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....Plug In and Drive

Can I Charge My New EV and Avoid a Panel Upgrade in my Single-Family Home?
You Bet !!
12 Ways to Save $$ and Charge Your EV
Be a Happy EV Driver 

SacEV General Membership Meeting, March 8, 2023

- Dwight MacCurdy, retired, SMUD Electric Transportation R&D Department
- Phil Haupt – Qualified Local Electrician
- All of You Experts in the Audience

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Convenience Cordset from the EV Trunk/Frunk with 120V/240V Adapters

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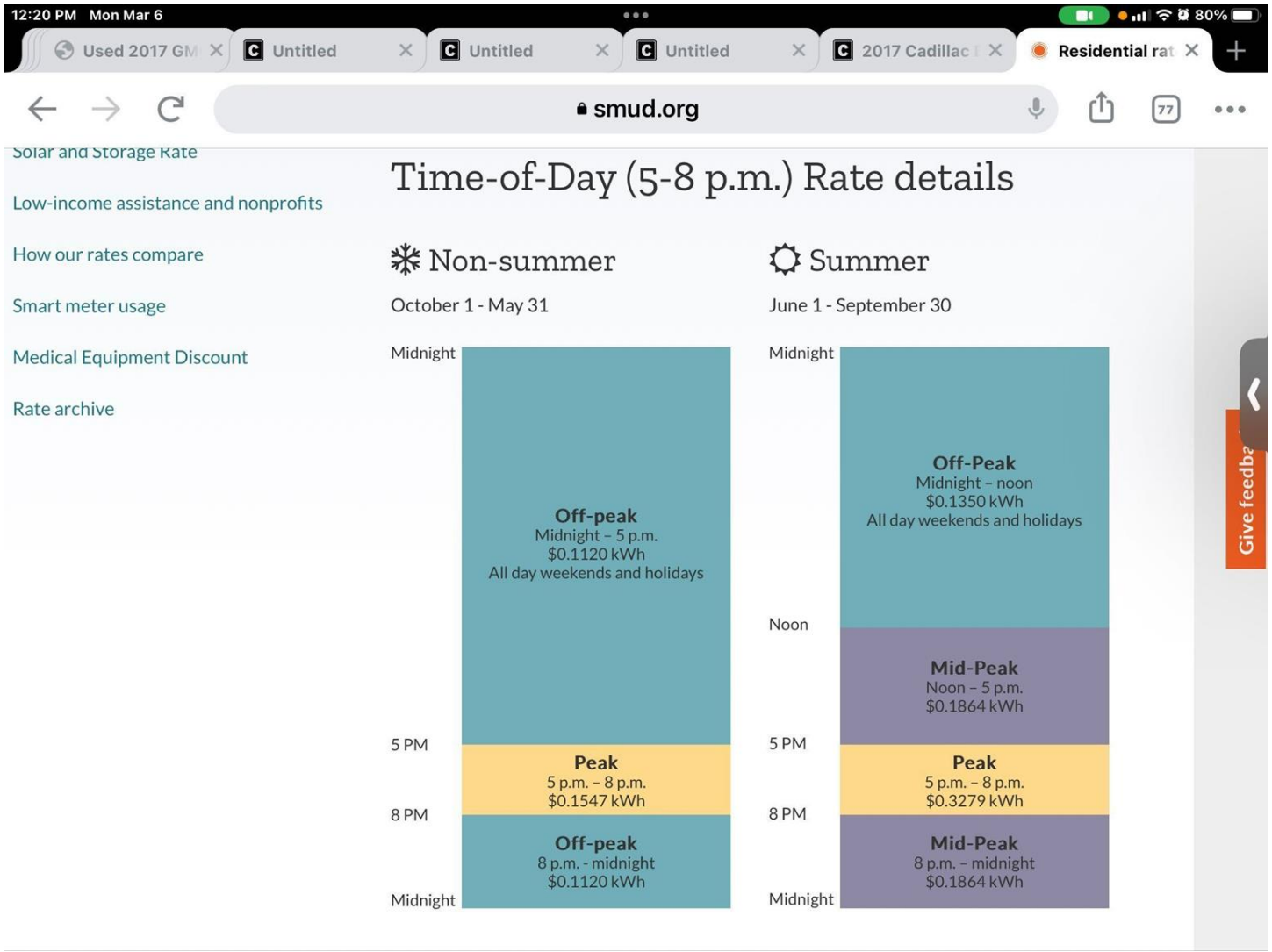
Typical Wall Mounted EV Charging Station

LCS-25P, Plug-in
20 Amp, Level 2
EVSE, 240V,
NEMA 6-50 plug,
with 25 ft cable

SMUD TOD Rates:



SMUD Residential TOD Rates – 1.5 cent discount for EVs between Midnight and 6:00 a.m.

October - May

Off-peak
Midnight – 5 p.m.
$0.1120 kWh
All day weekends/holidays

EV Rate: $0.097/kWh 12:00 am to 6:00 am

Peak
5 p.m. – 8 p.m.
$0.1547 kWh

Off-peak
8 p.m. - midnight
$0.1120 kWh

June – September

Off-Peak
Midnight – noon
$0.1350 kWh
All day weekends and holidays

EV Rate: $0.12 from 12:00 am to 6:00 am

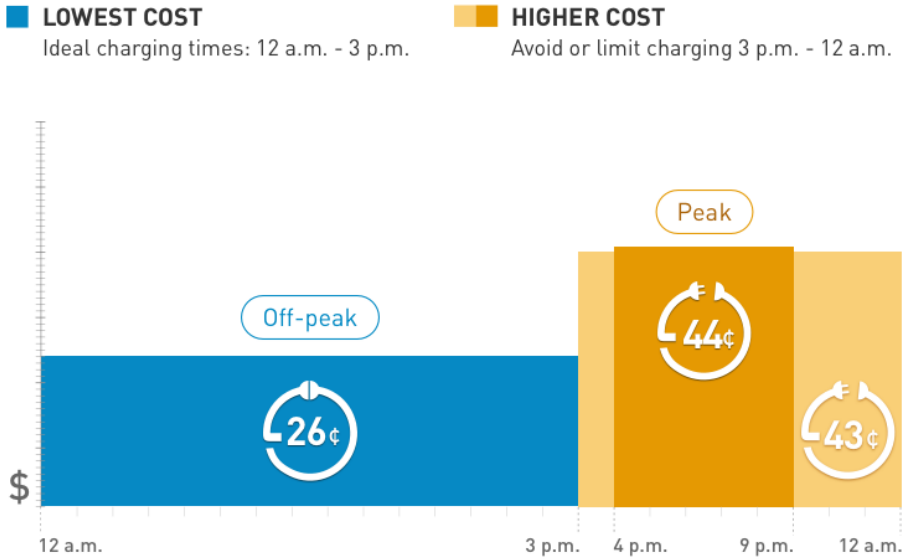
Mid-Peak
Noon – 5 p.m.
$0.1864 kWh

Peak
5 p.m. – 8 p.m.
$0.3279 kWh

Mid-Peak
8 p.m. – midnight
$0.1864 kWh

PG&E TOD EV2-A Rates:

Summer:
June - Sept



Winter:
Oct - May

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Use an Existing 120 Volt Circuit !

- Do you have an existing 120V circuit in the garage?
  - Dedicated circuit? Great ! – you are good to go with a 120V charging station!
  - Non-dedicated circuit? Has other heavy loads such as a refrigerator?
  - Then best to reduce the amperage at which your car charges to 8A from the instrument panel, or buy a charging station with amperage settings

- At night **over a 6-hour off-peak period, you can recover 25 miles** and **over a 12- hour period you can recover 50 miles** from a **120V 15 Amp branch circuit !**

- **How often do you drive more than that every day?**

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Any Abandoned 240V Circuits?

- Was there ever an **electric water heater** in your house that was converted to a gas water heater in the past, **leaving an unused 30A circuit?**

- Or, a **50A welding circuit** that was abandoned in the past?

Share the 240 Volt Existing Dryer Circuit !

- Do you have an electric dryer in the garage? Terrific !!
  - Share the dryer circuit to charge your EV when not drying clothes
  - Dryer circuits normally have a **24A output** on a 30A breaker
  - 24A Output x 240V = **5.8 kW Output**

- At night **over a 6-hour off-peak period, you can recover 104 miles** and **over a 12- hour period you can recover 207 miles** from a **30A dryer circuit**
- **How often do you drive more than that every day?**

Automatic Power Switching Devices Using an Existing 240V Circuit, Such As a Dryer Circuit

- There are many brands of power switching devices
- **Make sure any brand you use is UL/NRTL CERTIFIED – NOT ALL ARE CERTIFIED. Do not use a non-certified device.**
- **Most give automatic priority to the primary circuit and only allow the EV to charge when the primary circuit is not drawing power**
- Some plug into the dryer outlet or other 240V circuit and others are hard-wired
- Plug-In Models
  - **NeoCharge**
  - **Dryer Buddy**
  - **SplitVolt**
- Hard-Wired Model
  - **simpleSwitch**

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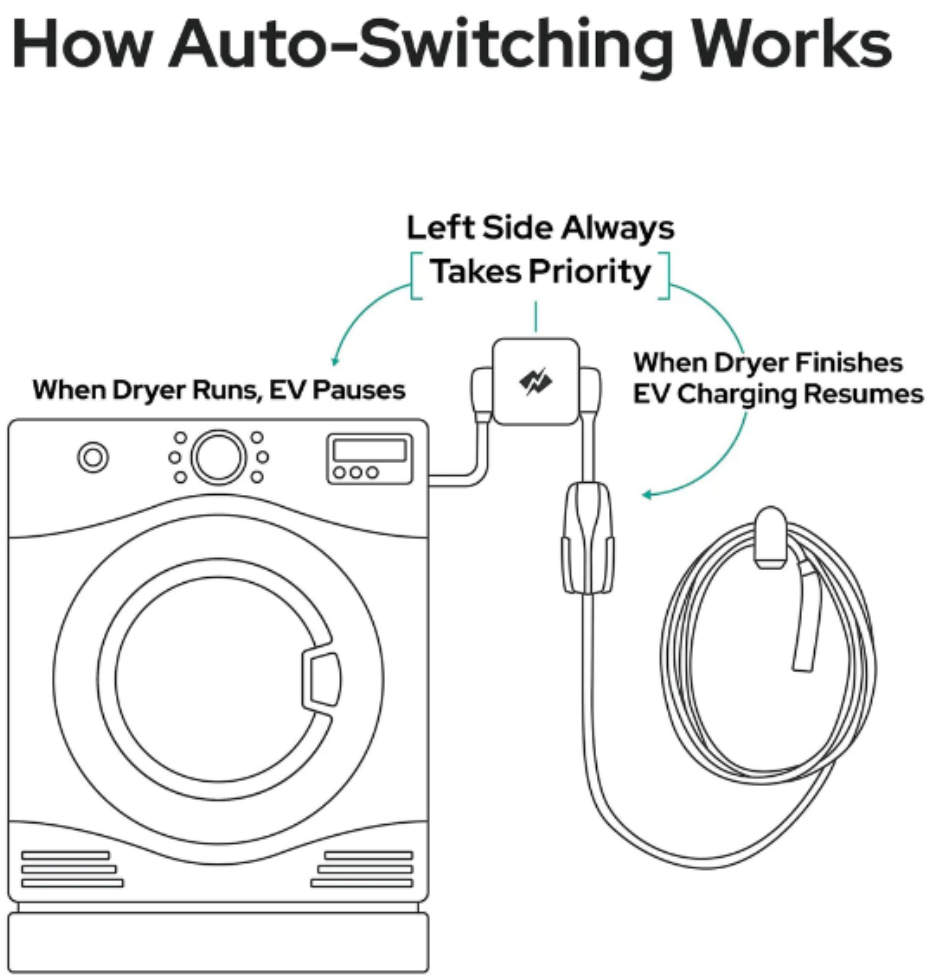
Plug in Devices - Dryer Should Get Priority

Be Sure to Plug it in with the Dryer in the Priority Receptacle



“Plug In” Power-Sharing Devices for the 240 Volt Dryer Circuit ! Automatic 2 Way Switchers

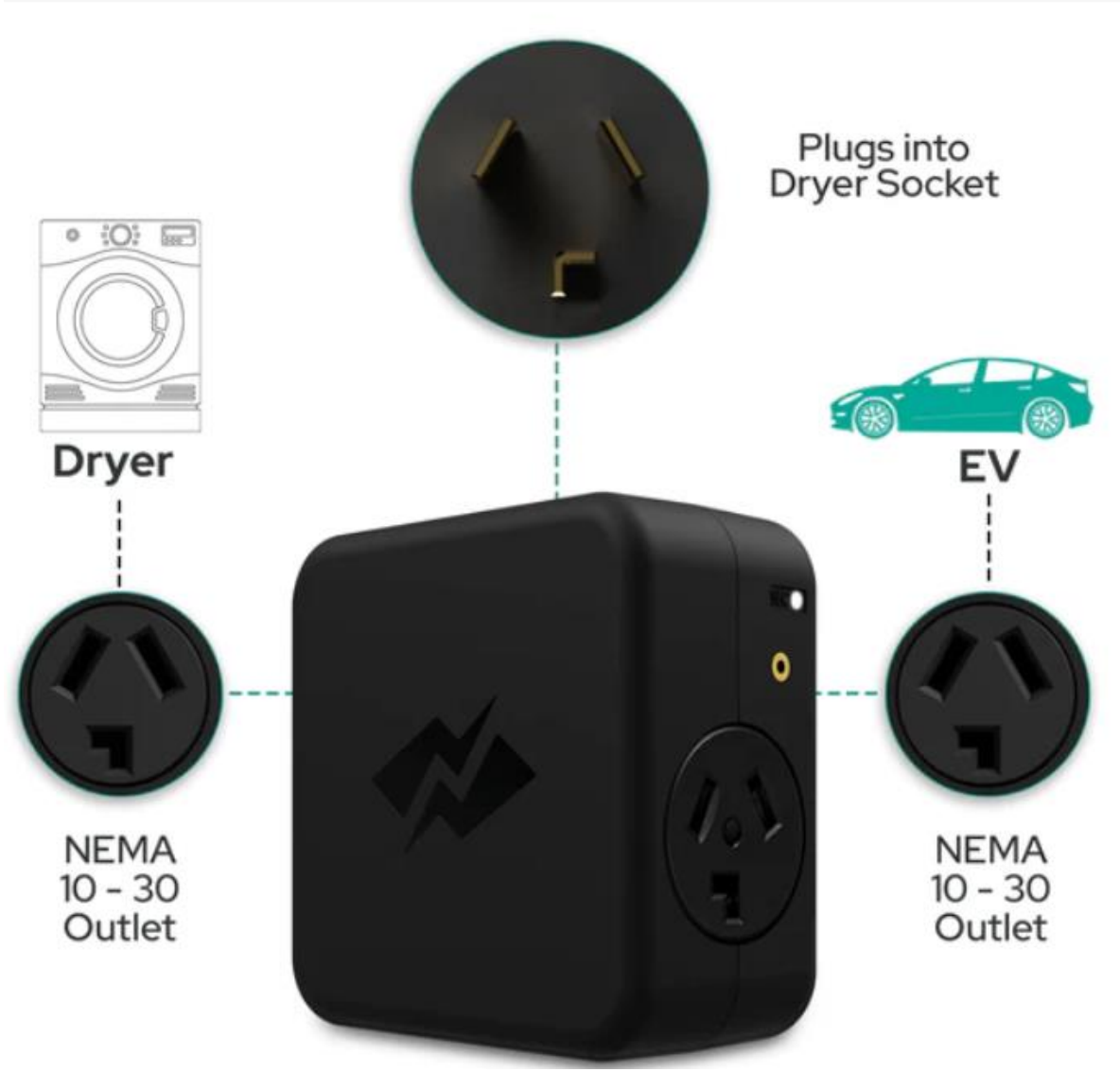
- **NeoCharge – Smart Splitter**
  - Share your dryer with your EV, or Charge 2 EVs from any 240V circuit
  - Auto Switching
  - The dryer socket (receptacle) and the box plug can be NEMA 10-30 or 10-40
  - The sockets (receptacles) in the power sharing box can be any combination of NEMA 10-30, 10-50, 14-30, 14-50, 6-50

Dryer Buddy
  - **Similar/same features but with kWh meter**

- **SPLITVOLT**
  - **Similar/same features but with kWh meter**

- **All give automatic priority to one of the 2 sockets (receptacles) in the power sharing box, so be sure to plug your dryer into the priority socket (receptacle).**

NeoCharge Smart Splitter



NeoCharge is offering an exclusive $25 - $175 discount code for EVA members! See myeva.org website for details

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Dryer Buddy Plus Auto, 30A, 2 Way Switcher, 5' Cable with kWh Meter

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SPLITVOLT Auto Switch with kWh Meter

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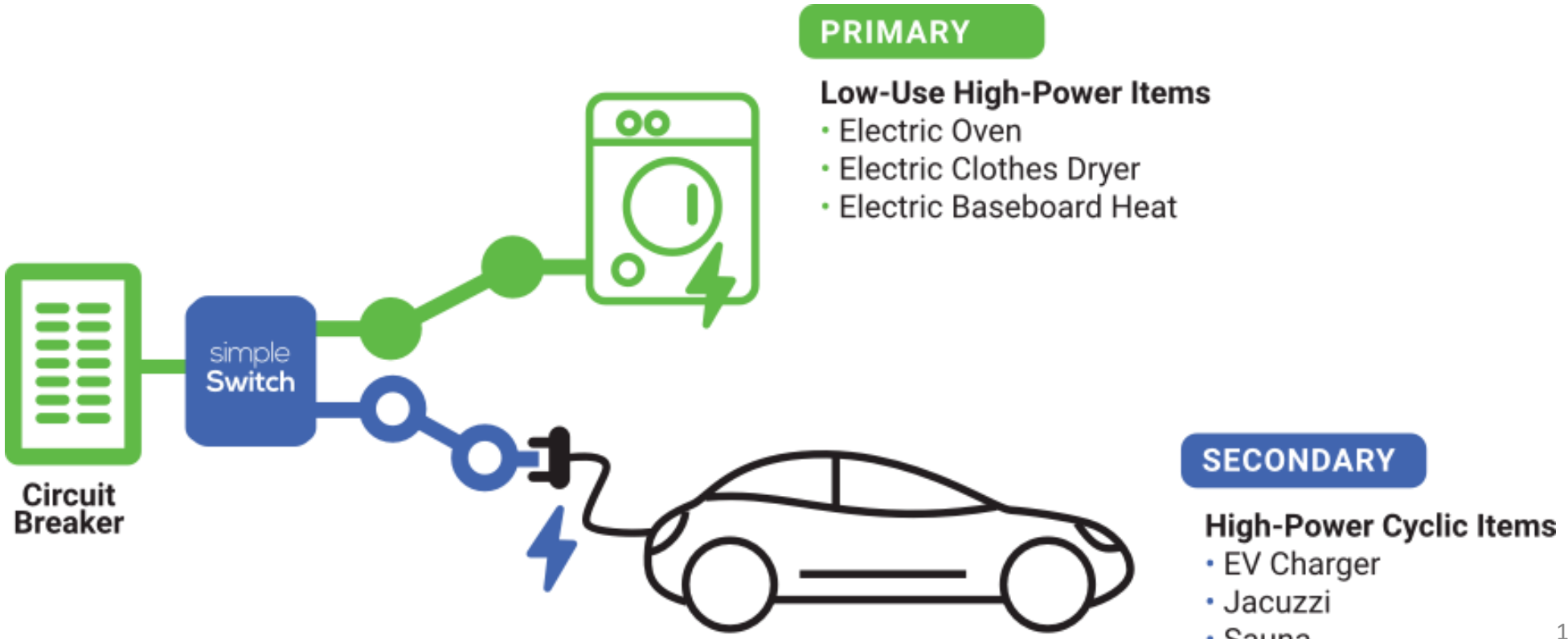
"Hard-Wired" Version of Power Sharing Device: Share 240V Intermittent Load Circuits ! Automatic 2 Way Switching – "simpleSwitch"



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SMUD Incentive for Power Sharing Devices

Up to $300. These devices are UL/NRTL CERTIFIED according to SMUD!

Brand	Model	Warranty	Certification	Notes	Website Link
NeoCharge	Smart Splitter	2 years	UL Certificate of Compliance E507438	Indoor use only. Plug in.	Link
*** Please note that there are several devices available at the simpleswitch website, however only the models shown below are eligible for the SMUD Charge@Home rebate. *Both devices below require installation by a licensed electrician.***					
*simpleSwitch	240	Lifetime for original Homeowner, 5 year for non-homeowners	UL Certificate of Compliance E510161 US/CAN LISTED	Indoor or Outdoor use. Hardwired.	Link
*simpleSwitch	240M	Lifetime for Homeowner, 5 year for non-homeowners	UL Certificate of Compliance E510161 US/CAN LISTED	Indoor or Outdoor use, Hardwired.	Link

https://www.smud.org/-/media/Documents/Going-Green/EVs/Circuit-Sharing-Device-QPL-updated-January-2023.ashx

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Some EVSE Manufacturers Can Program the EVSE with a Lower Level of Output to Match Available Power, such as for 30A Dryer Circuit

Charge 2 EVSE with a Share 2 card, and couple with dryer splitter, so you are feeding a dryer and 2 EVs from a 30A circuit

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Power Sharing EVSE Are Available with 2 Connectors from a Single Enclosure

Charge 2 adjacent EVs from A Single Enclosure – 1 BEV and 1 PHEV?

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If You Have Breaker Space in the Panel, Add A Circuit !

- For most EV drivers a dedicated 120V circuit will suffice for daily commuting since it provides 50+ miles of range over 12 hours
- If you need more range, a 20A 208/240V circuit will provide 150+ miles in 12 hours
- **Hire a qualified electrician to add a circuit in your panel**
- Make sure they are licensed and bonded
- Bonding covers $15,000 in recompense if things go south - the bonding company pursues the contractor
- Make sure all components are UL OR NRTL CERTIFIED!

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If You Have Panel Capacity, but Are Shy on Breaker Spaces

1. **There are half-height breakers that allow 2 breakers to be installed in the place of one standard height breaker**
2. **Or,** add a **Subpanel**

- Use a qualified electrician !
- Pull a permit !
- An extra set of eyes by the inspector is always a good idea !
- Use only UL or NRTL CERTIFIED EQUIPMENT

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More Sophisticated Solutions:
Yes: Require A Qualified Electrician :-)

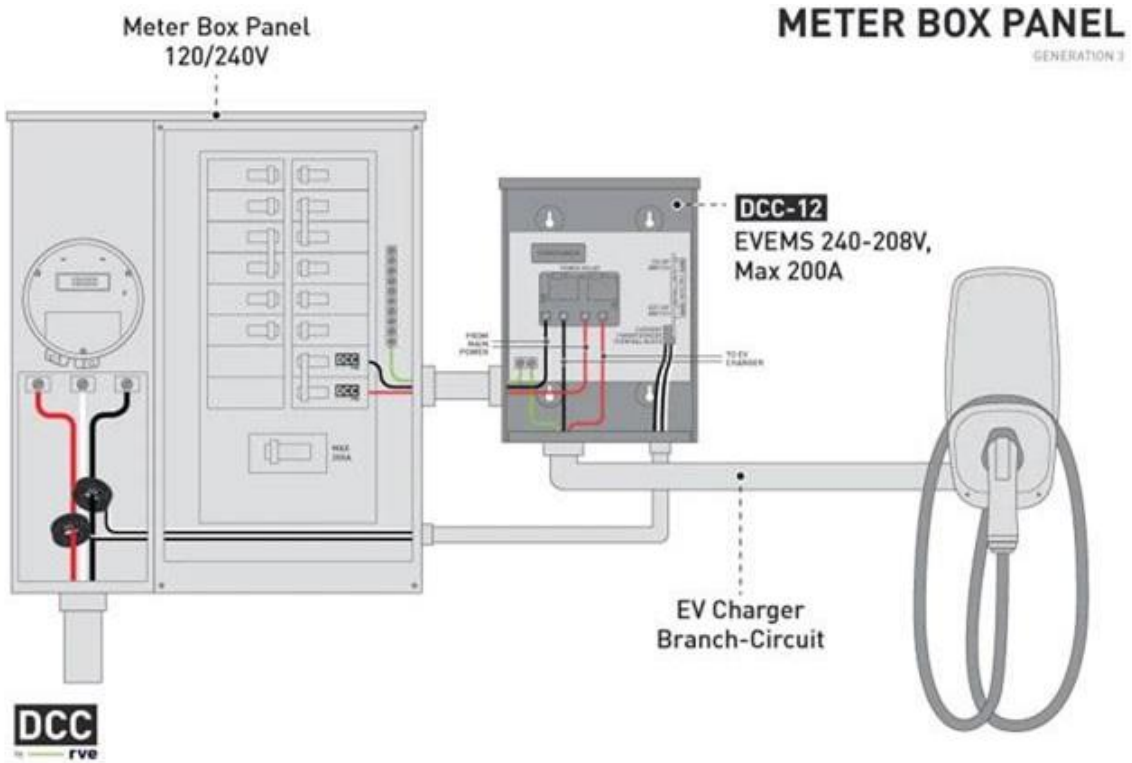
- DCC9 – load management "splitter" to add an EV circuit
  - If your panel would be overloaded by an added circuit, the DCC9 energy management subpanel will detect when your house load drops below the max capacity amperage, and enable the EV circuit to receive power for charging

- Whole house smart electrical panels if load management controls are helpful for entire house loads
  - Siemens "Smart Control Panel"
  - Span "smart panel"
  - Square D/Schneider "Energy Center Smart Panel"

- Several versions of "smart" home monitoring systems to better understand your loads and costs
  - Sense "Home Energy Monitor"

DCC Series - DCC9, DCC10, DCC11,DCC12

- Adds a load management subpanel, aka EV Energy Management System (EVEMS)
- Monitors total home load
- Allows charging when all loads are less than main breaker capacity
- Pauses EV charging when loads exceed main breaker capacity
- Restores charging after 15 minutes below threshold



Concerned about a Panel Overload? Or, Pulling a Permit to Add a Circuit?

- Call the SMUD EV help line, 916-732-5565, ask for the record of your loads over the last year or two, aka a **"load study"**, and leave your house address and email address on the voicemail
- You will get an email response within 48 hours, telling you the max load in kW and Amps over the last 2 years
- I did this recently as suggested by a qualified electrician. I have a 200A panel and the peak load was 8.6 kW and 36 amps – plenty of excess capacity for an additional EV circuit
- You will need this load study when applying for a permit to add an EV circuit

Itron EE (MDMS PRD - IEE 9.0 HF23 / ISAIM_EhP7_SP1_HF27 (12/4/2021))

Workbench Tools (MDM) Application Data Window Help

Graph

Setup Detail Demand

Detail Demand

Service Point ID:	1139268	Customer:		Start Time:	02/24/201
Channel:	1	Account:		Stop Time:	02/24/202
Interval:	60	Premise ID:		Max Value:	8.64 kW
Minutes to Roll:	60	Meter ID:	2060449	On:	07/16/201
Version Date		Time Zone:	Pacific Time (US,Canada); Tijuana	Summary:	35584.33
		Recording Device ID:	2060449		

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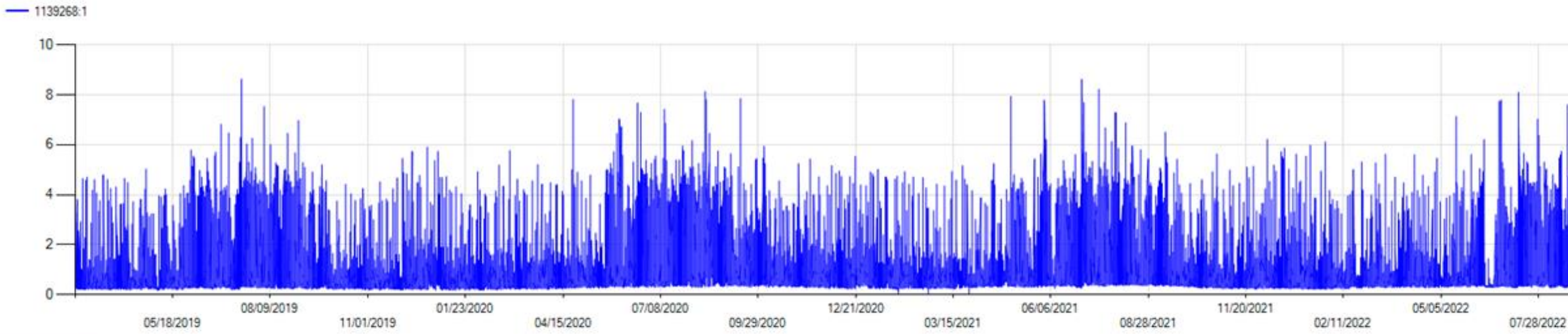

Date	Value	Status
02/24/2019 01:00 PST	0.2208	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 02:00 PST	0.2472	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 03:00 PST	0.2964	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 04:00 PST	0.2412	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 05:00 PST	0.2292	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 06:00 PST	0.2040	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 07:00 PST	0.2064	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 08:00 PST	0.1836	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 09:00 PST	0.1872	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 10:00 PST	0.9744	NV, VEESET1PV, VEESET2NV, VEESET3NV
02/24/2019 11:00 PST	0.5880	NV, VEESET1PV, VEESET2NV, VEESET3NV

Meter Data Management

If Not in SMUD Territory
Use the PG&E “Green Button”, call PG&E or Get A Load Study by Qualified Electrician

- Access your PG&E load data with the “Green Button”, or call PG&E 1-877-660-6789
- Or, an electrician can install a recording device on your panel to conduct a load study
- The National Electrical Code has specs for a load study
- Ask for one month of data, or as recommended by the electrician
- May be required by the Authority Having Jurisdiction (Permit Office) if an electrician is helping you, but not in all cases

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Program Your EV for "Departure Time Charging Strategy"

- Most EVs are programmable so you can set the time by which you would like the EV to be charged
- Program your charging to be finished by 6:00 a.m. and your entire charge likely to take place during SMUD's 6 hour off peak period
- The EV will back-solve when it needs to start charging
- Help yourself to cheap rates and help avoid grid impacts !!

Are You Planning Other Electrical Work at Home? Save It Up, Do It at One Time and Save $$

- When we sold our 1951 3BR, 1B house in 2010, we finally installed central heat and air, which required a new panel upgrade for $2,500
  - **The cost to add an EV circuit to the garage at the same time was only $350**

- At the same time we bought our “new” 1961 home, and it sorely needed electrical upgrades and amenities, which cost ~ $5,000
  - **The cost to add an EV circuit in the garage was only $325.**

- Use copper, not aluminum conductor

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Summary

1. Spare 120V dedicated outlet. or spare non-dedicated 120V outlet but with other loads?
   - Reduce your amperage draw via your EV IP, or with controllable EVSE or with lower amperage EVSE to avoid tripping the breaker

2. Abandoned 24A electric water heater circuit or 40A welding circuit?

3. If you have an existing electric dryer, you are golden with options with power sharing
   3.1 NeoCharge, Dryer Buddy. SplitVolt, simpleSwitch
   3.2 You can plug one EVSE into a splitter, or even two

4. SMUD Incentives for Power Sharing Devices

5. Two EVSE with Share 2 cards can share a single circuit, and the power draw can be derated for the dryer circuit outlet or a 20A 240V branch circuit

6. An EVSE enclosure with 2 power-sharing “handles” may be handy if one less enclosure on the wall is more convenient

Summary

7. Add a circuit if there is breaker space in the panel

8. If there is panel capacity, but panel is shy on breaker spaces:
   8.1 Use two half-height breakers if there is no space for another breaker
   8.2 Add a subpanel

9. More sophisticated options – whole house load management devices, smart panels, smart circuits, smart monitoring systems

10. Get a load study from SMUD or qualified electrician if required by AHJ (Permit Office)

11. Pre-program your EV for a “ready by departure time” charging strategy to get the cheapest rates and to avoid grid impacts

12. Consolidate electrical jobs to save $$$

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Thank You !!

- Dwight MacCurdy, retired, SMUD Electric Transportation R&D Department, dwm22@sbcglobal.net
- Phil Haupt – Qualified Local Electrician, phil@philhauptelectric.com
- All of You Experts in the Audience – y'all please swap email addresses