JUNEAU EV CHARGING

2020

Planning Now for Juneau’s EV Future

Presented by Juneau Commission on Sustainability
TASK

Advise CBJ Public Works Committee and CBJ Assembly on EV Charging Permit and Parking options to be adopted by Ordinance or not

Obtain Public Comments by July 24, 2018 and Make Recommendations by August 1, 2018
Juneau EV Charging

Why Go Forward

Juneau Community EV Adoption is Rapidly Growing

Public EV Charging has costs

Public Chargers are crowded and access limited

More public charging stations are required
A TRANSPORTATION PERSPECTIVE

MANKIND USED HORSES FOR 6000 YEARS

5th AVE NYC
1900

Where is the car?

1900 NYC
5th AVE NYC
1913

Where is the horse?

A TRANSPORTATION PERSPECTIVE
ONE DECADE OF MOTORIZED TRANSFORMATION

IT HAPPENS
A TRANSPORTATION PERSPECTIVE - A STROLL DOWN JUNEAU’S MEMORY LANE
‘Expert’ Disruption Forecasts

In the mid-1980s AT&T hired McKinsey & Co to forecast cell phone adoption by the year 2000

THEIR (15-YEAR) PREDICTION
900,000

THE ACTUAL NUMBER WAS
109 million

They were off by a factor of:
120x
NOW

WORLD WIDE EV ADOPTION CURRENT GROWTH 2010 -2016

Figure 1 • Evolution of the global electric car stock, 2010-16

Notes: The electric car stock shown here is primarily estimated on the basis of cumulative sales since 2005. When available, stock numbers from official national statistics have been used, provided good consistency with sales evolutions.


Key point: The electric car stock has been growing since 2010 and surpassed the 2 million-vehicle threshold in 2016. So far, battery electric vehicle (BEV) uptake has been consistently ahead of the uptake of plug-in hybrid electric vehicles (PHEVs).
NOW
US
EV ADOPTION
GROWTH
2010 - 2017
THE RECENT TREND...

ELECTRIC ADOPTION IS A WORLD-WIDE PHENOMENA
THE RECENT TREND...

What going on in Juneau?

Juneau EV Adoption Curve
S-Curve of Consumer Adoption
Electric Car Adoption Overlay, via CleanTechnica / Zach Shahan

- Innovation
- Growth
- Maturity

Norway — 35%

EV ADOPTION CURVE - EV GROWTH IS COMING
EV Expected Demand

- **2030** 24% of Vehicle Sales will be Electric
- **2040** 54% of Vehicle Sales will be Electric

**Figure 1:** Annual global light duty vehicle sales

- **Figure 2:** Global light duty vehicle fleet

Source: Bloomberg New Energy Finance
NATIONAL DRIVE ELECTRIC WEEK

Participating number of Juneau EV’s doubles every year
CONSUMER ACCEPTANCE?

20% of Americans would purchase an EV as their next vehicle

AAA: 1-in-5 U.S. Drivers Want an Electric Vehicle
May 2018 AAA survey
EV CONSUMER ACCEPTANCE

YOUNGER AND MORE EDUCATED

Figure 26. Demographics of AEV acceptance

Sources: For 2016 (Singer 2016). For 2017: ORC for NREL (2017), Study No. 726058, n=1,017.

Note: The 2017 sample sizes are provided for each demographic group in the figure.

Source NREL 2017
ELECTRIC TRANSPORTATION IS GREEN

HOW DOES THIS TIE IN WITH JUNEAU POLICY AND COMMUNITY VALUES?

Source AEL&P
A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year.

This assumes the average gasoline vehicle on the road today has a fuel economy of about 22.0 miles per gallon and drives around 11,500 miles per year. Every gallon of gasoline burned creates about 8,887 grams of CO₂. Source: https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

Source EPA
Juneau, Alaska
Using 2016 data for AELP total emissions rate and the fueleconomy.gov kWh/mi rating for a Nissan Leaf, Juneau EVs have an emissions rate equivalent to driving a car that gets 15,776 MPG Source AELP
ELECTRIC TRANSPORTATION IS RECTANGULAR GREEN

HOW DOES AN EV FIT WITH YOUR FAMILY ECONOMIC VALUES?

Annual Fuel Cost EV vs ICE (Gas) Vehicle in Juneau

Source AEL&P
ELECTRIC TRANSPORTATION IS LESS EXPENSIVE TO MAINTAIN

2000 Moving Parts VS 18 Moving Parts
ELECTRIC TRANSPORTATION IS MORE POWERFUL THAN ICE

= faster start from a red light is less commute time

“The Tesla P90D accelerates faster than $1 million gas 'supercars' from Ferrari, McLaren, Lamborghini, Pagani and Porsche.” (1)
ELECTRIC TRANSPORTATION IS JUST... WELL ...FASTER

Tesla P100D vs 804 HP Dodge Demon Hellcat “Tesla Killer”...smoked
THE FINE PRINT SAYS IT ALL
Last Dodge Challenger SRT Demon, king of the muscle cars, rolls off the line

USA Today  June 1, 2018
ELECTRIC TRANSPORTATION IS MORE ENERGY EFFICIENT BY A FACTOR OF 5
WHERE DO USED EV BATTERIES GO?

Valuable and Repurposed-Grid Storage, Home Energy Storage, power tools, streetlights, recycle materials
WHAT IS THE FUTURE?

Follow the Money
2018 Growing EV Model availability options. More to come?

<table>
<thead>
<tr>
<th>Model</th>
<th>US</th>
<th>Range (mi)</th>
<th>0-60 (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMW i3</td>
<td>$44,450</td>
<td>114</td>
<td>33</td>
</tr>
<tr>
<td>Chevrolet Bolt EV</td>
<td>$36,620</td>
<td>238</td>
<td>60</td>
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<tr>
<td>Fiat 500e</td>
<td>$32,995</td>
<td>84</td>
<td>24</td>
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<tr>
<td>Ford Focus Electric</td>
<td>$29,120</td>
<td>115</td>
<td>33.5</td>
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<tr>
<td>Honda Clarity Electric</td>
<td>$37,510</td>
<td>89</td>
<td>25.5</td>
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<tr>
<td>Hyundai Ioniq Electric</td>
<td>$29,500</td>
<td>124</td>
<td>28</td>
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<tr>
<td>Kia Soul EV</td>
<td>$33,950</td>
<td>111</td>
<td>30</td>
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<tr>
<td>Nissan Leaf (2nd Gen)</td>
<td>$29,990</td>
<td>151</td>
<td>40</td>
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<tr>
<td>Smart ED</td>
<td>$23,800</td>
<td>100</td>
<td>17.6</td>
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<tr>
<td>Tesla Model 3 (Long Range) US</td>
<td>$50,000</td>
<td>310</td>
<td>75</td>
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<tr>
<td>Tesla Model S 75D</td>
<td>$74,500</td>
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<tr>
<td>Tesla Model S 100D</td>
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<td>100</td>
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<tr>
<td>Tesla Model S P100D</td>
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<td>315</td>
<td>100</td>
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<tr>
<td>Tesla Model X 75D</td>
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<td>75</td>
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<tr>
<td>Tesla Model X 100D</td>
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<td>100</td>
</tr>
<tr>
<td>Tesla Model X P100D</td>
<td>$140,000</td>
<td>289</td>
<td>100</td>
</tr>
<tr>
<td>Volkswagen e-Golf</td>
<td>$30,495</td>
<td>119</td>
<td>35.8</td>
</tr>
</tbody>
</table>
Future EV Options are Growing - Trucks/SUV’s
GM plans expanded Bolt production, 20 new electric vehicles by 2023
June 12, 2018 Detroit Free Press

Ford plans $11 billion investment, 40 electrified vehicles by 2022
January 14, 2018 Reuters

Fiat Chrysler will launch over 30 EVs and hybrids by 2022
June 2, 2018 Financial Times.

Nissan's New Electric Vehicle Goal: Sell 1 Million Annually by 2022
March 23, 2018 Fortune Magazine

VW to Build Electric Versions of All 300 Models by 2030
September 11, 2017, Bloomberg

Global carmakers to invest at least $90 billion in electric vehicles
Reuters. January 15, 2018

Driving the Future
CATL - China’s largest Auto battery manufacturer is worth US $12.3 billion dollars
• EV Batteries: A $240 Billion Industry

PLANNED EV BATTERY PRODUCTION

EXISTING VS PLANNED

BILLIONS OF NEW INVESTMENT IN GIGAFactories

China Targets Sevenfold EVs Sales Increase By 2025.

China Is The Centre Of The Lithium Universe.

It is not only Tesla Gigafactory - 30 Lithium Batteries Megafactories are rising all over the globe.
2017

Trend Data for Battery Pack $/kWh - Tesla vs. Market Average (BNEF research)
(Cost Axis is Log Scale, dashed lines are estimated data)

Bloomberg New Energy Finance

2018 Update

$100/kWh Tesla Battery Cells This Year, $100/kWh Tesla Battery Packs In 2020. June 8, 2018

=EV Production costs are rapidly declining
2018 - Tipping Point achieved 7 Years Early

**Tipping Point**
Battery costs are expected to drop below $100 per kilowatt-hour, making electric cars competitive on price by 2025

- Lithium-ion battery pack price

$1,200 kilowatt-hour

Note: Prices starting in 2017 are forecasts
Source: Bloomberg New Energy Finance
EV GROWTH VS. OTHER ADOPTION OF TECHNOLOGY

Source: BlackRock
US TRANSPORTATION SECTOR CONTRIBUTES 27% OF US GHG

Electric Transportation Transformation can have a major impact on world GHG emissions
Juneau Community Values

Juneau Climate Action Plan
- Res. 2593 (2012)

CBJ Support for Advancement of Electrified Transportation Vehicles and Supporting Res 2722 (2015)

Juneau Charging

88% of all EV Charging is done at home. NREL 2017

Public Chargers provide a public safety service
Levels of Charging:

- **Level 1**: Residential Charging
  - Duration: 290 minutes
- **Level 2**: Juneau’s Public Chargers
  - Duration: 115 minutes
- **Level 3**: Juneau’s Newest L3 Chargers
  - Duration: 23 minutes

**Average Time Spent Charging**

Level 3 provides a full charge from empty in less than 30 minutes.
Juneau’s Chargers Coming Soon Privately Funded - Fred Meyers - Alaska Brewery

Level 2 and Level 3

Level 3 Fast Charger

More to Follow as Smart Business see the Trend of Growing EV’s in Juneau
Juneau' Chargers Coming Soon Privately Funded-Fred Meyer- Alaskan Brewery

Level 2 and Level 3 Fred Meyer

Level 3 Fast Charger Alaska Brewery

More Chargers to Follow
CBJ Chargers 6, Other Juneau 10

- State-Grant
- CBJ-GRANT
- Private
- Rock Dump
- CBJ-GRANT
- UAS
- Docks & Harbors
- State-Grant
- JHI
- Private
- Private
- AELP
- Private
- CBJ-GIFT
- 2 Private chargers coming soon
CHARGERS AND PARKING-HOW DO OTHERS HANDLE THE ISSUE?
Compare and Contrast-Parking vs. Charging

City of Angeles issues EV Permits. At many locations EV’s are **exempt from parking fees** as long as they are Zero Emissions. In other locations, EV’s receive discounted parking fees and **preferential parking locations**.

UCSB-EV Permit **program is based on EV Battery size**. Nissan Leaf is $45 month. Tesla is $105 month. Provides preferential EV only parking with access to charger. Non-EV permits are $2.00 an hour for charging on campus.

18 Charging Stations. **EV Charging is Free** with valid permit. Parking Permits: EV vehicles $0, ICE vehicles $536 to $2482 annually.
Compare and Contrast-Parking vs. Charging

EV Power Permit $25 Annually. EV’s receive Preferred Parking Locations

Electric Vehicles park for free at City owned parking lots and receive free two hour parking at Santa Monica metered street parking.

Electric Vehicle permits have a $25.00 annual surcharge added to the parking permit price to cover charging. For EV charging sessions longer than 4 hours, the user may be charged $1.00/hr for each additional hour of charging.
EV’s **pay 50% of parking fees** of ICE’s for any City owned parking garage.

City operates 93 EV charging stations. 13 additional charging stations for City fleet vehicles.

Level 1 and Level 2 chargers are **free** with a valid parking permit. For Level 1 chargers, customers may leave the vehicle for unlimited *active* charging time. Level 2 EV stations have a four-hour time limit for parking.

Regular parking fees apply. Charging is **free** for City owned Level 2 and Level 3 chargers.
Cities, Airports and Universities are offering charging as a public service. Many are free charging.

102 charging parking places. Electric vehicle drivers must pay regular rates for parking, but do not have to pay extra to charge their cars.
Juneau EV Situation Today

Juneau is a nationally recognized High EV Adoption Community

Juneau has experienced rapid EV Adoption Growth with continued increases in adoption.

Juneau charging stations have been initiated and mostly paid for by private (non CBJ) sector and grant support for EV charging.

Juneau has a roughly equal mix of public/private managed charging stations. There are limited public charging stations on CBJ properties.
### Status of Juneau CBJ charging today

<table>
<thead>
<tr>
<th>Location</th>
<th>Fees and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown Transit Center</td>
<td>Parking is 75 cents an hour. Parking is only allowed while actively charging. One level 3 plug.</td>
</tr>
<tr>
<td>Marine Parking Garage</td>
<td>Parking is 75 cents an hour. Parking is only allowed while actively charging. Two Level 2 Plugs.</td>
</tr>
<tr>
<td>Valley Library</td>
<td>Parking is free. Two Level 2 Plugs.</td>
</tr>
<tr>
<td>Douglas Library</td>
<td>Parking is free. Two Level 2 Plugs.</td>
</tr>
<tr>
<td>Treadwell Arena</td>
<td>Parking is free. One level 2 Plug.</td>
</tr>
<tr>
<td>Statter Harbor</td>
<td>Parking is $1.00 an hour. One level 2 Plug.</td>
</tr>
</tbody>
</table>

Currently CBJ Charging is covered with Parking fees like many other communities.
POTENTIAL SCENARIOS

Parking Versus Charging
Scenario 1- Do Nothing

- **Scenario 1- Do Nothing. No Ordinance.** Recommend that No ordinance is necessary, needed or required at this time.

- Perhaps, there are not enough CBJ owned chargers to economically justify a permit program as many Juneau chargers are non-CBJ/private but are free and open to the public.

- There might not be enough electric vehicles in Juneau to require a CBJ ordinance/program.

- Many other communities offer the same practice

- Revisit the issue in the future.
Scenario 2- Do Something

Adopt Current Draft Ordinance.

- Recommend that the draft Ordinance be adopted. The Ordinance covers CBJ costs with a $50 EV permit annually.
- Would only cover CBJ charging locations even if private money paid for chargers and installs.
- May or may not resolve CBJ parking and charging congestion issues.
Scenario 3- Do More.

Craft and Adopt modified Ordinance.

- Based on Public input and comments- Design ordinance in alignment with the Juneau Climate Action Plan, Juneau Renewable Energy and existing CBJ resolutions to meet current parking and charging demand.

- Parking vs. Charging bifurcation?
Scenario 4- Do A lot.

Craft and Adopt modified Ordinance and a Plan

• Based on public comments, prepare Juneau for the impending EV Transformation with a “Go Forward EV charging Plan”.

• Expand additional charging locations in Juneau and to establish parking and charging protocols consistent with the public input to meet current demand and to plan for growing electric vehicle transportation in Juneau.
Go Forward Scenarios

1. Do Nothing
   No Ordinance Necessary

2. Do Something
   Adopt Current Draft Ordinance

3. Do More
   Craft and Adopt modified Ordinance based on Public Comments

4. Do A Lot
   Craft a modified Ordinance and a Plan based on Public Comments
IF JUNEAU IS AHEAD OF THE PACK...

WHAT JUNEAU EV PATH LAYS AHEAD?
Public Comments

Public Comment Period for Scenarios is Open from June 19, 2018 to July 18, 2018 with a recommendation made to the CBJ Assembly

http://www.juneau.org/sustainability/
References


- US EPA website [https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle]

- The Electric Vehicle Disruption – TonySeba.com

- [http://evadoption.com/future-evs/]

References Continued


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  Clean Technica June 8, 2018

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  https://www.fleetcarma.com/everything-need-know-electric-cars/

• Flip the Fleet. EV charging Survey May 12, 2018
  https://flipthefleet.org/author/admin/

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  https://www.nrel.gov/docs/fy18osti/70371.pdf

• National Plug-In Electric Vehicle Infrastructure Analysis. NREL 2017
  https://www.nrel.gov/docs/fy17osti/69031.pdf