design Problem

What problems are caused by growing Artificial Intelligence (AI) use?

The race to develop AI is demanding immense energy. Companies are in a hurry to be the first to build AI systems that will be reliable and profitable. In the state of Virginia, 25% of all power produced goes to **data centers**.¹ In 2023, data centers used about 50 gallons of water for each U.S. resident²—nearly half of what we each drink annually. This amount is expected to increase exponentially in only a few years.



Demand is growing so fast because AI requires greater storage on the **cloud** (remote servers); expanded computing infrastructure to handle huge amounts of data; faster processing; and quick cooling of these faster, more powerful machines. Because most of the energy that we use still comes from non-renewable sources, the result is unsustainable and threatens the climate.

Meanwhile, concerns about sustainability are growing. Local communities are becoming more wary of data centers. Their electricity and water bills are going up with the added demand for power. Noise and light pollution has negative health effects, and threatens birds and animals.

1. "Data Center Energy Consumption Statistics & Data (2026)," The Network Installers, Jan. 12, 2026
2. "United States Data Center Energy Usage Report," Lawrence Berkeley National Laboratory, Dec. 2024, and "Fast Facts: Data on Water Consumption," Center for Disease Control, Jan. 2024.

Take notes on the problem

Focus 1: Designing Better Data Centers

What are people doing to reduce AI's negative effects on the environment?

Experts are using several different approaches to increase the sustainability of AI data centers and reduce their negative impact on the environment.

Designing Better Data Centers

Researchers are trying to design data centers that use less energy and don't rely on water cooling. For example, some designs are testing **submersion cooling**, where infrastructure is immersed in fluid that doesn't conduct electricity. Another approach underway is to build data centers in space, which is also cold and has no risk of fire, since there is no oxygen. There is increasing demand to process data collected from satellites in space.

The city of Stockholm, in Sweden, is linking its 30 data centers to its electricity grid—recovering enough heat to warm 31,000 homes sustainably. Because the climate is cold and warmth is needed, the city expects to use the heat created by the data centers to become fossil free by the year 2040. Underneath the city is an existing network of underground pipes that are used for heating homes and other buildings. Finland and Norway have similar projects underway.

Vocabulary

Term	Definition
Artificial intelligence (AI)	A device or program designed to mimic aspects of human intelligence to complete complex tasks, such as learning, problem solving, and decisionmaking.
Cloud	Storage, servers, and applications that exist on the internet, instead of locally on your computer or local server.
Equitable	To be just and fair, often in a way that accounts for existing disparities
Submersion cooling	Cooling systems that immerse data center infrastructure into liquid that does not conduct electricity.
Data center	Cooling systems that immerse data center infrastructure into liquid that does not conduct electricity.

Learn More

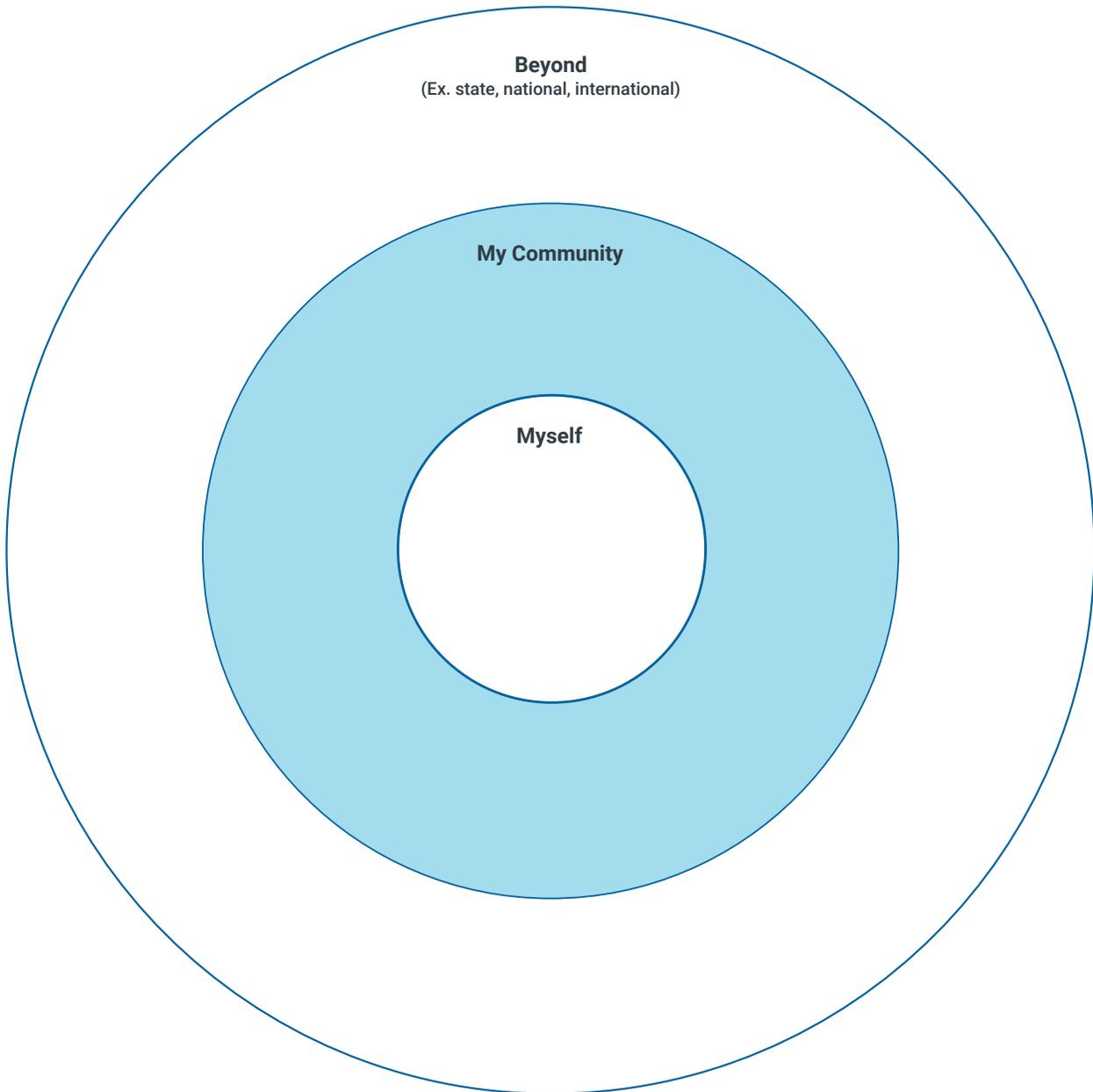
Video: [Finland's Big Idea: Turning Data Center Waste Into Heat](#), Bloomberg Television (11:14 mins)

Read More: [The Nordics' Quiet Revolution: Turning Server Heat into City-Scale Warmth](#), Global Data Center Hub, May 24, 2025

Review the background information and take notes on what you learn:

<i>How does this solution reduce impact on the environment?</i>	
<i>How does this solution fit into the larger system?</i>	
<i>What else stands out about this approach?</i>	

Brainstorm and Create Brainstorm some individual, community, and global solutions to the problems of AI sustainability.



Consider:

- **Individual:** *Are there things that you can do yourself to reduce AI's impact on the environment? How much impact will these interventions have on the system?*
- **Community:** *Are there ways that you could organize with your community to address AI sustainability? Some communities have pressured politicians not to allow data centers to be built in their area. Is this the most **equitable** solution? Why or why not?*
- **Global:** *Besides changes made internally by companies, are there ways to transform the design of all AI systems overall? How?*



Share Your Ideas

- What ideas have inspired you so far?
- Looking at the design of AI systems, what areas have the most potential for greater change towards sustainability?

Choose a few ideas to share with others.