Electric Vehicle Charging & Solar Carports – An OWNER’S Perspective

Will Hegman
601-656-6161
will@MsSolar.net
Carolyn & Will’s Solar Carport & Tesla
Solar Carport – Designed & Built 2008
Solar Carport Detail & Spec’s

• Cost - app. $15,400 (in funny money $10,780)
• A 2.8 kW grid-connected 2 car solar carport
• Wired for both 120v & 240v EV charging
• Projected annual energy production- 3,670 kWh’s (TVA annual energy offset- 8,074 kWh’s)
• Actual avg. annual production (3 yrs data)- 4,095 kWh’s (TVA annual offset- 9,008 kWh’s)
• Solar produces energy to drive Tesla 24,000 miles per year (plus household energy cost reduction of $491.30 under TVA)
2011 Excess Production Payments

Central Electric
POWER ASSOCIATION
P.O. Box 477 Carthage, Mississippi 39051

PAY Eighty Two Dollars And 75 Cents

TO THE ORDER OF
WILL AND CAROLYN HEQMAN
215 ROPE ROAD
CARThAGE MS 39051

DATE 10/14/2011
AMOUNT $82.75

CENTRAL ELECTRIC POWER ASSOCIATION
GENERAL FUND ACCOUNT
VOID AFTER 90 DAYS

MANAGE

OFFICE MANAGE

THIS CHECK HAS A COLORED BACKGROUND AND CONTAINS MULTIPLE SECURITY FEATURES - SEE BACK FOR DETAILS

Central Electric
POWER ASSOCIATION
P.O. Box 477 Carthage, Mississippi 39051

PAY Three Hundred Two Dollars And 09 Cents

DATE 10/14/2011
AMOUNT $302.09
Excess Carport/Shop Solar Production
= 23,090 Solar Miles

AMOUNT: $82.75

AMOUNT: $302.09
Examples of Solar Parking

Commercial Solar Parking

Underside with EV Chargers
Examples of Solar Parking
Electric Car Acronyms

- EV
- NEV
- PEV
- PHEV
- EVSE
- IED
PEV’s – Pure Electric, no tailpipe

Tesla Sedan & Roadster – Range 300 / 245 miles

Nissan Leaf – Range 100 miles
PHEV’s- Plug-in Hybrids, Electric and/or Gas (Tailpipe Included)

NEV’s – Neighborhood EV’s, max speed limited to 25 MPH

Bad Boy – Mississippi

My Car - Mississippi
How & Where do we Charge These Cars?

• Lots of charging options – Level 1, Level 2, Level 3 (120v, slow / 208 or 240v, faster / DC Fast Charge, nearly as fast as filling your gas tank & emptying your bladder).

• Locations could be anywhere there is an appropriate power source, but this is unlikely.
Tesla has over double the range of other EV’s, the charging time required of other EV’s is much less.

Tesla makes adapters which fit all of the plugs you see on the right.

The National Electric Codes requires electricians to size all plugs to the appropriately sized circuit breaker which is connected with appropriately sized wire.

All of the plugs shown can be readily purchased in either male or female from any electric supplier and installed by a certified electrician at a fraction of the cost of most EV charging stations.

It is important to realize a charging station is not the battery charger! The battery charger is onboard the car. The charging station itself is a convenient place to store the cord & plug which is connected to your power source.
Tesla Charging Solution

Tesla Universal Adapter Kit
$1,175

Kit fits easily in truck of car or can be permanently installed anywhere

Tesla recommends installing a NEMA 14-50R receptacle if possible. The receptacle should be installed in a dry environment with easy access to the vehicle.
Finding a Public Charging Station in Mississippi is going to be a challenge!

Home Charging Should be Simple Enough?

About the only other option is using dealership charging stations.
Technology is changing how manufacturers achieve greater fuel economy with plug-in hybrids and electric vehicles.

"A lot of the hybrids will be moving to where gas is the second option," said Roger King, director of the Center for Advanced Vehicle Systems at Mississippi State University.

Plug-in hybrids use electric motors at startup and have the gas engine to charge batteries.

General Motors' Volt exemplifies a plug-in hybrid, while the Nissan Leaf is an all-electric vehicle. The Volt is available at some dealerships, and the Leaf will go on sale later this year.

One of the biggest concerns is creating infrastructure for recharging the vehicles.

Entergy Mississippi soon will launch a federally funded program that will provide five free charging stations. Entergy would cover maintenance costs.
Entergy’s John Wesley at JSU
Signage

Politically Correct

To the Point
Level 1 (120v) Opportunity Charger
GE Level 2 Charging Stations
Chevy Level 2 Charging Stations

Collins, MS – Volt SPX Charging

Collins, MS – Interior Charger
Chevy Volt Level 2 SPX with plug for different locations

This level 2 is very similar to the Tesla Universal charging kit.

The J-1772 plug will fit most PEV’s (Tesla excluded, however Tesla owners have an adapter which allows us to plug in to any of the Level 2 charging stations including this one.

This is the same type charging station as the one we installed in Collins, MS
Nissan Level 2 Charging Stations
Level 3 Fast Charge & Plug
Key Issues

- Foreign oil dependency
- Climate change
- Energy cost (transportation costs)
- Jobs

Plug-in Electric Vehicles as a Solution

- 60% US oil is imported
- 70% of all US oil used for transportation
- 97% of transportation fueled by oil

- Multiple studies confirm reduced CO₂ and improved air quality impacts from PEVs

- Fueling cost = ¼ of gasoline
  - $2-3 = 100 miles
  - Short-term gasoline market volatility

- Several US companies / organizations have capabilities that support PEVs
Plug-in Electric Vehicle Stakeholder Map

Key Point:
Complexity in and among actors, systems and services.
All stakeholders need to work together.

Component / System / Vehicle Manufacturers:
- R&D
- Safety
- Consumer Marketing
- Price
- Incentives
- Battery
- Recycling

Incentives
Regulation / Legislation

Technology Value

Utility
- Infrastructure
- Customer Service / Support
- Education / Outreach
- Vehicle & Infrastructure incentives
- Fleet
- Understand and manage grid impact
- Facilitate customer PEV adoption
- Policy / Rates / Billing
- Smart Charging
- Smart Grid/Standards
- Consumer Interface
- Integration/Interoperability
- Planning

Customer
- Energy Independence
- Lower Energy Costs
- Environmental Benefits
- Jobs

Convenient Energy

Support Services and Goods
- R&D
- Safety
- Codes/Standards
- Residential
- Commercial
- Public
- Suppliers
- Contractor’s
- Planning & Development

Policy
- National Security
- Carbon/GHG Emissions
- CAFE/Fuel Economy
- Incentives/Tax Credits
- Mandates
- Public Good
- Economic Health
- Environmental Health

Charging Infrastructure
PEVs are not new... but this time it’s different

- Technology
  - Plug-in *hybrid* electric technology
  - Improved batteries with higher energy density/longer range
- Marketplace
  - Driving factors include gas/oil prices, energy security, GHGs
  - Not just California
  - Broad support and incentives
- Customer Features
  - Instant torque
  - Preconditioning the cabin
  - Internet connected

Thanks for your time,
Will Hegman
will@mssolar.net
# CHEVY VOLT SPEC’s

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<th><strong>Fuel Efficiency</strong></th>
<th><strong>VOLT</strong></th>
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<td>EPA MPG Equivalent - Hwy (Electric)</td>
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<td>Charging Time - 120V [7] / 240V</td>
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Key to Acronyms

- **EV** - Electric Vehicle
- **NEV** - Neighborhood Electric Vehicle
- **PEV** - Plug-in Electrical Vehicle
- **PHEV** - Plug-in Hybrid Electrical Vehicle
- **EVSE** - Electrical Vehicle Supply Equipment
- **IED** - Improvised Explosive Device, i.e., “BOOBY TRAP”
Free Solar Tours by Request
Scum-bags by the Bucket Full!

Solar Power - Carport Solar Panel Systems

Solar panel coverage for parking lot and drive area coverage. We can design a solar carport or solar trellis structure that is specifically configured for solar panel coverage and alignment without sacrificing valuable parking, drive and walkway areas.

Advantages of Solar carports and structural steel trellis systems:

- The solar carport offers various advantages by generating power, providing a covered shaded place to park, and efficient placement of an array that lacks roof space or a southern facing roof.
- Solar carports utilize existing parking areas to generate power without sacrificing valuable real estate.
- By utilizing Parking areas in addition to existing building roofs solar carports can vastly increase the overall energy production of your solar project.
3rd Annual
Down on the Farm
Solar Tour

Saturday, October 1, 2011
9:00 AM to 4:00 PM
AT: 215 Popes Road
Carthage, MS 39051

For more information about solar or the solar tour,
contact Mississippi Solar at 601-656-6161.

Hosted By:

For more information about this tour, contact Carolyn Hegman at
601-656-6161, or 305-807-0323, or at Carolyn@msssolar.net.
Also, visit http://schoolsonsolar.com.
Rankin County Middle School Solar Day
Key to Acronyms

- **EV** - Electric Vehicle
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- **EVSE** - Electrical Vehicle Supply Equipment
- **IED** - Improvised Explosive Device
- **NEC** - National Electric Code
- **MEPI** - Mississippi Energy Policy Institute
- **MDA** - Mississippi Development Authority
- **PSC** - Public Service Commission
Descriptive Key to Acronyms

- **EV**: Electric Vehicle (maybe they forgot plug)
- **NEV**: Slow Electric Vehicle (golf cart, etc.)
- **PEV**: EV with a plug?
- **PHEV**: Charge it or Gas it up (goes either way)
- **EVSE**: Generally an Expensive “Gotcha”
- **IED**: Booby Trap – see “Who Killed the ...”
- **NEC**: Code generally disregarded in MS
- **MEPI**: You don’t know & don’t want to know
- **MDA**: God’s Authority- “Bow or be Beaten”
- **PSC**: These guys are really powerful also!
One Source for a Comprehensive EV Charging Solution

Residential Garage:
- Reduces charging time by 50% over level 1 charging solutions.

Fast-charging Stations:
- Charge 80% of the battery in less than 30 minutes.

Retail Parking Lots:
- User identification to ensure only authorized customers have access to charging stations.

Fleet Charging:
- Energy management and remote monitoring capability in one complete solution.