

JUNEAU EV CHARGING 2020

Planning Now for Juneau's EV Future

Presented by Juneau Commission on Sustainability



Driving the Rain

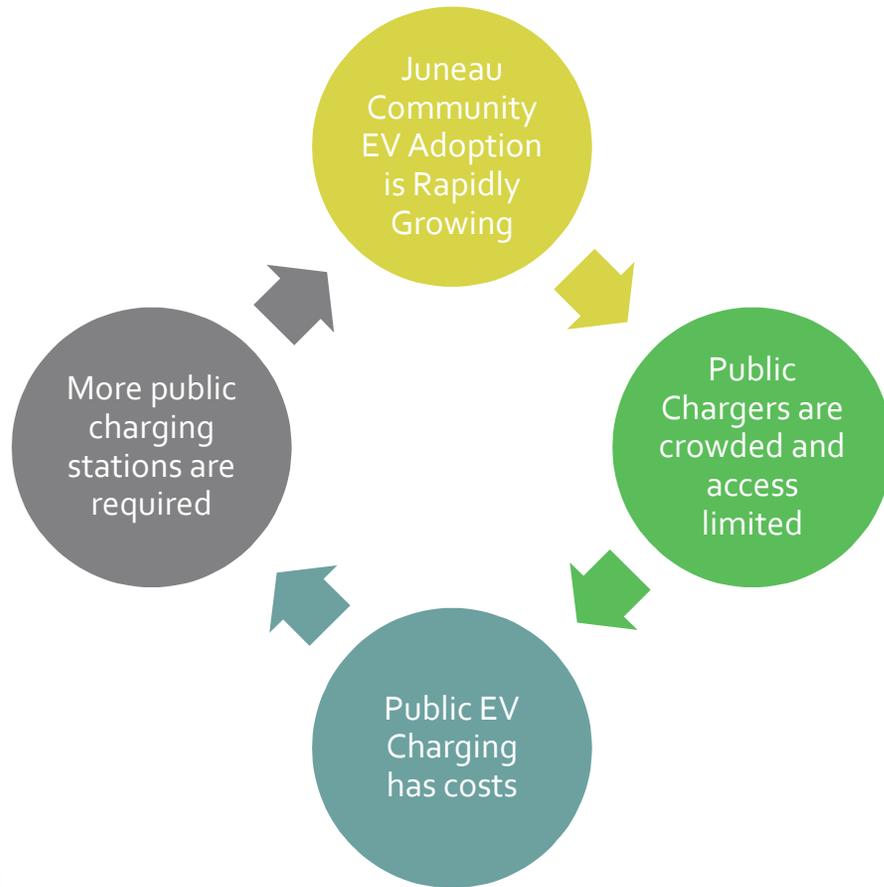
TASK



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





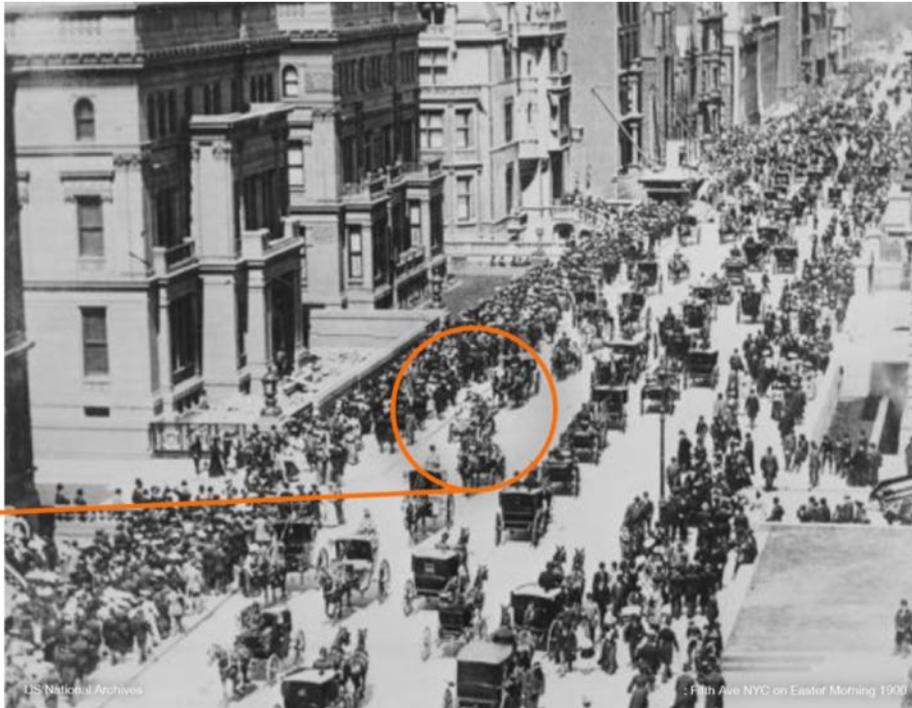
Juneau EV Charging

Why Go Forward



5th AVE NYC
1900

Where is
the
car?



Copyright © 2016 Tony Seba

US National Archives

5th Ave NYC on Easter Morning 1900



A TRANSPORTATION PERSPECTIVE

MANKIND USED
HORSES FOR 6000
YEARS

1900 NYC



5th AVE NYC
1913

Where is
the
horse?



Copyright © 2016 Tony Seba

George Grantham Bain Collection

Photo: Easter 1913, New York, Fifth Avenue looking north.



A TRANSPORTATION
PERSPECTIVE

ONE DECADE OF
MOTORIZED
TRANSFORMATION

IT HAPPENS

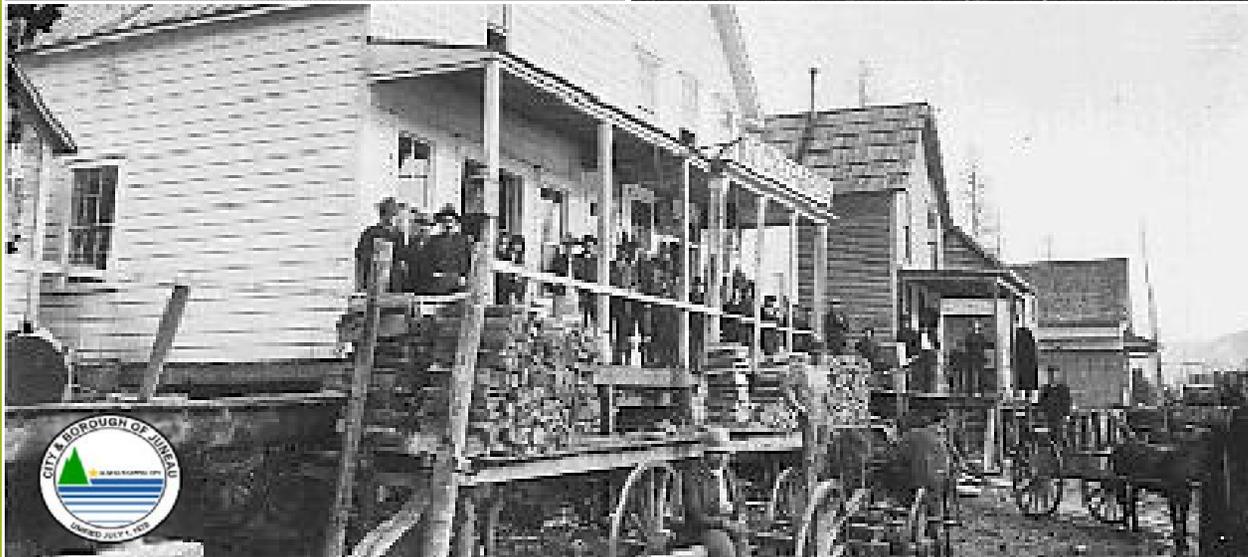




Alaska State Library - Historical Collections



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

SUBSCRIBERS

THE ACTUAL NUMBER WAS

109 million

They were off
by a factor of:

120x



Motorola DynaTAC 8000X from 1984. Source: Wikimedia, Source: Economist

ANOTHER
HISTORICAL
TECHNOLOGY
ADOPTION
EXAMPLE

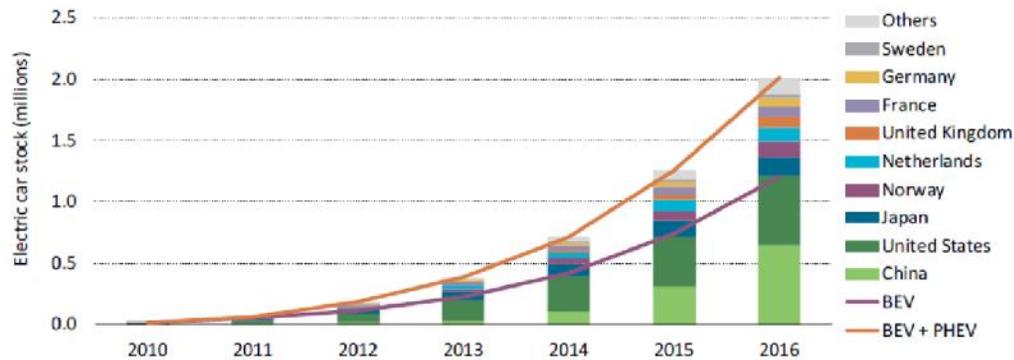
TRANSFORMATION
PERSPECTIVE



NOW

WORLD WIDE EV ADOPTION CURRENT GROWTH 2010 -2016

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



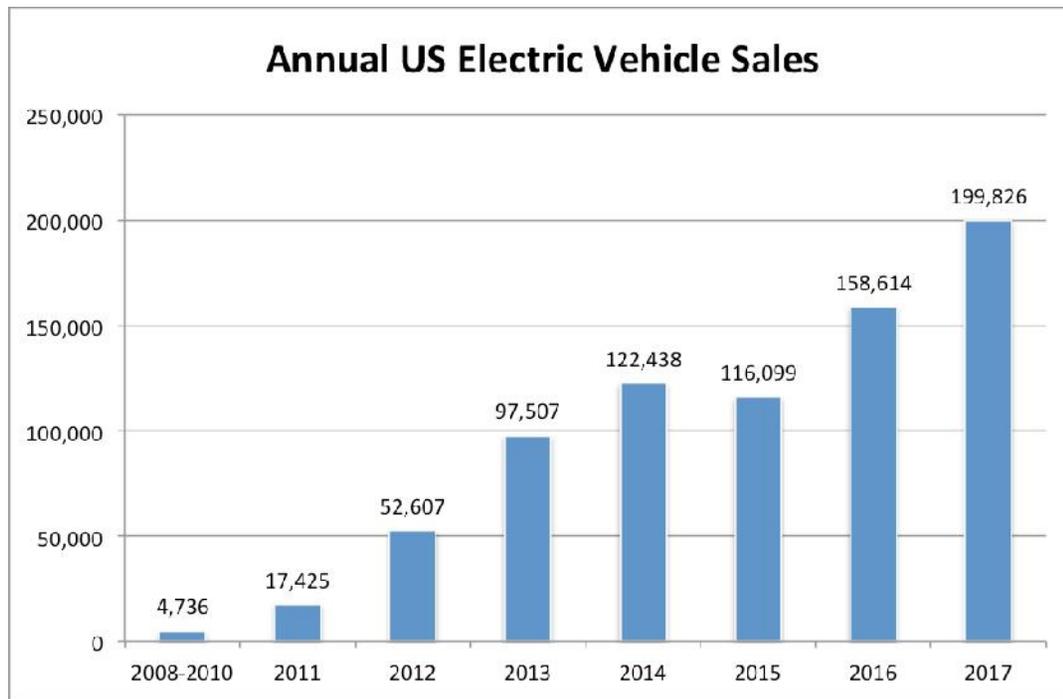
Notes: The electric car stock shown here is primarily estimated on the basis of cumulative sales since 2005. When available, stock numbers from official national statistics have been used, provided good consistency with sales evolutions.

Sources: IEA analysis based on EVI country submissions, complemented by EAFO (2017a), IHS Polk (2016), MarkLines (2017), ACEA (2017a, 2017b) and EEA (2017).

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).

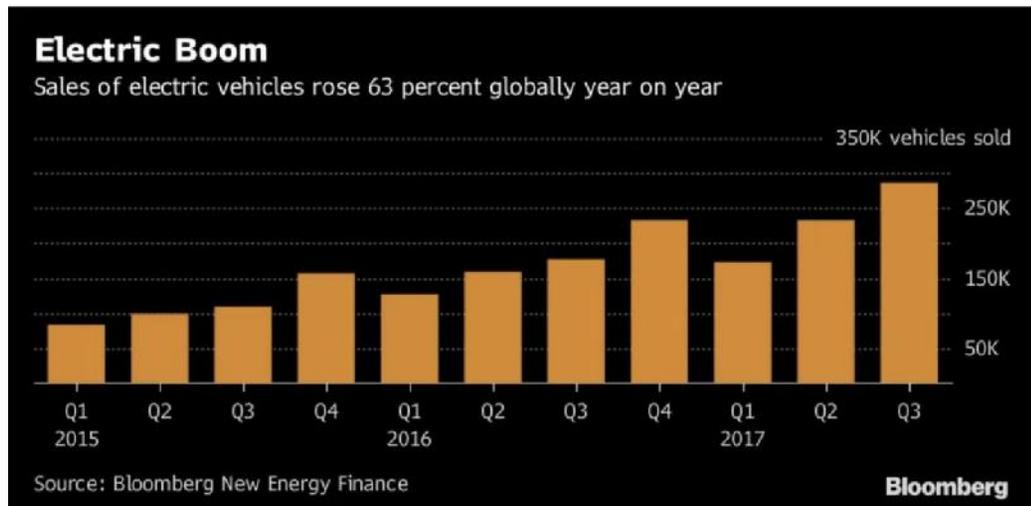


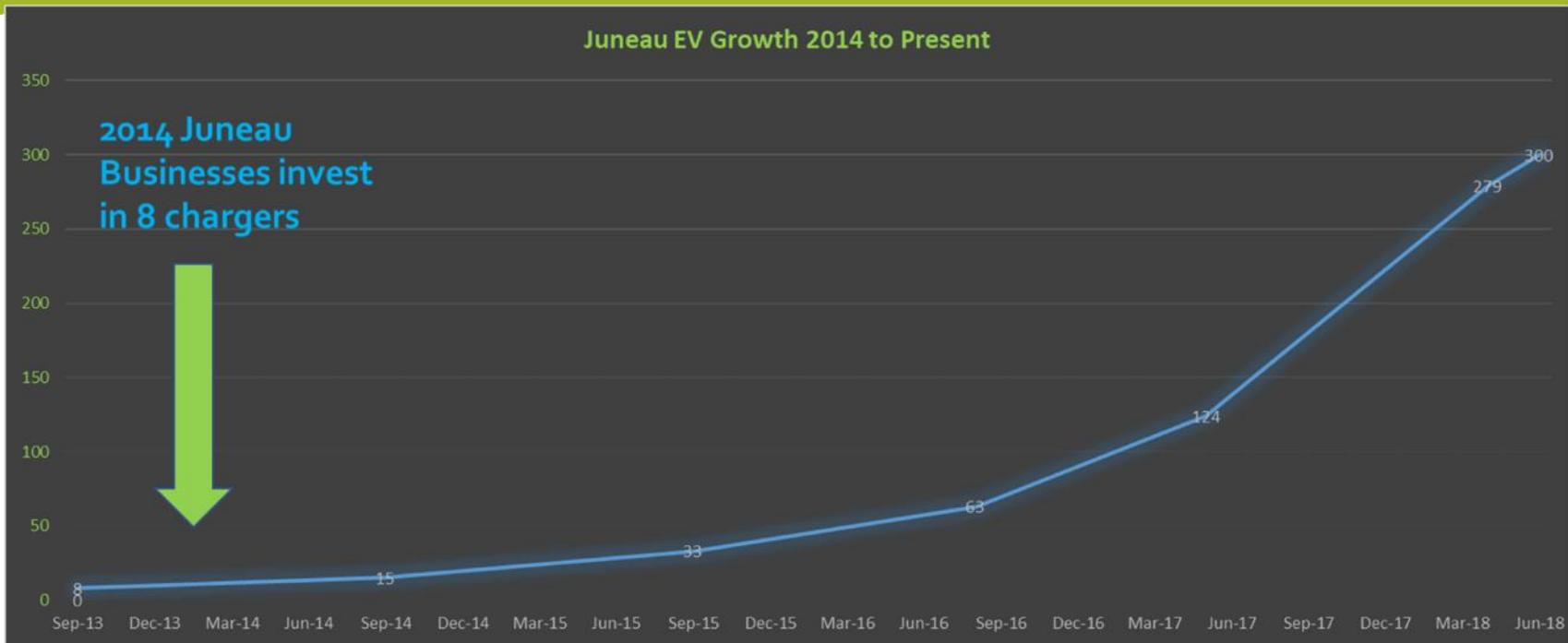
NOW US EV ADOPTION GROWTH 2010 - 2017



THE RECENT TREND...

ELECTRIC
ADOPTION IS A
WORLD-WIDE
PHENOMENA





THE RECENT TREND...

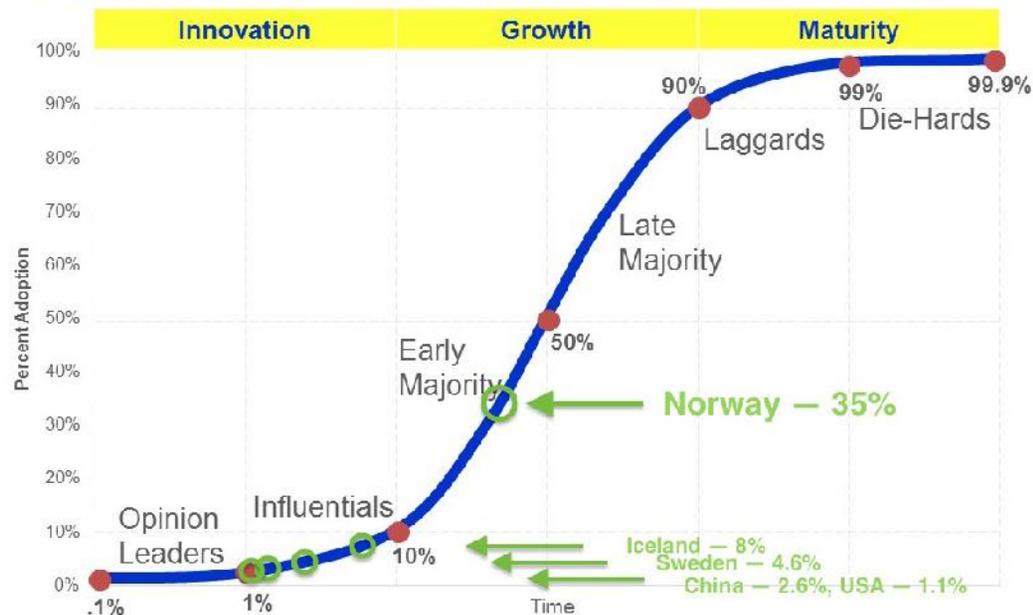
What going on in Juneau?

Juneau EV Adoption Curve



S-Curve of Consumer Adoption

Electric Car Adoption Overlay, via CleanTechnica / Zach Shahan



Source: Dent Research

www.dentresearch.com



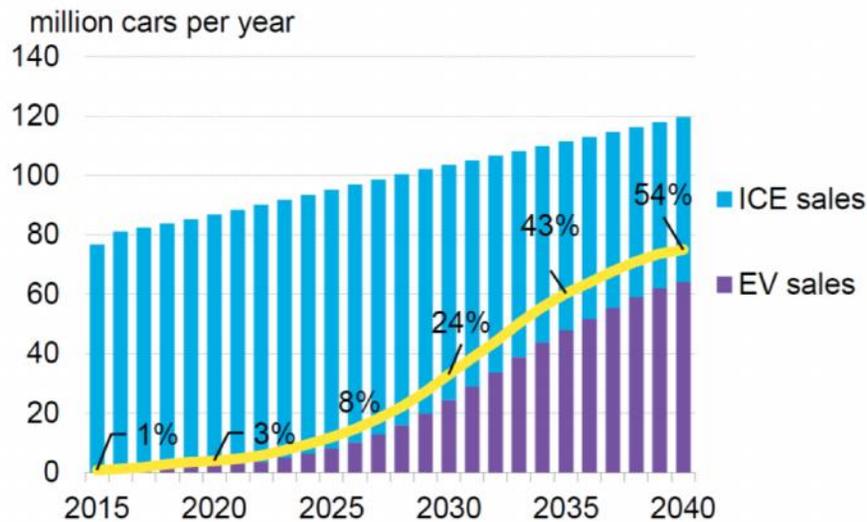
EV ADOPTION CURVE- EV GROWTH IS COMING

EV Expected Demand

2030 24% of Vehicle Sales will be Electric

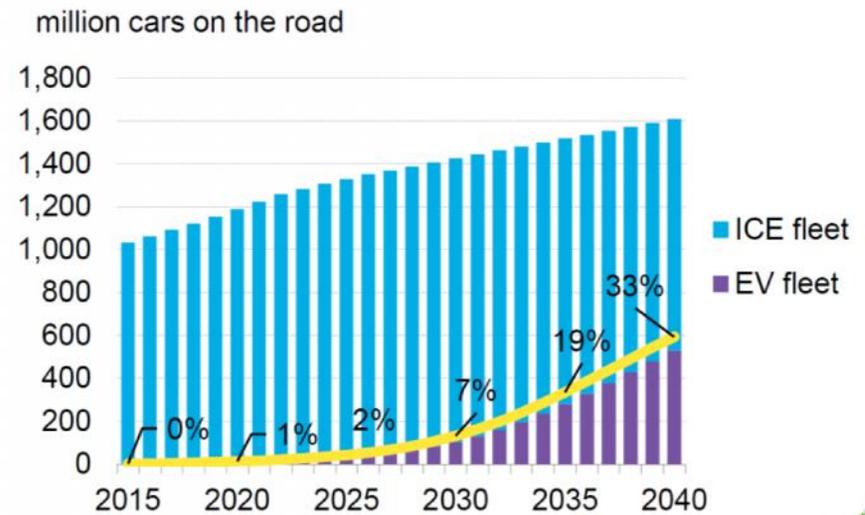
2040 54% of Vehicle Sales will be Electric

Figure 1: Annual global light duty vehicle sales



Source: Bloomberg New Energy Finance

Figure 2: Global light duty vehicle fleet



Source: Bloomberg New Energy Finance



JUNEAU EV HISTORY-THE VEHICLES





NATIONAL DRIVE ELECTRIC WEEK

Participating number of Juneau EV's doubles every year





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

CONSUMER ACCEPTANCE?

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



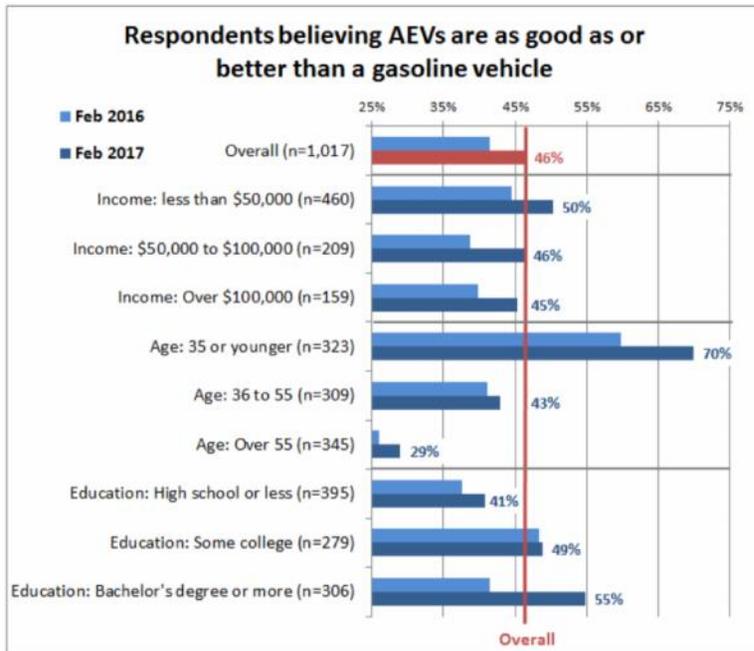


Figure 26. Demographics of AEV acceptance

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.



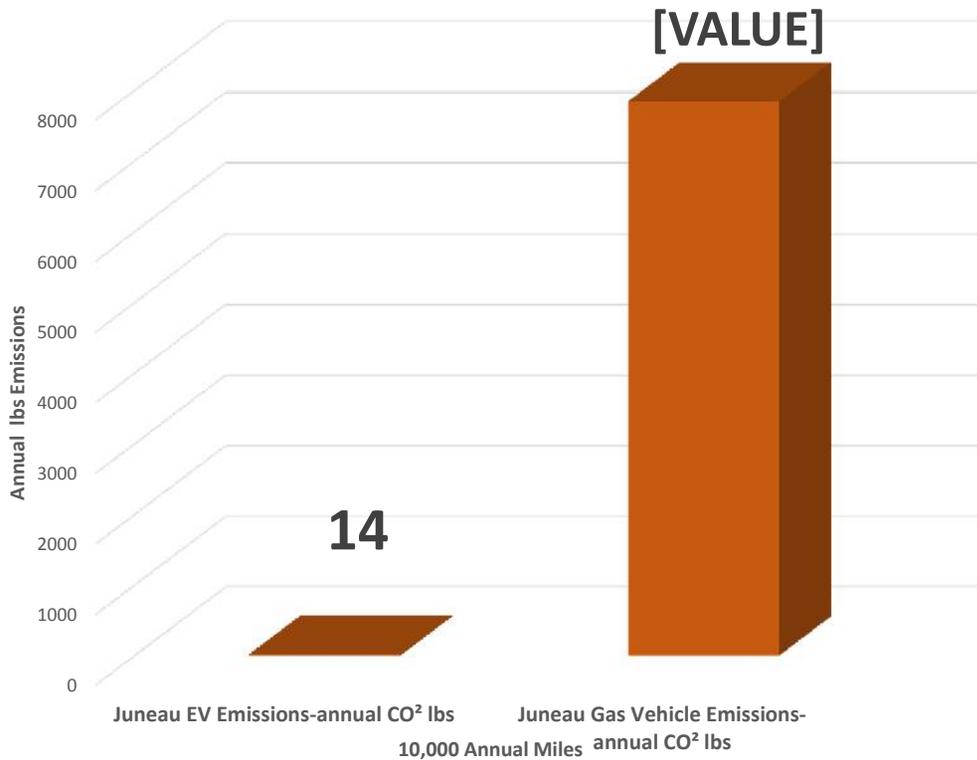
Source NREL 2017

EV CONSUMER
ACCEPTANCE

YOUNGER AND
MORE
EDUCATED



Annual CO² Emissions EV vs ICE (Gas) Vehicle



Source AEL&P

ELECTRIC
TRANSPORTATION
IS GREEN

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



A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year.

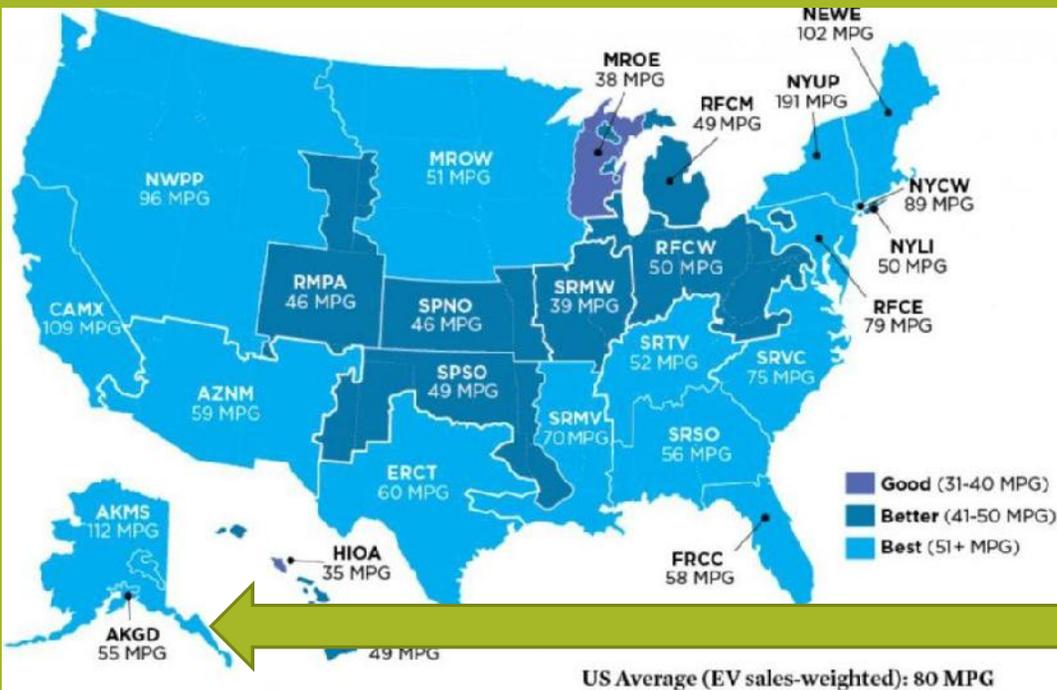
This assumes the average gasoline vehicle on the road today has a fuel economy of about 22.0 miles per gallon and drives around 11,500 miles per year. Every gallon of gasoline burned creates about 8,887 grams of CO₂. Source: <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

Source EPA



ELECTRIC TRANSPORTATION IS GREEN





Juneau, Alaska

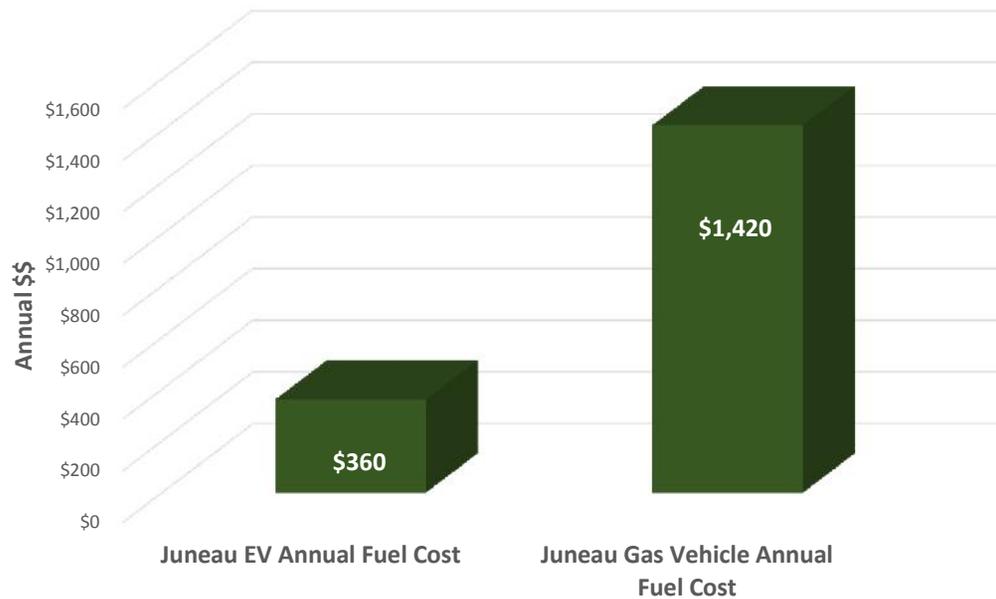
Using 2016 data for AELP total emissions rate and the fuelconomy.gov kWh/mi rating for a Nissan Leaf, Juneau EVs have an emissions rate equivalent to driving a car that gets

15,776 MPG Source AELP

ELECTRIC TRANSPORTATION RUNS ON HYDROPOWER IN JUNEAU



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



Source AEL&P



**ELECTRIC
TRANSPORTATION
IS *RECTANGULAR
GREEN***

*HOW DOES AN EV FIT WITH YOUR
FAMILY ECONOMIC VALUES?*



ICE (Gas) Vehicle
2,000+ moving parts (1)

Electric Vehicle (EV)
18 moving parts (1)

Transmission,
driveshaft, clutch,
valves, differentials,
pistons, gears,
carburetors,
crankshafts...



- ▶ EVs **10X-100X** cheaper to maintain!
- ▶ Tesla: **Infinite Mile Warranty!** (2)

Copyright © 2016 Tony Seba

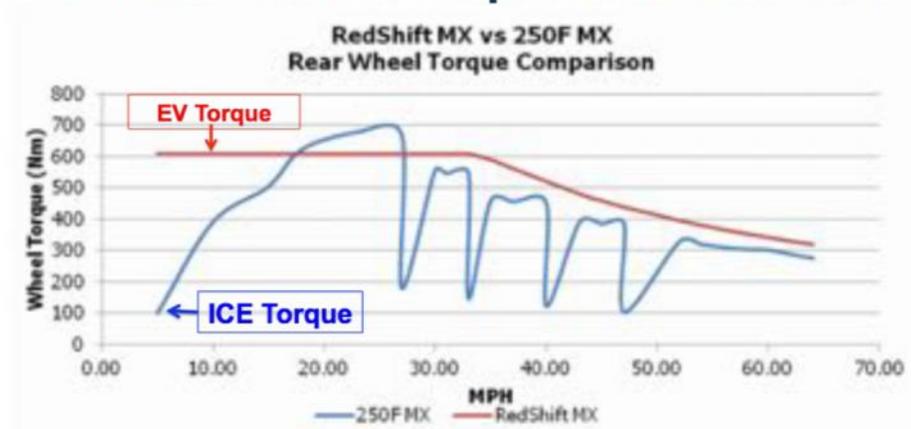
Source: (1) Baron Funds, (2) Tesla Blog

ELECTRIC TRANSPORTATION IS LESS EXPENSIVE TO MAINTAIN

2000 Moving Parts VS **18** Moving Parts



4 – EVs FAR MORE powerful than ICE



“The **Tesla P90D accelerates faster than \$1 million gas 'supercars'** from Ferrari, McLaren, Lamborghini, Pagani and Porsche.” ⁽¹⁾

Copyright © 2016 Tony Seba

(1) ChargeDevs Magazine, Image: BRD Motorcycles

ELECTRIC TRANSPORTATION IS MORE POWERFUL THAN ICE

= faster start from a red light is less commute time





ELECTRIC TRANSPORTATION IS JUST... WELL ...FASTER

Tesla P100D vs 804 HP Dodge Demon Hellcat "Tesla Killer"...smoked





THE FINE PRINT SAYS IT ALL



NEWS FLASH



Last Dodge Challenger SRT Demon, king of the muscle cars, rolls off the line

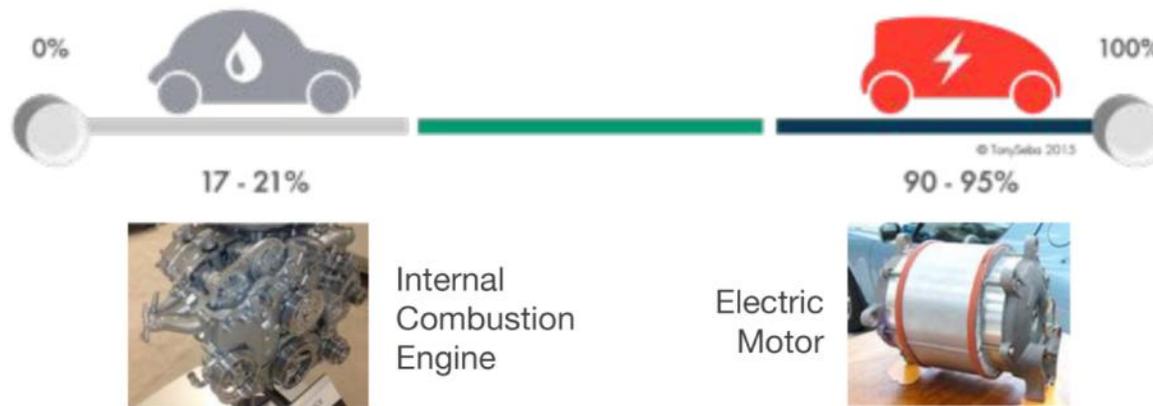


USA Today June 1, 2018



1. Electric Motor - 5X more Energy Efficient

Energy Efficiency



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Sources: ICE - DOE, EM Wikipedia, Image Sources: ICE - Tony Seba, Electric - BradMerritt.com

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



• BMW i3	US	\$44,450	114	33
• Chevrolet Bolt EV	US	\$36,620	238	60
• Fiat 500e	US	\$32,995	84	24
• Ford Focus Electric	US	\$29,120	115	33.5
• Honda Clarity Electric	US	\$37,510	89	25.5
• Hyundai Ioniq Electric	US	\$29,500	124	28
• Kia Soul EV	US	\$33,950	111	30
• Nissan Leaf (2nd Gen)	US	\$29,990	151	40
• Smart ED	US	\$23,800	100	17.6
• Tesla Model 3 (Long Range)	US	\$50,000	310	75
• Tesla Model S 75D	US	\$74,500	259	75
• Tesla Model S 100D	US	\$94,000	335	100
• Tesla Model S P100D	US	\$135,000	315	100
• Tesla Model X 75D	US	\$79,500	237	75
• Tesla Model X 100D	US	\$96,000	295	100
• Tesla Model X P100D	US	\$140,000	289	100
• Volkswagen e-Golf	US	\$30,495	119	35.8



2018
Growing EV
Model
availability
options.
More to
come?



Future EV Options are Growing-Trucks/SUV's



2019

2019

2020+





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



Volkswagen

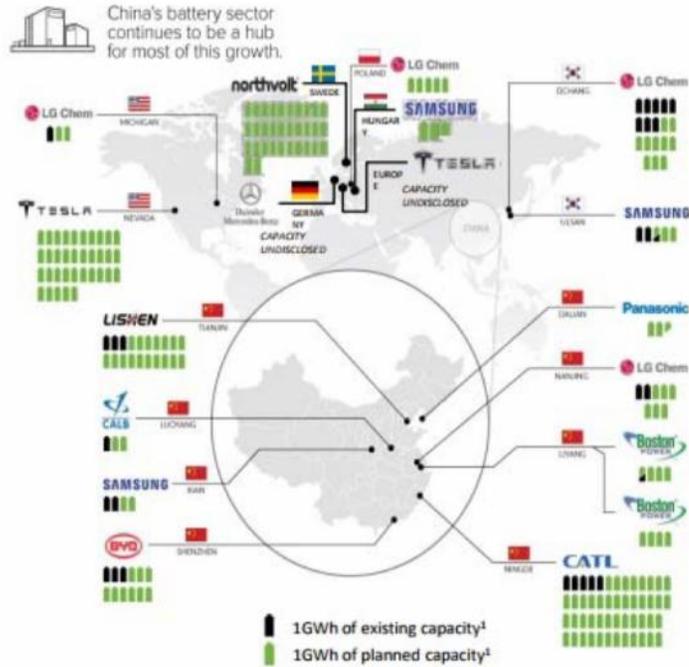
VW to Build Electric Versions of All 300 Models by 2030

September 11, 2017, Bloomberg

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



Planned Construction/Expansion Of Selected Gigafactories



Source: Benchmark Minerals



CATL-China's largest Auto battery manufacturer is worth US \$12.3 billion dollars

PLANNED EV BATTERY PRODUCTION

EXISTING VS PLANNED

BILLIONS OF NEW INVESTMENT IN GIGAFACORIES



• EV Batteries: A \$240 Billion Industry

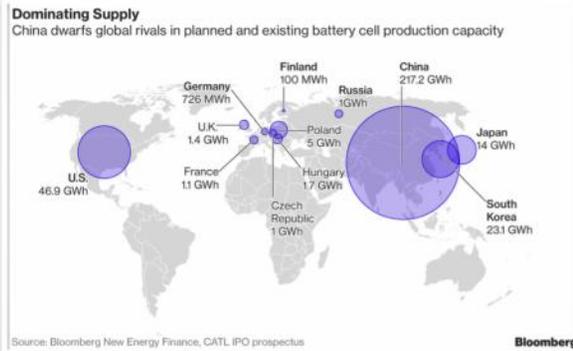
China Targets Sevenfold EVs Sales Increase By 2025.



The new assemble lines will make CATL world's largest EVs Lithium Battery Maker.

© Krill Klip GEM Royalty TNR Gold
Lithium Wentworth 2018

China Is The Centre Of The Lithium Universe.



If it is not only Tesla Gigafactory – 30 Lithium Batteries Megafactories are rising all across the globe.

© Krill Klip GEM Royalty TNR Gold
Lithium Wentworth 2018

PLANNED EV BATTERY PRODUCTION

EXISTING VS PLANNED

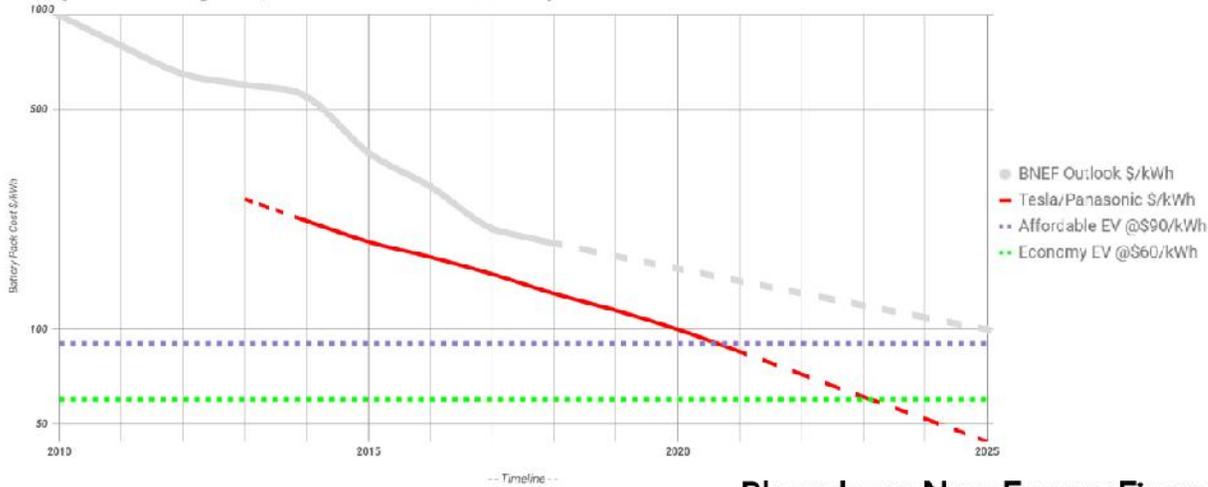
BILLIONS OF NEW INVESTMENT IN GIGAFACTORIES



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



BATTERY COSTS ARE RAPIDLY DECLINING

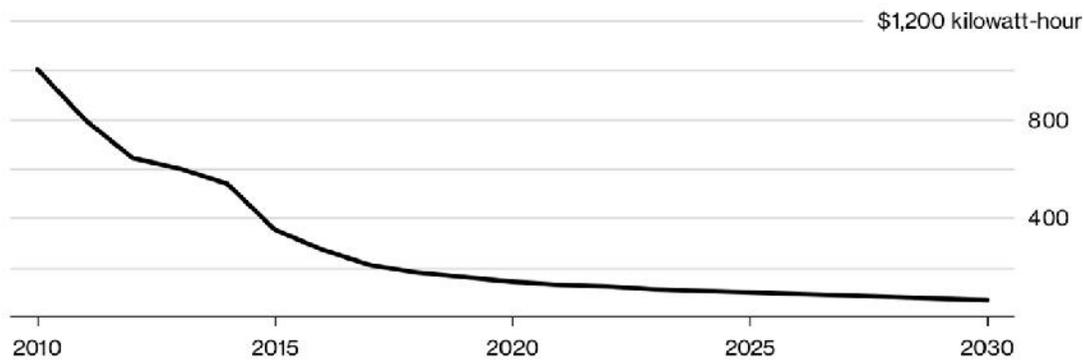
=EV Production costs are rapidly declining

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



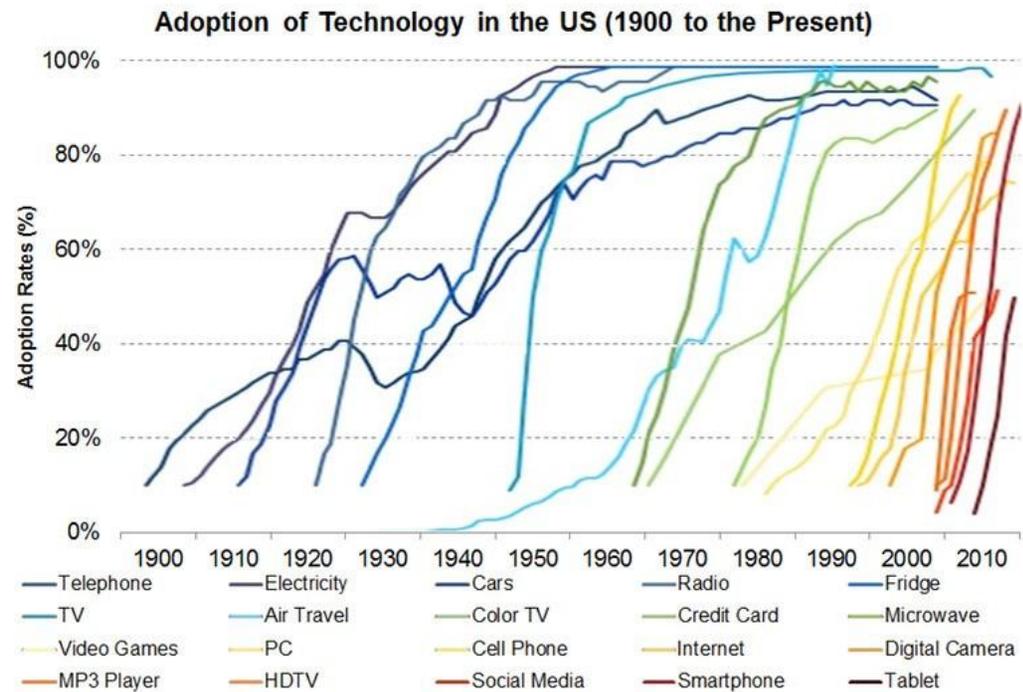
Note: Prices starting in 2017 are forecasts
Source: Bloomberg New Energy Finance

Bloomberg



\$100/KWH

EV BATTERY NIRVANA



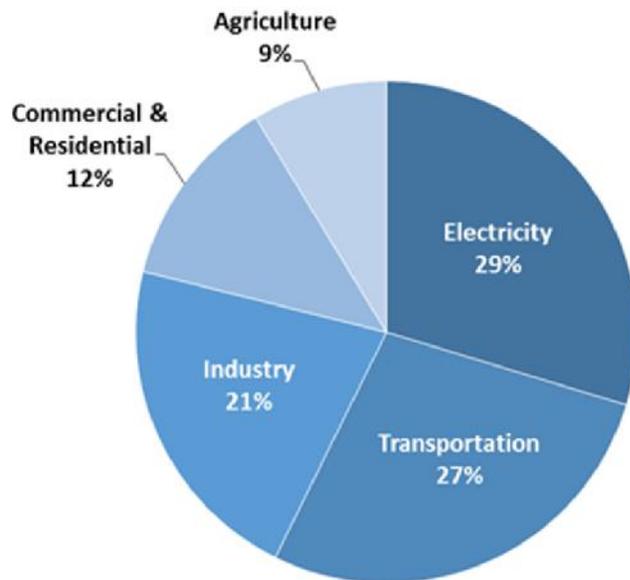
Market Realist[®]

Source: BlackRock

EV GROWTH VS. OTHER ADOPTION OF TECHNOLOGY



Total U.S. Greenhouse Gas Emissions by Economic Sector in 2015



U.S. Environmental Protection Agency (2017). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015.



US TRANSPORTATION SECTOR CONTRIBUTES 27% OF US GHG

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





Juneau Climate Action & Implementation Plan

November 2011



Adopted by the City and Borough of Juneau Assembly, Resolution 2593 on November 14, 2011.



RESOLUTION OF THE CITY AND BOROUGH OF JUNEAU, ALASKA

Serial No. 2722

A Resolution Expressing Support for the Advancement of Electrified Transportation Vehicles and Supporting Infrastructure.



Juneau Community Values

Juneau Climate Action Plan- Res. 2593 (2012)

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

Juneau Renewable Energy Strategy (2017)



U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

National Plug-In Electric Vehicle Infrastructure Analysis

September 2017

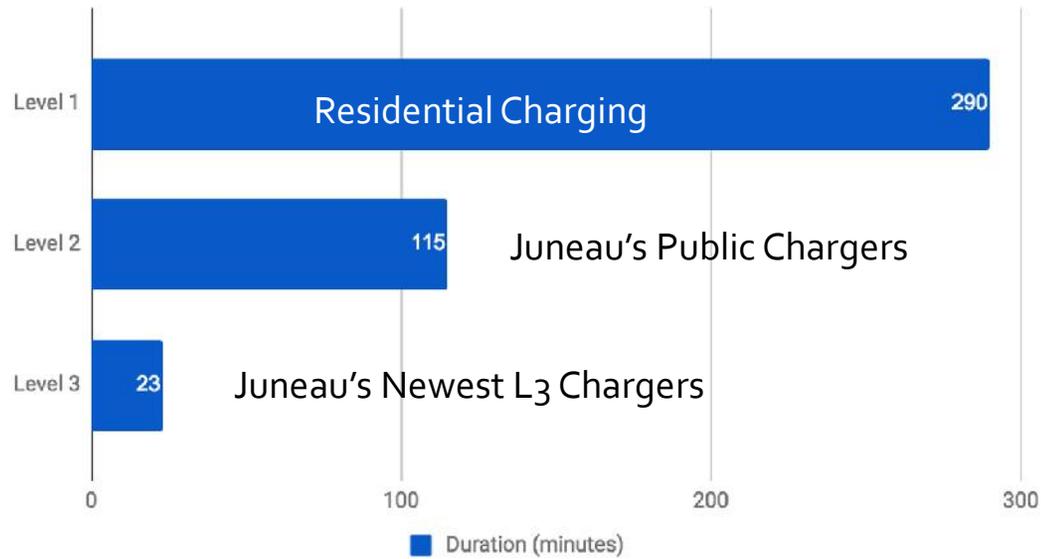
Juneau Charging

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

Public Chargers
provide a public
safety service



Average time spent charging per charger level



Average Time Spent Charging

Level 3 provides a full charge from empty in less than 30 minutes



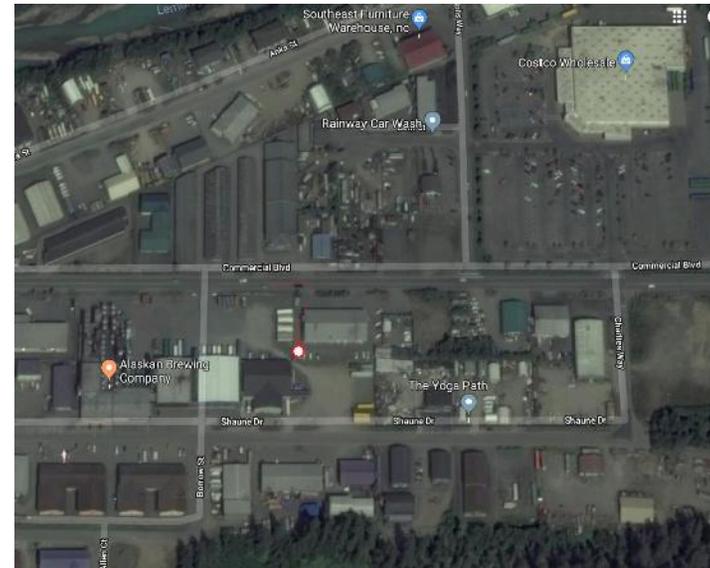
Juneau's Chargers **Coming Soon Privately** **Funded**-Fred Meyers- Alaska Brewery

Level 2 and Level 3



COMING SOON!

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



COMING SOON

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



State-Grant



Docks &
Harbors



CBJ-
GRANT



KTOO-GIFT



CBJ



CBJ-GIFT



JHI
Private



CBJ-GIFT



AELP
Private

2 Private
chargers
coming soon



CHARGERS AND PARKING-HOW DO OTHERS HANDLE THE ISSUE?

Parking Versus Charging



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



Colorado State University

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.



Compare and Contrast-Parking vs. 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.



CITY OF ASPEN



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

Downtown Transit Center Ground Floor. Parking is 75 cents an hour. Parking is only allowed while actively charging. One level 3 plug

Marine Parking Garage. Parking is 75 cents an hour. Parking is only allowed while actively charging. Two Level 2 Plugs

Valley Library-Parking is free. Two Level 2 Plugs

Douglas Library-Parking is free. Two Level 2 Plugs

Treadwell Arena-Parking is free. One level 2 Plug

Statter Harbor. Parking is \$1.00 an hour. One level 2 Plug

**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.



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**

Go Forward Scenarios





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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/>

YOUR
OPINION
MATTERS!



References

- Juneau Climate Action and Implementation Plan-2011 http://www.juneau.org/sustain/climate-action-plan/documents/CAP_Final_Nov_14.pdf
- CBJ Resolution 2722- CBJA Resolution Expressing Support for the Advancement of Electrified Transportation Vehicles and Supporting Infrastructure -2015 <http://www.jedc.org/sites/default/files/RE%201.pdf>
- Juneau Renewable Energy Strategy-2017 http://www.juneau.org/sustain/energy_plan.php
- 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/>
- BMW Is Turning Its Electric Vehicle Batteries Into a New Business. Fortune June 22, 2016 <http://fortune.com/2016/06/22/bmw-energy-storage/>



References Continued

- Renault to sell electricity from recycled EV batteries, Futuremobile 2017 June 11, 2017 <https://eengineous.com/renault-to-sell-electricity-from-recycled-ev-batteries/>
- Nissan is using recycled Leaf batteries to power street lights, Endgadget March 26, 2018 <https://www.engadget.com/2018/03/26/nissan-recycled-leaf-batteries-street-lights/>
- 2018 EV List <https://evrater.com/evs>
- Top 12 Reasons Why Electric Cars are Better Than Gas Cars. June 12, 2017 <https://www.fleetcarma.com/why-electric-cars-are-better-than-gas-top/>
- EV Batteries: A \$240 Billion Industry In The Making That China Wants To Take Charge Of. Forbes August 3, 2017 <https://www.forbes.com/sites/jackperkowsky/2017/08/03/ev-batteries-a-240-billion-industry-in-the-making/#b8c636b3fo84>



References Continued

- \$100/kWh Tesla Battery Cells This Year, \$100/kWh Tesla Battery Packs In 2020
Clean Technica June 8, 2018
<https://cleantechnica.com/2018/06/09/100-kwh-tesla-battery-cells-this-year-100-kwh-tesla-battery-packs-in-2020/>
- Charging An Electric Vehicle Is Far Cleaner Than Driving On Gasoline, Everywhere In America. Forbes March 14, 2018.
<https://www.forbes.com/sites/energyinnovation/2018/03/14/charging-an-electric-vehicle-is-far-cleaner-than-driving-on-gasoline-everywhere-in-america/#61a5f38e71f8>
- Everything you need to know about electric cars. Fleetcarma 2018
<https://www.fleetcarma.com/everything-need-know-electric-cars/>
- Flip the Fleet. EV charging Survey May 12, 2018
<https://flipthefleet.org/author/admin/>
- The Barriers to Acceptance of Plug-in Electric Vehicles: 2017 Update . NREL 2017
<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>

