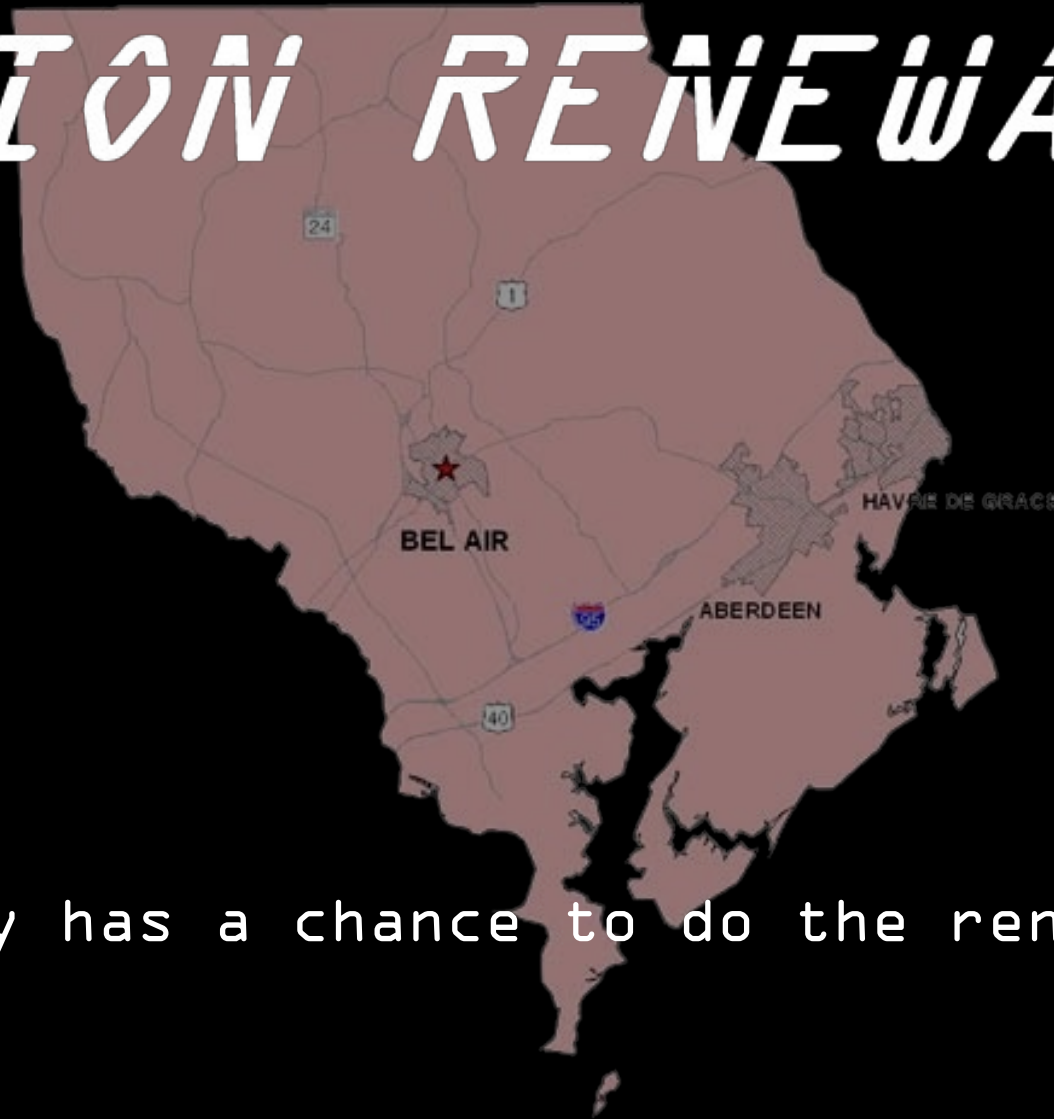


Therm Firm presents...

# *MISSION RENEWABLE*



One county has a chance to do the renewable

# Character of Harford County

- Agriculture is a major industry in Harford County
- Commercial areas (Development Envelope) dominate southern industry
- Both must be considered when planning renewable energy
- All sectors of Harford County are threatened by a changing climate



## Harford County Agriculture: By The Numbers

628 Farms



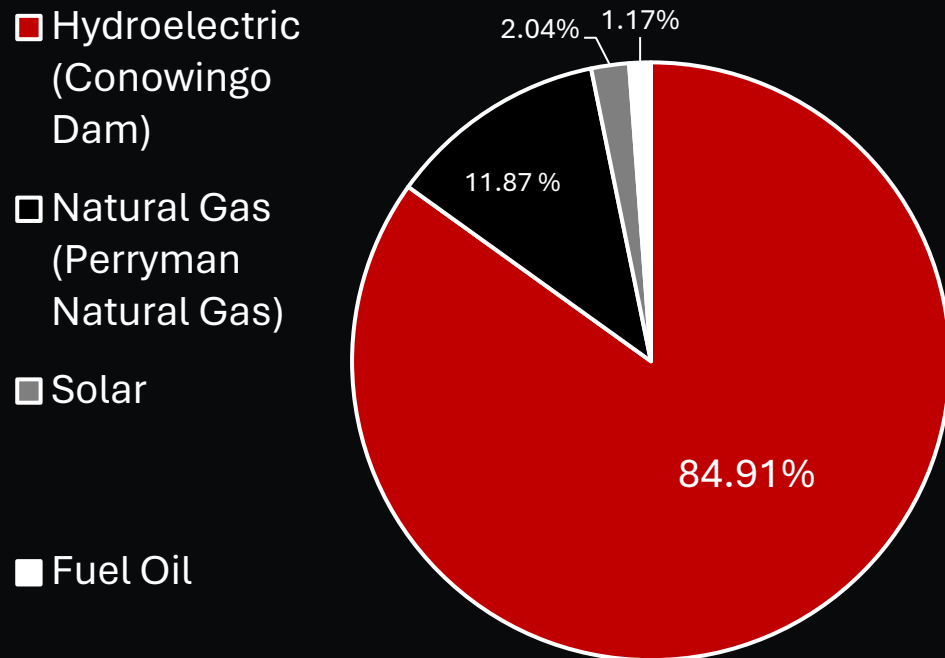
75000 Acres of Farmland

45 Million USD in Goods Produced Annually

Source: 2017 Farm Census

# Current Energy in Harford County

## % of Energy Production



Utility energy production: 2.1 million MWh (8.07 MWh/person)

Energy from renewables: 1.9 million MWh

## Existing Issues

- Longevity issues with the Conowingo Dam
- Low energy diversity throughout the county

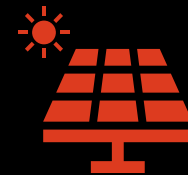
# Three-Tiered Mission



Energy Efficiency



Diversifying Sustainable Energy



Impact Assessment



# Improving Efficiency

## How can we improve efficiency?

- Building automation
- Combined Heat and Power Systems
- LED lighting

## How can our local government help?

- Green standards for new buildings constructed after 2025
- Energy efficiency project in Downtown Bel Air

## Downtown Bel Air Building Efficiency: By the Numbers

6.1 Million USD to Install

6.1 Million lbs of Carbon  
Emissions Reduced

6.9 Million kWh of Energy  
Reduced by BAS and CHP

Up to 950000 USD Saved  
Annually



# Diversifying Sustainable Energy



# Renewable Energy Sources

Geothermal

Solar - Microgrids

Anaerobic Digestion

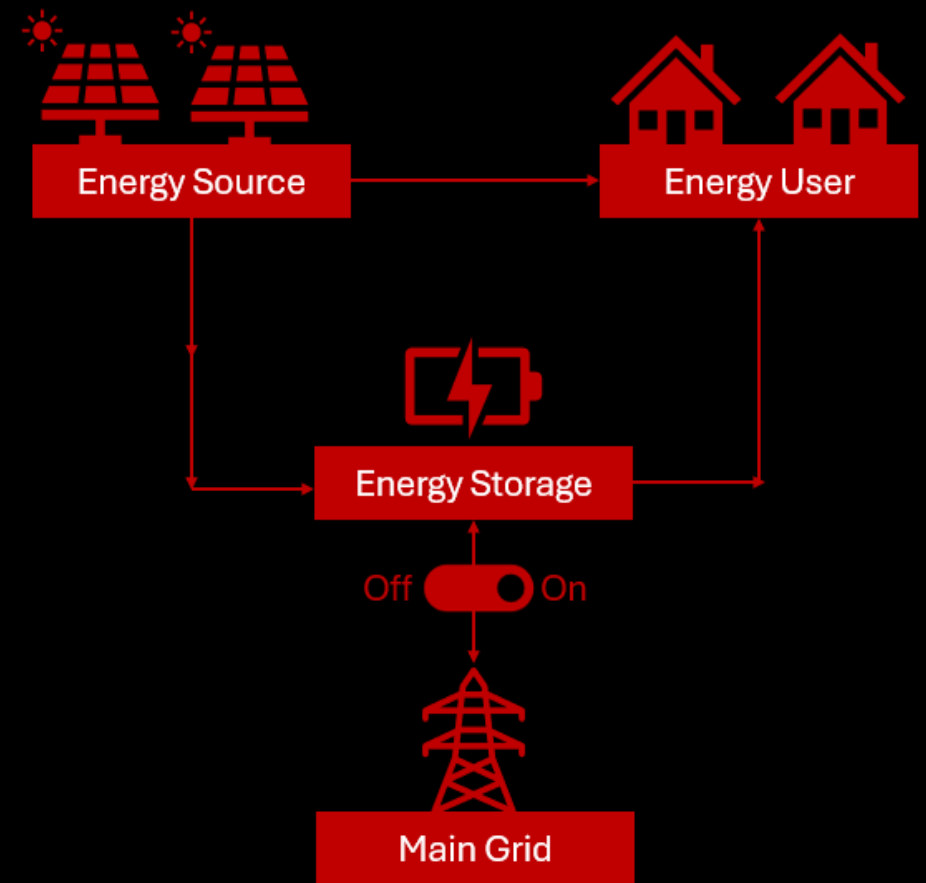
# Solar - Microgrids

## *What is it?*

- A small, localized electrical grid
- A way to make solar panels viable
- Benefits grid flexibility

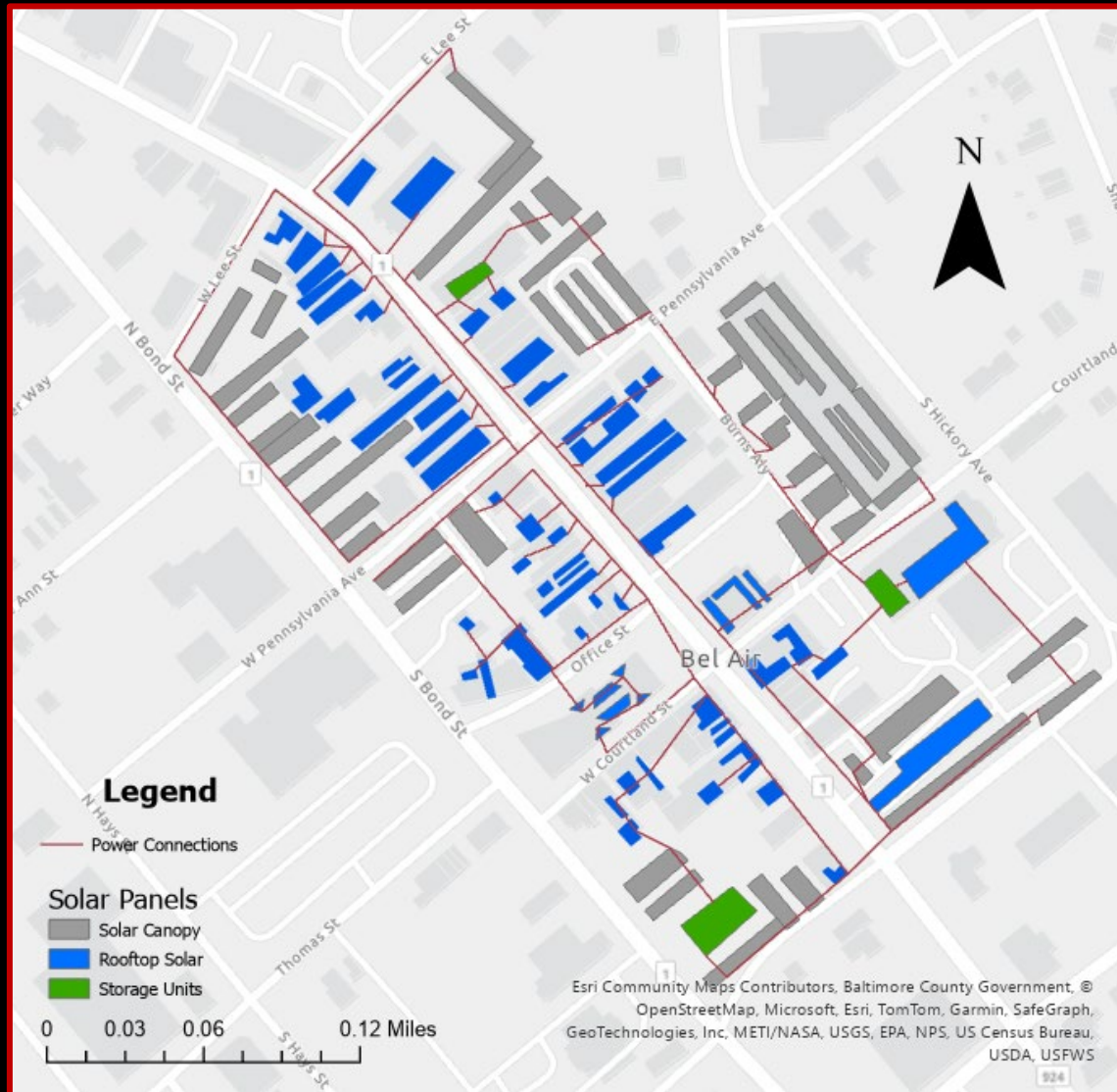
## *How do we implement it?*

- Microgrid Development Team
- Funding from FEMA and DOE





# Bel Air Microgrid



## What is it?

- A pilot program in downtown Bel Air
- Provides clean energy to urban areas

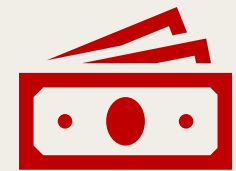
## How is it implemented?

- Energy generated by solar panels
- Energy stored by batteries

## Bel Air Solar Project: By the Numbers



12.3 Million kWh of Electricity  
Produced Annually



3.2 Million USD Saved  
Annually

27 Million lbs of Carbon  
Emission Reduced Annually

7.6 Million USD to Install

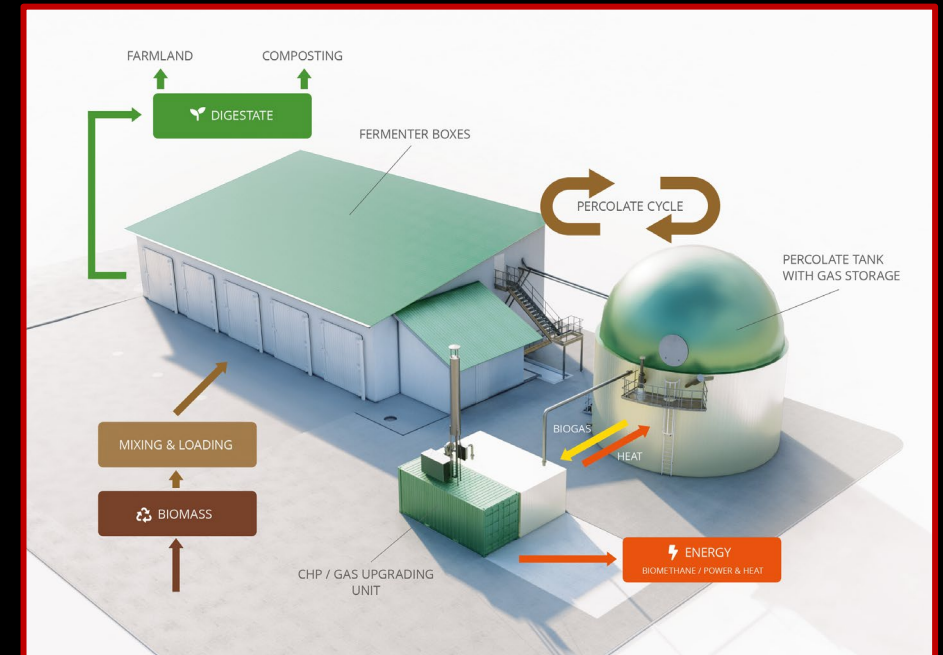
# Anaerobic Digestion in Harford County

## *What is Anaerobic Digestion?*

- Bacteria breaks down organic matter
- Requires an oxygen-free container
- Introduces cleaner transitional fuels

## *What does it create?*

- Renewable Natural Gas (RNG)
- Digestate, an organic soil amendment



# Proposed - Creswell **Digester**

## *Location*

- Two-Tank Digester in Creswell, Harford County
- Parcel purchased from the Churchville Quarry
- Distribution centers in Fallston and North Harford

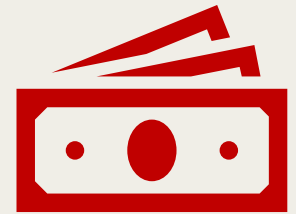
## *Funding*

- Grants required to break even with initial cost
- Per-ton charges for drop-offs

## Creswell Digester: By the Numbers



Up to 19.4 Million kWh of Green Electricity Produced Annually

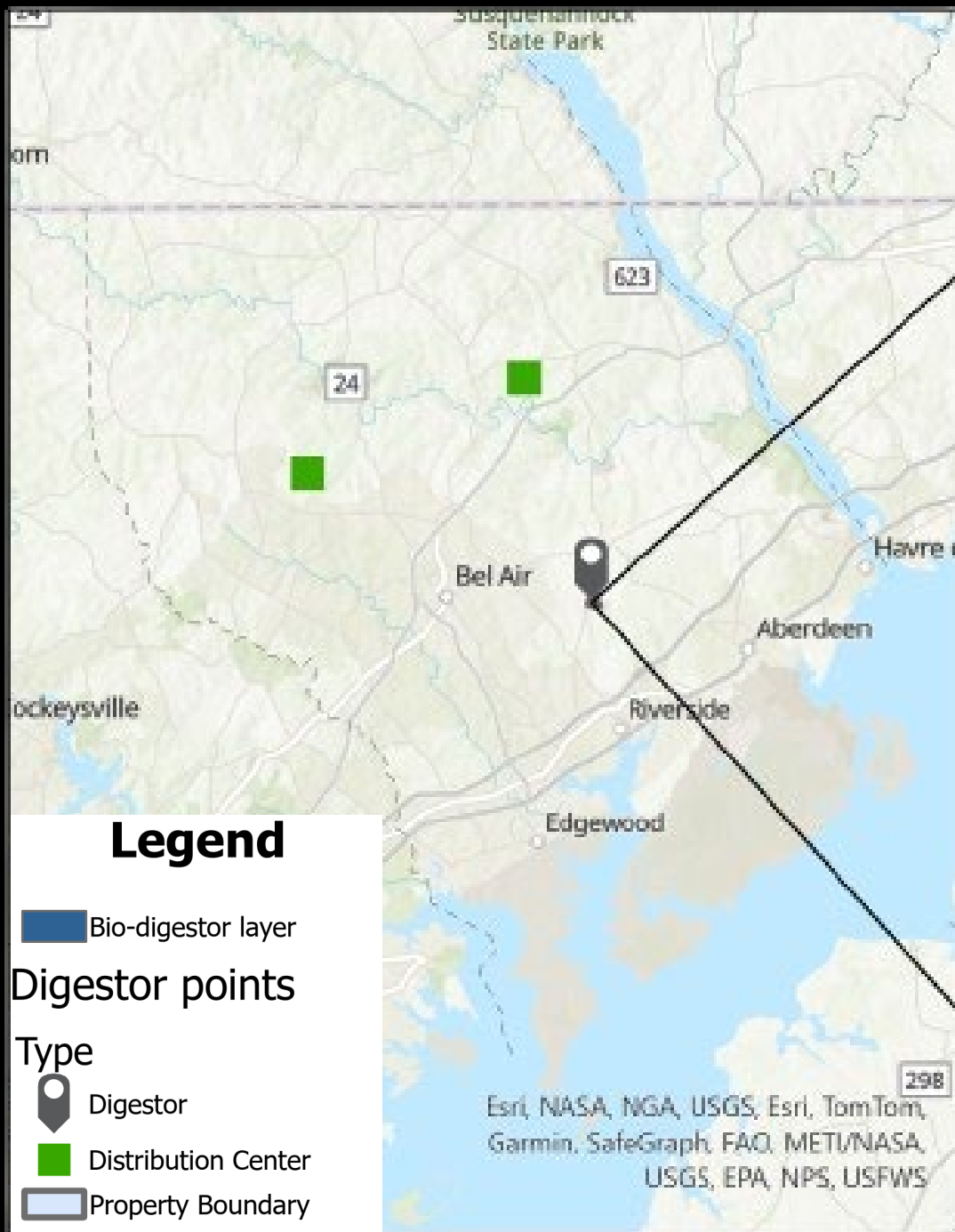


8.3 Million USD in Annual Savings

60-80 Million USD to Install in Creswell

11 Million USD in Annual Management Costs

21000 Tons of Carbon Emissions Reduced Annually



# Geothermal HVAC and Agrisolar

## *What is it?*

- Dual-use methods to create energy and heating
- Viable clean energy solution for agricultural areas



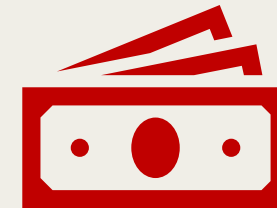
## *What are its benefits?*

- Geothermal reduces HVAC costs and energy demand
- Agrisolar increase efficiency of energy and crops

## *How will it be implemented?*

- Dublin Ag Center Pilot Program
- Incentives for farm installation

## Dublin Farm System: By the Numbers



USD 1.6 Million  
Saved in Utility  
Costs Annually

USD 2.4 Million to  
Install Geothermal  
and Solar

8.6 Million kWh of  
Energy Produced

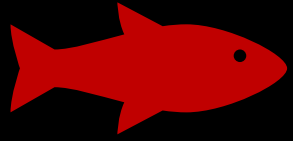
# 30-Year Cost Breakdown

Money In		Money Out	
Dublin Ag. Renewable Energy	\$72 Million	Operations Costs	\$262.5 Million
Building Efficiency	\$18 Million	Up-Front Costs	\$82 Million
Bel Air Microgrid	\$96 Million	Insurance	\$12 Million
Biodigester	\$249 Million	Property Tax	\$7.5 Million
Tax Investment Credit	\$24.6 million	-	-
Revenue Total	\$435 Million	Costs Total	\$364 Million

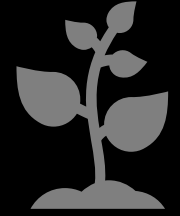
Total Profit: **\$95.6 Million**

# Impact Assessment





# Environmental Impacts



## Wildlife and Aquatic Impacts:

- Fragment existing wildlife habitat
- Alter river hydrology, fish migration, and water pollution

## Forest and Soil Impacts:

- Cause deforestation and reduce forest health
- Increase soil erosion and reduce soil health

## Our solutions:

- Incentivize use of digestate to improve soil health
- Construct renewable energy in pre-developed areas
- Retrofit the Conowingo Dam





# Community **Impacts**

## People

- Renewable education/outreach
- Energy literacy
- Public Forums
- Public Education Campaign

## The economy

- Economic growth
- Job creation

## Business Partnerships

- Veterans Compost
- Microgrids
- Town of Bel Air

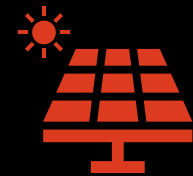
# Three-Tiered Mission



Energy Efficiency



Diversifying Sustainable Energy

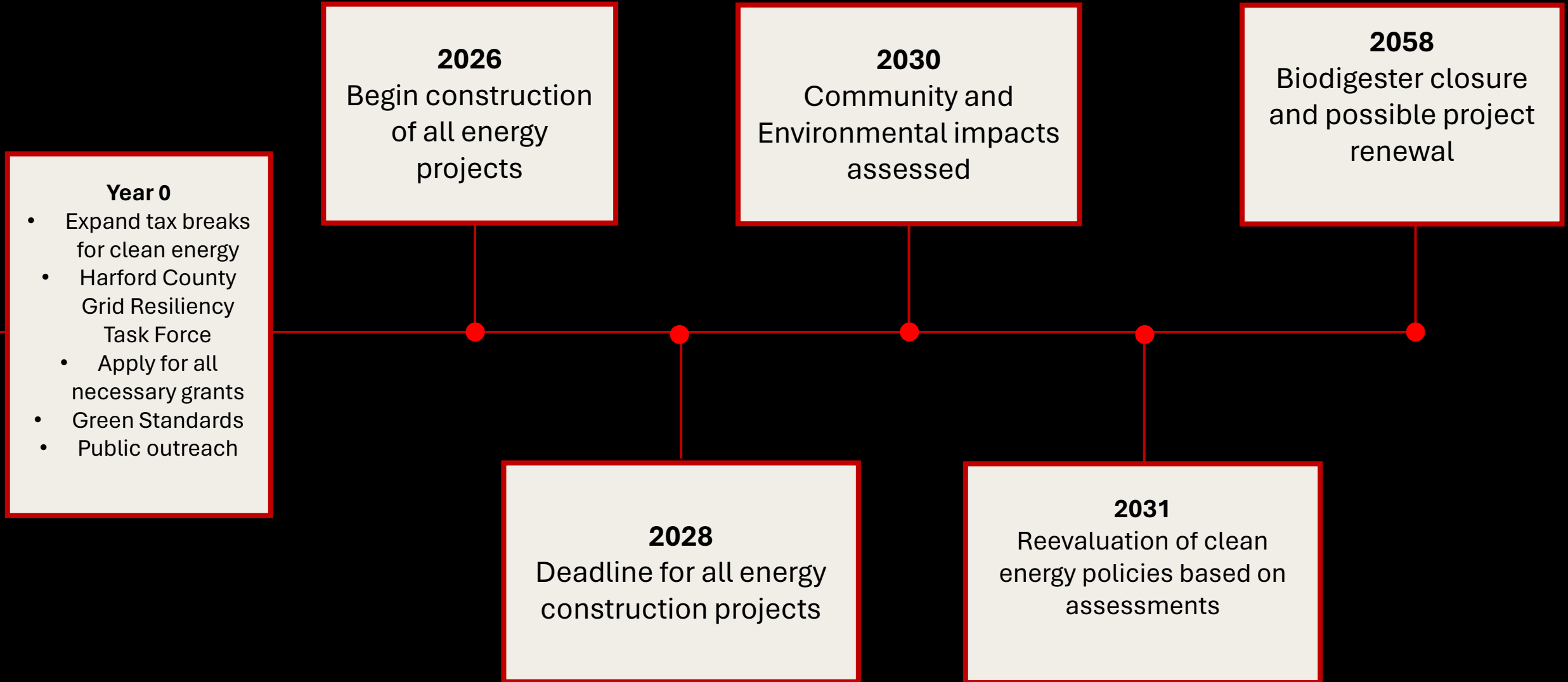


Impact Assessment



Mission...  
Accomplished

# Timeline



# 30-Year Cost Breakdown

