

DER

Massachusetts Department
of Energy Resources

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

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Technical Potential of Solar Study

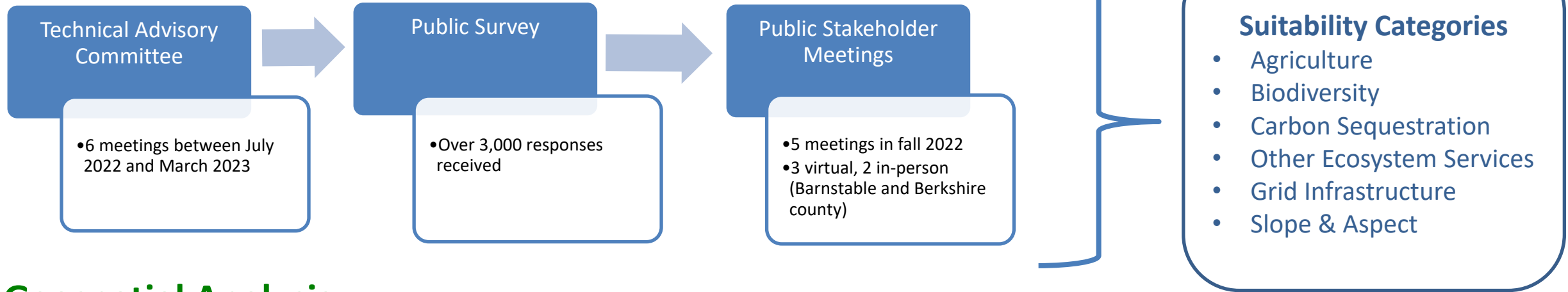
September 12, 2023

Purpose

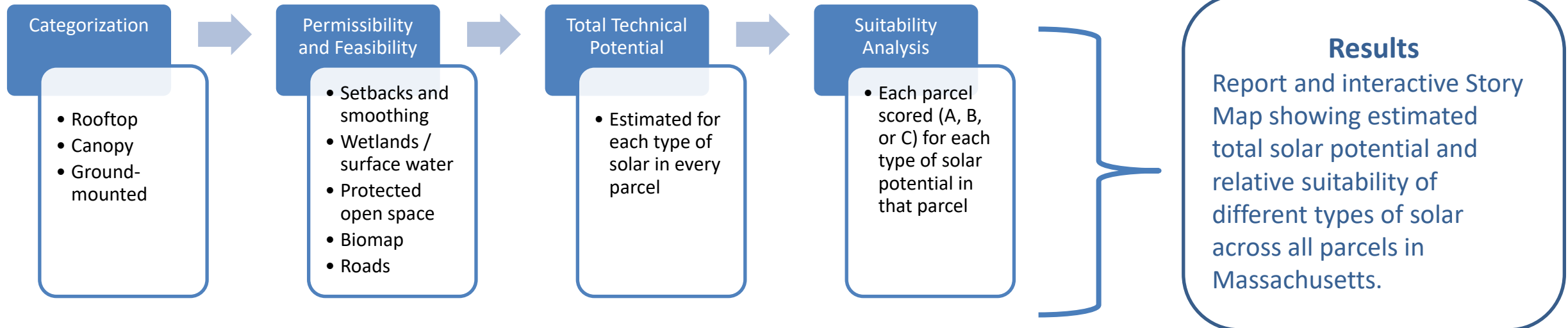
- Clean Energy and Climate Plan: 27-34 GW of solar needed by 2050 to achieve statewide emissions limits required by the Global Warming Solutions Act
- DOER undertook the Technical Potential of Solar Study to estimate the total amount of solar that could physically be built in Massachusetts
- Developed a framework to rank solar potential for suitability – categories based on natural resource impacts and economic factors
- Results summarized in an interactive StoryMap that shows total potential and suitability for rooftop, canopy, and ground mounted solar in every tax parcel in MA

Study Overview

Stakeholder Engagement



Geospatial Analysis



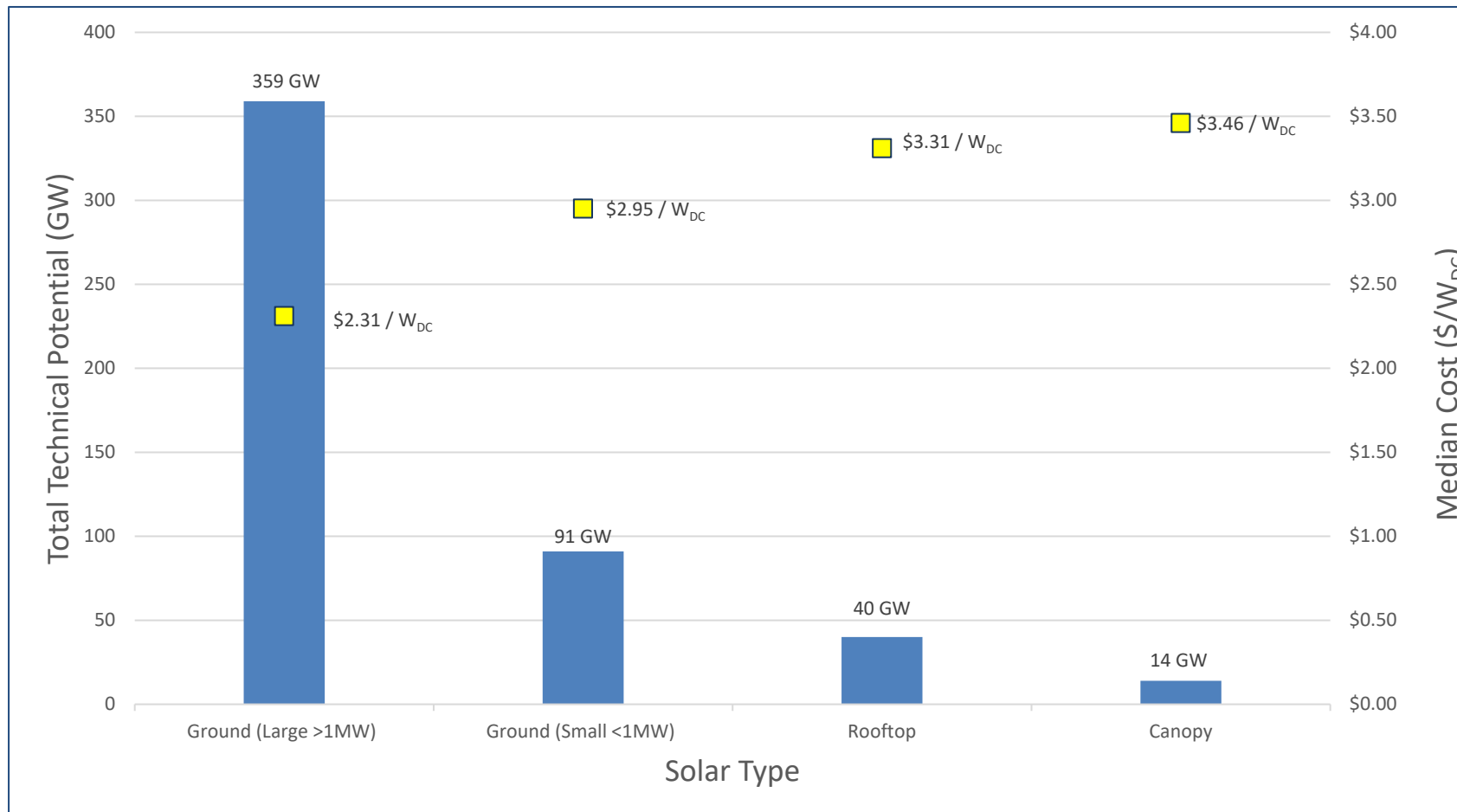
Suitability Categories and Criteria

		Biodiversity	Agriculture	Other Ecosystem Services	Embedded CO₂e	Slope and Aspect	Grid Infrastructure
Grade	<i>A - Most Suitable</i>	Sum of local BioMap area and Core/CNL area within the object is less than 25% of the object area	Prime agricultural soil area covers less than 25% of the object area and parcel is not designated as farmland	Sum of area covered by Interim Wellhead Protection Area, Zone 2 wellhead protection area, ACECs, and Zone 1 wellhead protection area is less than 25% of the object area	No embedded CO ₂ e, as estimated in Clark University study, or contains up to 225 MT CO ₂ e/acre embedded and foregone CO ₂ e	≤10% grade, facing any direction	Parcel is within 2 miles of a substation
	<i>B - More Suitable</i>	Sum of local BioMap area and Core/CNL area within object is greater than or equal to 25% of the object area	Prime agricultural soil area covers greater than or equal to 25% of the object area and parcel is not designated as farmland	Sum of area covered by Interim Wellhead Protection Area, Zone 2 wellhead protection area, ACECs, and Zone 1 wellhead protection area is greater than or equal to 25% of the object area	Embedded and foregone CO ₂ e ranges from 226-275 MT CO ₂ e/acre	>10% grade and ≤20% grade, facing south, where “south” is defined as between 45° and 315°	Parcel is within 2 to 5 miles of a substation
	<i>C - Less Suitable</i>	Core/CNL area within object is greater than or equal to 25% of the object area	Parcel is coded as farmland (this is all or nothing for the parcel, so no % cutoff is needed)	Sum of area covered by ACECs and Zone 1 wellhead protection area is greater than or equal to 25% of the object area	Embedded and foregone CO ₂ e ranges from 276-363 MT CO ₂ e/acre	>10% grade facing north; >20% grade facing south	Parcel is more than 5 miles from a substation

Total Technical Potential

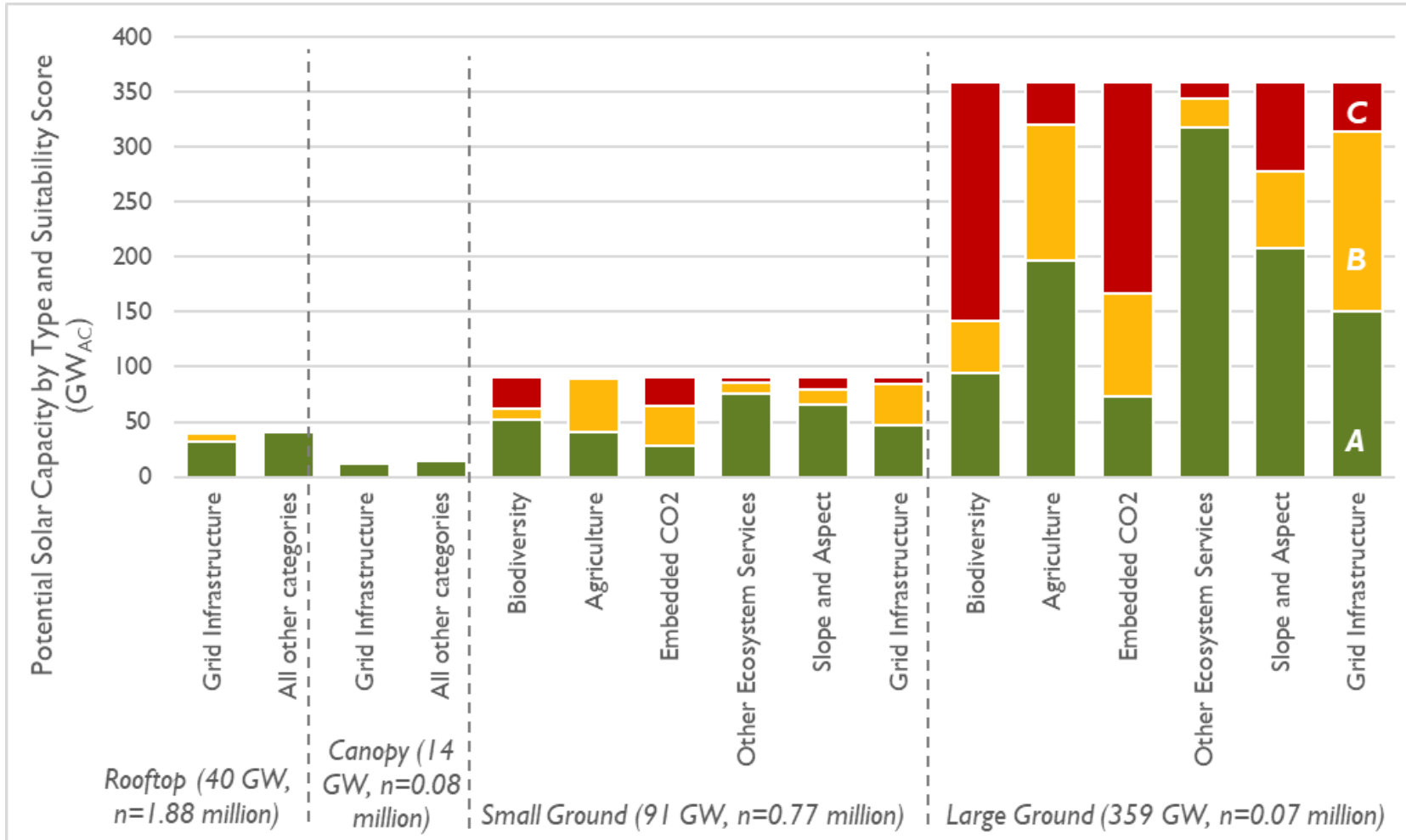
Key Take Away: Massachusetts has 506 GW of solar potential

Figure 3. Total technical solar potential and cost/watt of type of solar



Suitability Results

Figure 4. Share of technical potential by solar type and suitability score

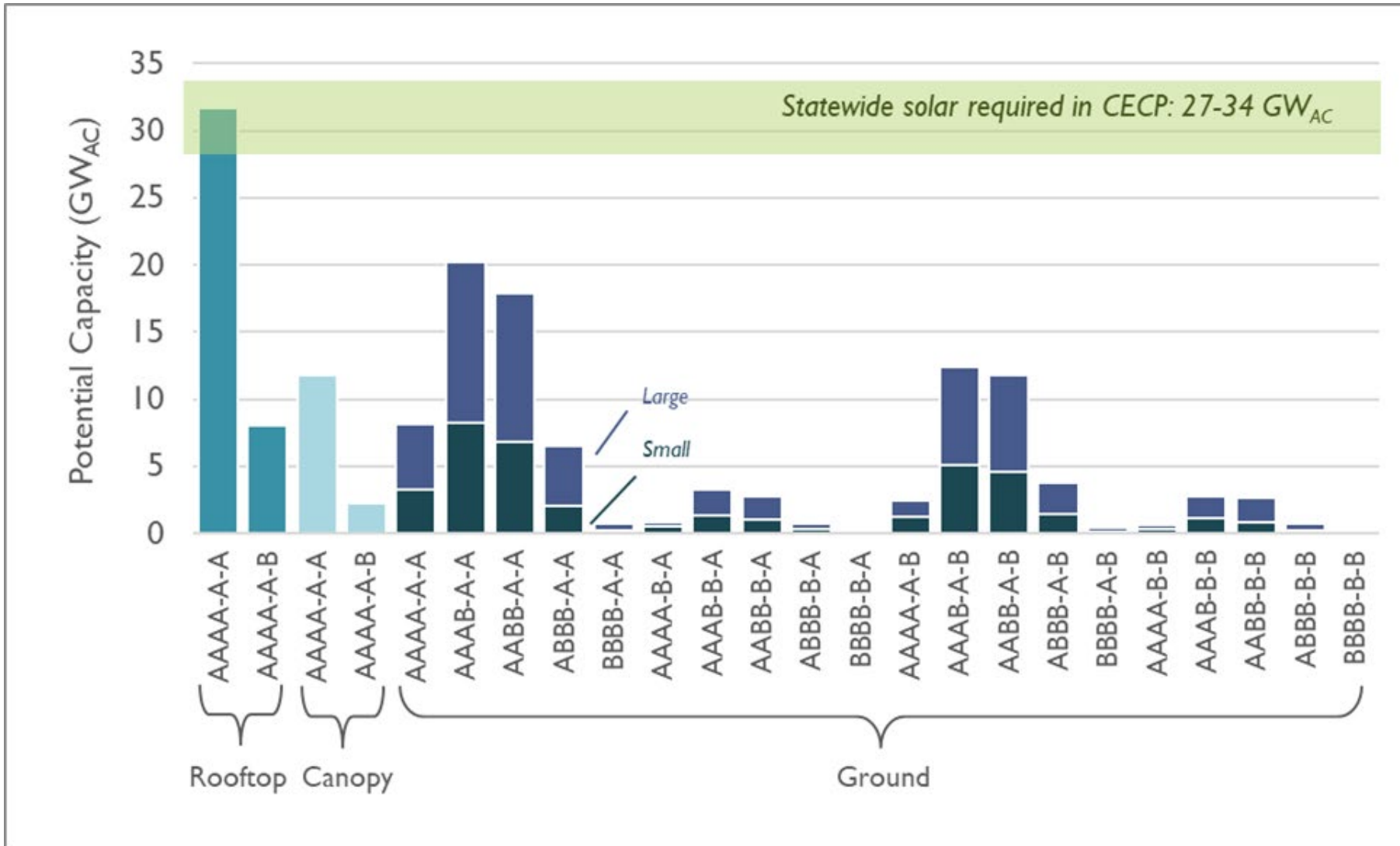


Key Take Aways:

- **152 GW_{AC}** receives a Highly Suitable score (A or B in every category)
- **52 GW_{AC}** receives an A in every category
- *We can site solar **strategically** to balance land use priorities while meeting solar deployment needs*

Suitable Potential by Type of Solar

Figure 5. Suitable Potential by Type



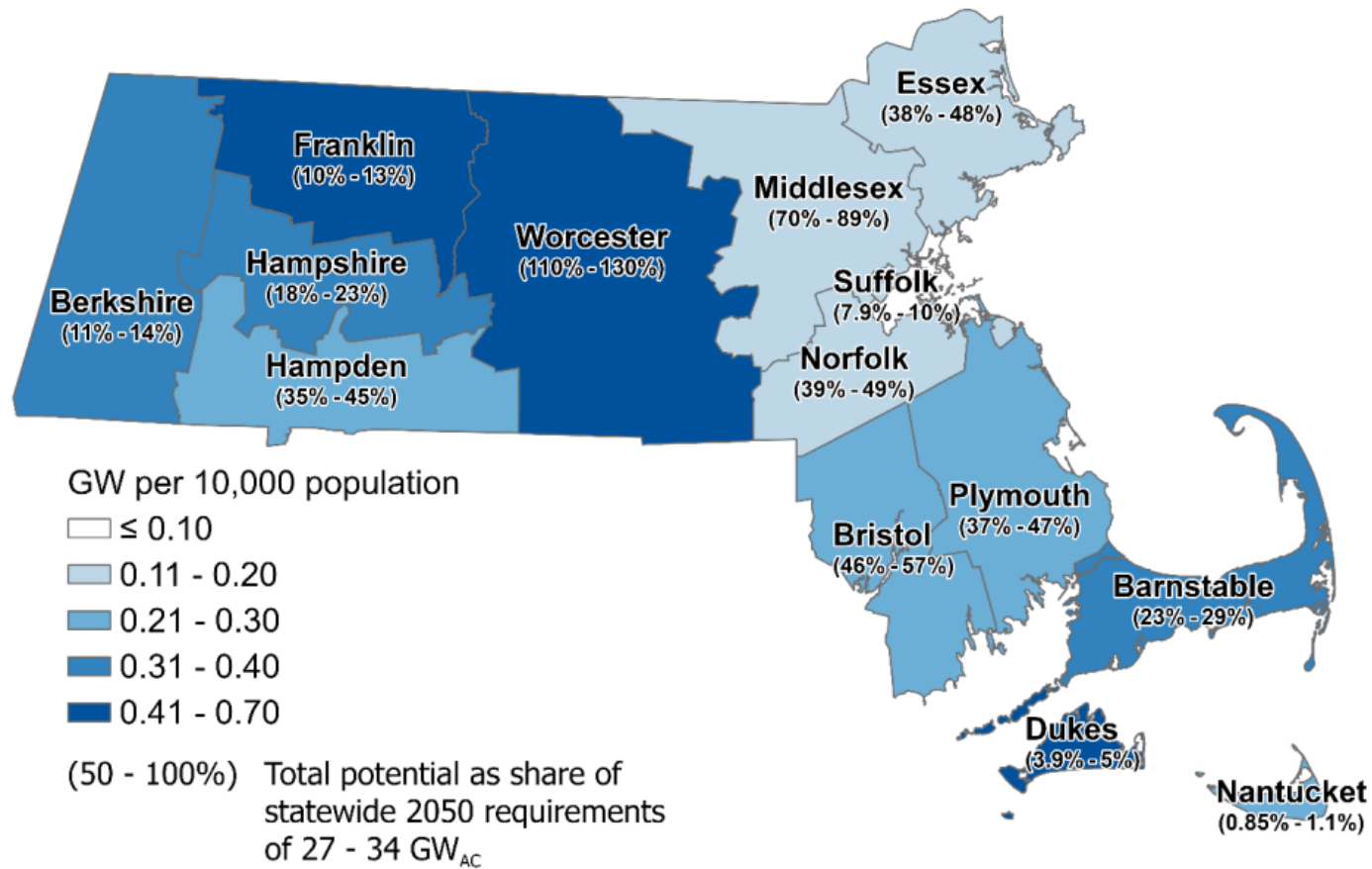
- Key Land Use Estimates:
- Commercial & industrial rooftops: 7.5 GW
 - Landfills and brownfields: 0.4 GW

Suitable Potential by Land Use Type

- Commercial & industrial rooftops: 7.5 GW
- Landfills and brownfields: 0.4 GW

Western MA Solar Potential

Figure 6. Distribution of highly suitable solar potential across Massachusetts, normalized by population



Technical and Suitable Potential Examples

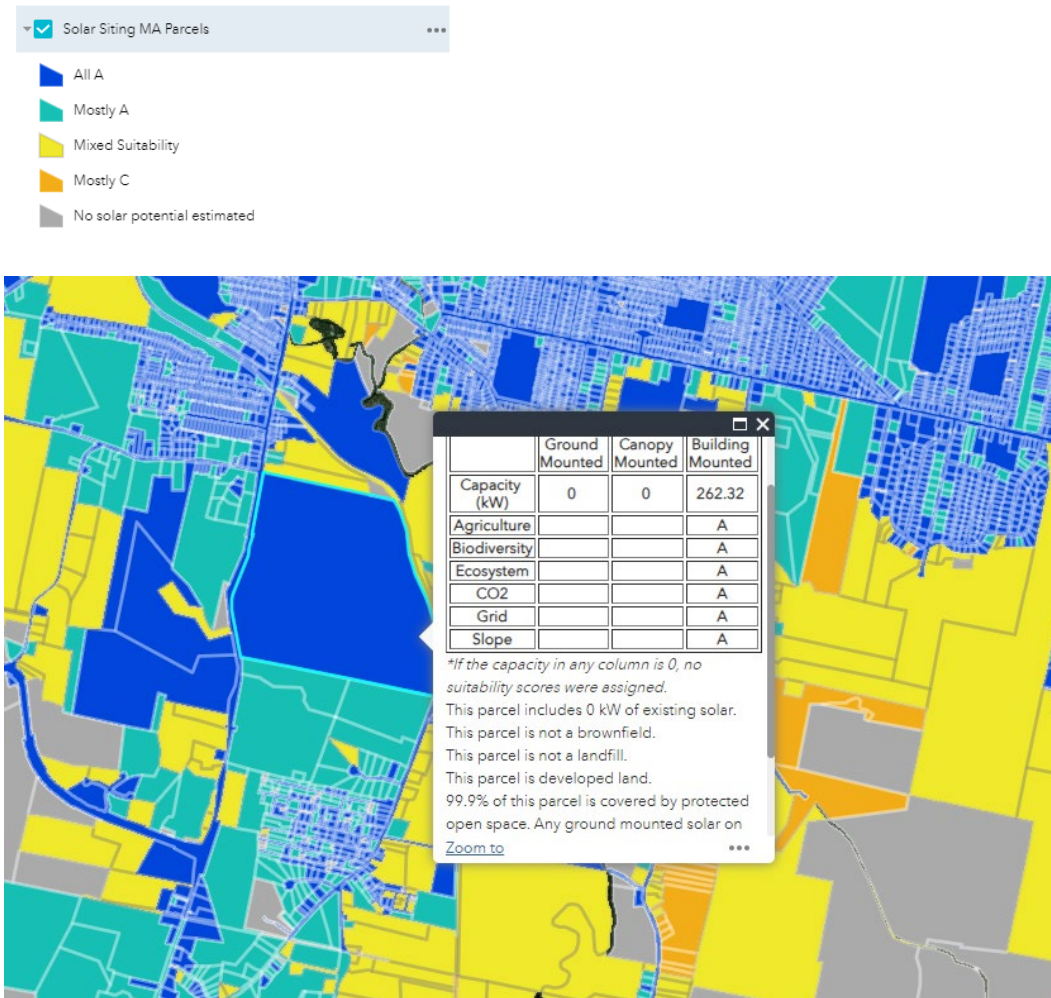


Figure 7. Multi-use parcel in Pittsfield – 99.9% protected space, building mounted potential only

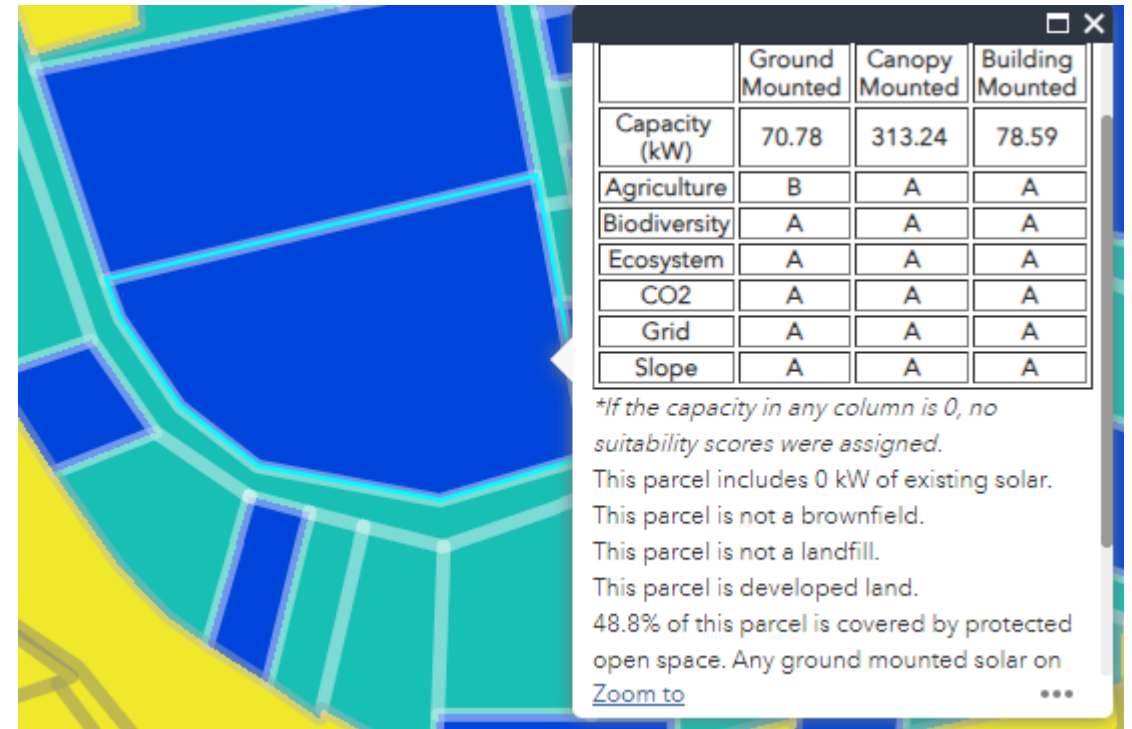


Figure 8. Municipal parcel in Leeds – 48.8% protected space not included in ground mounted potential

Policy Considerations

- We do not assume all solar will be built in only Highly Suitable locations
 - Competition for roof space as building electrification increases need for other rooftop equipment
 - Roof age, condition, and structural ability
 - Competition from other types of development (housing, etc.)
- Grid infrastructure is a major barrier to solar deployment
 - Analysis does not account for current hosting capacity
- Environmental justice is a nuanced topic that cannot be analyzed quantitatively
 - Solar siting decisions in EJ communities require community planning and engagement
- We encourage local officials and planners to use the Story Map as a tool to assess solar potential in their communities
 - Shapefiles are available for download on our website