Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

Disclosure: Paul Gipe has worked with Aerovironment, ANZSES, An Environmental Trust, APROMA, ASES, AusWEA, AWEA, David Blittersdorf, Jan & David Blittersdorf Foundation, BWEA, BWE, CanWEA, Canadian Co-operative Assoc., CAW, CEERT, Deutsche Bank, DGW, DSF, EECA, ES&T, GEO, GPI Atlantic, IREQ, KWEA, MADE, Microsoft, ManSEA, MSU, NRCan, NRG Systems, NASA, NREL, NZWEA, ORWWG, OSEA, Pembina, PG&E, SeaWest, SEI, TREC, USDOE, WAWWG, WE Energies, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, World Future Council, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.
Driving Electric
If Not Now
When?
Why Drive Electric?

• Cleaner
• Safer
• More Fun

Paul Gipe, wind-works.org
Why Drive Electric?

• Uses Fewer Resources
  More Efficient--High Mileage
• Zero Tail-Pipe Emissions
• 50%-70% Fewer Total Emissions
• Keeps Oil in the Ground
• Fast & Fun

Paul Gipe, wind-works.org
IEA said the dramatic rise in SUVs is fundamentally undercutting gains by EVs in cutting CO₂.

Rise of SUVs 'makes mockery' of electric car push
IEA: SUVs Leading Growth in CO₂

SUVs were the second largest contributor to the increase in global carbon emissions from 2010 to 2018.

Change in global emissions by sector (in MtCO₂)

- Power: 1,405
- SUVs: 544
- Heavy industry: 365
- Trucks: 311
- Aviation: 233
- Shipping: 80
- Other cars: -75

Source: IEA

Paul Gipe, wind-works.org
NOx Tail-Pipe Emissions

Leaf EV
EPA Fleet
SUV
2008 SUV
VW Jetta
VW Passat

The Law

Dieselgate Has Cost Auto Cos. $35 Billion

Paul Gipe, wind-works.org
Lowest Total CO$_2$e Emissions

- Batteries Add Few Relative Emissions Even with 1-2 Battery Replacements!
- Most Emissions from Fuel

Source: UCS, Cleaner Cars from Cradle to Grave 2015
EVs: More Efficient (UCS)

- GHG emissions: 80 mpg for equivalent gasser in states with EVs
- GHG emissions: 50 mpg Nationwide
- Trend is Increasing
  - As Generating Mix is Greening
- Trend for Gassers is static

Paul Gipe, wind-works.org
Average EV MPG (UCS)

2016

Paul Gipe, wind-works.org

EVs are Much Like Solar

Up-Front Costs =

Long-Term Savings

Paul Gipe, wind-works.org
EVs: Lower Maintenance Costs

• No Engine
  No Oil Changes
  No Spark Plugs
  No Air Filter

• EVs—Rotate the Tires

• Chevy Bolt vs Sonic
  $1,500 Savings after 150,000 miles (UCS)

Paul Gipe, wind-works.org
EVs: Lower Fuel Costs

• **UCS:** Equivalent Cost of Gas
  
  LADWP: $2.20/gal standard rate plan; $1.8/gal on TOU rate plan
  
  SCE: $2.10/gal standard rate plan; $1.10 TOU rate plan

Paul Gipe, wind-works.org

Annual Fuel Costs (2019)

Paul Gipe, wind-works.org

## EV & Electricity Consumption

<table>
<thead>
<tr>
<th></th>
<th>kWh/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nies-Gipe</td>
<td>3,600</td>
</tr>
<tr>
<td>Nies-Gipe &amp; EV</td>
<td>4,000</td>
</tr>
<tr>
<td>Avg CA Home</td>
<td>6,500</td>
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</tbody>
</table>

10,000 miles/yr

Paul Gipe, wind-works.org
Why Now?

- Better Cars
- Better Batteries
- Longer Range (3X)
- More Fast Charge Stations
- Hefty Subsidies

Paul Gipe, wind-works.org
Better Cars

• Vehicles for Different Purposes
  Trucks, SUVs, Sedans

• No One Vehicle Does it All!

• EVs No Different
  CUVs, Sedans, “Hot Hatch”

Paul Gipe, wind-works.org
EV Range = kWh Traction Battery

kWh = Size of the Gas Tank

Tesla Model 3 - 62 kWh
Hyundai Kona - 64 kWh
Bolt EV - 66 kWh
Nissan Leaf + - 62 kWh
2015 Leaf - 22 kWh

EPA Miles

Paul Gipe, wind-works.org
EV US Market

- 2% USA
- 8% California!!!
- 1.5 Million EVs in USA

Paul Gipe, wind-works.org
California Worlds 2nd Largest Market

Paul Gipe, wind-works.org
EV Market Now Equals Hybrid Market

Paul Gipe, wind-works.org
Tesla Model 3 in California

- 3rd in Total New Car Sales
- Could Become 2nd Beating Out Camry
Tesla is in a class by itself!

Tesla will reach 1 million in total sales in 1st Qtr 2020!
2019 Cumulative EV Sales USA

- Tesla Model 3: 2 Years
- Tesla S/X
- Nissan Leaf: 10 Years
- Chevy Bolt

Thousands

Paul Gipe, wind-works.org
What to Buy or Lease

Paul Gipe, wind-works.org
What Every EV Should Have

• DC Fast Charge Capability
  For Road Trips
• Heated Steering Wheel
• Heated Seats

Paul Gipe, wind-works.org
Chevy Bolt Charge Port

Charge Latch

AC Port

DC Port

DC Port Cover

Paul Gipe, wind-works.org
Federal Subsidies

- Tesla: $0
- Chevy Bolt: $1,875
- Nissan Leaf: $7,500
- Others: $7,500

Paul Gipe, wind-works.org
## California Subsidies

<p>| | |</p>
<table>
<thead>
<tr>
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<td>State</td>
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<tr>
<td>SJVAPCD</td>
<td>-$3,000</td>
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<tr>
<td>PG&amp;E</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>-$5,800</strong></td>
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</table>

Paul Gipe, wind-works.org
Tesla Model 3

2019 Tesla Model 3 Standard Range Plus

https://ev.pge.com/
Paul Gipe, wind-works.org

Any Color You Want—as Long as it’s White.
Model 3 $5,000 Cheaper Than Camry
3 Years Total Cost of Ownership

The Tesla Model 3 Standard Range Plus is $5,792 cheaper to own over 3 years

Your EV Selection
Tesla Model 3 Standard Range Plus

Similar Gas Vehicle
Toyota Camry Hybrid XLE/SE

Vehicle net Incentives, Resale
Electricity
Gasoline
Insurance
Maintenance

$0 $5,000 $10,000 $15,000 $20,000 $25,000

$16,799
$22,592

Paul Gipe, wind-works.org

https://ev.pge.com/
Chevy Bolt

2019 Chevrolet Bolt EV

https://ev.pge.com/
Paul Gipe, wind-works.org

Now 259 Miles Range
Bolt $700 Cheaper/yr Than Camry

Compare the Chevrolet Bolt EV to a similar gas vehicle, the Toyota Camry XLE/XSE

The Chevrolet Bolt EV is $60 cheaper to fill up monthly

https://ev.pge.com/
Paul Gipe, wind-works.org

Fuel Costs Only
Bolt $7,000 Cheaper than Camry
3 Years Total Cost of Ownership
Nissan Leaf Plus—Lease Only!

2019 Nissan LEAF PLUS

Cash

Loan

Lease

LEASE PAYMENT

$114 / month

FIRST LEASE PAYMENT

$4,034

INCENTIVES FOR LEASE

$13,800

All Costs >

All Incentives >

View all cars

Paul Gipe, wind-works.org
## Cost of Our 3-Year 10,000 mile/year Bolt Lease

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Lease</td>
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<tr>
<td>Down Payment</td>
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<tr>
<td>Federal Subsidy</td>
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<tr>
<td>State Subsidy</td>
<td>-$2,500</td>
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<tr>
<td>SJVAPCD Subsidy</td>
<td>-$3,000</td>
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<tr>
<td>PG&amp;E</td>
<td>-$800</td>
</tr>
<tr>
<td>Total</td>
<td>$2,700</td>
</tr>
</tbody>
</table>

$75/month Not Counting Gas Savings

= Cell Phone Plan!

Paul Gipe, wind-works.org
Are EVs Different?

• Yes, of Course
  You “Fill Up” (Charge) at Home

• Vive La Différence!

• No Need to be Afraid
  They Really Do Work ;)
  Ask any EV Driver

Paul Gipe, wind-works.org
How to Use (Drive) EVs

• Normal Driving—Charge at Home
• Road Trips—Charge at DCFC Stations
“Filling the Tank”

... Charging the Battery

Paul Gipe, wind-works.org
EV Home Charge Station

- J1772 EV Plug
- EVSE 240 V, 40 A
- kWh Meter
- Switch
- NEMA 14-50 Receptacle

Paul Gipe, wind-works.org
Non-Tesla Level 2 Plug

J1772 (in the US & Canada)
240 V, <50 A

Paul Gipe, wind-works.org
EV Fast Charging Standards

- Tesla
- Everyone Else
  - CHAdeMO: Nissan, Mitsubishi
  - CCS: American & German mfgs.

40 kW: 30 mins

Paul Gipe, wind-works.org

Pacific View Mall North, Ventura, California
Tesla Charging

- 90% at Home 10 kW
- <10% on the Road 120 kW
  <30 mins
- Supercharger Network—Most Extensive in North America—Bar None!
Non-Tesla EV Charging

• 90% at Home
  Level 2: 240 V, 40 A, ~7 kW
  ~7 Hours @ 7 kW
  @ $0.23/kWh

• <10% on the Road
  DCFC: 400 V, 100-300 A, ~50 kW-100 kW
  30-45 mins
  Cost Varies: ~$15/charge

Paul Gipe, wind-works.org
DCFC Stations & Kiosks

- Station = Group of Kiosks
- Kiosks = Dispenser (1-2 Cables)
- Tesla
- CCS + CHAdeMO (CP, EVgo, et al)
- CCS Only (EA)
- CHAdeMO Only (EVgo, Rare)

Paul Gipe, wind-works.org
Tesla Supercharger Stations

- Tejon: 8 Kiosks ("Gas" Pumps)
- Bakersfield: 10 Kiosks
- Kettelman City: 40 Kiosks
- Baker: 40 Kiosks

Paul Gipe, wind-works.org
Tesla Supercharger Network

Paul Gipe, wind-works.org
Regional DCFC Networks

Non Tesla

June 2020 Completion

Paul Gipe, wind-works.org
North American DCFC Networks

Non Tesla 900+ Stations (Not Dispensers)

Paul Gipe, wind-works.org
Electrify America (VW) DCFC Network

Non Tesla

Diesel-Gate Settlement

Paul Gipe, wind-works.org
DCFC Charge Station: 1 Kiosk

- EV Connect
- Santa Clarita
- Rare

Paul Gipe, wind-works.org
DCFC Charge Station: 2 Kiosks

- EVgo
- Visalia

Paul Gipe, wind-works.org
DCFC Charge Station: 3 Kiosks

- ChargePoint
- Coalinga (I-5)
DCFC Charge Station: 4 Kiosks

- Electrify America
- Coso Junction

Paul Gipe, wind-works.org
DCFC Charge Station: 6 Kiosks

- Recargo
- Prunedale (101)
- Rare

Paul Gipe, wind-works.org © PlugShare
Why Drive Electric?

• It’s the Right Thing to Do
• Practice What We Preach
• Time to Ditch the Prius—or SUV

Paul Gipe, wind-works.org
Must Increase Deployment Rate

• Growth—Good but not Good Enough
• Must Accelerate Growth
• What Can be Done
  Continue Federal Subsidies
  Increase & Expand State Subsidies
  Early Adopters—Sierra Club Members
  Must Move Now (No Time to Wait)

Paul Gipe, wind-works.org
Time for Sierra Club to Take the Road to the Future

Paul Gipe, wind-works.org
No Time to Waffle

No Time for Half-Measures

No Time to Lose

Paul Gipe, wind-works.org
No Plug--No Deal

Paul Scott, *Who Killed the Electric Car*
Driving Electric

What’s Stopping You?

Paul Gipe, wind-works.org