JOBS EV 1.0 WEBINAR

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U.S. DEPARTMENT OF ENERGY Argonne National Laboratory is a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC.

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TODAY'S DISCUSSION

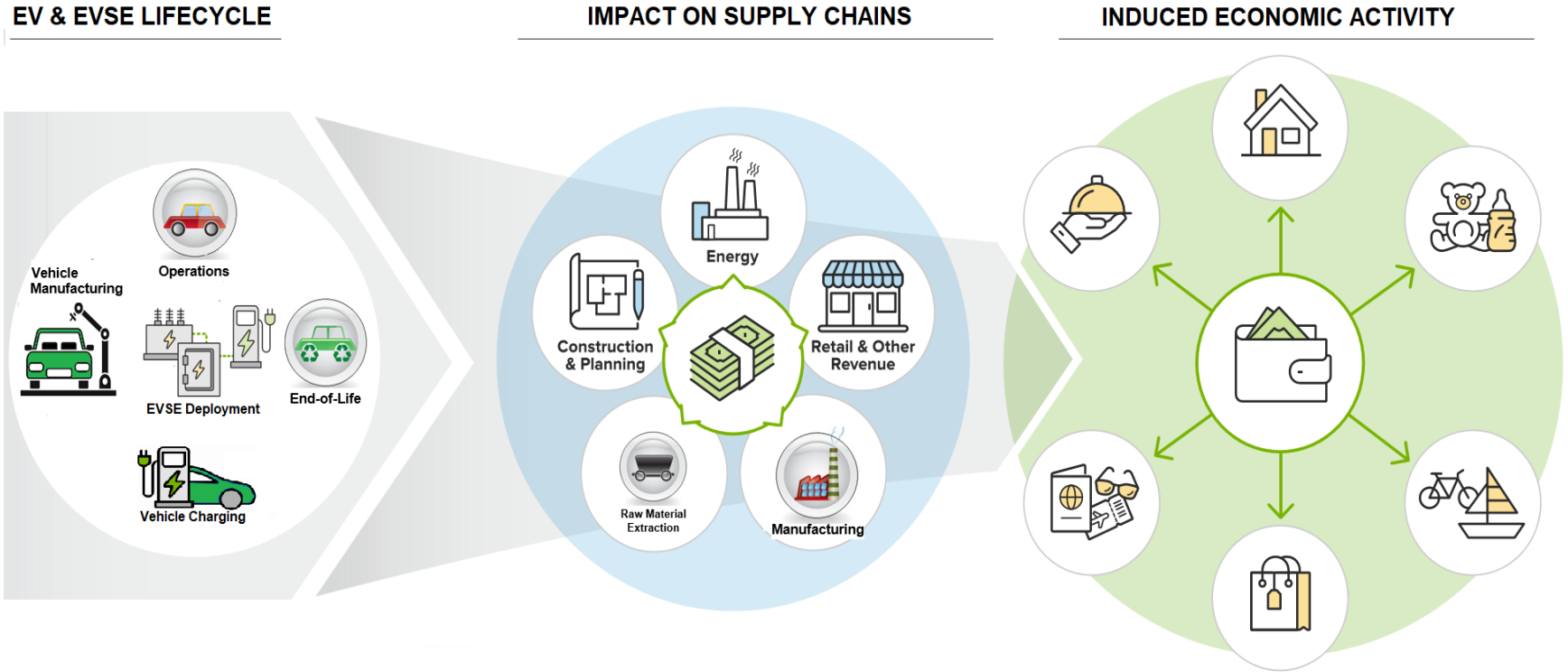
- JOBS EV 1.0 overview
- Methodology
- Default data and assumptions
- Demo and illustrative results
- Next steps for model
- Company investment tracking

https://www.anl.gov/es/jobs-models

JOBS models help energy and economic planners, decision-makers, and Clean Cities and Communities coalitions and their stakeholders estimate the economic impacts of deploying and operating alternative fuel equipment and infrastructure, including:

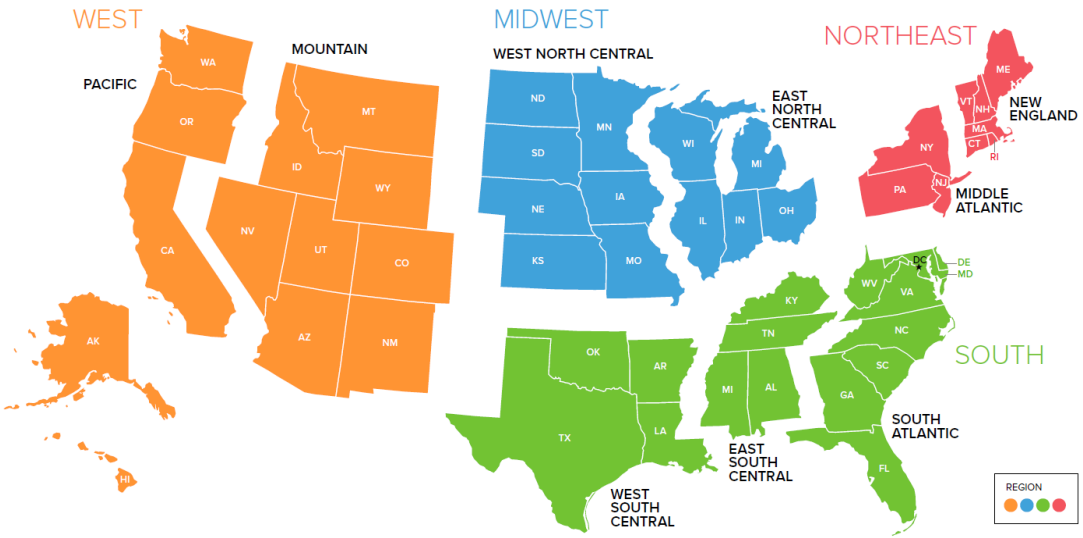
- **Electric vehicles (EV)**
- Electric vehicle charging stations (EVSE)
- Natural gas fueling stations (NG)
- Hydrogen fueling stations (H2)
- Fuel cells in forklifts, backup power or prime power applications (FC)

JOBS EV TAKES A HOLISTIC APPROACH TO MODELING ECONOMIC IMPACTS



JOBS EV 1.0

Excel-based tool estimates economic impact for **user-defined scenarios:**



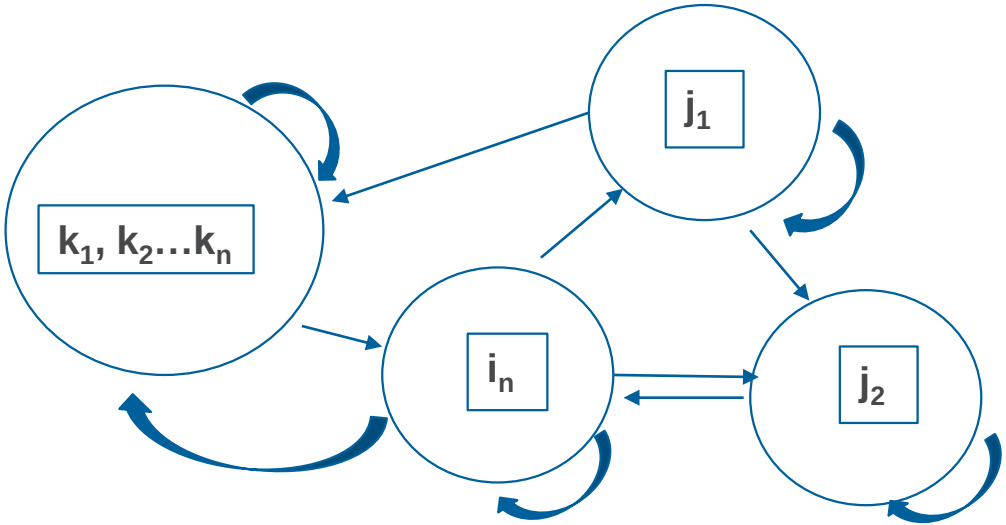
- Geographic region of interest
- Number, type of vehicles
- Manufacturing includes upstream components manufacturing
- Utilization includes electricity generation and induced sales but not station development
- Default values or user inputs

Expenditures are translated into **dollar flows among industries** using the U.S. Department of Commerce RIMS2 input-output model

METHODOLOGY

INPUT-OUTPUT MODELING

- Output (goods and services) of any industry **i** is input to other industries **j** and to industry **i** itself
- Industry **i** output depends on input requirements to all **n** industries
- Output of many industries **k** are inputs to industry **i**



SCOPE AND DEFINITIONS

- **Supply Chain Jobs – Directly involved in producing, shipping, installing, constructing and operating stations and in supplying inputs to those activities**
- **Induced Jobs – Re-spending of wages/incomes by supply-chain job holders**
- **Vehicle manufacturing expenditures:**
  - All major vehicle components, variable quantities, uninstalled costs and assembly
  - Shipping expenditures
  - Number of vehicles sold per year
- **Vehicle operation expenditures:**
  - Annual vehicle miles traveled (VMT)/charging
  - Maintenance and repair
  - Dealerships
- **Local shares:**
  - For producing, shipping and assembling each motor vehicle or vehicle component
  - Dealership costs

DEFAULT DATA AND ASSUMPTIONS

JOBS EV 1.0 TOOL

Manufacturing & Utilization Steps

- Step 1 - BEV Types
- Step 2 - Number of BEVs Manufactured
- Step 3 - BEV Component Expenses (uninstalled)
- Step 4 - BEV Component and Assembly Expenses – Local Share Percentages
- Step 5 - BEV Assembly Expenses
- Step 6 - Number of BEVs Sold Each Year
- Step 7 - BEV Utilization Expenses
- Step 8 - BEV Maintenance and Repair Expenses
- Step 9 - BEV Shipping-Related Expenses
- Step 10 - BEV Dealership-Related Expenses

VE

All dollar values ar

Step 3 - BEV Component Expenses (uninstalled)

DIRECTIONS: In Step 3a, specify the expenditure for each component category for a singl
3c. Assembly expenses can be specified in Step 4. In Step 3b, specify the quantity of comp

3a - Component Expense ($/Unit)

Component Name	Passenger Car (2WD)	Passenger Car (AWD)	Compact SUV (…
			Parts Uniq…
E-motor, drive, transmission	$1,344	$1,344	$1…
Battery cell/pack	$10,555	$10,555	$10…
Power electronics	$1,704	$1,704	$1…
			Other Bo…
Wheels and tires	$418	$418	
Climate control, engine cooling	$1,445	$1,445	$1…
Chassis	$4,694	$4,694	$4…
Audio, telematics	$696	$696	
Electronics, electrical	$4,138	$4,138	$4…
Axles and driveshafts	$950	$950	
Interior	$1,786	$1,786	$1…
Passenger restraints	$466	$466	
Body glass	$192	$192	
Braking	$960	$960	
Steering	$504	$504	
Suspension	$763	$763	
Total	$30,614	$30,614	$30…

3b - Component Quantity (Unit)

Component Name	Passenger Car (2WD)	Passenger Car (AWD)	Compact SUV (…

Manufacturing & Utilization Steps

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- Step 10 - BEV Dealership-Related Expenses

Restore Default Values for Current Step

Restore All Default Values

VEHICLE UTILIZATION RELATED EXPENSES

All dollar values are in 2020$. All user-specified entries must be entered in 2020$.

Step 7 - BEV Utilization Expenses

DIRECTIONS: Please enter the total number of BEVs on the road by year and vehicle type. This value may be different from the number entered in the previous step if there are already BEVs present in the geographic region of study. Default values are based on national data on the total number of each vehicle type, inclusive of ICEVs, and should be adjusted based on your anticipated BEV penetration rates.

7a - Number of Battery Electric Vehicles on Road

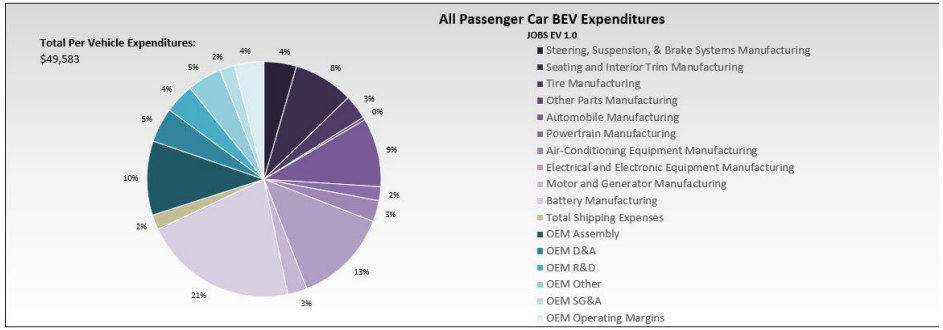
BEV Type	Year									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Passenger Car (2WD)	991,313	991,313	991,313	991,313	991,313	991,313	991,313	991,313	991,313	991,313
Passenger Car (AWD)	496,304	496,304	496,304	496,304	496,304	496,304	496,304	496,304	496,304	496,304
Compact SUV (2WD)	237,097	237,097	237,097	237,097	237,097	237,097	237,097	237,097	237,097	237,097
Compact SUV (AWD)	812,206	812,206	812,206	812,206	812,206	812,206	812,206	812,206	812,206	812,206
SUV (2WD)	135	135	135	135	135	135	135	135	135	135
SUV (AWD)	75,043	75,043	75,043	75,043	75,043	75,043	75,043	75,043	75,043	75,043
Pickup (2WD)	137	137	137	137	137	137	137	137	137	137
Pickup (AWD)	23,687	23,687	23,687	23,687	23,687	23,687	23,687	23,687	23,687	23,687

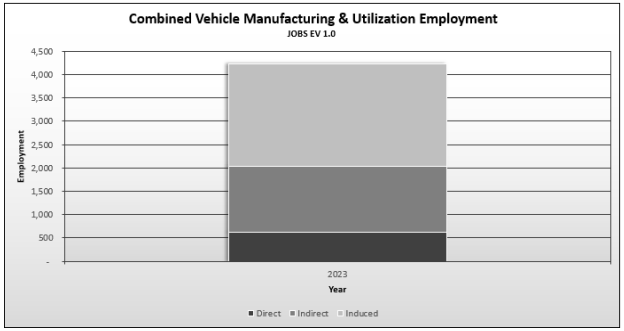
7b - Total Battery Electric Vehicle Miles Driven

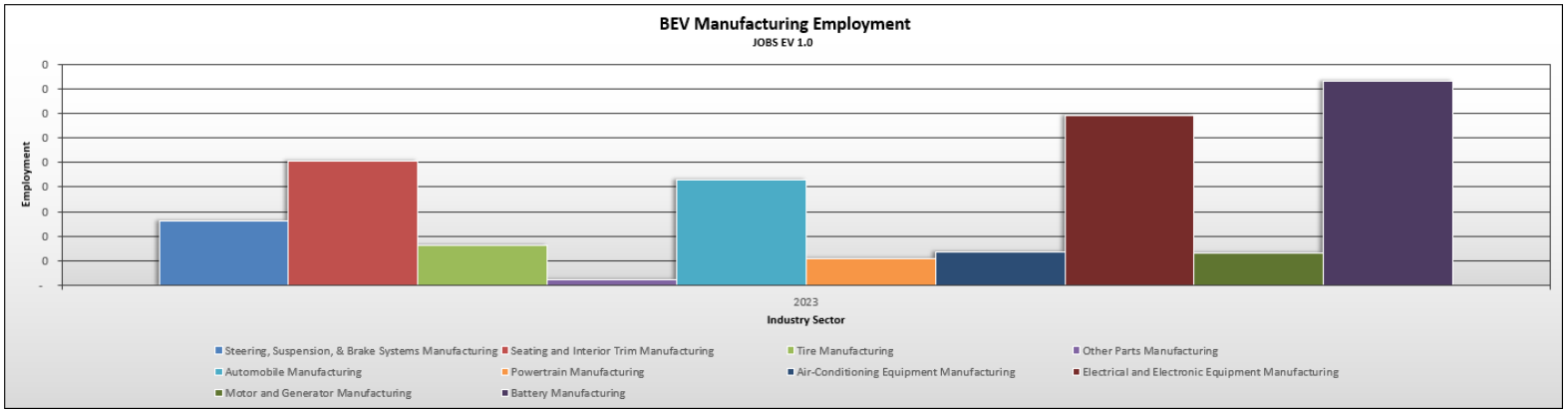
DIRECTIONS: Please enter the total annual miles driven by battery electric vehicle type. Default values are based on national miles driven data inclusive of ICEVs, and should be adjusted based on your anticipated BEV penetration rates.

BEV Type	Year									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Passenger Car (2WD)	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259	14,490,016,259
Passenger Car (AWD)	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908	7,254,478,908
Compact SUV (2WD)	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085	3,465,645,085
Compact SUV (AWD)	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011	11,872,012,011
SUV (2WD)	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338	1,966,338
SUV (AWD)	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237	1,096,905,237
Pickup (2WD)	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673	2,003,673
Pickup (AWD)	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200	346,237,200

JOBS EV 1.0 TOOL (CONT'D)







DEMO/TOOL WALKTHROUGH

NEXT STEPS

JOBS MODELS FACT SHEET AND AFDC LINK

ARGONNE TOOLS HELP QUANTIFY THE ECONOMIC BENEFITS OF PROPOSED TRANSPORTATION FUELING INFRASTRUCTURE

Argonne's JOBS tools quantify how deploying transportation energy infrastructure creates jobs and "ripple effect" economic activity.

Transportation technologies change and grow, and so do the jobs they support. When we invest in developing transportation fueling infrastructure—such as for the planning, manufacture, installation and operation of equipment—employment, earnings and economic output rise. This is true for the industries that supply equipment as well as for the industries in their supply chains. Moreover, employment, earnings and economic output also increase when earnings related to these activities re-enter the economy ("ripple effect"). That spending supports even more service and support industries, which further adds to the economic impact of the infrastructure itself.

Argonne's team of experts evaluates how existing and emerging fuel technologies, including electric batteries, natural gas, hydrogen and stationary fuel cells, affect economic systems. The JOBS EVSE tool, for example, measures the economic impact of electric vehicle charging based on the electric vehicle supply equipment (EVSE) deployed at the station. Expenditures are translated into dollar flows among industries using the U.S. Department of Commerce's RIMS2 input-output model.

This tool, as well as others from Argonne, is built on data from installers and developers, EVSE network providers, utilities, equipment manufacturers, site planners, U.S. Department of Energy (DOE)–designated Clean Cities coalitions, analysts and researchers. Collectively, these tools offer what decision-makers need to estimate the economic impact—on jobs, local economies and industries—of proposed alternative fueling installations.

THE IMPACT

Argonne's approach examines the full economic impact of transportation energy infrastructure. It considers supply chain jobs (those directly or indirectly producing, shipping, installing, constructing and operating fueling infrastructure) and "induced" jobs (created when supply-chain job holders re-spend wages), earnings and economic output (money spent across the economy). The result: a more complete picture of transportation fueling infrastructure's impact on employment and economies.

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Tools

The Alternative Fuels Data Center offers a large collection of helpful tools. These calculators, interactive maps, and data searches can assist fleets, fuel providers, and other transportation decision makers in their efforts to advance alternative fuels and energy-efficient vehicle technologies.

Calculators

EVI-Pro Lite
Estimate a city or state's need for vehicle charging and the effect on electric load.

AFLEET Tool
Calculate a fleet's petroleum use, cost of ownership, and emissions.

Vehicle Cost Calculator
Compare cost of ownership and emissions for most vehicle models. mobile

VICE Model
Evaluate the financial case for natural gas vehicles and battery electric buses.

JOBS Model
Estimate economic impacts of deploying alternative fuel and charging infrastructure.

Heavy-Duty Vehicle Emissions
Calculate the emissions of alternative fuel medium- and heavy-duty vehicles.

EVolution: E-Drive Vehicle Education
Understand the costs and benefits of electric vehicles based on location.

Interactive Maps

Alternative Fueling Station Locator
Locate alternative fueling stations and get maps and driving directions. mobile

Alternative Fuel Corridors
Find maps and station data to help with nominating alternative fuel corridors.

TransAtlas
Analyze vehicle densities and locations of fueling stations and production facilities.

Biofuels Atlas
Compare feedstocks and analyze biofuel production by location.

Coalition Locations
Find Clean Cities coalitions and contact information for coordinators.

Energy Zones Mapping Tool
Identify potential energy resource areas and energy corridors in the United States.

ATRAVEL Tool
Estimate costs, travel time, and emissions for private vehicles and other travel modes

Data Searches

Vehicle Search
Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.

Laws and Incentives Search
Search for laws and incentives related to alternative fuels and advanced vehicles.

Battery Policies and Incentives
Find policies and incentives for batteries developed for EVs and energy storage.

Fuel Properties Comparison
Compare alternative fuel properties and characteristics.

Find a Car
Compare fuel efficiency, costs, carbon footprints, and emissions. mobile

State Information
Find state information about alternative fuels and advanced vehicles.

https://afdc.energy.gov/tools

JOBS EV: NEXT STEPS

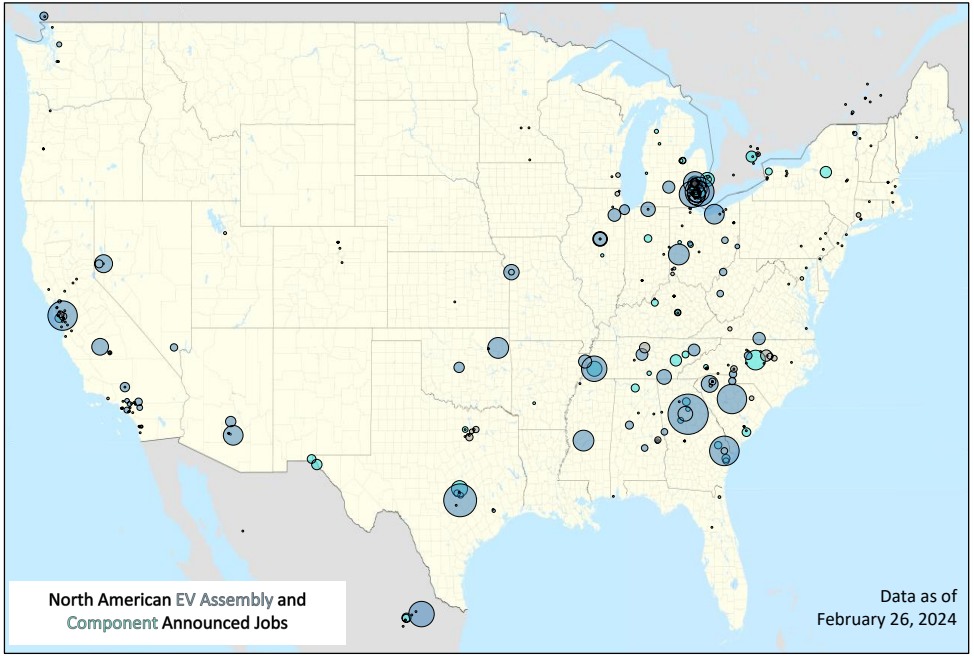
- Posting of model, tutorial, and presentation materials to Argonne's JOBS models website (https://www.anl.gov/esia/jobs-ev)

- JOBS EV 1.1:
  - More granular/state-specific defaults for upstream manufacturing
  - Include end-of-life

- JOBS EV 2.0:
  - M/HDV
  - Improved integration with JOBS EVSE

INVESTMENT TRACKING

- We are carefully tracking corporate announcements for manufacturing investment in electric vehicle and battery supply chains



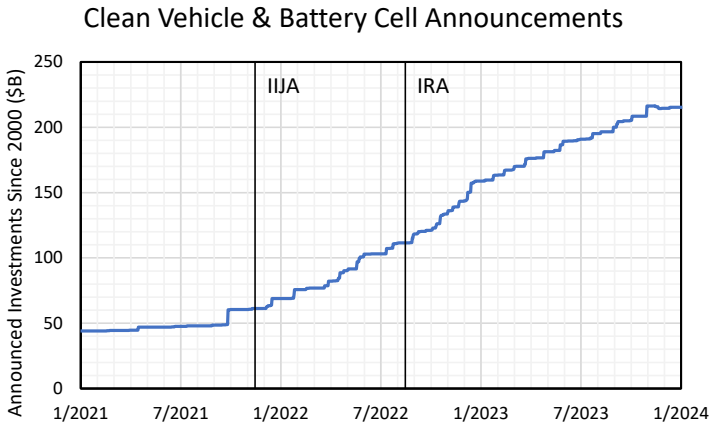
New U.S. electric vehicle component and assembly plant investments announced under President Biden:

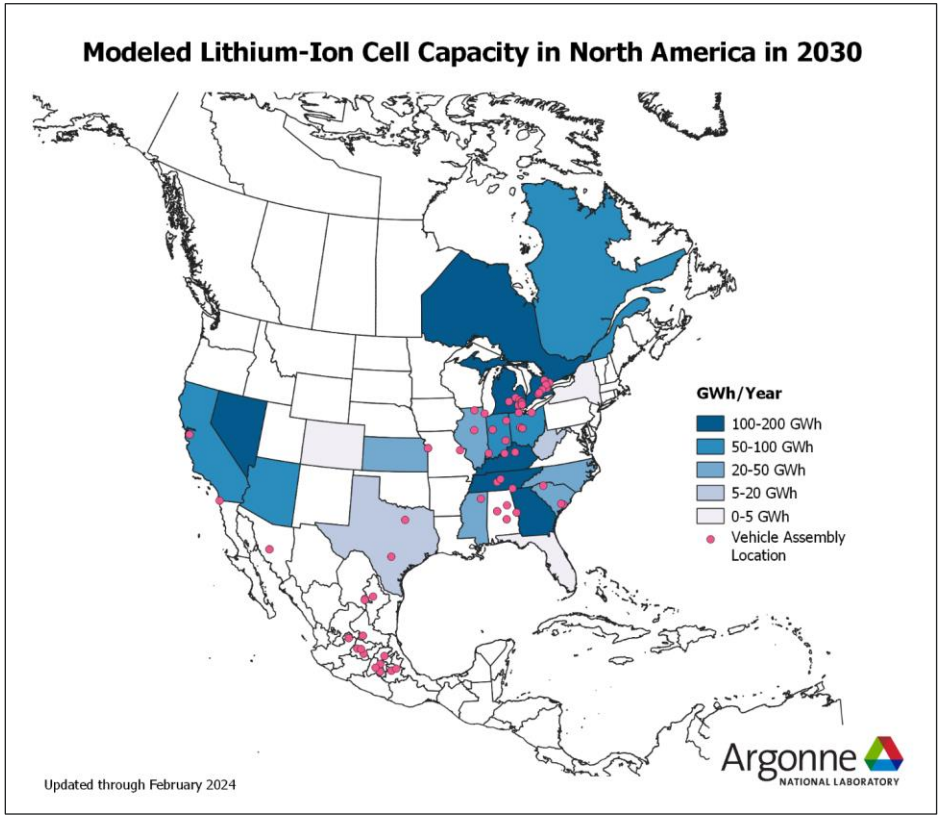
- Over $40 billion announced so far
- Over 150 new or expanded sites for EV assembly and EV component or charger manufacturing
- Over 50,000 potential new jobs

https://www.energy.gov/invest

VEHICLE AND BATTERY PRODUCTION

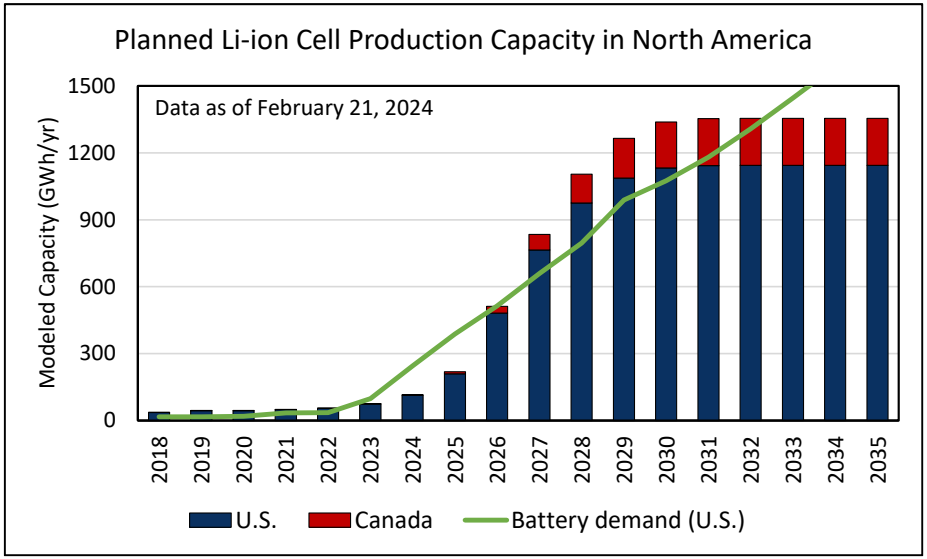
- Battery production is being announced in similar locations as historical production of vehicles
- Companies have announced over $200B in investments since 2000, ¾ of which in last three years

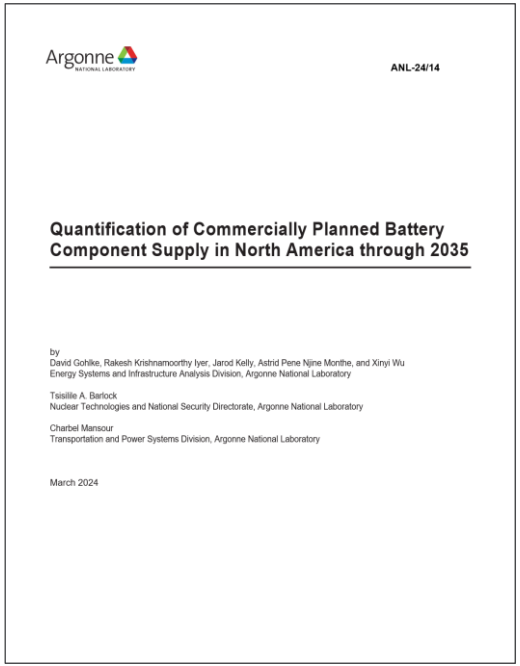




PRODUCTION DEMAND AND CONSTRAINTS

- We also track material and component production to compare with demand
- Technical analysis to be published next month

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ANL-24/14

Quantification of Commercially Planned Battery Component Supply in North America through 2035

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THANK YOU!

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QUESTIONS?

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