Green-Energy & Highway Rest Areas - PV Education & EV Charging(?)
Pilot Plan at I-90 Rest Area 22, Beloit WI

Bob McCallister - UW-Whitewater at Rock County
Celestino Ruffini, Executive Director – Visit Beloit
Terri White, Director Visitor Services – Visit Beloit
Interstate Rest Area 22 @ Beloit WI
**Vision** — There is tremendous positive potential for massive numbers of people to experience successful, beautifully-designed, and practical installs of green energy and potential EV charging at highway rest areas.

**Goals** — Create an outstanding working exhibit of solar architecture as an ideascape for other public spaces. Inform/encourage — practicality of shift to integrated renewables as a modern life-style.
R.A. 22 Background Info

- RA 22 is ~40 acres in size, outskirts of Beloit
- Pop 36,000 manufacturing (downturn), education, health and human services

- Avg traffic count (2018) was ~1,400 vehicles/day.
- ~5,000+ people visit on a good summer day
- ~1,124,000+ people stopped at RA 22 in 2018

- Major flow of people up to vacationland and T.C., points north and west
- Major flow to Chicago, points south and east
Why is Green Energy at RA 22 a Good Idea?

“Forward” into the Future

• World-wide movement demands greener energy
• It’s time to act responsibly to lessen life-disruptive climate change impact in WI
• Pollinator numbers plummeting with habitat
• U.S. job growth forecast in green energy is tops
• WI awakes—economy & environment thrive together, green energy is booming world-wide.
• Stateline area - regional green energy supply chain
• Generate power for Alliant Second Nature program – green energy to customers
Fastest Growing Occupations

**Fastest growing occupations**: 20 occupations with the highest percent change of employment between 2016-26.

*Click on an occupation name to see the full occupational profile.*

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>GROWTH RATE, 2016-26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar photovoltaic installers</td>
<td>105%</td>
</tr>
<tr>
<td>Wind turbine service technicians</td>
<td>96%</td>
</tr>
<tr>
<td>Home health aides</td>
<td>47%</td>
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<tr>
<td>Personal care aides</td>
<td>39%</td>
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<tr>
<td>Physician assistants</td>
<td>37%</td>
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<tr>
<td>Nurse practitioners</td>
<td>36%</td>
</tr>
<tr>
<td>Statisticians</td>
<td>34%</td>
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</tbody>
</table>
WHO

- Alliant Energy
- Freight & Roadside Facilities – WisDOT
- Office of Governor Tony Evers
- Renew Wisconsin
- Rest Area Management – VIP Services, Inc.
- UW-Whitewater at Rock County
- Visit-Beloit, Wisconsin Welcome Center

Time is right...Rest Area 22 - an ideal setting for this green energy project
Green Energy Pilot Project
I-90 Rest Area 22
Beloit, WI

- Cooperative Partnerships
- Interest Research Planning Progress
- Concept Design Solar PV “Show & Go” System
- Sustainable Partnerships-Project Growth & Evolution
- Construction & Physical Maintenance
- Procedural “How To’s”, Bids/Costs & Funding
- Ownership & Responsibilities
Idea is...

1) **SHOW**: have public-access to a cutting edge solar PV landscape of various PV array installations. Combine with pollinator-friendly perennial plantings.

   **AND**

2) **GO**: also a separate area with field of multiple grid-tied standard PV racks to offset electricity use at facility. Perennials.

3) **EV charging** down the line???
taken out
I-90 Rest Area 22 Solar PV Project. Smaller image of concept draft planning map used 9-29-17 at Beloit Travel WI Welcome Center. Note areas on larger original were outlined in pen and with orange highlighter. See notes of meeting for descriptions.
Increasingly, State transportation agencies are exploring solar power technologies to reduce electricity costs and promote energy security.

Renewable Roadsides  by Tina Hodges and Amy Plovnick
Publication Number: FHWA-HRT-19-002
Issue No: Vol. 82 No. 4
Date: Winter 2019

https://www.fhwa.dot.gov/publications/publicroads/19winter/04.cfm
There is tremendous positive potential for massive numbers of people to experience successful, beautifully-designed, and practical installs of green energy at highway rest areas.

We envision rest area buildings, picnic areas, and walkable settings with a variety of solar PV installations of the most modern kind. Create an outstanding working exhibit of solar architecture as an ideascape for people to carry away with them.
Solar PV in Highway Right-of-Ways
State Examples – GA

Georgia – GDOT

- The Ray on I-85, a “living laboratory” for sustainable transportation innovations
- Free Solar EV charging station
- Wattway solar road
- Planning 1 MW solar ROW project

Federal Highway Administration – Roadside Renewables
I-90 Rest Area 22 Solar PV Project. Smaller image of concept draft planning map used 9-29-17 at Beloit Travel WI Welcome Center. Note areas on larger original were outlined in pen and with orange highlighter. See notes of meeting for descriptions.
Site 1: Approach drive view

- Eye-catching tree & flower-like solar arrays
- Perennial plantings
- Wide pathways through plants to each array
Solar “tree” array configurations. Prairie plantings and pathways...
Example signage

How solar panels work

1. Sun’s energy is absorbed by panels.

2. Inverter changes electric current.
   The electric current coming from the panels have one direction, which is called direct current (DC). The electricity used to power our home and appliances switches direction, which is called alternating current (AC). An inverter changes DC to AC so we can use it.

3. Energy is ready to use.
   Our building uses the power generated and stores it in batteries using solar. Larger solar panels on our other buildings can also power us toward a clean and renewable future.

Alliant Energy Hdqrs, Madison, WI
Interactive Kiosk?

https://www.smartcitiesworld.net/energy/energy/smart-buddy-monitor-launched
https://www.solaranalytics.com/au/
Garfield New Energy Communities Initiative, using energy impact funds from Colorado Dept of Local Affairs. Xcel Energy Solar*Rewards rebates. $1.6 million
“Now that they see this, people are saying that if they knew solar could be this pretty, they’d have put it in a long time ago,” said Bob Knight, Parachute’s town administrator. “With these flowers, we will continue to push the solar industry, and it’s an opportunity to help educate people on solar.”
At Alliant Energy Hdqrs, Madison, WI
I-90 Rest Area 22 Solar PV Project. Smaller image of concept draft planning map used 9-29-17 at Beloit Travel WI Welcome Center.
Note areas on larger original were outlined in pen and with orange highlighter. See notes of meeting for descriptions.
Eye catching PV array as drive past on I90 also power lighting for sign at night.

At Alliant Energy Hqrs, Madison, WI
Picnic tables dot the RA 22 landscape.
They can plug their e-devices into outlets on the pole, and the pole base is a battery for 24/7 electricity.
Existing solar-powered lighting?
PV panels on covered picnic tables with e-charging and lights at night.
“GO” PORTION

Build a separate solar PV array field at RA 22, grid-connected to match power use of RA 22 facility. Inform/encourage – showcase the practicality of shifting to integrated renewables as a modern life-style.
Solar PV in Highway Right-of-Ways
State Examples - MA

Massachusetts – MassDOT

- Eight solar array facilities online producing roughly 5.5 million MW annually
- Contractor finances, installs, and operates solar arrays
- Private sector partner takes tax incentives and sells electricity to MassDOT
- MassDOT buys back power at lower than usual rate
- Site is leased to the developer for 20-years
- No up-front State funding
- **First full year energy savings: $442,500**
Solar PV in Highway Right-of-Ways
State Examples – VT

Vermont – VTrans

- Solar projects on top of parking garages, at the airport, and at a welcome center, totaling 330 kW of capacity
- Developed a Solar Plan

Federal Highway Administration – Roadside Renewables
Solar PV in Highway Right-of-Ways
State Examples – OR

Oregon – ODOT

- First large scale highway ROW solar project in US
- Partnered with utility company
- Developed a [guidebook for Departments of Transportation to develop solar photovoltaic systems in the ROW](https://www.fhwa.dot.gov/real_estate/right-of-way/corridor_management/roadside_renewables.pdf)

Federal Highway Administration – Roadside Renewables
Photo Credit  JBM Solar Developments Ltd. – Burton Solar UK

Pollinator numbers and diversity are plummeting along with habitat loss. Growth of ground-based solar PV can also help grow habitats where pollinators thrive!

**Fresh Energy** and other agricultural and environmental organizations helped to create the **Pollinator-Friendly Solar Act** in MN:

- Encouraged other states to pass similar guidelines
- Solar PV/pollinator scorecards to help guide successful PV Plantings.
Photo: Center for Pollinators in Energy – Fresh Energy
Deer graze by a solar array on the NREL campus.

Co-located Pollinator Habitat at RA 22

- Solar PV + pollinator plantings are complementary: benefits to habitat, enriched soil health, carbon sequestration, water absorption and more.
- For both the “SHOW” and the “GO” areas, perennial plantings for pollinators should be abundant.
- At RA 22, connect people to nature in safe and interesting setting, grass walking trails around “SHOW” PV installs.

[Image of solar panels and pollinator habitat]

Photo - University of Minnesota Energy Transition Lab https://energytransition.umn.edu/projects/solar-pollinators/
EV Charging & Rest Areas

EV Corridors in the Future – Public-Private partnerships on WisDOT highways?

- Springboard to bring forward parallel ideas of Electric Vehicle (EV) touring corridors with assured recharge ranges.
- E.G. an EV corridor for Great River Road, possibly with privately operated range-satisfying EV charging adjacent to/near to WisDOT highways.
EV charging stations getting more widespread at work places, shopping centers.
I-90 Rest Area 22 Solar PV Project. Smaller image of concept draft planning map used 9-29-17 at Beloit Travel WI Welcome Center. Note areas on larger original were outlined in pen and with orange highlighter. See notes of meeting for descriptions.
EV charging stations at Interstate Rest Areas could:

- promote early stage growth in EV vehicles
- encourage f-2-f conversations between EV & non-EV drivers
- help to build out EV driving corridors for tourism/commerce.
EV Road Trip Blues: Why Charging Station Buildout Lags Behind Electric Car Adoption

Forbes  March 26, 2019  Bill Roberson

• Need a sprawling network of charging stations to lessen range anxiety
• Who builds it? Federal govt, States, utilities, oil companies, who else?
• Need a standardized charging coupler
• Need to decrease time spent charging

Need to Rethink the Rest Stop

• EV charging takes longer than most would like to linger. Give drivers a chance to stretch their legs and minds.
• Comfy seating areas, phone charging stations, internet access, laptop stations, play areas for kids and adults? Showers? ... might draw in drivers.

https://www.forbes.com/sites/billroberson/2019/03/26/ev-road-trip-blues-why-charging-station-buildout-lags-behind-electric-car-adoption/#323178764f71
VW’s $2 billion penalty for diesel scam, Electrify America, builds electric charging network across US to boost EV market

CNBC FRI, MAY 10 2019

Electrify America’s new Level 3 systems will almost all provide a minimum of 150 kilowatts at 400 volts and many ...will be up to 250 kW and 800 volts. ...That’s more than most existing electric cars can handle.

Ohio Toll-roads adopting 350kW DC Fast Chargers. Charge capable vehicles at speeds of up to 20 miles of range per minute.

electrifyamerica.com

Electrify America charging station

Source: Electrify America
Electrify America (VW settlement)
Locate a charger

https://www.electrifyamerica.com/
Federal Highway Administration
Corridor-Ready Alternative Fuel Corridors (2018)

FHWA’s objective is to establish DC Fast Charge (Level 3) infrastructure at 50 mile intervals along designated corridors...

Vending And Blind Trade Oppose Rest Area Commercialization Of Interstate Highways

There is strong ethical & economic opposition to EV charging of private vehicles at interstate rest areas.

A coalition led by the National Federation of the Blind, vending businesses, restaurants, retailers, city governments, and trucking firms argue that the sale of food, fuel, etc, at interstate rest areas would:

- Drain local businesses of customers
- Shrink community jobs and tax revenue
- Put established businesses in competition with state governments
- Threaten jobs of blind merchants - service rest area vending machines

Under the Randolph-Sheppard Act, sight-impaired vendors are given priority in bids to manage vending locations at rest areas along federal interstates.

https://www.natso.com/topics/dot-to-establish-electric-vehicle-charging-corridors
These are heavy-duty reasons to relinquish EV charging of private vehicles at highway rest areas. SO...

• Electric utility vehicles can quickly traverse the confines of a rest area, hauling supplies, equipment, and people.

• Utilize the solar PV electricity to showcase EV charging... *Charge electric utility vehicles* used by rest area employees.

https://cleantechnica.com/files/2018/03/v1.jpg

Some states... Oregon, already have their own tourism-based EV corridors.
Governor Evers signed the State Budget today, with 78 partial vetoes. One of those vetoes was used to edit the section designating Volkswagen Settlement funding... up to $10 million can be used for electric vehicle charging stations.
Thank You!

At UW-Whitewater at Rock County, Janesville, WI