2030: At least 1 in 5 vehicles must be EV
What will it take?

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Climate Target: >50M EVs by 2030 (currently: 1.5mil EVs)

How might EVs and DC Fast-Chargers be distributed? (currently: 5,000 DCFC)

Near-term action is critical as States will be very challenged to support this scale of EV and EV Charging Infrastructure growth if we delay (need to install 30,000 DCFC/yr)

50M EVs in 2030:
- 17 states with > 1mil EVs

300k DCFC in 2030:
- 78% Home charging (EEI)

Sources: FHWA 2017 Vehicle Registration Data; NREL (88% home charging) and EEI (78% home charging) Infrastructure Analysis, with RMI scaling
EV Market Barriers

1. Battery and EV Cost/Affordability
   • #1 automaker priority is to get cost out of these technologies
     - EVs (and EVSE) are broadly unprofitable today

2. Lack of Charging Infrastructure
   • Address both the “Perception” (public charging) and the “Reality” (home and workplace charging)

3. Build EV Demand
   • Drive Consumer and Fleet Demand through Infrastructure, Awareness and Policy

Despite significant (85%) battery price reductions since 2010, additional cost improvements are needed to achieve parity with conventional vehicles.
Crossovers (CUVs) and SUVs make up the majority of new car sales in most states, creating a challenge for EV Manufacturers: larger batteries vs. consumer cost sensitivity.

US Average: Cars = 28%; CUV = 37%; SUV 9%, Pickup 21%; Van 5%
An increasingly broader selection of EV body styles is necessary (but still not sufficient) to drive EV adoption.

Vast majority “Cars”

Broader selection of body styles, including CUVs and SUVs

2019
83 Models
- 44 BEVs
- 35 PHEVs
- 4 FCEVs

Segment Breakdown
- Cars = ~50
- CUV/SUV = ~20
- Pickups = 0
- Van = 1

Source: Bloomberg NEF (2020) in partnership with the Business Council for Sustainable Energy
Some EV Models Expected 2020-2023

- Audi Q4 e-tron (2021)
- BMW iNext (2023)
- BMW iX3 (2022)
- Mazda MX-30 (2021)
- Nissan Ariya (2021)
- Mercedes-Benz EQC (2021)
- Bollinger B1 (2021)
- Bollinger B2 (2021)
- Ford F-150 Electric (2021)
- Ford Mustang Mach-E (Late 2020)
- Volvo XC40 Recharge (2020)
- VW ID 4 (2021)
- Lordstown Endurance (2021)
- GMC Hummer EV SUV (2021)
- Tesla Cybertruck (2022)
- Rivian R1S (2021)
- GMC Hummer EV SUT (2022)
- VW I.D. Buzz (2022)
- Rivian R1T (2021)
Good progress has been made in building EV charging station infrastructure, but it is nowhere near sufficient to actually drive EV adoption (to achieve the EV scale required by 2030).

SAE DC Fast-Chargers
July 2015
204 stations

SAE DC Fast-Chargers
Sept 2020
3,297 stations, 6,533 charging outlets

DC = Direct Current; SAE = Society of Automotive Engineers (ie. Industry standard-setting body)

https://afdc.energy.gov/stations/#/analyze
3 Areas of Key Infrastructure Investment

Electrify America (VW Settlement)

- Compelling “storytelling”
- Part of a planned $2Bil investment (439 sites operating; 1,939 EVSE)

State App. D Funds (VW Settlement)

- 47 States to invest in EV charging
- $316 mil investment

Only 13% of EV charging investment to date has come from the private sector, due to the challenging business case; utility engagement is imperative

Utility Investment

- Utility engagement is key
- $1.5B approved; $1.4B pending (2,500 DC + 50,000 L2)

Source: AFDC (10/15/2020); Atlas Policy Data; RMI Analysis
Current charging **infrastructure debates are over short-term** issues:

- cost-shifting from EV drivers to non-EV drivers
- cost recovery from utility investments in EV charging infrastructure
- regulator reluctance to let utilities invest
- utility reluctance to bring a rate case before skeptical regulators
- distribution of costs among market participants

... and thus we are woefully behind on building the home, workplace, and public charging networks we urgently require.
Why Electrify?

### Vehicle Benefits
- **Better** driving experience (acceleration, handling)
- **Quiet**, less stress (engine vibration)
- **Safe** and **convenient** home “fueling” (~ a cell phone)
- **Fuel savings** ($12k/EV over 14 yr life)
- **Electricity price stability**
- **Clean**

### Beyond-Vehicle Benefits
- **US competitiveness** and jobs
- **Electricity price stability** (fleet operators)
  - **State economic growth**: >90% of electricity sales revenue stays in the state ($7,000/EV over 14 yrs)
- **Grid Efficiency**: new loads (and fixed transmission costs) benefit all ratepayers ($3,500/EV over 14 yrs)
- **Increased use of grid renewables**
- **Clean air** and **health**
- **Carbon reduction and climate**

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EVs benefit not only EV drivers, but also all ratepayers, power generators, charging providers, and the states themselves.

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Policy May Play the Most Important Role in EV Adoption

# of Key EV-enabling Policies by State

- Building Codes (3 → 5)
- Charging Incentive (21 → 29)
- Charging Service Provider (20 → 27)
- EV Charging Rate (17 → 18)
- HOV Exemption (11)
- MD/HD Incentive (new → 9)
- NGO Incentive (2)
- REV West Plan (8)
- BEV Incentives (12 → 17)
- State Fleet Incentive (3 → 6)
- PHEV Incentive (12 → 15)
- Transportation Elect Plan (24)
- Transportation Elect Target (14)
- Utility Enabling Legislation (4 → 8)
- Utility Filing (30 → 33)
- Utility Incentive (20)
- Utility Own/Operate (11 → 12)
- VGI Strategy (new → 3)
- ZEV Program (12)

Purchasing an EV has to be a more attractive option than buying an ICE – have these policies achieved this?

Source of Data: AFDC; Atlas Policy; RMI analysis

Arrows represent increases over past ~2 years
Policy May Play the Most Important Role in EV Adoption
Announced ICE Phase-Outs (new vehicle sales)

UK: 2035
   (Scotland: 2032)
Ireland: 2030
Norway: 2025
Sweden: 2030
Denmark: 2030
Netherlands: 2030
Israel: 2030
Spain: 2040
S. Korea: 2020
Taiwan: 2040
Singapore: 2040
China: TBD (2040)
Canada: 2040

Plus growing city-led targets:
- Aachen
- Amsterdam
- Antwerp
- Arnhem
- Athens
- Auckland
- Balearic Islands
- Barcelona
- Berlin
- Bonn
- Bristol
- British Columbia
- Brussels
- Cape Town
- Cologne
- Copenhagen
- Darmstadt
- Dusseldorf
- Eindhoven
- Essen
- Frankfurt
- Ghent
- Hainan
- Hamburg
- Heidelberg
- Lombardy
- London
- Los Angeles
- Madrid
- Mainz
- Mexico City
- Milan
- Munich
- Nijmegen
- Oxford
- Paris
- Quito
- Rome
- Rotterdam
- Scotland
- Seattle
- Stuttgart
- The Hague
- Utrecht
- Vancouver
- Wiesbaden
A car or truck bought today will be on the road an average of 12 years (25% of vehicles are at least 16 years old).

Last ICE vehicle sales must occur by 2035...

...so that by 2050 most vehicles on the road are electric.
What It Will Take to Achieve >50M EVs by 2030?

• Acknowledge the full value of transportation electrification
  • Benefits to ratepayers, states, US competitiveness, a cleaner/resilient grid, and societal goals (health, air quality, equity and climate impact)

• More EV charging infrastructure!
  • National EV strategy with aligned infrastructure plans for home, work, public charging
  • Utility-investment and engagement (all 3,200 utilities)
  • Ensure that installed EV chargers maximize the public benefits (e.g. renewables, off-peak charging)

• Drive demand certainty and EV awareness
  • Government, corporate, and commercial fleet commitments
  • Sustained financial and non-financial incentives and perks
What It Will Take to Achieve 50M EVs by 2030?

“Just” 1 in 5 of us need to switch to an EV within the next 10 years:

- The average transaction price for a new vehicle in 2019 was $38,948
- 60% of Americans live in single-family homes
- 66% have more than 2 vehicles in the household
- 80% of Americans commute less than 40 miles/day to and from work

This is Doable!