

# 100% Clean Energy by 2050 Resolution

Staff Feasibility Research

June, 2018



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# Introduction

- March – 2018. Commissioner Hutchinson introduced resolutions supporting 100% Clean Energy by 2050.
- GLUE Committee referred to Staff for Feasibility and report back in May.

# 100% Clean Energy Resolution Mandates...

- 100% Clean Energy by 2050
- 80% Clean Energy by 2030
- Phase out of Fossil Fuels by 2050
- All of Wake County
  - All Sectors
  - All Citizens

# 2050 Clean Energy Resolution

Staff Approach: *evaluation based on current technology*

Evaluation Process\*:

- Technical
- Organizational *(first today)*
- Economic

\*2018 Energy Design and Management Guideline Section 1.4

# Organizational Feasibility

## **Do we have the Authority?**

- No legal authority to mandate beyond Wake County Government
- Review addresses Wake County Government facilities and fleet.

## **Can we maintain it?**


- Yes – Future Technology and cost unknown
- Additional Contract maintenance

# Technical Feasibility

## Evaluation

- Define Clean Energy
- Assemble Existing Usage
- Identify methods to convert to 100% Clean Energy
- Identify methods to produce/procure Clean Energy

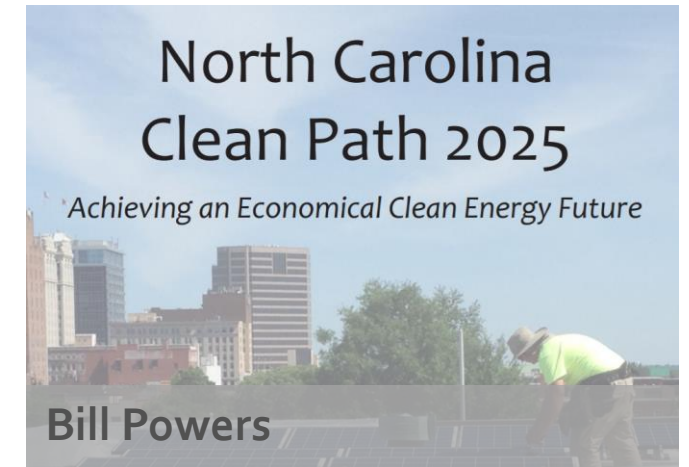
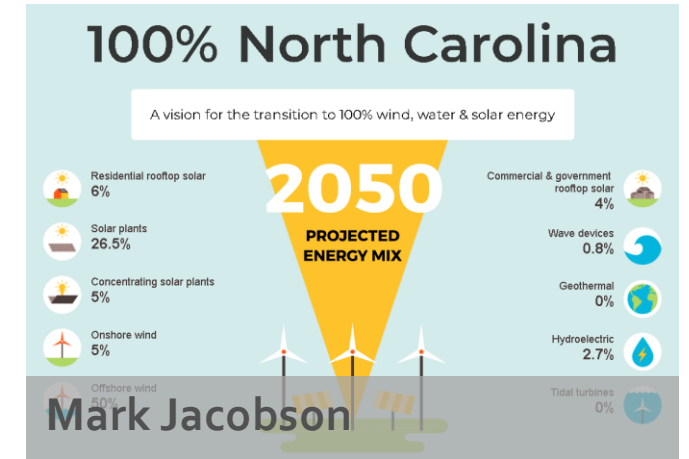
## Clean Energy

- 
- Solar Power
  - Wind Power
  - Geothermal Energy
  - Hydroelectric Power
  - Tidal Power
  - Wave Energy

# Methods to Reach 100%

## Two studies exploring 100% Clean Energy:

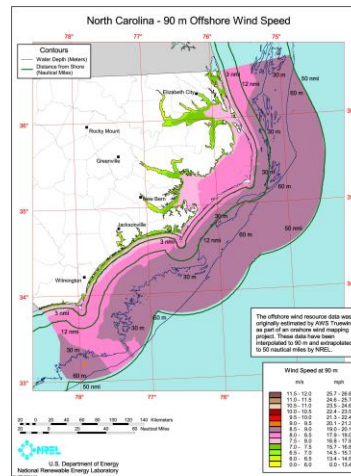
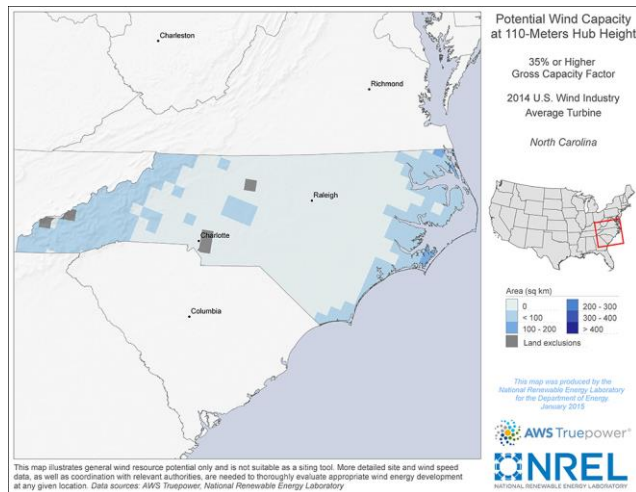
- 100% Clean and Renewable Wind, Water and Sunlight, *Mark Jacobson*
  - All sectors electrified by 2050
  - Solar, Wind, etc. and efficiency
- Clean Path 2025, *Bill Powers*
  - All electric Use
  - Solar and energy efficiency
  - Rooftop, Parking Lot, Ground Mounted Solar with Battery Storage



# NC - Wind and Solar

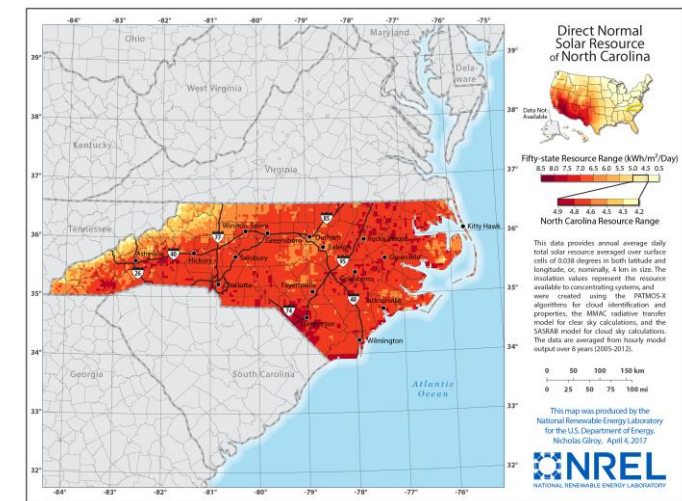
## Wind Energy

- Resource is geographically limited
- Renewable Energy Credit Potential



## Solar Energy

- Resource Availability
- Technology easily scaled

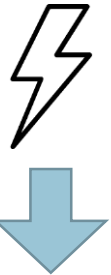




# How?

## 2050 Resolution Scope: Phase out fossil fuels...

Electricity



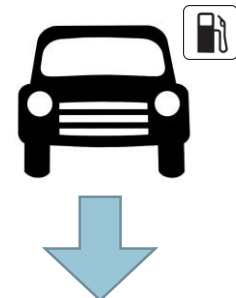
Solar PV  
Install On or Off site  
Solar and/or Purchase  
Clean Energy

Natural Gas



Solar PV  
Convert thermal  
equipment to electrical

Fleet

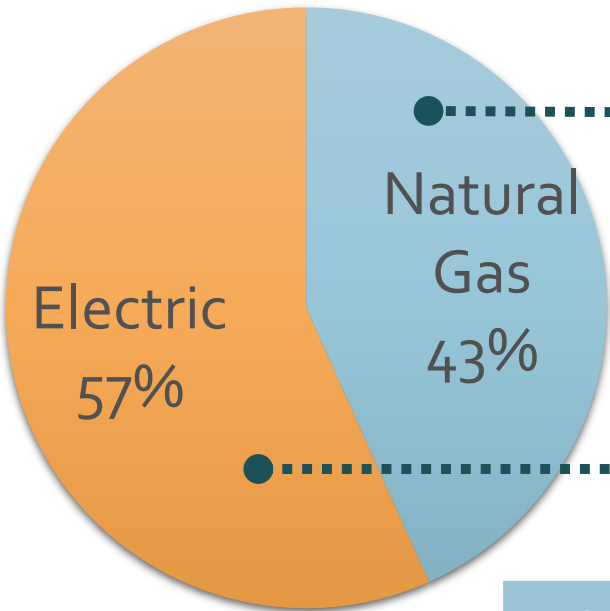


Electric/Hydrogen  
Fuel Cell Fleet  
charged with Clean  
Energy

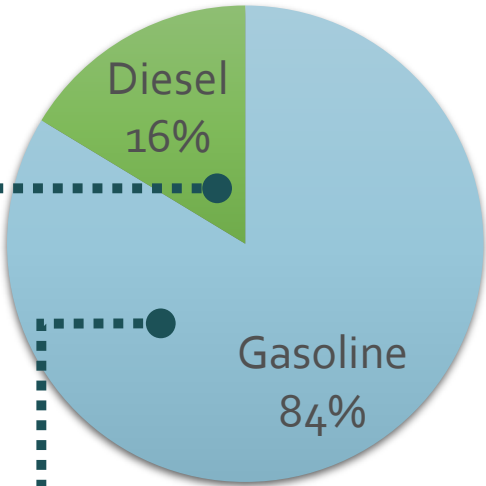
...solutions require solar. How much solar?

# Wake County Energy Consumption

Building Energy Consumption



Fleet Fuel Consumption



52 MW	31 MW	3 MW	8 MW
Solar PV Equivalent for 100% Clean Energy w/ efficiency + utility renewable growth			
80 MW			

# On-site Solar PV Potential

## Roof Top PV Potential

- 30-60% of roof area
- Wake County Facilities:  
5-6 MW Solar PV Potential

## Canopy PV Potential

- Unshaded Parking Area
- Wake County Facilities:  
3-6 MW Solar PV Potential

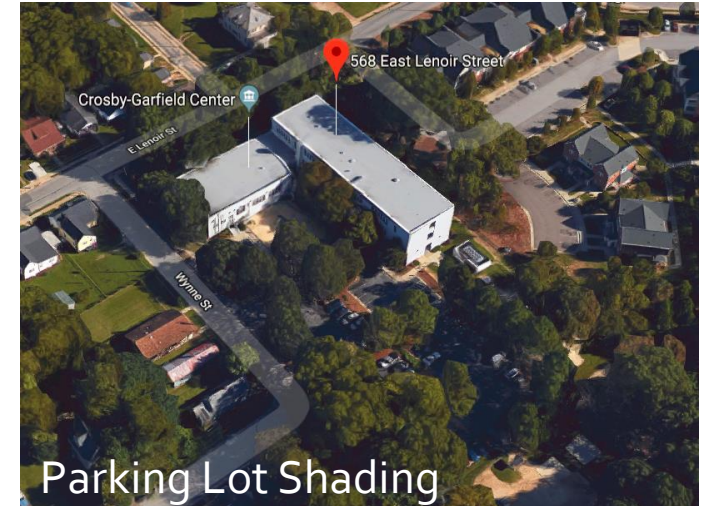
On-site Solar Potential:

**10-15%**



# On-site Limitations

- 10 largest buildings = 70% energy
- Remaining buildings = 30% energy
- Few could achieve 100% energy with on-site solar
- Consider off-site energy production





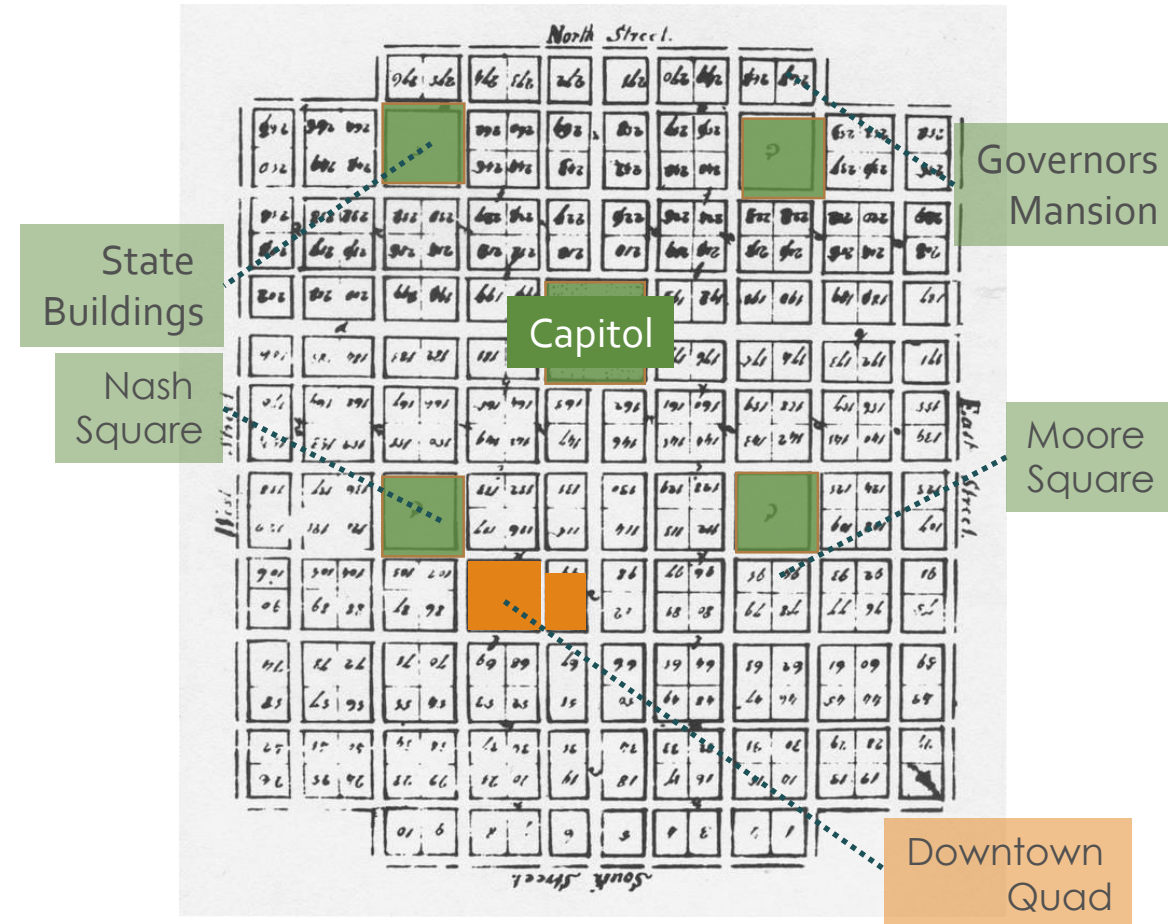
# Technical Challenge Illustrated

## Wake County Facilities

Facilities: 4.8 million ft<sup>2</sup>  
(Downtown: 1.6 million ft<sup>2</sup>)

Fleet: Over 1000 vehicles

Solar PV Needed:  
80 Megawatts, 430 acres



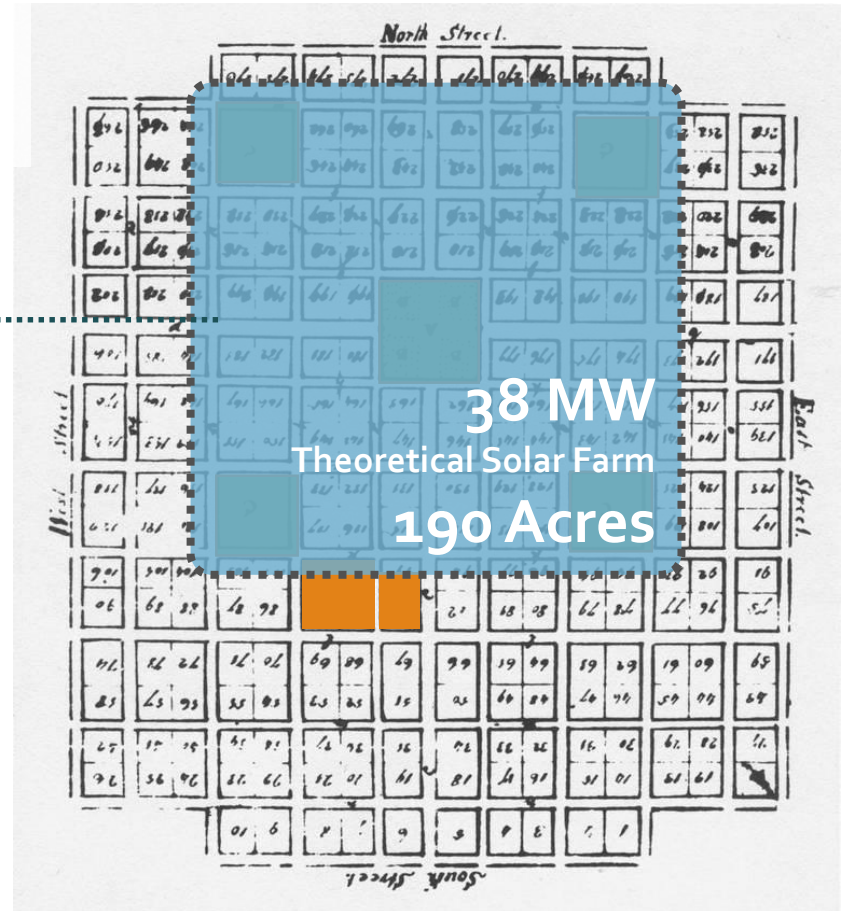
\*William Christmas' Plan for Raleigh 1792

# Technical Challenge Illustrated

## Theoretical Panel – 4 Buildings

### Downtown Quad

Electric and Natural Gas GHG Equivalent:  
38 Megawatts Solar PV, 190 acres



\*William Christmas' Plan for Raleigh 1792

# Technical Challenge Illustrated

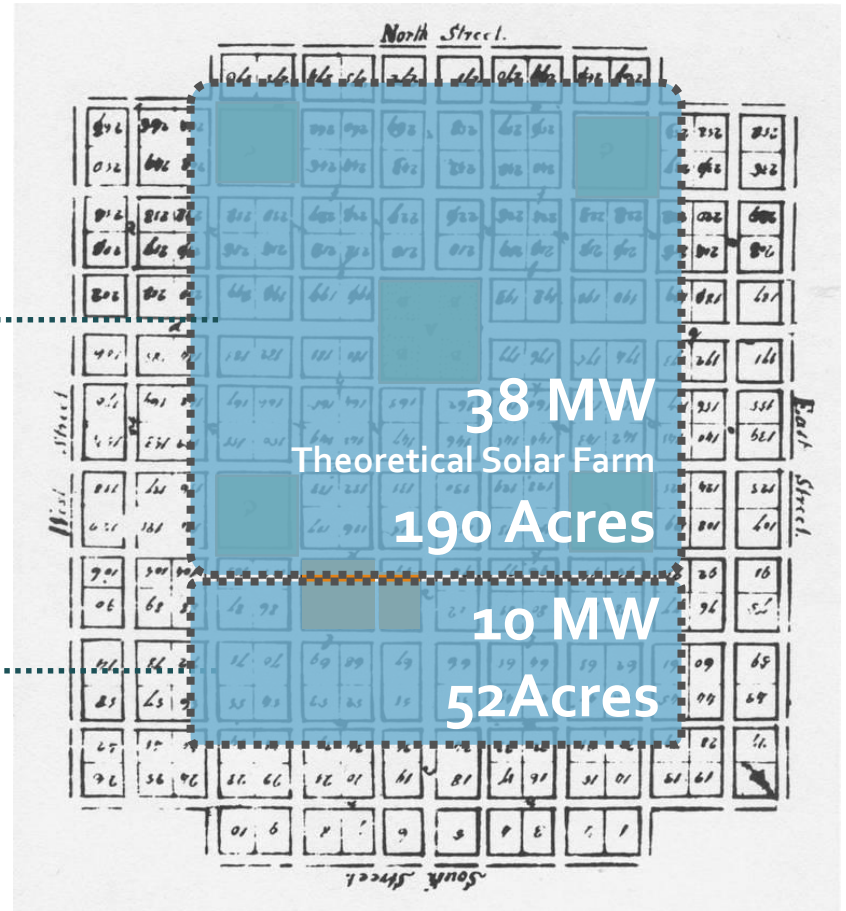
## Theoretical Areas

### Downtown Quad

Electric and Natural Gas GHG Equivalent:  
38 Megawatts Solar PV, 190 acres

### Fleet

Fuel GHG Equivalent:  
10 Megawatts, 52 acres



\*William Christmas' Plan for Raleigh 1792



# Off-site Solar PV Potential

## Utility Scale PV Potential

- Additional:  
70 MW Solar PV Needed
- Would require 350+ acres
- County farm land available, but within future Little River Reservoir
- May or may not be suitable for utility scale development
- Renting land could be an option

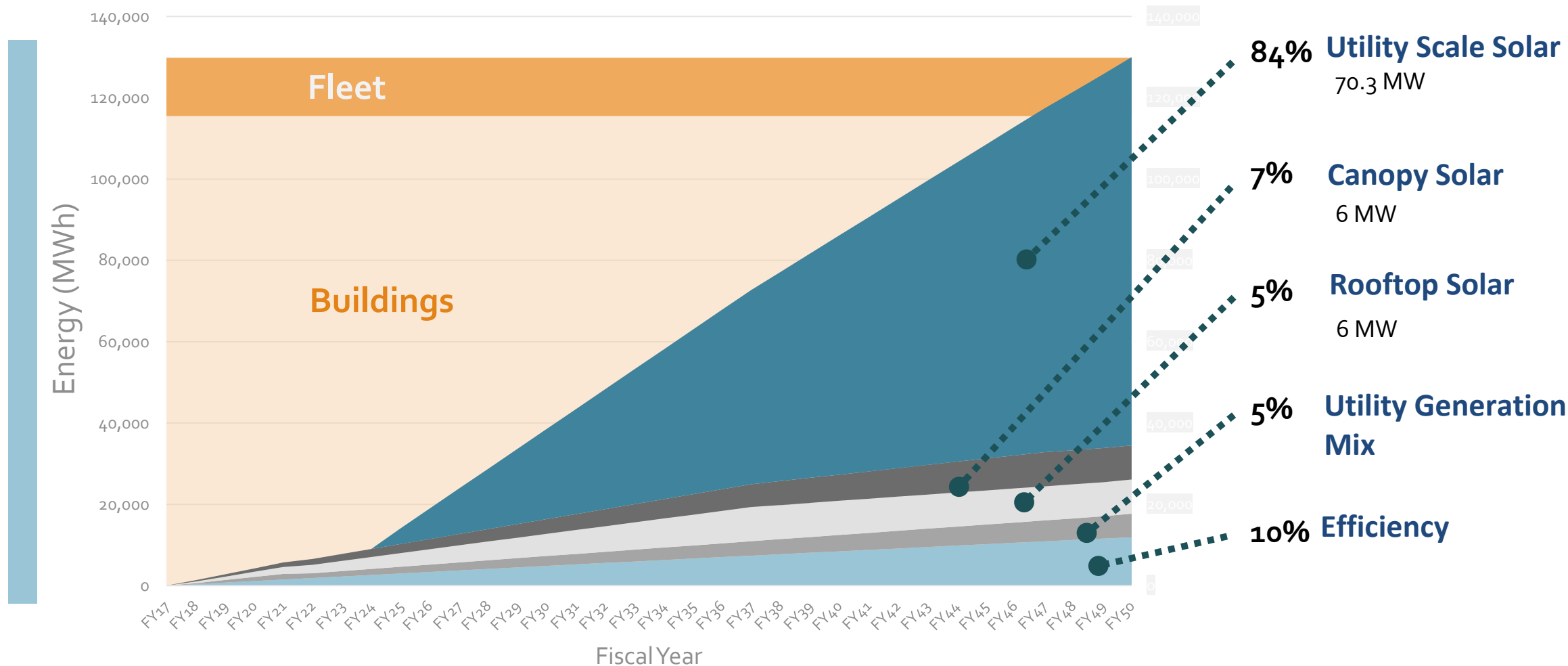
Off-site Solar Need:

80-85%





# Path to 100%



# Technical Feasibility

## 2050 Draft Resolution Not Technically Feasible

- Significant near term work to redesign and convert HVAC systems
- Large land area needed for off site solar production
- Electric and fuel cell vehicles which are not commercially available to plan phase out
- All vehicles to be clean energy including construction vehicles

# Economic Feasibility

On Site	
Building Conversions	\$10.8 million
Vehicles	\$unknown
Efficiency	\$1.2 million
Rooftop Solar	\$15 million
Canopy Solar	\$21 million
\$48 Million Plus	

Off Site	
Utility Scale Solar	\$135 Million
\$135 Million	

**Not Economically Feasible**

# Conclusion & Recommendation

## Conclusion:

- 100% Clean Energy by 2050 is not feasible w/ current technology

## Recommendation:

- Direct staff to work with the Energy Advisory Commission and use the newly adopted energy guidelines to:
  - Maximize renewable energy and green technology
  - Require greater efficiency measures
  - Promote sustainable resources and environmental stewardship