



Sustainable Montpelier 2030

Executive Summary, team 80242

A real path to net zero

In organizing a strategy for Net Zero Montpelier we asked how can our design approach enhance existing opportunities, uncover hidden assets, expand and enrich public space, and make energy efficiency a catalyst for specific and targeted density, allowing for growth while also providing a better living experience for all?

There is already strength and vitality in the community and city fabric.

“Rather than imposing a bold new vision on the city, the plans should reinforce the existing city qualities: as a dense environment, the city should become more dense, and the city should become a place that people would want to come to.”

– Leo Hollis from *Cities Are Good for You*

Achieving net zero in a comprehensive way requires both environmental and social responsibility. While it begins as numbers and projections, a true response needs to stir the imagination as well. Our design is realizable and scalable: making it happen is critical and all aspects of this proposal are grounded in reality and backed up with data. Making it happen should be an initiative of the entire community.

How to provide enough parking while reducing paving

Desire: Downtown parking can be greatly reduced by introducing better mass transit, alternative transportation and density.

Reality: While the above strategies will make our community much less auto dependent, as the state capital Montpelier is a destination city and without a significant regional and statewide adoption of public transportation parking will remain necessary for many people in the local and regional community.

Solution: Our design reduces existing pavement by 6.6 acres yet provides an additional 100± parking spaces through the use of strategically placed parking structures beneath and adjacent to proposed new buildings. This solution also has the benefit of raising the buildings above the FEMA flood elevations while using the sloped topography to maintain grade-level street frontage.

How to move people in and out of downtown

Desire: Introduce significant alternative mass transit modes.

Reality: The scale of Montpelier makes it difficult to introduce some potential solutions and many proposed modes are in conflict with a net zero goal.

Solution: We propose a people mover electric trolley connecting remote parking areas at the Rt. 2 roundabout and Amtrak station. We propose two trolleys operating in 15-minute intervals for 16 hours per day. The electrical demand per year will be 84,000 kWh (or .54 acres of PV). The potential ridership and reduced parking needed downtown are in balance with this scheme. Our design rules out other large-scale mass transportation ideas, including a tram to the National Life Complex. Assuming a tram will run 8 hours per day, the electrical demand per year would be 220,000 kWh (or 1.4 acres of land). An electric bus to National Life running 12 hours per day at 15-minute intervals will need 33,000 kWh (or .2 acres of land.) *Obviously, the electric bus is a far more efficient solution.*

How to add more housing

Increasing population without disrupting the urban fabric

Desire: Create 1,000 additional housing units downtown.

Reality: If we desire to maintain our existing City character, large-block housing structures will not work. Large housing developments are also dependent on significant private development in an economically difficult environment.

Solution: We propose a nuanced and diverse approach to housing creation. Our design includes appropriately scaled new construction downtown including small-scale downtown infill development, one and two family infill development in our beautiful neighborhoods and a program of accessory dwelling units (ADU's) in existing larger-than-needed homes. This approach allows for development at many scales for larger and small development firms as well as individual property owners. Introducing the income from ADU's will also help with maintaining affordability for private homeowners.

1,125 new homes are developable within a 15-minute walk of downtown

How to generate enough new energy

Desire: Rooftop photovoltaic arrays (PV) will be sufficient to meet the energy load to accomplish net zero.

Reality: Even if all downtown buildings are renovated and constructed to net zero ready specifications, the available roof areas will not be sufficient to accommodate needed PV panels. This is especially true when considering the historic nature of the existing building fabric and the fact that new construction should be fitting to the current city aesthetic. Our calculations indicate that rooftop PV on new structures will provide 1,010kWp, less than 30% of the anticipated electrical load.

Solution: Our design includes appropriately designed PV on both new and existing buildings. The remaining PV would be ground mounted: our data indicates that to achieve net zero (including the energy required for the proposed people mover) an additional 1,600 kWp of PV is required. This will require 9 acres of land. The City stump Dump has a perfect site available accommodating 8.3 acres. An additional .7 acres will be needed and we feel can easily be found within the City limits.

Summary of energy loads and sources

Total new load required

4,300,000 kWh/yr

Net Zero ready new building load

4,200,000 kWh/yr

Trolley annual load

84,000 kWh/yr

Cogeneration from the District Energy plant

Cogeneration output

1,350,000 kWh/yr

Photovoltaic generation

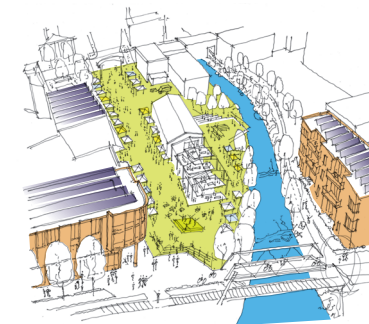
Rooftop capacity:

1,010 kWp, like: 1,161,500 kWh/yr

Ground mount PV array:

1,600 kWp, like: 1,840,000 kWh/yr

Area needed for ground mount PV = 9 acres



Market Plaza as summer outdoor market framed by new residential buildings shown with rooftop PV.

1,840,000 kWh/yr
generated by a new
ground mount PV array
(43% of load)

1,110,000 kWh/yr
generated by new rooftop
PV arrays
(26% of load)

1,350,000 kWh/yr
generated by converting
the existing District
Energy plant to
cogeneration
(31% of load)