



ENERGY COMMITTEE REMOTE MEETING AGENDA

MONDAY, OCTOBER 7, 2024, AT 4:30PM

<https://us02web.zoom.us/j/89621127913>

• +1 646 931 3860 US Meeting ID: 896 2112 7913

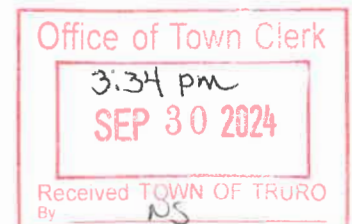
- Public Comment

- Climate Leaders program discussion
- Discussion with Town Staff
 - DPW Director updates
 - Annual Budgeting, Longer Term Capital Planning, Building Inventory
 - Vehicle Inventory
 - Solar Procurement Options
 - Mass Energy Insight – Energy Reduction
 - Climate Leaders program
 - ZEV policy

- Community Solar Presentation/Discussion
- Approval of Minutes
- DPW plans; Ad Hoc Building Committee update
- Climate Action Committee update
- CVEC update
- Large Projects updates
 - Solar Canopies
 - Town Facilities – Energy reduction plans & Solar
 - Landfills
 - Other

- MVP Action Grant and Microgrids; Electric Grid
- Building Codes, Net Zero Goals, State Agencies

- Other issues from any members.
- Next Meeting Schedule





SOLAR SIMPLIFIED®

Community Solar Municipality Program

Town of Truro, Massachusetts

October 7th, 2024

Agenda

- What is Community Solar?
- Community Solar Benefits
- What is Solar Simplified?
- Case Studies
- Next Steps
- Open discussion and Q&A



What is Community Solar?

Community Solar is a State-run guaranteed savings program, which allows homeowners, renters, and businesses to enjoy the benefits of solar power without installing solar panels on their property.

An estimated 85% of U.S. households can neither own nor lease rooftop solar panels for various reasons, like renting, roof can't support a solar system (too small or too old), living in a shaded area, prohibitively expensive for some, etc.

Community Solar addresses this population and allows them to benefit from solar energy savings and support the development of renewables.



How Does Community Solar Work?



Local solar projects are producing solar energy that is pumped directly into the grid



Eversource then applies the produced energy to customers' accounts in the form of credits

Sample Eversource Bill			
Usage Summary		Value of applied credits	
Off-Site Gen	853 kwh @ \$0.17552		-\$149.72
Solar Simplified Repay	\$149.72 @ 10% discount*		\$134.75
Guaranteed Discount			\$14.97
		Savings	

Customers continue receiving their Eversource bills and see their solar credits in the form of a negative dollar amount directly on their bills

*10% discount applies to all Eversource accounts

*20% discount applies to Income-qualified households



Community Solar Benefits



Guaranteed savings on all
Solar Credits

No Fees



No installation required
Priority registration to a solar
farm within Eversource



Reduces your carbon
footprint, advancing
renewable energy in
Massachusetts



Support a cleaner
environment for your
community

Civic contributions of \$50 for every enrolled account in Truro



Case Studies

Lancaster, NY (pop. 20,000)

- Enrolled all qualified municipality accounts
 - Over \$5,000 in savings annually
- Priority registration in a Community Solar farm in Troupsburg, New York
- 700+ enrolled accounts
 - Average annual savings of \$100 per customer
- Over \$200,000 in savings generated
- Over \$35,000 in Civic Contributions received

Richmond, NY (pop. 3,300)

- Enrolled all qualified municipality accounts
 - Estimated annual savings of \$1,000
- Priority registration in a Community Solar farm in Richmond, New York
- 300+ enrolled accounts
 - Average annual savings of \$100 per customer
- Over \$15,000 in Civic Contributions received



Reference

“One of my greatest accomplishments during my time as Supervisor was partnering with Solar Simplified. Not only was this an environmental accomplishment, but it also saved the town, along with many of the residents, money by earning solar credits.”

Ron Ruffino

Supervisor, Lancaster NY



Solar Simplified

Solar Simplified drives accessibility, transparency, and mainstream adoption of solar energy by working directly with local municipalities and focusing on consumer education.

We match renters, homeowners, and small businesses who care about the environment and want to save money on their electricity bills with local Community Solar farms through an easy and transparent signup process, making renewable energy accessible to all.

- 1) **Immediate Capacity:** A portfolio of Eversource projects servicing ~300 households in 2024
- 2) **Track Record of Success:** Dozens of successful municipal campaigns
- 3) **Zero Formal Complaints:** We credit our unwavering commitment to customer satisfaction
- 4) **Focus on Relationships:** Pride ourselves on the ongoing relationship we've built since launch



Next Steps

1. Approve the Municipality Program
2. Sign an agreement between the town and Solar Simplified
3. Solar Simplified executes a marketing campaign to all residents within your municipality at our expense.
4. Qualified residents that choose to participate enroll in the program and start seeing savings directly on their utility bills
5. The town receives \$50 in civic contributions per enrolled account within the municipality



EV CHARGING STATIONS

SUMMARY

There are 64,187 EV charging stations across the U.S. in 2023, an increase of 20% over 2022. Those stations have multiple outlets, bringing the total charging outlets at the end of 2023 to 175,575.¹

Truro is a seasonal community, and many summer visitors arrive in EVs. But there is a scarcity of charging stations in Truro, causing some visitors to resort to going to Provincetown to charge. To remain competitive in the seasonal market, Truro needs to increase the number and convenience of charging stations available to its many visitors during the summer. We are at a point where EV charging becomes a decision variable for visitors, where not being able to conveniently charge their vehicle could put Truro at a competitive disadvantage to other Cape Cod towns.

BATTERY CAPACITIES AND CHARGING REQUIREMENTS

To understand the amount of charge that a customer might require at a charging station, we used the Tesla as a typical example. The amount of kWh required to charge a Tesla depends on the model and battery size.

60 kWh to 80 kWh is the range, assuming an 80% charge is required.

Here are approximate figures for popular Tesla models:

- Tesla Model 3:
 - Standard Range: ~54 kWh
 - Long Range: ~75 kWh
- Tesla Model S:
 - Long Range: ~100 kWh
- Tesla Model X:
 - Long Range: ~100 kWh
- Tesla Model Y:
 - Long Range: ~75 kWh

¹ <https://www.consumeraffairs.com/automotive/how-many-ev-charging-stations-are-in-the-us.html>

These figures reflect a full charge from 0% to 100%, although in practice, most drivers do not let their battery drain to 0% nor charge fully to 100% frequently, to preserve battery health.

PUBLIC CHARGING RATES

Our research found rates varied widely.² But the “sweet spot” of rates is the vicinity of

- **\$0.29 / kWh**
- **\$0.60 / hour idle fee.**

kWh FEE

The per kWh fee reflects the cost of electricity, and the amount of charge the vehicle takes. The suggested rate is comparable to what consumers will pay for electricity in the Northeast on their home electric bills.

IDLE FEE

Many paid EV charging stations, including Tesla Superchargers and others, impose an idle fee if your car remains plugged in after it's fully charged. These fees are designed to encourage drivers to move their vehicles promptly after charging is complete, freeing up the station for others. The idle fees typically apply when the charging station is busy.

For example, Tesla charges an idle fee of \$0.50 per minute if the station is at least 50% occupied and \$1.00 per minute when the station is 100% occupied. Other charging networks may have similar policies, with fees often ranging from \$0.40 to \$1.00 per minute, depending on the network and location.

COST PER CHARGE

Assuming a typical charge for a typical vehicle requiring an average of 70 kWh of electricity, at the above rate would cost the customer \$20.30. That assumes the customer does not stay in the charging spot after the charging session is complete.

² <https://www.consumeraffairs.com/automotive/how-many-ev-charging-stations-are-in-the-us.html>

SOLAR CANOPIES ABOVE CHARGING STATIONS

Investing in solar canopies to generate electricity that can then be resold can be another source of Town revenue. Customers will be attracted to canopies above charging stations, just as they expect a covered area above gasoline pumps when they pull into a gas station on a rainy day. They will also make the charging station more visible from a distance.

TYPES OF EV CHARGERS FOR CARS

There are three types of electric vehicle chargers, level 1, level 2 and direct-current fast charging³. The charging equipment ranges in its power and speed of charging a vehicle. Charging times are also affected by battery depletion, battery storage, battery type and the temperature. On average, charging an electric vehicle to 80% can take as little as 20 minutes to 40 or more hours depending on the equipment.

Level 1: This is the most basic and provides charging through a common 120-volt residential outlet, similar to one used for small household items, such as a lamp. On empty, this charging method may take 40 hours or more to charge an all-electric vehicle to 80%.

Level 2: This offers a higher speed of charging through 240-volt outlets, which in residential applications are the type used for large appliances, or 208 volt in commercial applications. Level 2 can charge an all-electric vehicle from empty to 80% capacity in four to 10 hours. Level 2 charging stations are common for home — as some individuals have this equipment installed in their garage — and in workplaces or public charging locations.

Direct-current fast charging (DCFC): This is the fastest charging equipment and can charge an all-electric vehicle to 80% in just 20 minutes to one hour. DCFC equipment is installed on heavily trafficked public corridors at stations. DCFC equipment and level 2 chargers have also been installed at some public locations, including grocery stores, movie theaters and coffee shops.

ACCOUNTING

Although the Town is early in the life cycle of electric vehicle charging, it is important to establish suitable accounting systems for future decision making.

Solar energy is a clean revenue generating opportunity for the Town, but will require planning and investment.

³ <https://www.enelxway.com/us/en/resources/blog/the-ultimate-guide-to-electric-vehicle-public-charging-pricing>

TRANSITION TO ELECTRIC TRUCKS

SUMMARY

In an effort to understand what we might expect for how trucks will participate in the future electrification and decarbonization trends, we've compiled the following information from numerous sources.

It is clear that the industry is at an inflection point where electric trucks will follow the adoption curve that electric automobiles are following. As they become more cost competitive, electric trucks will be more prevalent in fleets. Accordingly, planning should allow for a predominantly electric fleet in the longer term, while economically accommodating short term requirements for fossil fuel trucks.

A KEY QUESTION AND ANSWER

Q: *We are developing a plan for a new maintenance and storage facility for trucks that will last 50 years. All the trucks now are gasoline or diesel. What should we do in terms of planning for them to become electric trucks in the future? What evidence is there that electric trucks are becoming more available?*

A: To develop a plan for a new facility that will last 50 years and accommodate a transition to electric trucks, consider both current needs and future requirements. Here are key steps to guide your planning:

1. Infrastructure Readiness:

- **Electrical Capacity:** Ensure the facility has sufficient electrical capacity to support multiple high-power electric vehicle (EV) chargers. Plan for a scalable electrical system with an on-site substation or transformer to handle future load increases.
- **Conduits and Cabling:** Install conduits and basic cabling infrastructure now to minimize future disruption and costs. Place them strategically in areas where EV chargers might be installed later.
- **Charging Stations:** While the immediate need for EV chargers may be minimal, consider installing a few chargers initially and leaving space for expansion as the fleet transitions to electric.

- **Energy Storage and Generation:** Plan for integration of renewable energy sources (solar panels) and energy storage systems (batteries) to manage peak loads and reduce energy costs.

2. Space Planning and Layout:

- **Parking and Charging Zones:** Designate areas specifically for charging to allow for easy access and to avoid obstructing other vehicles.
- **Flexible Layouts:** Use modular designs to accommodate future changes in truck size and charging infrastructure.
- **Maintenance Area:** Electric trucks will require a different sort of maintenance on its powertrain. Other components, such as brakes and suspensions are similar to existing internal combustion engine (ICE) trucks.

3. Ventilation and Safety:

- **Adaptable Ventilation Systems:** While electric trucks do not emit exhaust, maintenance garages may need flexibility in ventilation systems to accommodate mixed-use fleets during the transition period.
- **Fire Safety Systems:** Consider fire suppression systems designed for battery fires, which have different requirements than those for gasoline or diesel fires.

4. Digital Infrastructure:

- **Smart Charging Management:** Incorporate systems for managing energy usage efficiently. Smart chargers can help control the power draw to prevent overloading the electrical grid, especially during peak times.

Evidence of Electric Truck Adoption

1. Market Growth and Investments:

- Several major truck manufacturers, including Volvo, Daimler, and Tesla, have launched electric truck models. Volvo Trucks and Daimler Trucks, for instance, are already selling medium- and heavy-duty electric trucks in several markets, with five-year plans for expanded production.
- Investments in EV infrastructure are also increasing. The U.S. government, for example, has committed significant funding to build EV

charging networks, and numerous states have set mandates for zero-emission trucks.

2. Regulatory Push:

- Regulations are pushing for the adoption of electric trucks. The European Union has set a goal to reduce CO2 emissions from trucks by 30% by 2030. California and other states have adopted the Advanced Clean Trucks rule, which requires truck manufacturers to increase the share of zero-emission trucks sold annually.

3. Total Cost of Ownership (TCO):

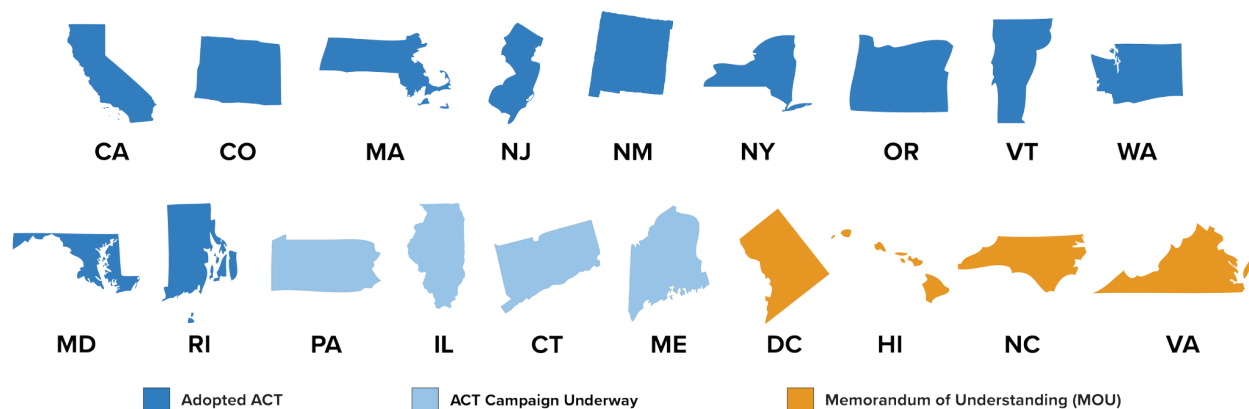
- Studies show that while electric trucks currently have higher upfront costs, they offer lower total costs of ownership over time due to lower fuel and maintenance costs. As battery technology improves and economies of scale are achieved, electric trucks are expected to become more cost-competitive.

By considering these factors, a facility can be designed that is future-proof, accommodates both current gasoline and diesel trucks, and seamlessly transitions to electric trucks as they become more prevalent.

THE PUSH TO ELECTRIC TRUCKS BY STATES

States have a clear policy path to replace dirty diesel trucks and buses with clean electric vehicles.

In June 2020, 15 states and the District of Columbia committed to accelerating the transition from dirty diesel trucks and buses to clean, electric medium- and heavy-duty vehicles. The states pledged that 30% of truck sales would be zero-emission by 2030, and that all new truck sales would be all-electric by 2050.



<https://www.electrictrucksnow.com/states>

<https://www.electrictrucksnow.com/how>

ELECTRIFICATION OF TRUCK FLEETS - “CARB” STANDARDS

Massachusetts often follows California’s lead in adopting environmental regulations relating to vehicles due to the state's participation in the California Air Resources Board (CARB) program. Typically, Massachusetts adopts California's standards with a lag of about 2 to 3 years.

This lag period is influenced by several factors, including the time needed for regulatory review, public commentary, legislative adjustments, and coordination with federal standards, such as those set by the U.S. Environmental Protection Agency (EPA). For example, when California adopts new vehicle emission standards, Massachusetts must undergo a rule-making process to align with those regulations, which often results in this delay.

Moreover, the timeline can vary depending on the complexity of the regulation, political considerations, and any legal challenges that might arise. While the average lag is around 2 to 3 years, it can sometimes be shorter or longer, depending on the specific regulatory framework and context.

Massachusetts participates in the CARB program by adopting vehicle emissions standards set by California rather than the less stringent federal standards established

by the U.S. Environmental Protection Agency (EPA). The state is one of several that has chosen to follow California's more rigorous standards under the Clean Air Act, which allows states to opt for either the federal or California standards.

CARB's standards, particularly for vehicle emissions, are often stricter than federal regulations. Massachusetts' participation means the state commits to adopting California's emissions standards for passenger cars, light-duty trucks, and, in some cases, heavier vehicles. These standards aim to reduce greenhouse gas emissions, smog, and other pollutants from vehicles, contributing to better air quality and environmental health.

Massachusetts formally adopted California's Low Emission Vehicle (LEV) program in the 1990s and has continued to align with California's updates, such as the LEV II and LEV III standards, and the Zero Emission Vehicle (ZEV) mandate. This commitment includes adopting California's Advanced Clean Cars regulations, which set increasingly stringent limits on vehicle emissions and promote the adoption of electric and zero-emission vehicles.

By aligning with CARB standards, Massachusetts is part of a coalition of states that support stronger environmental protections and cleaner air. This coalition also helps drive innovation in vehicle technology by creating a larger market for low-emission and zero-emission vehicles. However, the state's participation requires a process of regulatory alignment and adoption, which can lead to the time lag of about 2 to 3 years when implementing new standards.

RECENT ELECTRIFICATION ADVANCES IN CALIFORNIA

<https://ww2.arb.ca.gov/new-california-requirements-road-and-road-heavy-duty-vehicles>

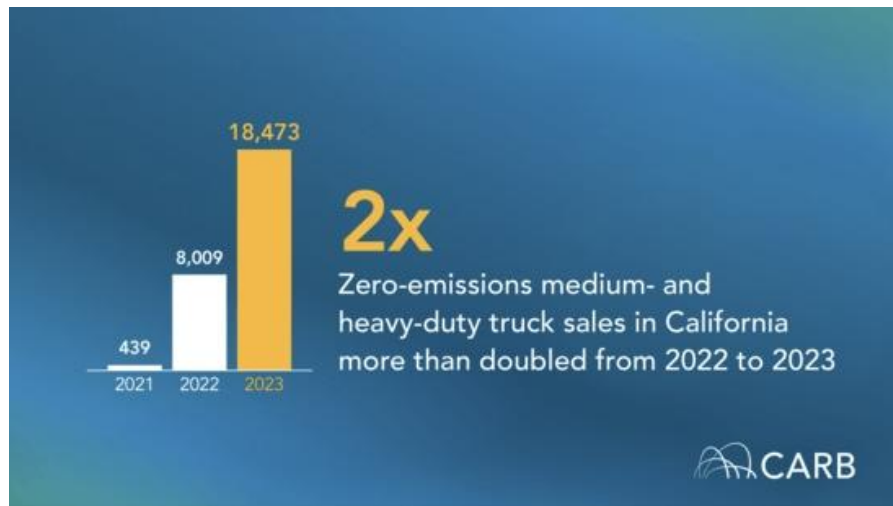
Beginning January 1, 2024, State and local government fleets, including city, county, special district, and state agency fleets, are required to add ZEVs to the fleet as a percentage of their purchases each year.

Starting January 1, 2024, 50% of vehicle purchases must be zero-emission vehicles and 100% of purchases must be zero-emission starting January 1, 2027.

<https://ww2.arb.ca.gov/resources/documents/zero-emission-road-medium-and-heavy-duty-strategies>

The [Governor's Executive Order N-79-20](#) requires that by 2035, all new cars and passenger trucks sold in California be zero-emission vehicles. Under the order, the California Air Resources Board (CARB) is mandated to develop and propose strategies

to achieve 100% zero-emissions from **medium and heavy-duty on-road vehicles in the State by 2045** where feasible and by 2035 from drayage trucks. While CARB will work out details on how to achieve this goal during the public outreach process, many of CARB's existing programs and ongoing work focus on advancing and increasing adoption of zero-emission technologies in on-road applications.



“California to require half of all heavy trucks sold by 2035 to be electric”

<https://www.bostonglobe.com/2023/03/31/nation/california-require-half-all-heavy-trucks-sold-by-2035-be-electric-2/>

California announced [June 6, 2024] during a press event that sales of new medium- and heavy-duty zero-emission vehicles (ZEV) in the state doubled in 2023 from the prior year.

State officials say **one out of every six new vehicles** sold for services that include last-mile delivery, freight transportation, and school buses in the state last year **was a ZEV**, a big step toward achieving its short- and long-term ZEV goals.

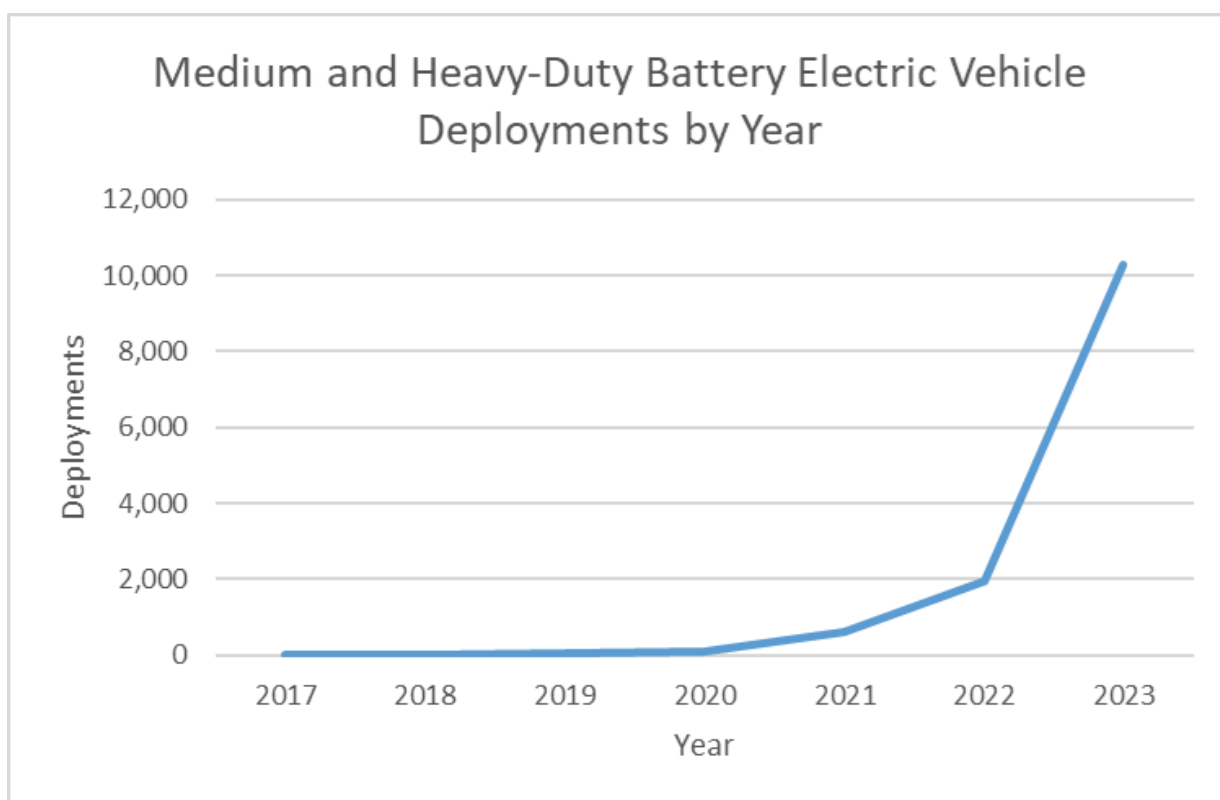
<https://www.truckpartsandservice.com/alternative-power/article/15677024/california-officials-say-commercial-zev-sales-well-ahead-of-targets>

U.S. TRENDS

Electric truck deployments by U.S. companies grew five times in 2023

U.S. companies are expanding their electric vehicle fleets, and last year was monumental. An astounding 10,265 electric trucks hit the road in 2023, according to a new EDF analysis of class 2b-8 fleet announcements.

EDF recently [revamped](#) the [Electric Fleet Deployment & Commitment tracking tool](#), a public list of orders, deployments and commitments by fleets to deploy zero-emission trucks.



<https://blogs.edf.org/energyexchange/2023/12/13/electric-truck-deployments-by-u-s-companies-grew-five-times-in-2023/>

MASSACHUSETTS TRENDS

MassDEP Files New Regulations to Reduce Emissions, Advance Market for Clean Trucks in the Commonwealth

To further reduce transportation emissions and accelerate the adoption of zero-emission vehicles (ZEV), the Massachusetts Department of Environmental Protection (MassDEP) today announced emergency regulations have been filed with the Secretary of the Commonwealth's office to immediately adopt California's Advanced Clean Trucks regulation, which requires an increasing percentage of ZEV truck sales starting with Model Year 2025 and ramping up through Model Year 2035, accelerating the market for medium- and heavy-duty ZEVs.

<https://www.mass.gov/news/massdep-files-new-regulations-to-reduce-emissions-advance-market-for-clean-trucks-in-the-commonwealth>

MASSACHUSETTS INCENTIVE PROGRAMS

This program helps eligible public entities acquire electric vehicles for their fleets.

<https://www.mass.gov/how-to/apply-for-massevip-fleets-incentives>

MEDIUM– AND HEAVY–DUTY ZEV COST EVALUATION

In all segments, the cost of owning an EV purchased in 2027 will be less than a diesel counterpart over the life of the vehicle. Maintenance and energy costs are significantly lower for EVs than diesel vehicles, making EV ownership even more economically beneficial over time.

<https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/02/FINAL-Roush-Fact-Sheet-2.10.22.pdf>

Electric truck sales are gaining momentum

Sales of electric trucks increased 35% in 2023 compared to 2022, meaning that total sales of electric trucks surpassed electric buses for the first time, at around 54 000. China is the leading market for electric trucks, accounting for 70% of global sales in 2023, down from 85% in 2022. In Europe, electric truck sales increased almost threefold in 2023 to reach more than 10 000 (>1.5% sales share). The United States also saw a threefold increase, though electric truck sales reached just 1 200, less than 0.1% of total truck sales.

We expect electric truck sales to continue to increase thanks to strong and ambitious policies, such as the European Union's CO₂ standards for HDVs, which target a 90% CO₂ emissions reduction by 2040. In the United States, the newly adopted heavy-duty emissions regulation is expected to result in ZEV sales shares of up to 60% by 2032 in different segments.

IEA - International Energy Agency

<https://www.iea.org/reports/global-ev-outlook-2024/trends-in-heavy-electric-vehicles>

BATTERY CAPACITIES AND RESILIENCY

The battery capacity of electric trucks can vary depending on the model, but generally ranges from 100 to 600 kWh. Here are some examples of electric truck battery capacities:

- Scania Group: Offers battery capacities of 416, 520, 624, or 728 kWh. The 728 kWh option can be fully charged in 110 minutes at 375 kW.
- Ram Electric: Offers an extended-range battery pack of 229 kWh.

10 electric trucks can store over 1 megawatt hour of electricity. That's enough power for about 30 homes for a day¹.

If these trucks are not needed in an emergency situation, and they are configured for transferring their stored power back to the local electrical infrastructure, they can provide a significant amount of battery backup resiliency. These 10 unused trucks could alternatively supply power to recharge 5 trucks twice during a prolonged outage.

For example, below is a clip from the Ford website illustrating this capability of their F-150 electric pickup truck, stating that a single pickup can power a typical home for 3 days.

IT'S READY TO WORK, EVEN WHEN PARKED

If the power goes out in your neighborhood, rest easy. 🌩️ You've got an F-150 Lightning.



POWER AT THE READY

Your F-150 Lightning automatically begins powering your home when connected to the 80-amp Ford Charge Station Pro. *



STAND UP TO YOUR OUTAGE

Your F-150 Lightning with extended-range battery can power your home for three days. Or even up to 10, if usage is properly rationed. *

¹ Using a 30 kWh per day typical usage per home

THE TRUCK MARKET

EXAMPLES FROM THE INTERNET

Are we ready for Electric trucks ? - These authors drove the new Mercedes trucks to find out | Electrifying.com

https://www.youtube.com/watch?v=gFIJc_LAIR0

Electric Trucks Are Making Their Way In California. We Took A Ride To See What It's Like

<https://laist.com/news/climate-environment/electric-trucks-are-making-their-way-in-california-we-took-a-ride-to-see-what-its-like>

RESOURCES

<https://californiahvip.org/vehicles/>

ELECTRIC TRUCK SHOWROOM

The appendix below shows examples of manufacturers offering **large** electric trucks today.



BALLARD
TRUCK CENTERS

Keyword Search 

Clear filter

▼



Stock#: MD Electric Model: MD Electric

[Read More...](#)[Request a Quote](#)

Stock#: LR Electric Model: LR Electric

Read

[Request a Quote](#)

Stock#: MD Series Model: MD Series

[Read More..](#)

Stock#: TerraPro Model: TerraPro

Read

Volvo VNR Electric

Stock: VNR Electric

Last Updated: 06/06/2024 08:44 PM

Compare
0





Search



Our ePortfolio

E-mobility is a crucial factor for the traffic of the future. As the technology leader of today, Daimler Truck is also aiming to shape the logistics and passenger transportation of tomorrow - with electrified solutions that provide maximum benefits for customers and the environment.



All On-Highway Medium Duty Vocational Zero Emission



MODEL
579_{EV}

Electric | Class: 8 | GCWR: 82,000 lbs. | Used for: Regional Haul, Drayage |
Max Horsepower: 670 hp (500kw) |
Front Axle & Suspension: 12,000 - 14,600 lbs. |
Rear Axle & Suspension: 40,000 lbs.



MODEL
579_{HFC}

Zero-Emission | Class: 8 | Est Refuel Time Approx. 30 Minutes



MODEL
520_{EV}

Electric | Class: 8 | GCWR: 66,000 lbs. |
Used for: Right-Hand Side Loader and Rear Loader Refuse Collection |
Max Horsepower: 670 hp (500kw) |
Front Axle & Suspension: 20,000 - 23,000 lbs. |
Rear Axle & Suspension: 46,000 lbs.



MODEL
220_{EV}

Electric | Classes: 6, 7 | GCWR: 26,000 - 33,000 lbs. |
Used for: Local Pickup, Delivery & Regional Haul/Beverage |
Max Horsepower: 355 hp (265kw) - 499 hp (372kw) |
Front Axle & Suspension: 10,000 - 12,000 lbs. |
Rear Axle & Suspension: 17,000 - 21,000 lbs.

Changes on the 2025 Ford F-150 Lightning

<https://www.youtube.com/watch?v=y5YAhOtbd4M>

<https://www.youtube.com/watch?v=zQ3EoKbEsh0>



From TruckPartsAndService.com

6/23/2022

Tewksbury, MA – Mack Trucks dealer Ballard Truck Center in Tewksbury, Massachusetts, is now a Certified Electric Vehicle (EV) Dealer and is equipped to service and support the Mack LR Electric, the OEM announced Thursday.

Ballard Truck Center is Mack's first dealership to be EV-certified in New England.

"Ballard Truck Center is another example of a dealership that is committed to support both diesel-powered and battery-electric vehicles," says Jonathan Randall, Mack Trucks senior vice president of sales and commercial operations. "Mack and Ballard are committed to helping customers achieve their sustainability goals, and we congratulate Ballard on this milestone."

Ballard Truck Center, located at 939 East St. A, Tewksbury, offers 11 service bays, one of which is dedicated to servicing electric vehicles. The Tewksbury branch has 11 technicians, four of whom are master techs, and three of whom are EV-certified. The 31,000 sq.-ft., branch has \$1.5 million in parts inventory.

Mack notes dealers must meet numerous stringent infrastructure, training, safety, charging and tooling requirements to become a Certified EV Dealer. Mack met regularly with Ballard executives to ensure a smooth process and that all standards for EV certification were met.

"Ballard wanted to be sure that we were ready to accommodate our customers for when they choose to purchase an electric vehicle," says Robert Picking, head of business development, Ballard Truck Center. "Customers have expressed a lot of interest in electric vehicles, and the Mack LR Electric in particular, and we look forward to supporting these customers in the future."

Ballard Truck Center, a fifth-generation family-owned business, was founded in 1906 as a blacksmith shop. Ballard Truck Center has five branches in Massachusetts – Tewksbury, Avon, West Springfield, West Wareham and Worcester. Ballard also has a location in Johnston, R.I.

Climate and Energy

From: Joan Holt (capejoanholt@comcast.net)

To: Energy Committee

Date: Tuesday, October 1, 2024 at 03:56 PM EDT

I think that we need to put before Town Meeting a Carbon Reduction Budget, that shows where we are, what we must achieve, and by when to meet our net-zero carbon reduction goal. We somehow need to bring Climate issues to the fore and make Climate threats and impacts more of a priority with our policy setters (the Select Board) and our administration (the Town Manager).

It shouldn't have to take a Hurricane Helene hitting Truro to make Climate a priority. Town departments and staffing makes it obvious that we are not treating the climate crisis as an emergency.

Maybe the Energy Committee should go before the Budget Task Force with a request to finance the construction of solar canopies over all municipal paved parking areas (i.e. at beaches and municipal buildings). We could sell some of the electricity produced by that much solar capacity to re-coup some of the cost. We might even be able to get federal money (via the climate provisions of the new IRA) for a municipal demonstration project.

Joan

SOLAR CANOPIES

SUMMARY

In an effort to understand more about solar canopies, we've compiled the following information from numerous sources.

Solar canopies are more expensive than basic rooftop solar arrays on an existing building since they require steel supports below the panels. But they are less expensive than traditional garages for sheltering vehicles from the weather.

Solar canopies over existing parking areas are also an alternative to clear cutting trees from land to install a ground-mounted solar array.

EFFECTIVE WEATHER SHELTER

A solar canopy designed with solar panels tightly packed together as a roof, placed above the ground, can be quite effective in shielding vehicles from various weather conditions. Here's how it performs against different types of weather:

1. **Sunlight and Heat:** The solar panels provide a solid barrier against direct sunlight, significantly reducing the amount of heat that reaches the vehicles below. This can help keep the interior of the vehicles cooler, reducing the need for air conditioning when starting the vehicle.
2. **Rain:** The tight arrangement of solar panels acts as a roof, effectively preventing rain from reaching the cars. However, the effectiveness will depend on the quality of the installation. Proper guttering and drainage systems need to be in place to handle runoff from the panels to avoid water pooling or dripping near the parked vehicles.
3. **Snow and Ice:** The canopy will prevent snow from directly accumulating on the vehicles, which can be particularly beneficial in reducing the need for scraping ice or snow before driving.
4. **Hail:** A well-constructed solar canopy can protect vehicles from hail damage, as the panels serve as a sturdy roof.
5. **Wind:** While the canopy does provide protection against falling debris during windy conditions, it does not offer significant protection against the wind itself. Vehicles may still be exposed to strong winds blowing horizontally, especially if the canopy is open on the sides. However, vehicles traveling on the highway create their own wind, often at gale force (32+ mph) or hurricane speeds (73+ mph), and are designed so that wind has minimal impact on them.

In summary, a solar canopy is effective in shielding vehicles from sunlight, rain, snow, and hail. Proper design and installation will provide weather protection.

ECONOMICAL

Solar canopies are especially cost-effective when there is a need to shelter vehicles from the weather. Rather than building a conventional garage, a solar canopy can be constructed at significantly lower cost. And since the roof generates electricity, the cost of the canopy will be paid back over time.

In effect, money spent on a solar canopy does double-duty, once as a protective roof cover and once as a solar electricity generator.

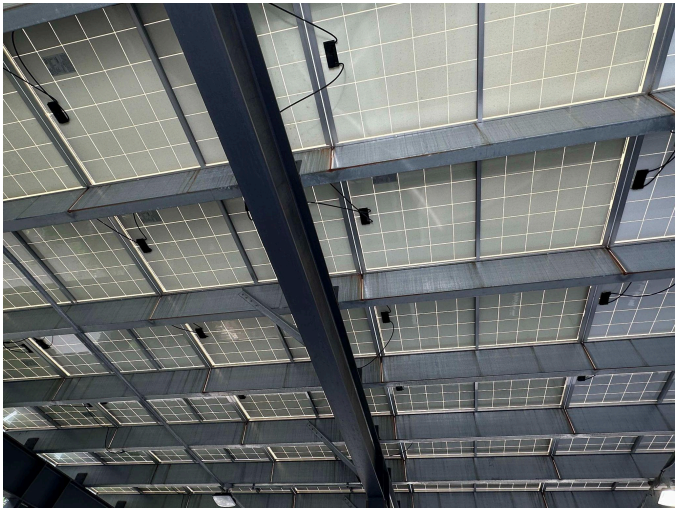
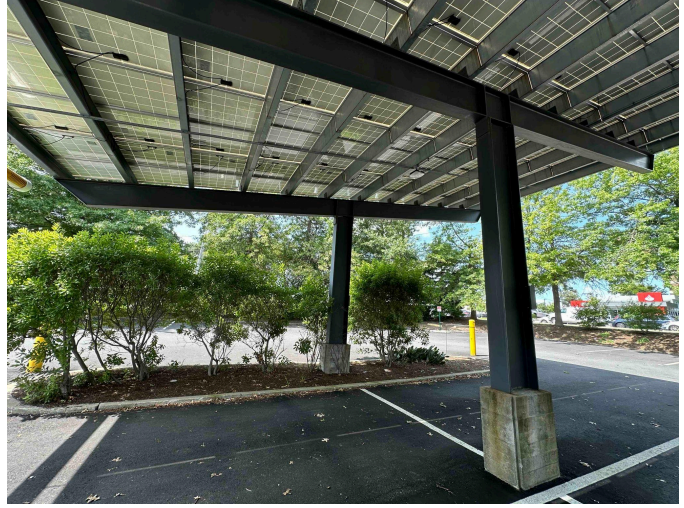
More on cost estimates will be discussed later in this document.

INCREASINGLY POPULAR

More solar canopies are being constructed year after year. Observed are both canopies for smaller passenger vehicles that tend to have about 9' overhead clearances, as well as canopies for larger vehicles such as buses and trucks.

A few examples of canopies in eastern Massachusetts and Cape Cod are illustrated below.

EXAMPLE SOLAR CANOPY - Framingham, MA REI Parking lot
 375 Cochituate Rd Framingham, MA 01701



8' 8" clear height

SOLAR CANOPY - TOWN OF BREWSTER, Captains Golf Course
1000 Freemans Way, Brewster, MA 02631



LARGE TRUCK-SCALE CANOPIES

Solar canopies can easily be built large enough to accommodate the largest trucks. In part, this is due to the fact that trucks are constrained in their maximum width and length and height by Department of Transportation regulations. Widths must be able to travel on the standard road lane width which is typically 12 feet. So trucks are held to less than 9 feet wide. Similarly Interstate bridges are designed to a minimum height clearance of 16.5 feet, so truck heights are seldom higher than that.

The bridges on Route 6 in Truro have clearances of 14 feet.



One advantage of using a solar canopy for vehicle storage and protection is that it can be oversized and still be economical. For example, a 40'x125' or 5000 SF canopy could be increased to 44'x136' or 6000 SF. The additional solar electricity will pay for the increased cost. Oversizing a canopy economically provides for future expansion or other unforeseen requirements.

A solar canopy protects Nauset School buses from the weather in Orleans.
70 MA-28, Orleans, MA 02653



“before” photo in 2019



CONSTRUCTION

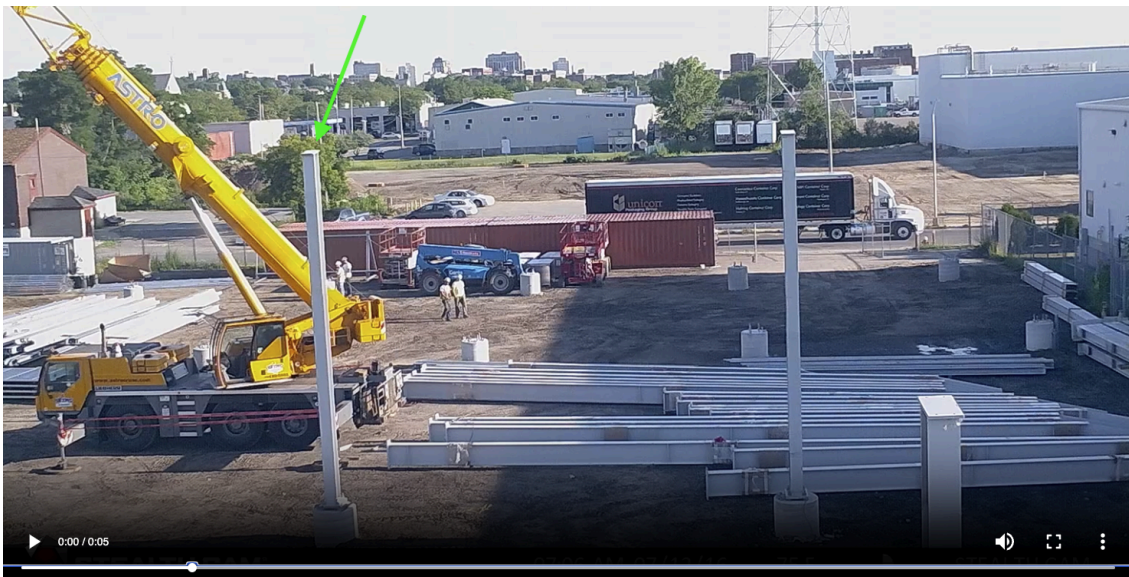
Solar Canopies are engineered to specifications that meet the requirements of a project..

The foundation of the construction is concrete piers to which the vertical posts are attached. These are 2 to 3 feet in diameter and dug into the ground to provide sufficient wind upload resistance.

The pre-cut steel materials are delivered to the site. There they are assembled relatively quickly (about a week).



Once the piers are in place, the vertical posts are then attached using a crane.



On top of the posts, the crew positions the main supporting steel beams.



The beams in turn support purlins¹ spaced to hold the solar panels.



¹ a horizontal beam along the length of a roof, resting on a main beam

The purlins support the solar panels fastened to them, row by row.



When solar panels are completely installed, the system is then wired, tested, and can be put into service.



To see this construction taking place, click on the [Time Lapse video - 5 seconds](#)

COST ECONOMICS

Several suppliers of solar canopies were contacted to understand the cost of constructing a solar canopy.

Typical cost is in the \$3.60 to \$4.00 per watt range (net of 30% federal credits). Per watt is a typical unit of cost measure for solar panels. This can be translated to a per square foot basis by using a typical watts per square foot measure of about 22 watts per square foot.

That translates to a net cost of approximately \$80 to \$100 per square foot. About half the cost is in the steel canopy structure, and the other half in the solar panels.

SOLAR PAYBACK

Assuming 1200 hours of sun per year, and a cost of electricity of \$0.28 per kWh, the solar canopy should generate approximately \$7.50 per SF. This will pay back the net construction cost of the canopy and panels in about 11 to 13 years. Increasing electric rates will create a faster payback.

EXAMPLE PROJECT COST

A project that wants to cover 6 large vehicles and 10 smaller vehicles might consider two separate canopies. A deeper one for longer vehicles (40') and more typical depth for smaller vehicles (32'). That will provide overhangs on all sides to shelter the vehicles from driving rain.

Larger vehicles might require a per vehicle space width of 19', whereas smaller vehicles can fit comfortably in a 12' space width. 10' is the typical parking space width.

Using these dimensions, a larger vehicle canopy could be sized 40' x 116' and covered with 103 kW of solar panels. The height of that canopy would want to be higher, at approximately 16' clearance.

A smaller vehicle canopy could be sized 32' x 124' and covered with 89 kW of solar panels. A height of 12' clear would typically suffice.

The total square feet of storage under the canopies in this example is 8,608 SF.

Based on the above cost economics, the total project cost would be approximately \$1,000,000 and after 30% federal credits would have an estimated net cost of approximately \$700,000.

TAXPAYER IMPACT - NONE - IN FACT, GENERATES REVENUE

Given the above economics, if the net canopy cost is financed by a 20 year municipal bond at 3.5% interest, the annual debt service would be approximately \$50,000. The value of the electricity generated annually would be approximately \$64,000, which would provide a

- Net Revenue source to the Town of approximately \$14,000 per year.
- After 20 years, the bond will have been paid off, and the net revenue to the Town would increase to approximately \$60,000 per year.

HEATING VEHICLES

If heat is required, an infrared heat source can be installed above the vehicles and below the solar panels. The space between the purlins provides a recess for mounting infrared heaters.

Install Infrared Heaters Strategically

- Ceiling-mounted infrared heaters are ideal as they can radiate heat directly downward onto the vehicles. Place them above the vehicles, ensuring they cover the areas where the engines are located.
- Positioning is crucial: place the heaters where they can evenly distribute heat over the hood or engine bay.

Control with Timers

- Equipping infrared heaters with timers allows for scheduling heating during the coldest hours or just before starting the vehicles. Wiring that includes a timer relay can provide this capability.

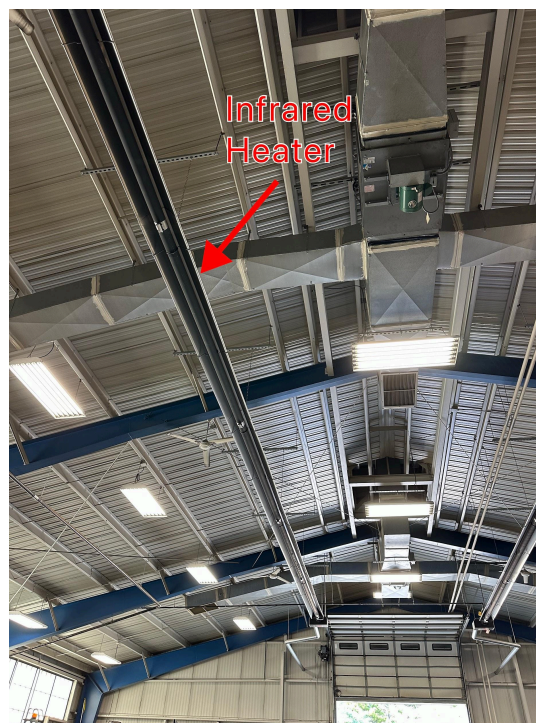
INFRARED HEATERS

SUMMARY

Infrared heaters primarily heat objects and surfaces in a room rather than directly warming the air. They emit infrared radiation, a type of electromagnetic wave, which is absorbed by objects like vehicles and people.

In contrast to convection heaters that heat air directly, infrared heaters provide a more focused and immediate source of warmth to areas they are directed at. This makes them effective for spot heating, such as in a specific area where objects are, rather than heating the entire room evenly.

WELLFLEET DPW EXAMPLE



Wellfleet DPW vehicle storage, with infrared heat tube above.
Installed circa 1999

These heaters were installed about 25 years ago, and are propane-fired. The space is also not insulated.

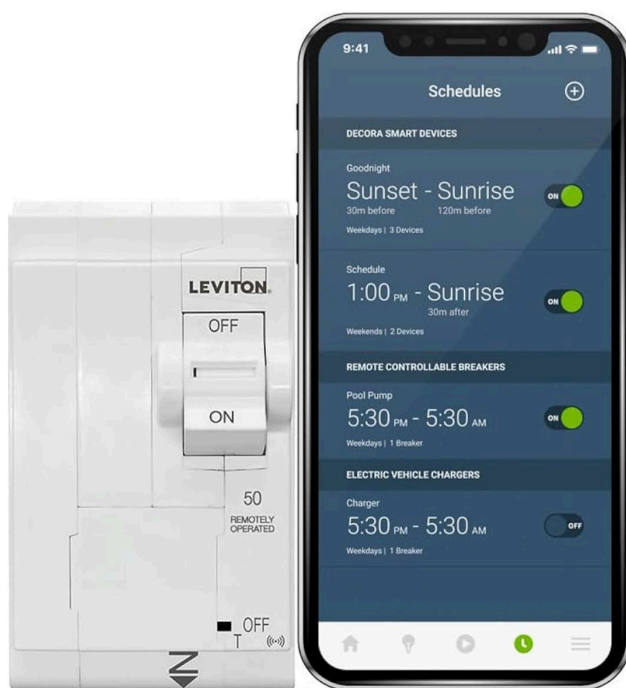
An electrified facility can take advantage of electric infrared heaters, which are available in many sizes and wattages. They are also more easily installed, and can be more modular in design. Each vehicle, for example, could have its own heater above it. And with electric heaters, they can be more easily controlled electronically, both on site and even remotely.

REMOTE CONTROLS

A basic timer-based control system can turn on a heating element above a single vehicle. This would enable heating just those vehicles needed for a particular operation, and only when needed. The controls could also be Internet operated.

For example, if a snow storm arises and a vehicle with plow is needed, it could be remotely signaled so its heater is activated shortly before scheduled use.

Leviton LB250-ST 2nd Gen Smart Circuit Breaker with Remote Control, Standard, 2-Pole 50 Amp, 120/240-Volt and 120/208-Volt, 10kA Interrupt Rating



EXAMPLE PRODUCTS

<https://www.glradiant.com/products/electric-infrared-radiant-heaters/>

https://www.reverberray.com/products/commercial-industrial/electric-heaters/?srsltid=AfmBOopNQDydBqGuz_14n1SIMOXOziBNn4-TUF_mrQbIGH1zHG982cAA

https://www.infratechheatersusa.com/123-4550-11237-0-420457/Infratech_Dual-Element-6000-Watt-Electric-Patio-Heater-WD6024SS.htm?nsoid=1663278

INFRARED HEAT RADIATION PHYSICS

The sun's energy reaches Earth primarily through radiation. The primary method by which the Sun transfers heat to the Earth is thermal radiation. <https://www.youtube.com/watch?v=QYW7IR-XuJA>

Different materials have different abilities to absorb and emit radiant energy, with darker surfaces generally absorbing more heat than lighter ones.

The farther away the radiant heat source is from the object it will warm, the less heat energy is transferred. For example, a person sitting 4' in front of the fireplace will feel much warmer than the person sitting 12' away from it.

SOURCES

Southern Light Solar

<https://southernlightsolar.com/solar-equipment-products/solar-power-mounting-solutions/solar-power-installation-carports-pergolas/commercial-solar-carports/>

<https://southernlightsolar.com/wp-content/uploads/2018/07/Solar-Carport-Installation.mp4>

Distributed Solar Development (DSD)

<https://dsdrenewables.com/rethinkwhatspossible/>

Parasol Structures

<https://www.parasolstructures.com/>

Debt Service Calculator

<https://www.mass.gov/doc/debt-service-schedule-template/download>

Spaulding Cape Cod's Solar Project Will Save Energy, Reduce Costs

NEWS-ARTICLE

October 27, 2016

Collaboration with Current, powered by GE, and Partners HealthCare will reduce carbon emissions and save energy costs

SANDWICH, MA - Spaulding Rehabilitation Hospital Cape Cod (SCC) is constructing a 1,100 kW solar installation that will support the hospital's commitment to sustainable energy and result in both energy and cost savings.

"This project is a significant step in our ongoing efforts to adopt sustainable practices, to be responsible citizens, and to help protect the fragile environment of Cape Cod where we're fortunate to live and work," says Stephanie Nadolny, Vice President of Operations for Spaulding Cape Cod. The project is being fast-tracked to be completed before the end of the year.

A collaboration among Spaulding Cape Cod, Partners HealthCare, and Current, powered by GE, the solar project reflects Partners' system-wide and local commitments to reduce negative environmental impacts from operations. Spaulding Cape Cod, a member of Spaulding Rehabilitation, is part of Partners HealthCare, which has set a goal to meet or



exceed the state's mandate of offsetting emissions of harmful greenhouse gasses due to operations 25% by 2020 and 80% by 2050.

"The solar photovoltaic system will export power directly into the grid, producing the equivalent of 70% of the hospital's electricity consumption while reducing a large portion of its electric bill," explains Dennis Villanueva, Senior Energy and Sustainability Manager for Partners Real Estate and Facilities. "There are significant environmental and health benefits for the community associated with the system's production. Over a 20-year period it will avoid nearly 40 million pounds of green house gas (GHG) emissions, equivalent to taking 185 cars permanently off the road."

The solar installation is located at the hospital on Service Road in Sandwich and consists of two parts: a 471 kW ground-mounted solar array, and a 629 kW array on carports.

"This project is a perfect example of how businesses can leverage clean energy solutions to not only slash monthly energy costs, but also to preserve the regions where they operate," says Erik Schiemann, General Manager of Solar at Current, powered by GE. "This has been a great collaboration to find the best solutions to positively impact a critical healthcare institution and the surrounding community."

Spaulding Cape Cod, the largest private employer in the Town of Sandwich, is nestled on 45 acres of land. Previously, SCC donated 33 acres of woodlands to the town for conservation. The ground-mounted solar array will be constructed over the hospital's leeching field and cover approximately seven acres. "This is land that couldn't be used for any other purpose, so we're excited to see it contribute to our sustainability efforts," says Nadolny.

Solar panels will also be installed on car ports that are being erected over existing and new parking spaces, covering about two-thirds of them. During October, SCC added 62 parking spaces to its current complement of 242 as part of a \$6.3 million expansion and renovation project that began in January. The expansion adds 6000 sq. feet of clinical and administrative space to the hospital, plus the new parking spaces. It also includes installation of high efficiency equipment, which will reduce energy waste in HVAC systems.

Installation of solar power is the latest in a series of initiatives SCC has undertaken to reduce its carbon footprint. SCC has twice received awards from Practice Greenhealth, most recently in 2016, when it achieved Emerald Award status for efforts to recycle, institute sustainable practices, and reduce use of mercury.

“As a health care provider, improving the health of the community is central to our mission,” states Nadolny. “By lowering emissions related to operations, we’re able to have a positive impact on the community as a whole, and that’s a good feeling.”

Installing solar power at Spaulding Cape Cod is just one of Partners’ projects. “By the end of the year, we expect to have installed close to 5,000 kW throughout the system, with two other projects similar in size to the one at the Cape,” says Villanueva. “Thus far we’ve achieved about 45% fewer emissions than the regional conventional fuel mix through strategic energy procurement for our facilities, which puts us on track to reach our GHG reduction goal. Reaching that goal will be accomplished through energy conservation, on-site power generation – including renewable sources, such as the solar array on the Cape – and strategic purchasing of renewable energy for its facilities across Massachusetts.”