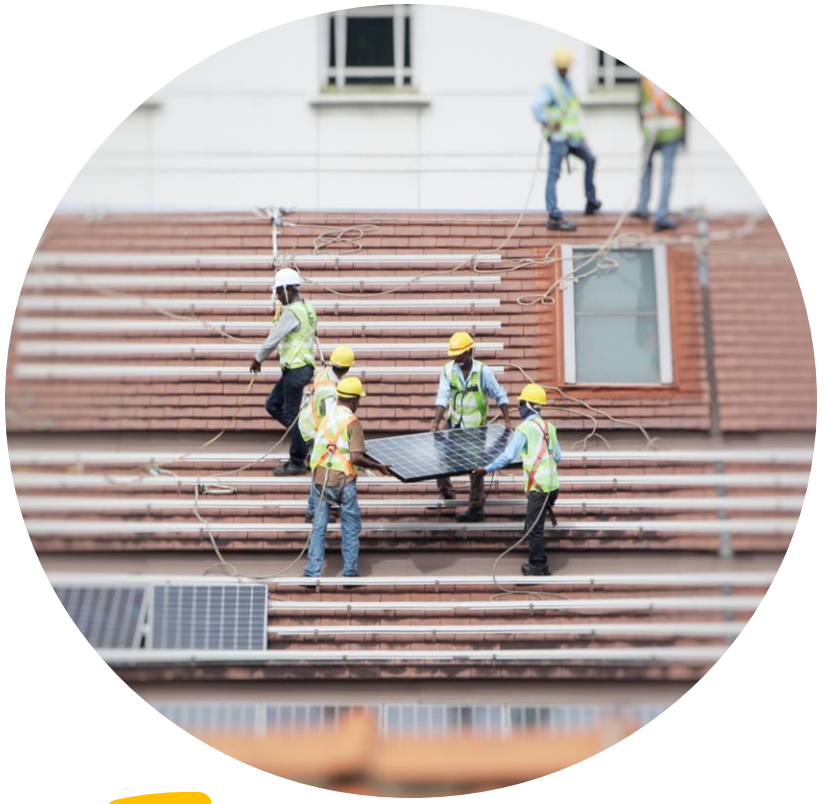
Energy Resilience in Milton



Town Center Microgrid Project

Department of Planning & Community Development,

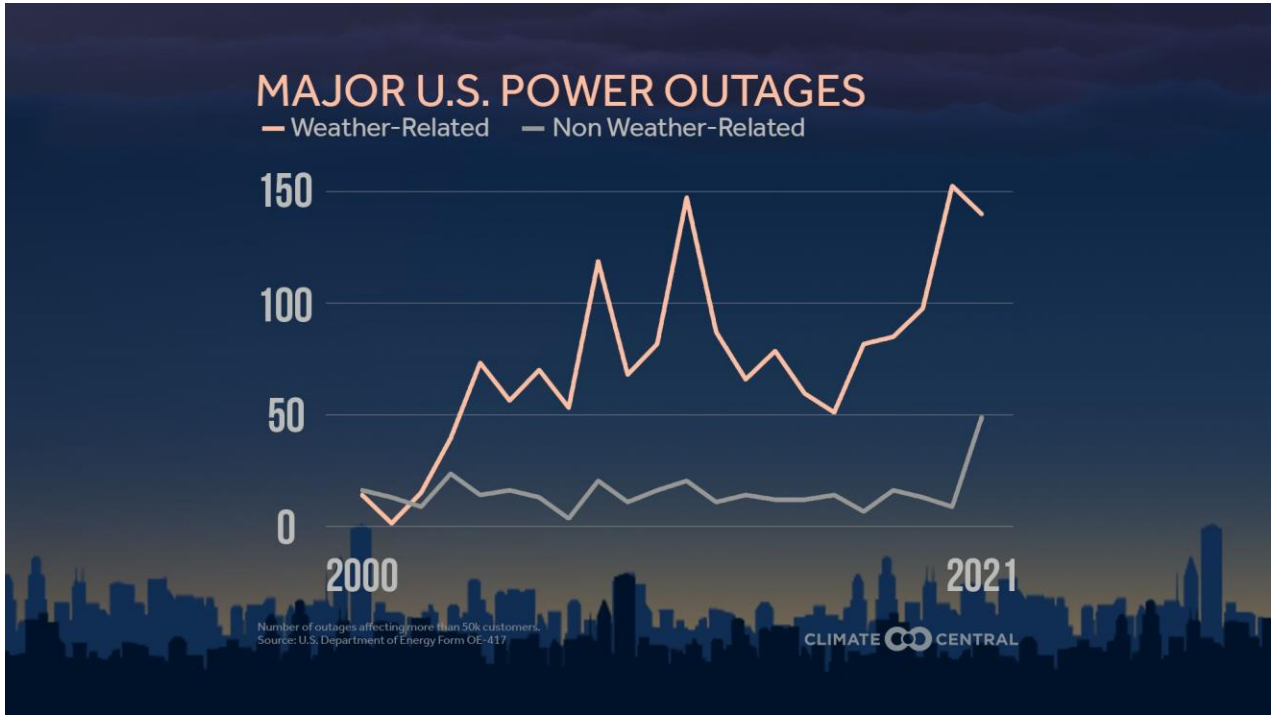
Four Key Questions

- Why are we doing this project?
- What is a microgrid?
- What does this project entail?
- What happens next?

Why are we doing this project?

Climate Change Threatens Our Grid

- Climate change is causing increasingly extreme weather events including extreme cold, heat waves, and severe storms, that stress or directly damage our energy infrastructure
- Power outages are becoming more frequent and more impactful in the face of more severe weather



Reliable Clean Energy is Critical

- Emergency services and municipal operations require a reliable flow of electricity to serve our community
- Medical devices and elder-care technology also require consistent power
- Traditional generators are particularly dirty and rely on having a backup of fuel available

Alignment with Town Goals

Municipal Vulnerability Preparedness Workshops

Priority Action #3 "Complete a feasibility study of microgrid power and renewable energy options for the town"

Milton Master Plan

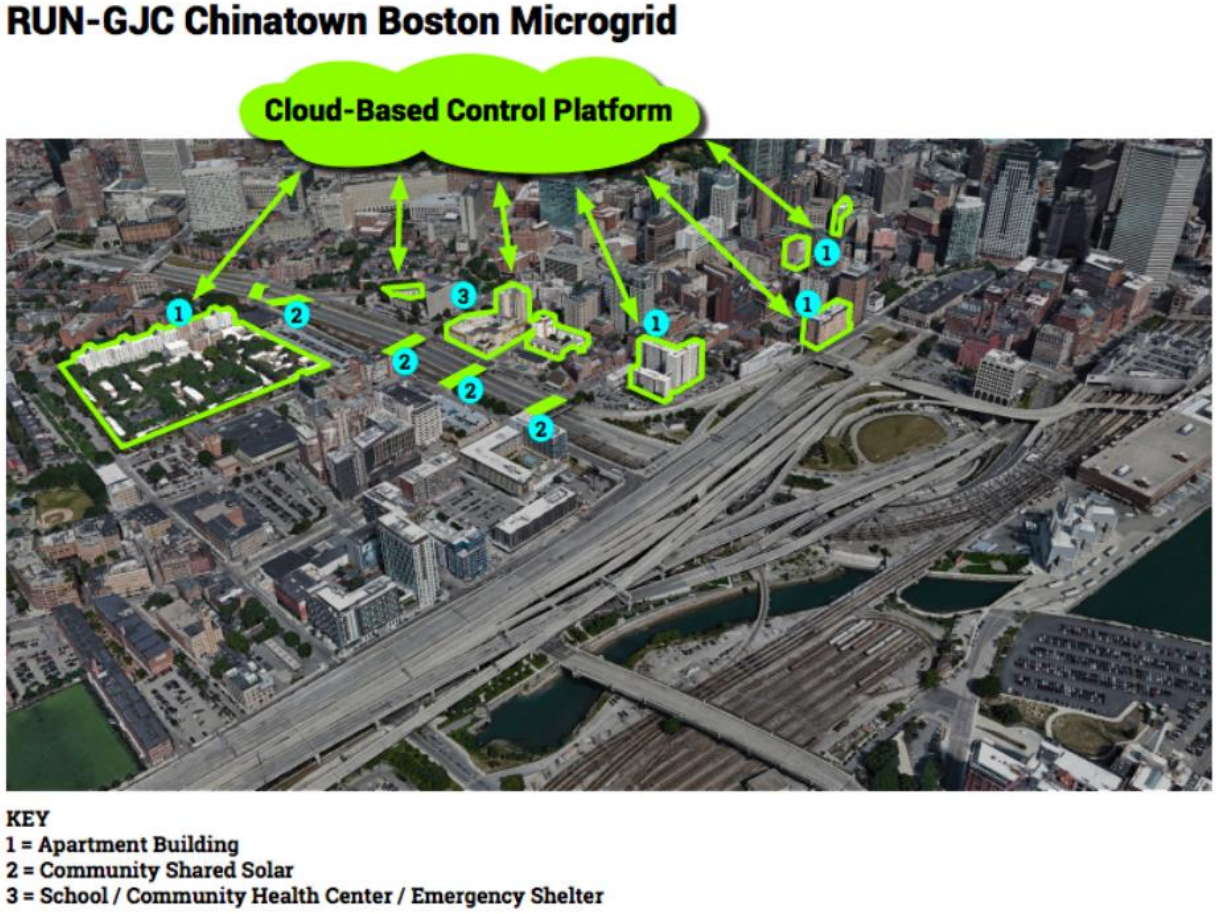
Goal 6.2: Continue to provide Milton Residents With State-Of-The-Art Municipal Services & Continue to focus on implementing sustainability measures

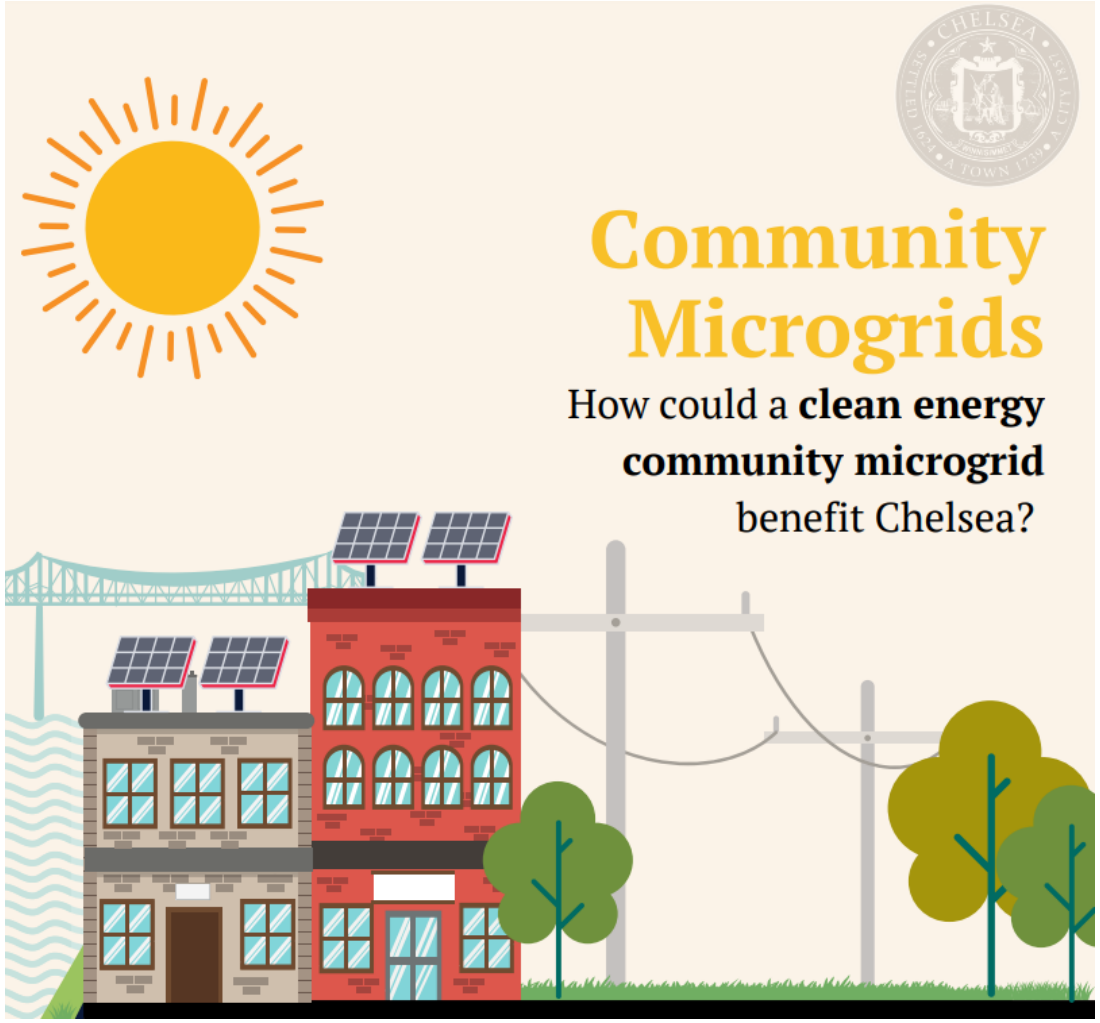
Goal 6.3: Provide support to specific demographic groups in town & Support a growing elderly population wishing to "age in place"

Housing Production Plan

Promotes energy efficiencies and other sustainability provisions

Following the Lead of Our Neighbors





MAPC Accelerating Climate Resilience Grant

"Advance strategies that protect people, places, and communities from the impacts of climate change."

Long-term, innovative changes

Climate equity, regional coordination, and social cohesion

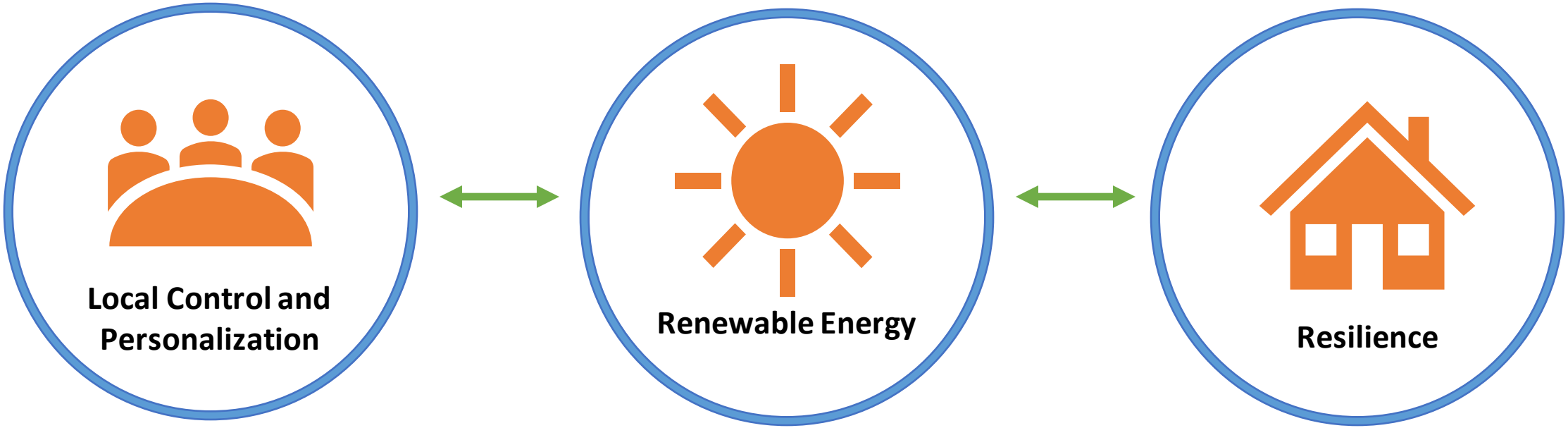
What is a microgrid?

Defining a Microgrid

"a small network of electricity users with a local source of supply that is usually attached to a centralized national grid but is able to function independently".

From Canary Media; Nigerian Microgrid

Why Microgrids?

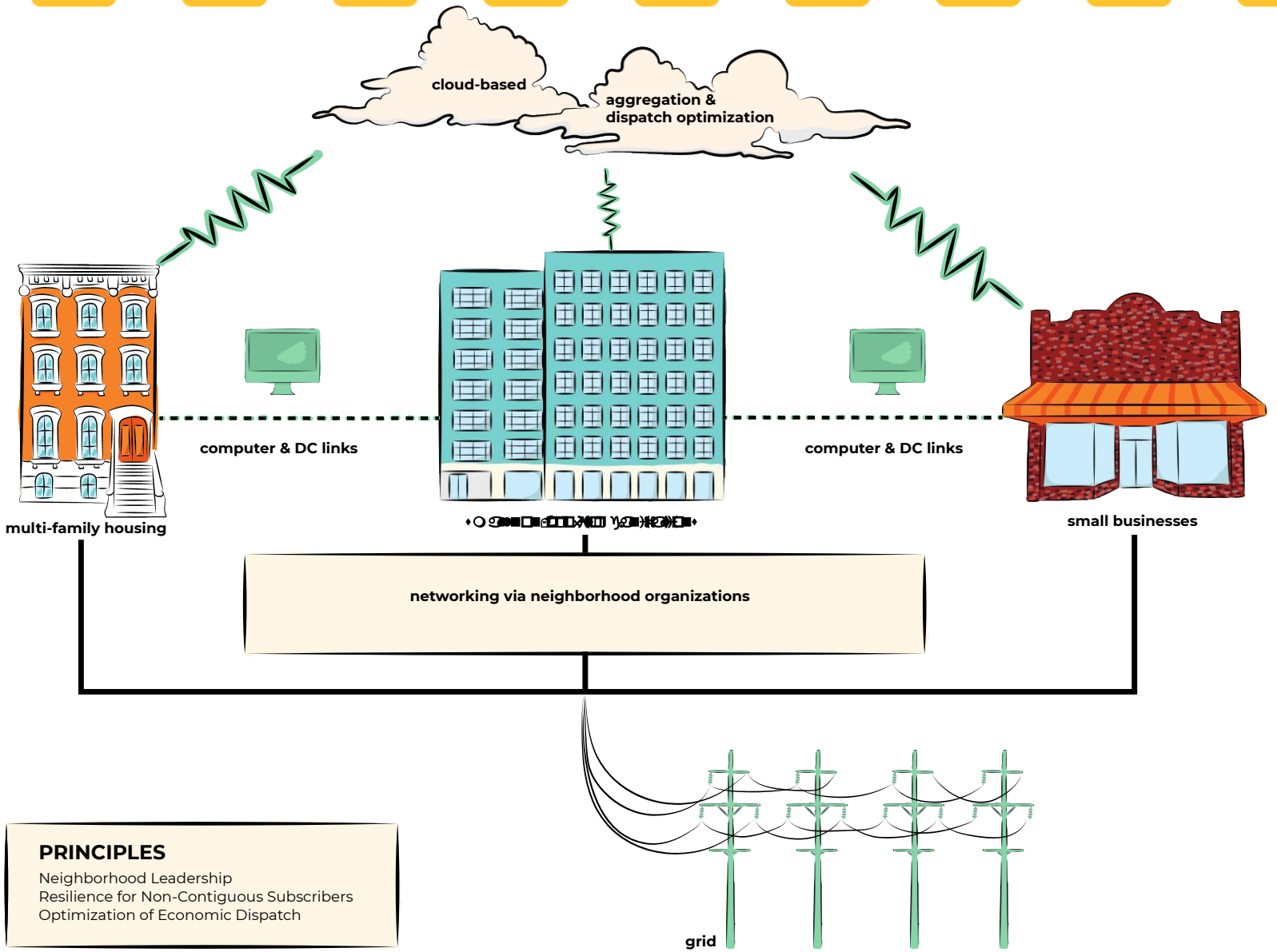


1. Microgrids give a personal experience
2. There is local control and user voice in design, installation, and operation

1. Solar microgrids reduce reliance on fossil fuels
2. Solar energy is cheaper than gas

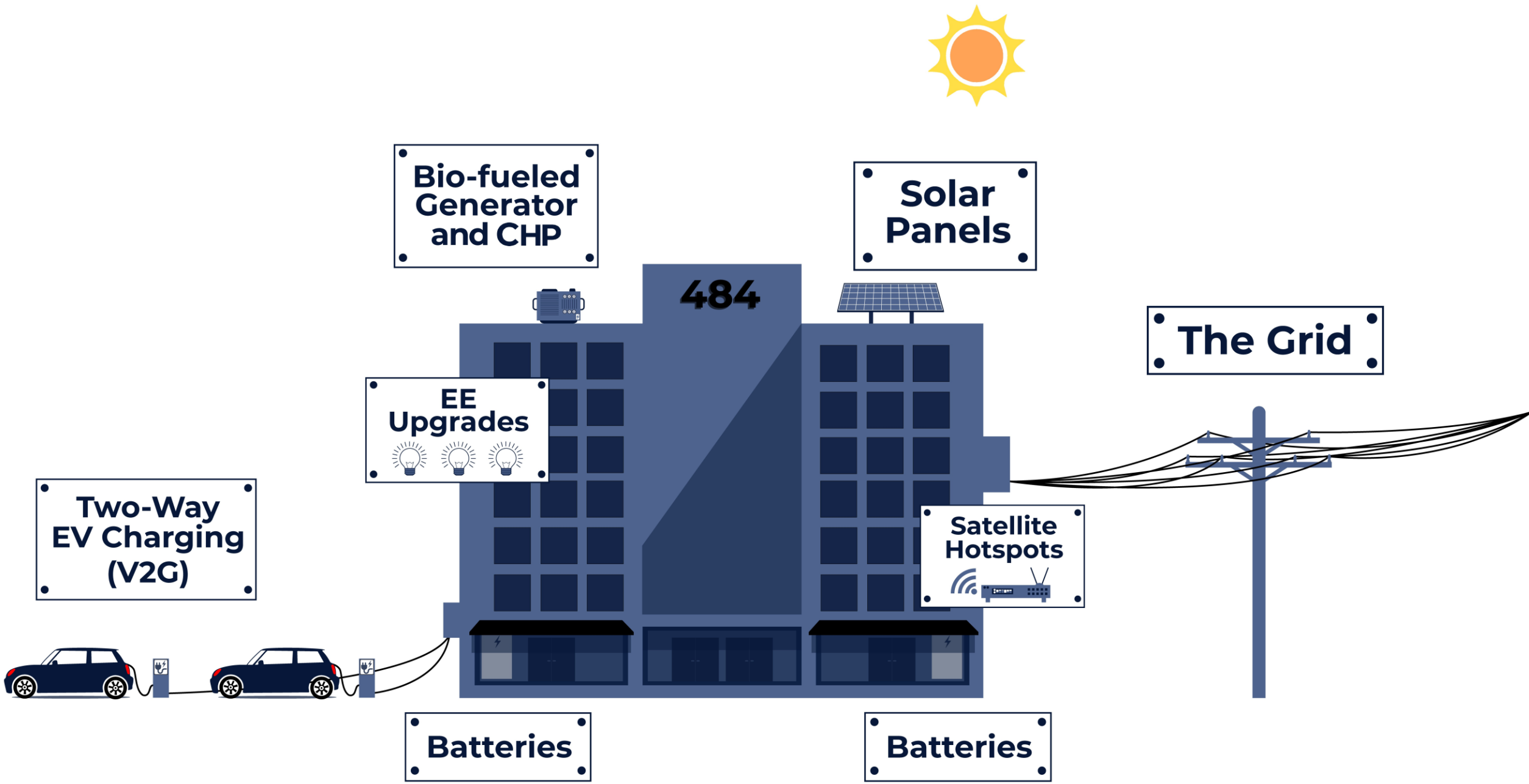
1. “islanding” power through battery storage means more resilience
2. Adaptable to future challenges

How It Works



PRINCIPLES

Neighborhood Leadership
Resilience for Non-Contiguous Subscribers
Optimization of Economic Dispatch


Bio-fueled Generator and CHP
Solar Panels
484
The Grid
EE Upgrades
Two-Way EV Charging (V2G)
Satellite Hotspots
Batteries
Batteries

MA Clean Energy Center Assessment

- 2019 – CEC issues RFP to cities in MA
- Objective: to determine feasibility and design of “Community Microgrids” (Solar + Batteries provide green resilience + savings)
- 14 awards, including Boston’s Chinatown and Chelsea
- Technical Assistance award to Clean Energy Solutions, Inc.
- CESI shared award with GreenRoots and Chinese Progressive association to lead neighborhood guidance
- Formed “RUN-GJC” coalition with Community Labor United, Peregrine (Chelsea’s CCA consultant), Synapse, Climable, others
- Legal advice from Brown Rudnick, CLF, LSO

Proof of Concept

- MA CEC challenged the Coalition to prove feasibility:
  - > Technical – will it work
  - > Financial – is it bankable and sustainable
  - > Governance – can it be locally managed in EJ communities
  - > Marketing – will building owners, community reps, etc. sign up
  - > Legal – can it be launched & run under current law & regulations
  - > Compatibility with utility – will Eversource approve it
- CEC insisted on "external validation" by national labs & experts
- CESI's Chairman assigned to lead the assessment

Industry growth and selection of an “ESCO”

- Today there are hundreds of microgrids operating profitably, but few in EJ neighborhoods and without borders
- See *Microgrid Knowledge,* MA CEC, Clean Energy Group for examples
- RUN-GJC assisted the Chelsea and Chinatown with RFPs and got multiple responses from major industry leaders
- Ameresco was chosen in Chelsea and Consigli/Arup/Renew Energy in Chinatown, for their depth of experience and commitment to City and community leadership
  - Milton has conducted initial outreach to Ameresco to learn about their work in Chelsea
- Chap. 25A procurement used
- US EPA, DOE, HUD, and IRS providing $ billions to grow this industry

What does this project entail?

Project Area

- Milton Town Hall
- Milton Police HQ
- Winter Valley Residences

Project Scope

Energy Audit

- Completed on-site inspections, data gathering and analysis
- Interviewed Winter Valley and Town managers
- Objectives: (1) to find opportunities for
  a) energy-efficiency improvements & savings
  b) solar energy installations
  c) resilience via energy storage
  d) electrification
  e) any necessary electrical and building upgrades

  and (2) to estimate costs, savings, other revenues, and investment supported
- Draft report submitted for Winter Valley; Town Hall and Police HQ in progress

Summary of Energy Audit Findings

- Energy Efficiency – Winter Valley has done excellent work on all energy systems and building envelope. Heat pumps could replace some heating and air conditioning. Water savings may be possible. Electrification essentially complete. No major electrical or structural upgrades urgent.
- Solar Energy – about **40%** of WV annual shared-spaces consumption could be replaced by solar panels on roofs of buildings 1-4 and the community building (about 140 kW in all). Some ground-mounted and canopy installations may add to this. Resident sharing possible via Community Solar
- Resilience – 54 kW of backup will carry each of buildings 1-4 main meters but 80 kW more needed to power all residential units in each. Building 5 and the community building master meters would each require 36 kW.
- Duration of Resilience depends on weather, behavior, and investment. (The combination of batteries, generators, and wiring of loads will require design detailing)
- Residential savings possible using heat pumps but utility allowances may offset
- Cell phone & internet backup – satellite “hotspot” recommended

Energy Load Assessment

- Shared space and offices in each building had maximum loads between 38 and 49 kW (winter peak) for 4 buildings and 17 kW (summer peak) for the 5th building in 2022. The community building peak was 48 kW in winter.
- Residential units are not demand-metered but likely have ~3 kW of maximum load each, since they are electrically heated (except for building #5 which is oil-heated) and cooled. The total coincident residential load in the first 4 buildings probably peaks at about **75-80 kW** each
- It is possible to share backup power among units by installing transfer switches which is already in the design for the new generator at building #5.

Feasibility Analysis

- The total WV campus including apartments could be backed up by (e.g.) two Model “ELM Microgrid 250” BESS units, 550 kWh version, made by Current Energy Storage Inc., which we are planning for Cambridge Community Center
- Apartment resilience requires connecting automatic transfer switches to the central BESS & generators
- Based on recent bids, total cost would be about $1.5 million for WV Solar + BESS. Including new federal grants yields a financeable return on investment
- Town Hall and Police HQ (and future buildings) can be included in microgrid by cloud-based controls.
- Considering inter-building sharing of solar & BESS, to save $$ and space – both wired and community solar options

Community Meetings

What happens next?

Project Timeline

	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Kickoff Meeting												
Task 2: Energy Audit												
Task 3: Energy Load Assessment												
Task 4: Community Meetings												
Task 5: Initial Feasibility Study												
Task 6: Final Feasibility Study												

Next Steps

- Energy audit of all three sites is nearing completion
- Discussions with Eversource engineers
- Town & WV discussions of resilience and heat pump trade-offs
- Feasibility study drafted
- Subsequent Community meetings

Project Outcomes

- This project will end with a complete feasibility analysis and recommendations for how Milton could develop a community microgrid
- This project **does not include** the actual installation of a microgrid, nor does it commit us to a certain path
- Gives us the framework to begin addressing the energy concerns of Milton's residents

Q & A

Thank you!