

Learning From the Ground Up:

Research on the first utility-deployed networked geothermal system

Illinois Commerce Commission (ICC)
Thermal Energy Workshop #1
Nov 15, 2023



#LeGUp



PUTNAM
FOUNDATION



WINSLOW
FOUNDATION

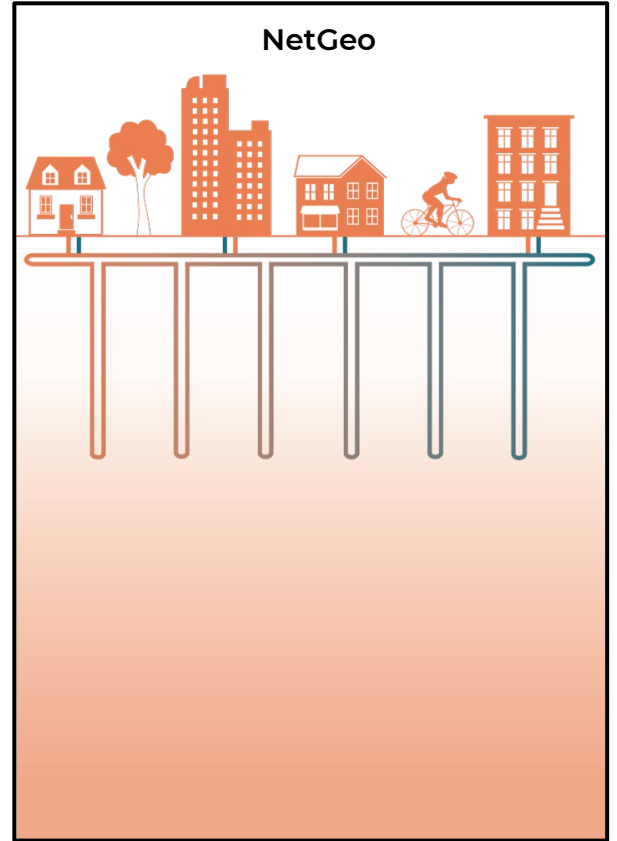
Geo District

Geo Power

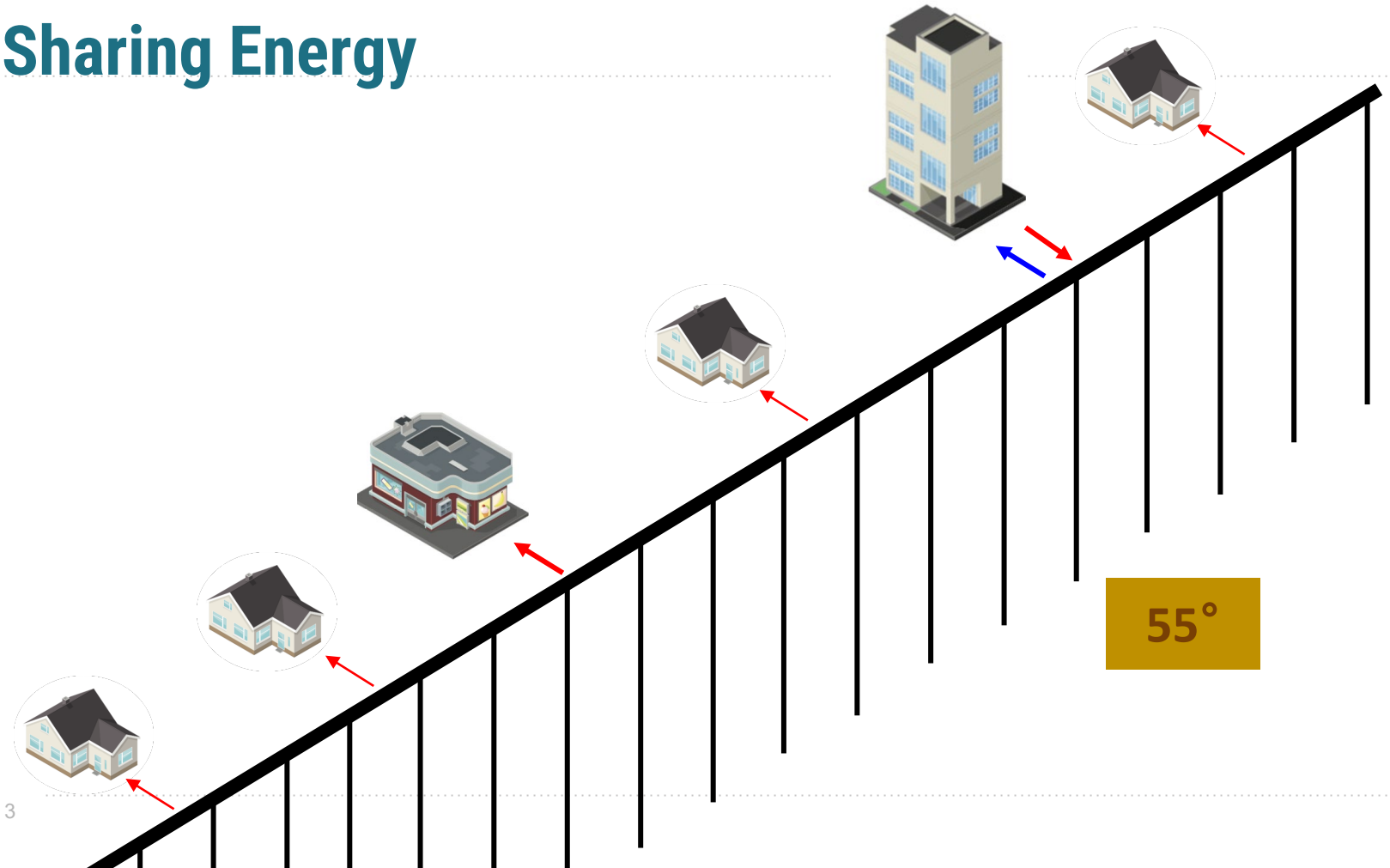
Geo Building



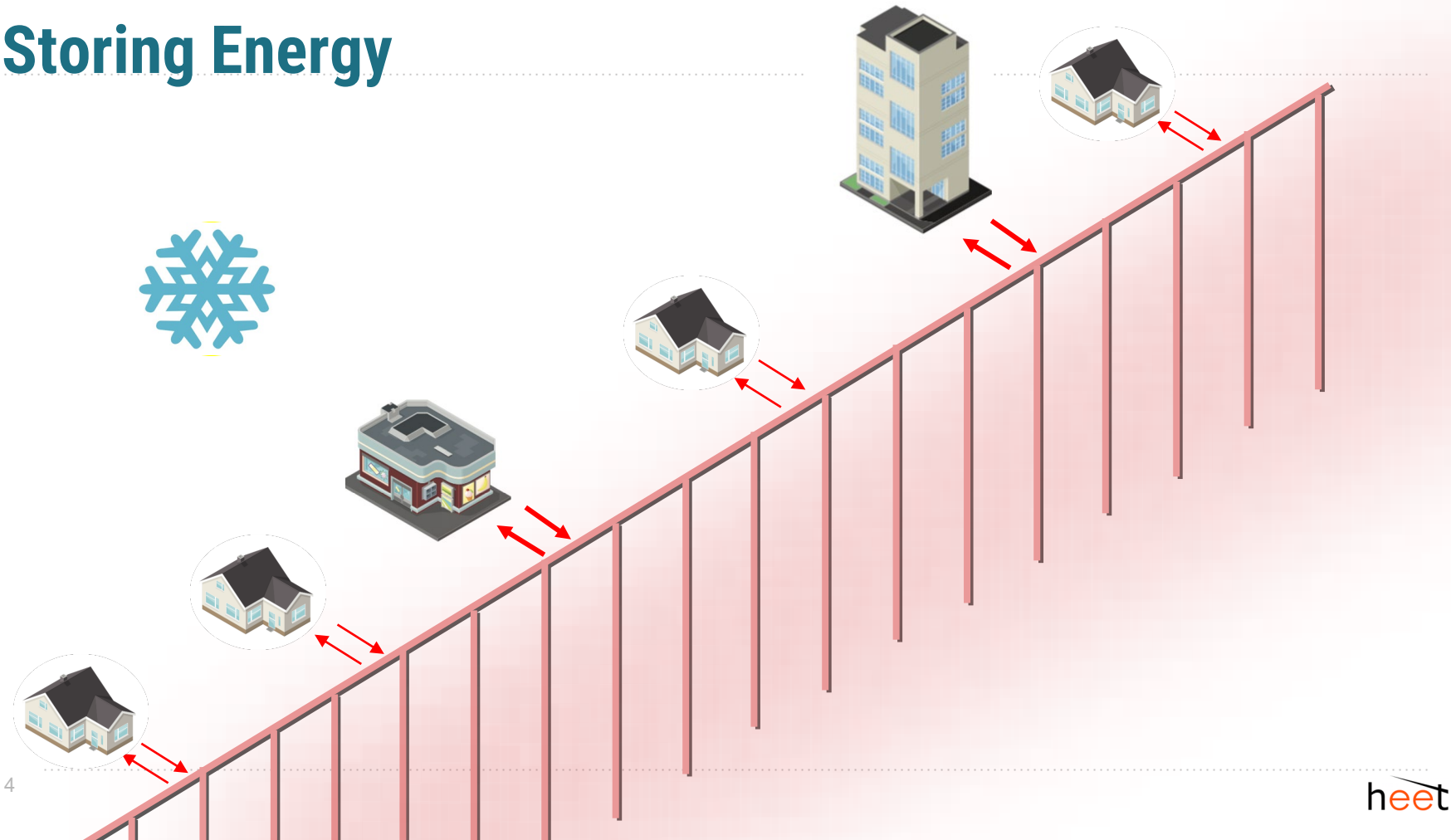
NetGeo



Sharing Energy



Storing Energy



Benefits for Consumers

- Safer
- Healthier indoor air
- Provides cooling
- Lower energy bills
- Equity & affordable



Benefits for Workers

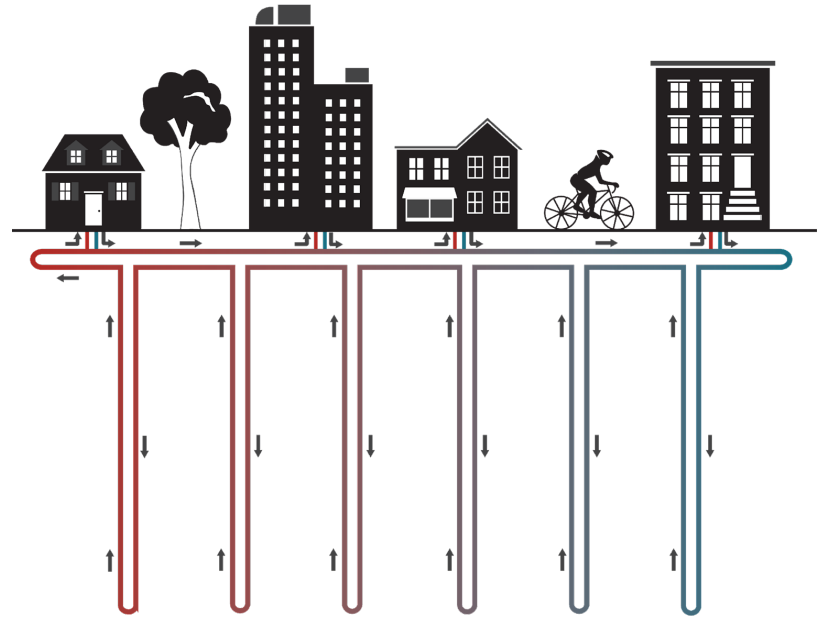
- Safer
- Keep comparable jobs
- Grows good new jobs

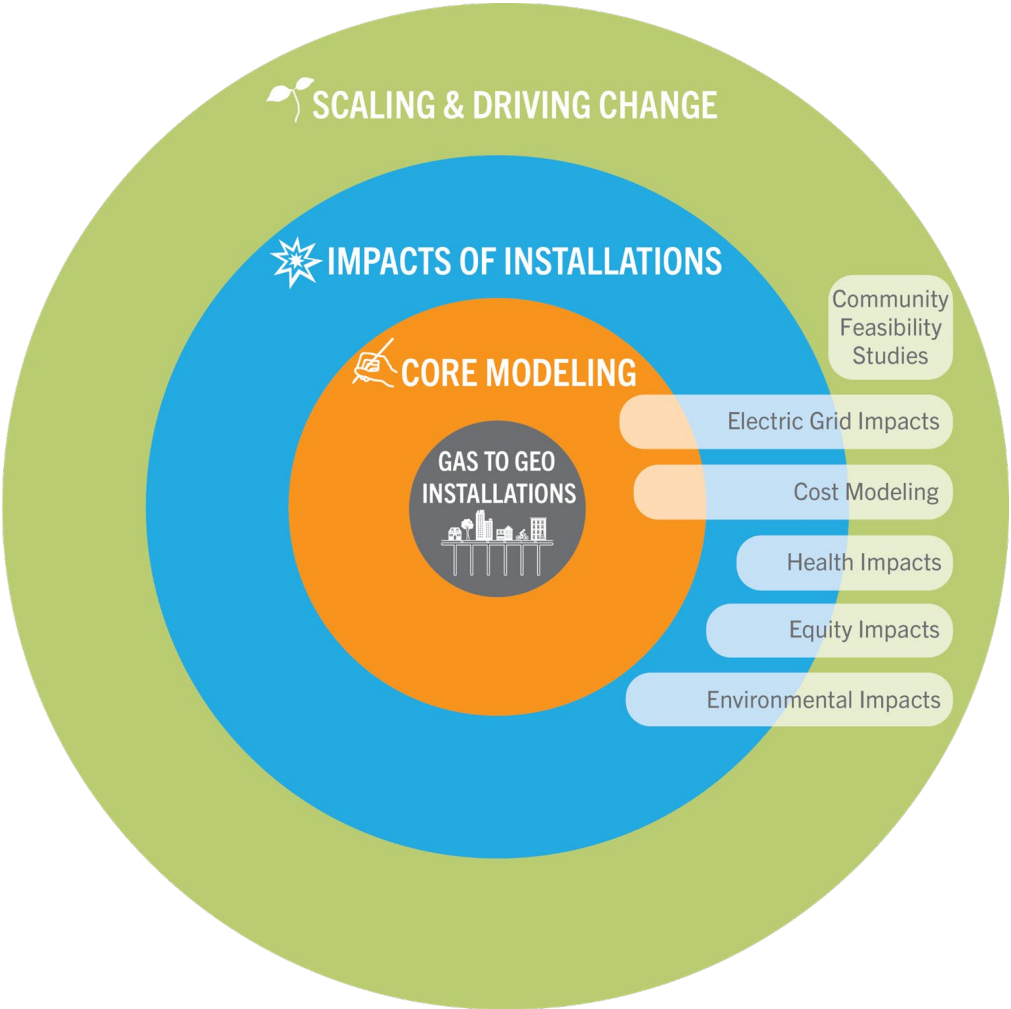


LeGUp RESEARCH PROJECT

Goals

- Evaluate the potential of networked geothermal to deliver heating and cooling in Massachusetts
- Engage with and share findings with stakeholders (e.g., Department of Public Utilities, gas utilities, communities)
- Help prepare Massachusetts communities to adopt change





DATA: PILOT INSTALLATIONS IN MA



Motivation: MA Decarb Roadmap mandates net-zero emissions by 2050, 32% of emissions from building sector (MA)

1. Framingham, MA

- **Eversource Gas**
- Construction underway
- 1 mile, ~ 40 buildings
- 140 individual customers

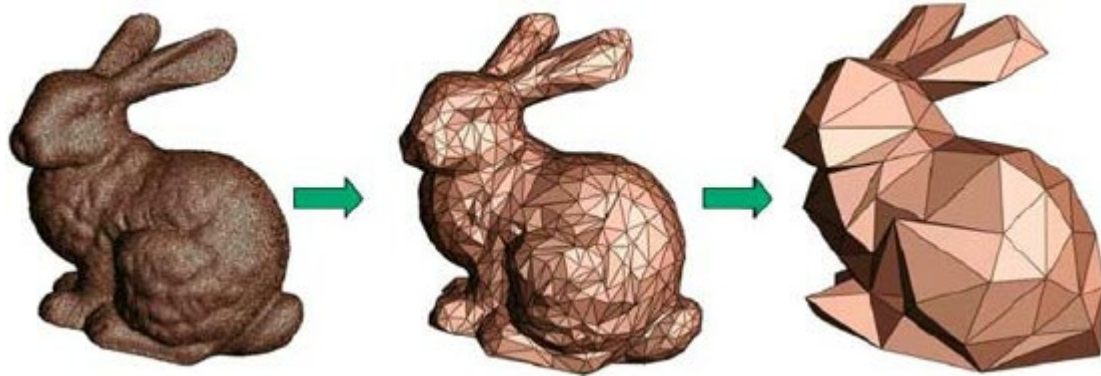
2. Lowell, MA

- **National Grid**
- Site selected. Design phase



STEP 1: DEVELOP CORE MODELS

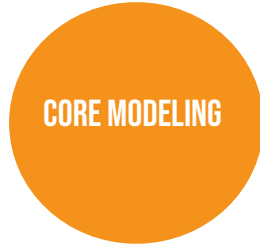
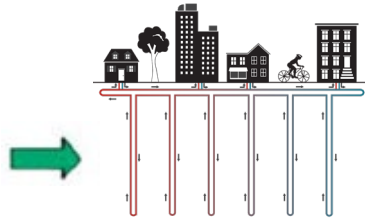
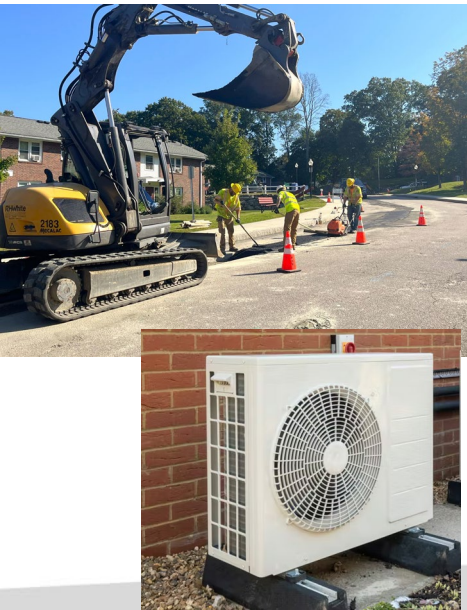
Develop **Full Physics** and **Reduced Order** models using data from the first few installations:



CORE MODELING

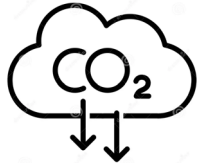
STEP 1: DEVELOP CORE MODELS

Develop **Full Physics** and **Reduced Order** models using data from the first few installations:



STEP 2: MODEL AND MONITOR IMPACT OF INSTALLATIONS

Develop data-driven models and test predictions:



Emissions



Grid



Costs



Ecology



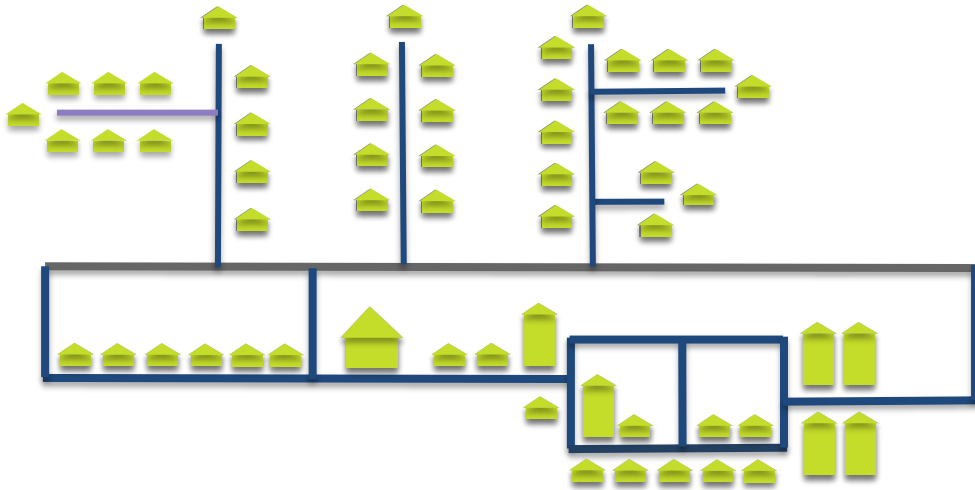
Health



Equity

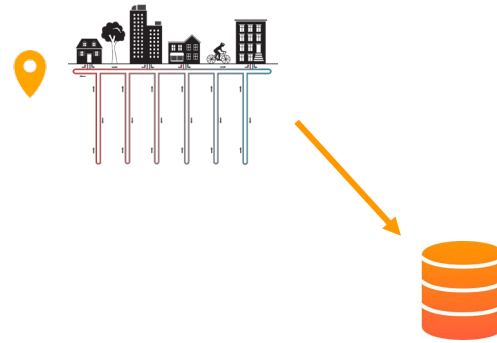
STEP 3: STATEWIDE ASSESSMENT

- Develop scaling projections from the Core Models
- Measure and maximize impact



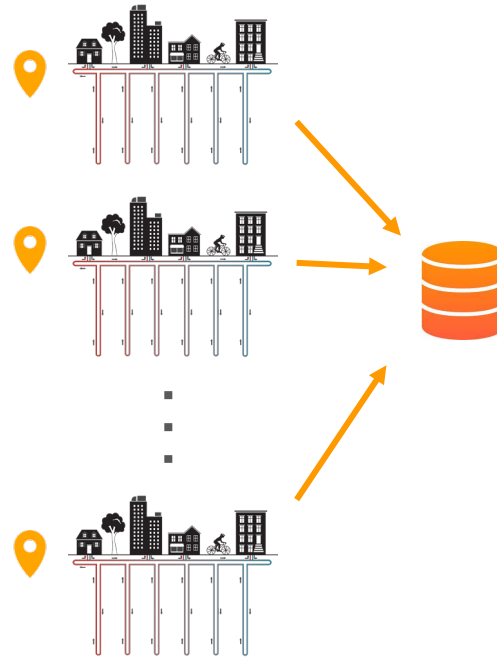
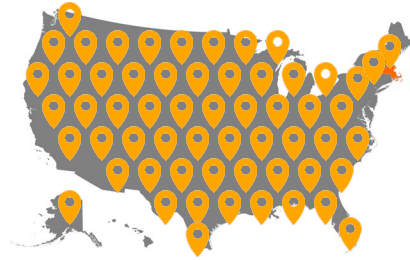
SCALING AND
DRIVING CHANGE

GeoDataBank



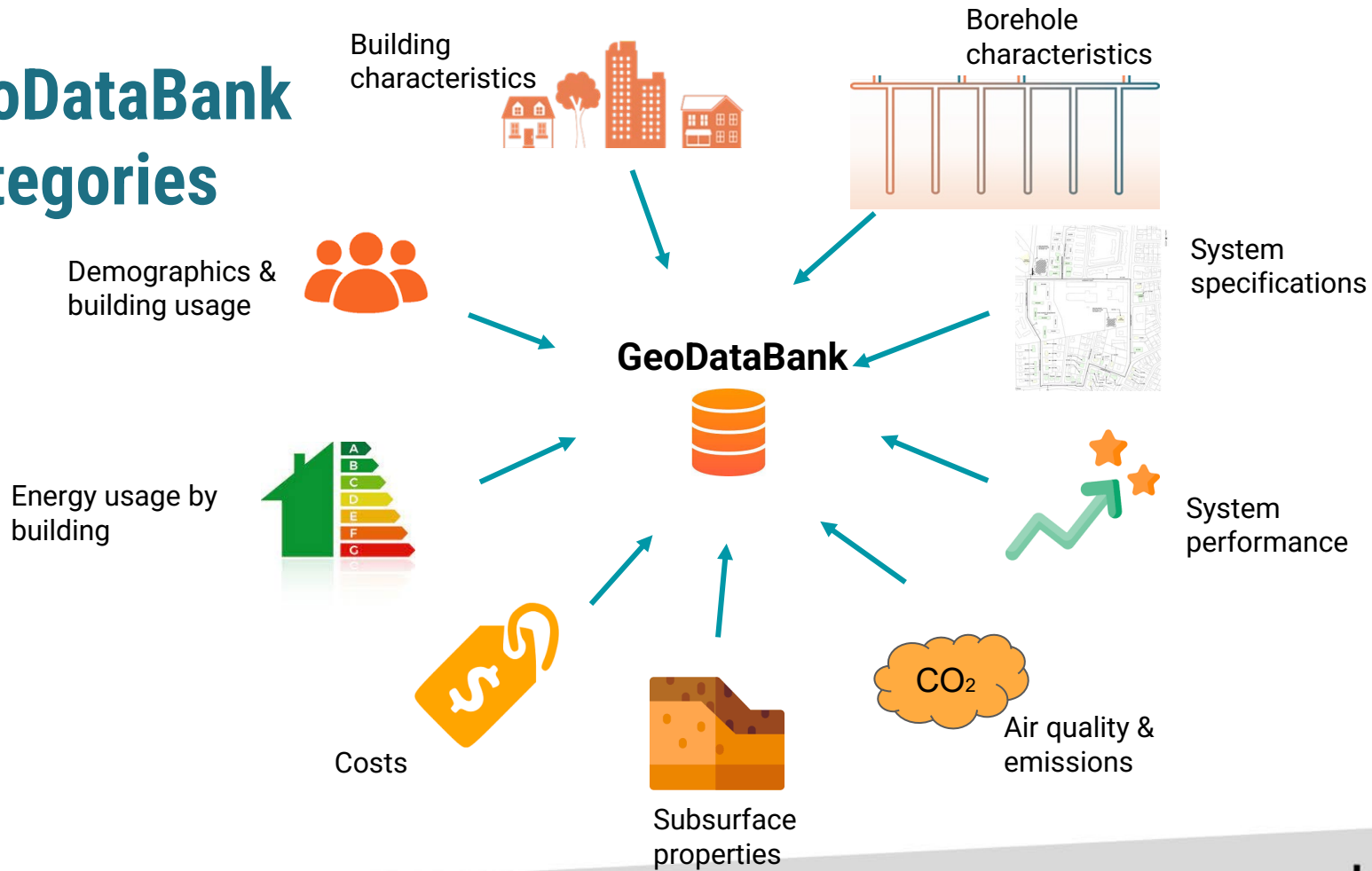
- **What** A **public data bank** of networked ground-source heat pump installations
- **Why** to **inform and facilitate** future developments, enabling societal-scale building decarbonization

GeoDataBank

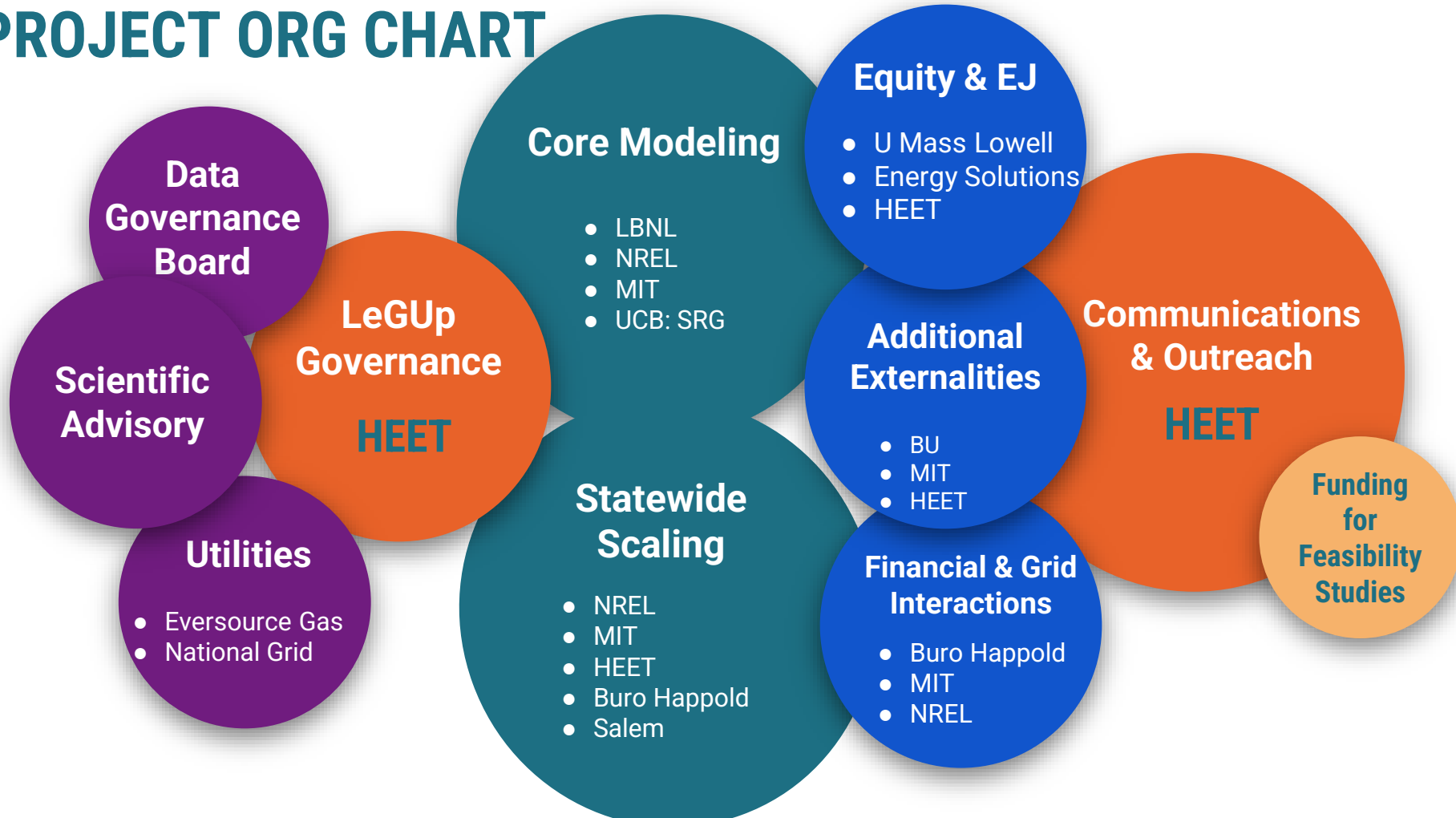


- **What** A public data bank of networked ground-source heat pump installations
- **Why** to inform and facilitate future developments, enabling societal-scale building decarbonization

GeoDataBank Categories



PROJECT ORG CHART



OPERATIONS IN FRAMINGHAM, MA (SEP, 2023)



LeGUp Team



SOGA RESEARCH GROUP
BERKELEY ENGINEERING



heet



the GreyEdge group



MASSCEC

BURO HAPPOLD



nationalgrid



EVERSOURCE

