JOBS EVSE 1.0 WEBINAR

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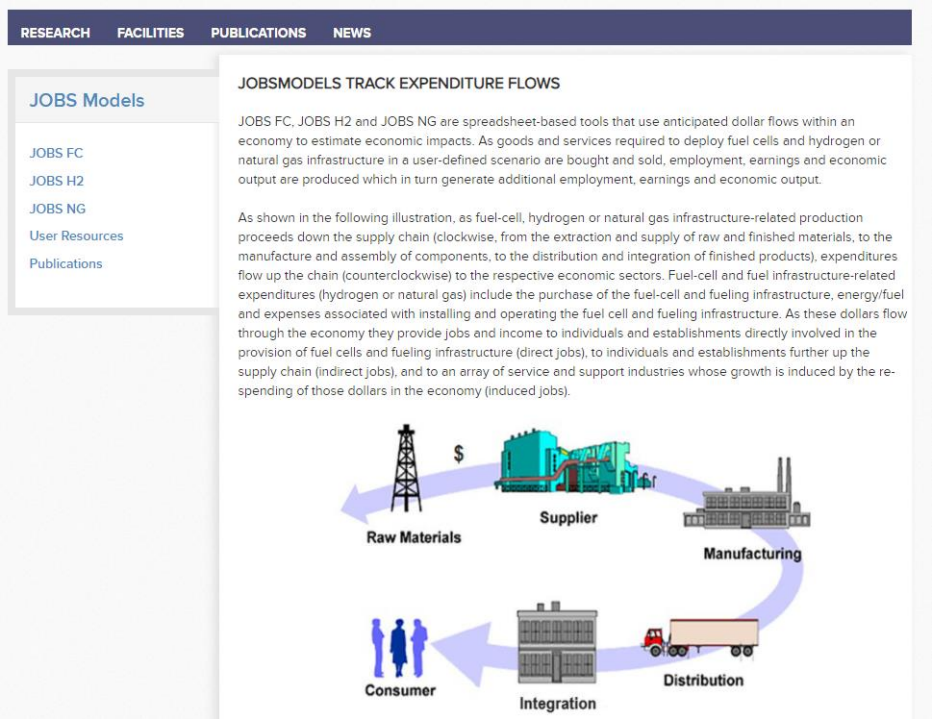
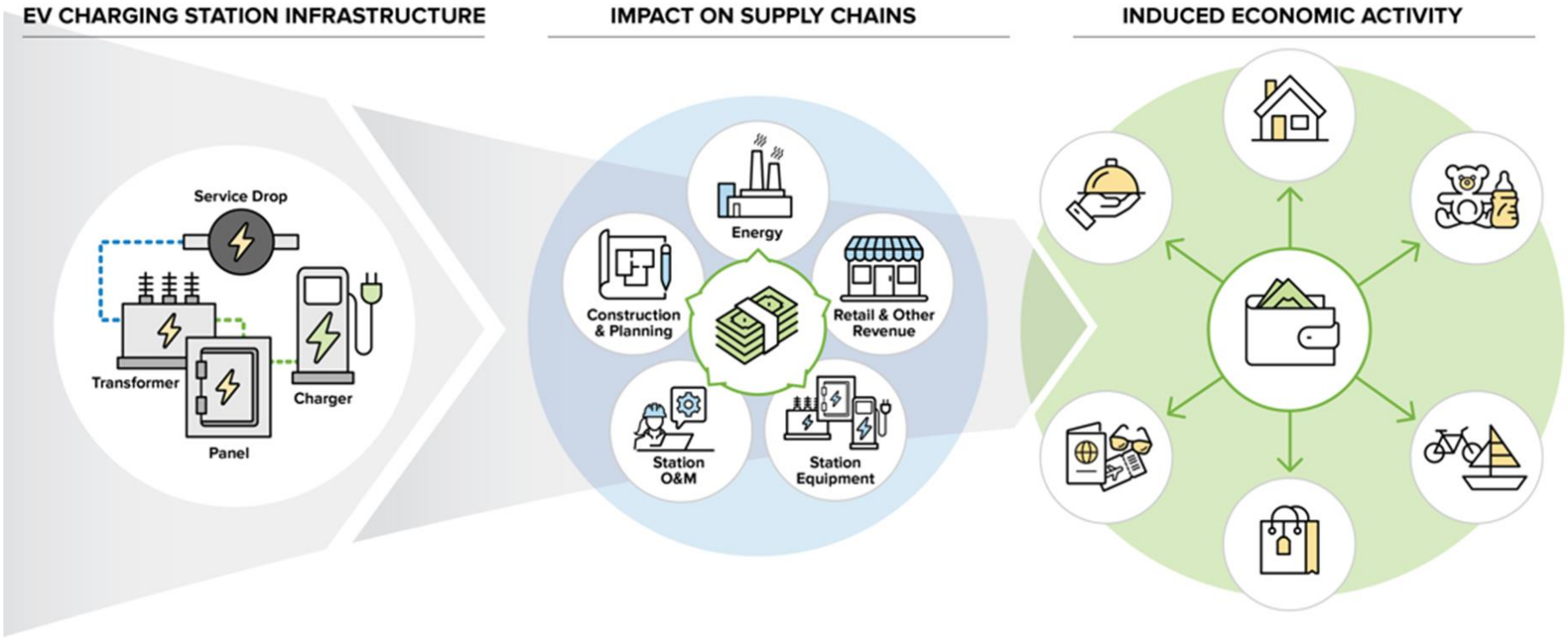
TODAY'S DISCUSSION

- JOBS EVSE 1.0 overview
- Methodology
- Default data and assumptions
- Illustrative scenario
- Next steps



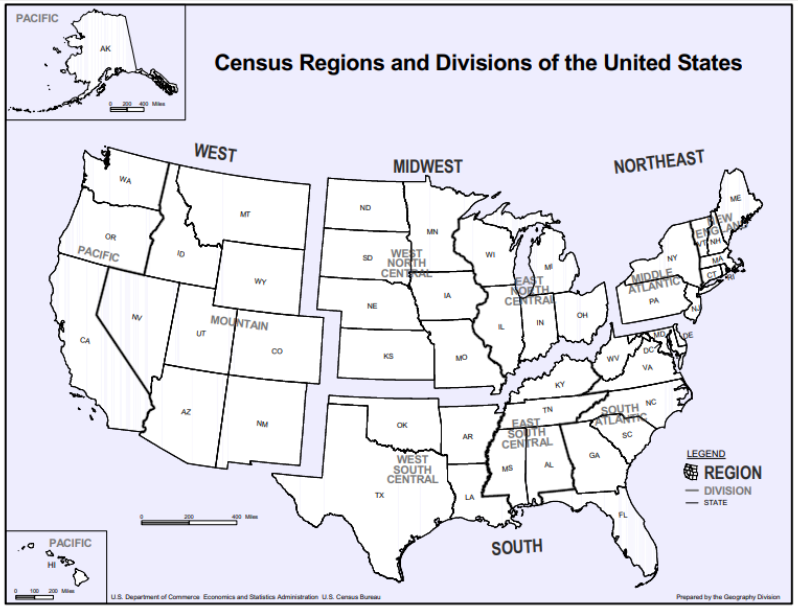
https://jobsfc.es.anl.gov/index.php

JOBS EVSE TAKES A HOLISTIC APPROACH TO MODELING ECONOMIC IMPACTS



JOBS EVSE 1.0

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



  - Geographic region of interest
  - Number, capacity of stations
  - Utilization, electricity price, etc.
  - Default values or user inputs

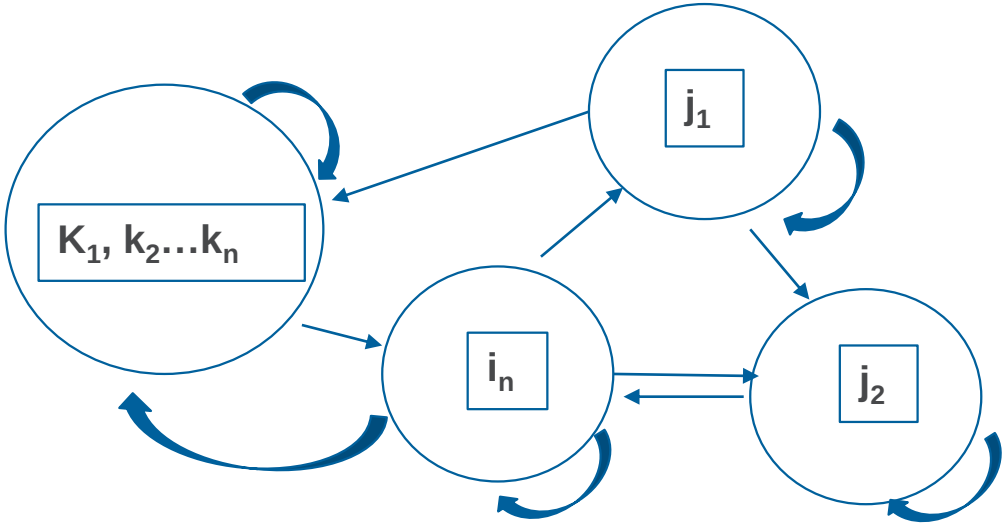
- **Deploying EV chargers**:
  - Manufacturing, transporting, installing equipment
  - Pre-construction and construction
  - Station operation & revenue

- Expenditures are translated into **dollar flows among industries** using USDOC 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

- Job – One year of work, full- or part-time, for one person
- Supply Chain Job – Directly involved in producing, shipping, installing, constructing and operating stations and in supplying inputs to those activities. Includes “direct” and “indirect”.
- Induced Job – Created by re-spending of wages/incomes by supply-chain job-holders
- Earnings – Wages and proprietor’s income
- Economic Output – Gross economic activity associated with expenditure flows across the economy
- Multipliers

SCOPE AND DEFINITIONS (CONT'D)

- **Station development expenditures:**
  - Up-Front Permitting
  - Engineering & Design
  - Site Preparation & Construction (including trenching/boring)
  - Electrical Infrastructure & Make Ready
  - Project Contingency
  - Uninstalled equipment ($/unit) for cable cooling, chargers, conduit and cables, on-site electrical storage, switchgear, transformers, safety & traffic control, and miscellaneous equipment
  - Shipping
  - Equipment Installation

- **Station operation expenditures:**
  - Electricity cost to station
  - Administrative expense
  - Maintenance expense
  - Warrantees
  - Data and networking fees

- **Station operation revenue:**
  - Retail sales
  - Advertising
  - Access fees

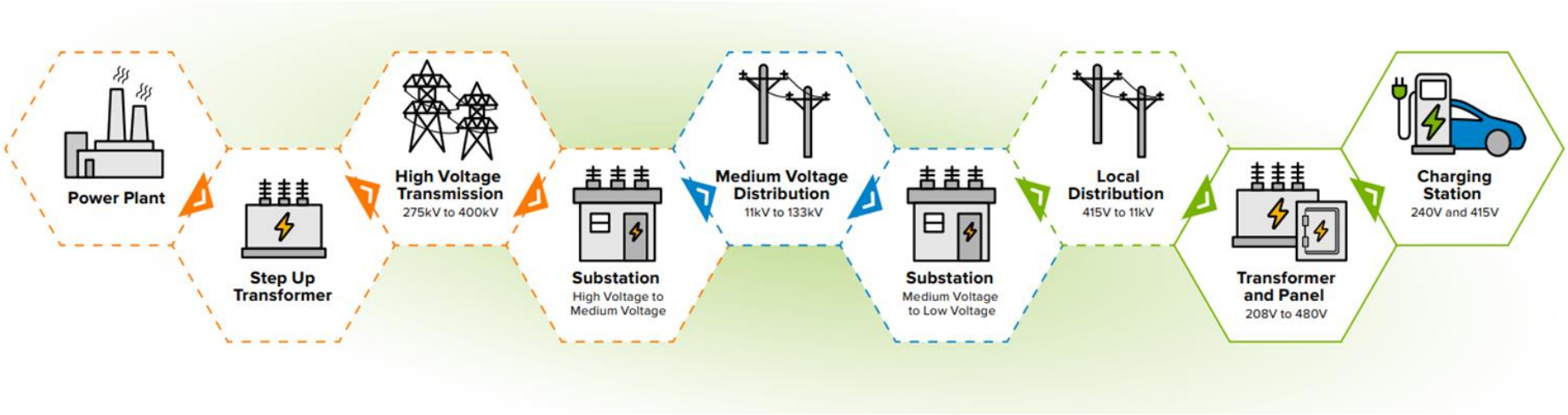
- **Local shares:**
  - For each type of station development expenditure (excluding equipment)
  - For producing, shipping and installing each type of equipment

DEFAULT DATA AND ASSUMPTIONS

KEY INPUT DATA SOURCES/STAKEHOLDERS

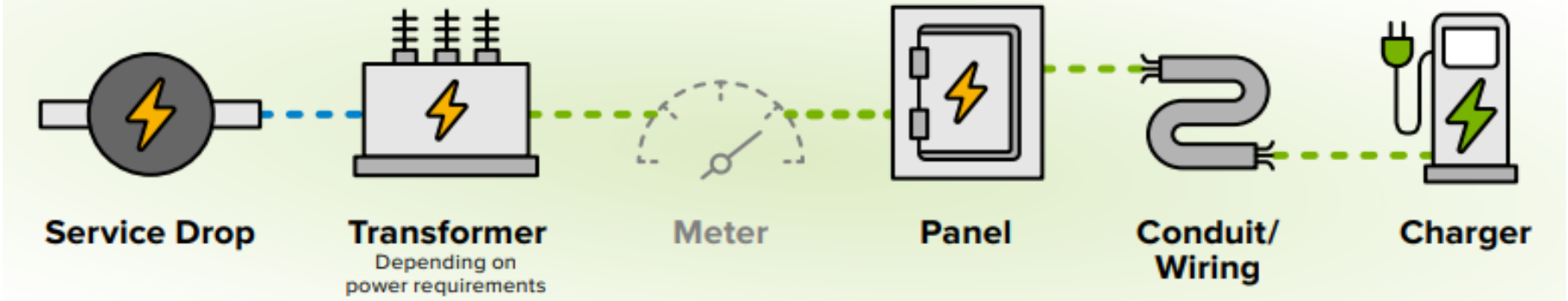
Installers/developers	EV Launchpad, Frances Energy, Solar Alternatives
Network providers	Blink, Greenspot, EVGo, ChargePoint
Utilities	W. Farmers' Generation & Transmission Co-op, National Grid, Avista, NH Co-Op, Eversource
Eqpt. manufacturers	ABB, Eaton, Freewire
Site plans	Foothill (Burns McDonnell), MGE East Washington Charging Hub, Argonne Smart Energy Plaza
Clean Cities Coalitions	TCC, C-OKCC, CC-CNY, SSCC, GRCC, NCCC, CDCCC, GSCC, ECC, MCCC, GLICC, LCF
Analysts/researchers	ICCT, RMI, INL, NREL, ICF/Fuel Institute, Atlas

JOBS EVSE CONSIDERS ENTIRE SUPPLY CHAIN



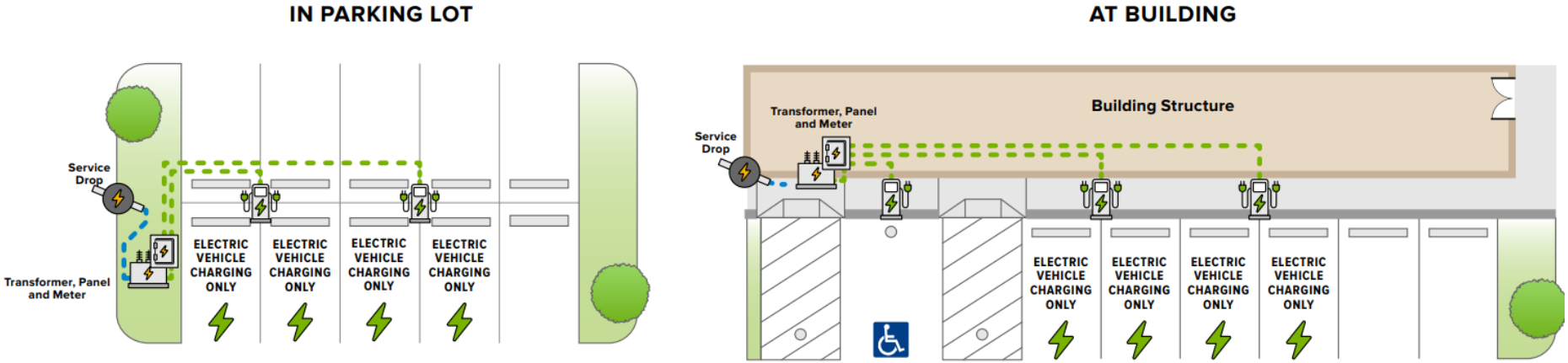
…….As well as recurring expenditures like electricity, network & data fees, revenues, warrantees, O&M, administrative and access fees

ON-SITE EXPENDITURES INCLUDE BOTH EVSE AND OTHER DEVELOPMENT AND OPERATING EXPENSES



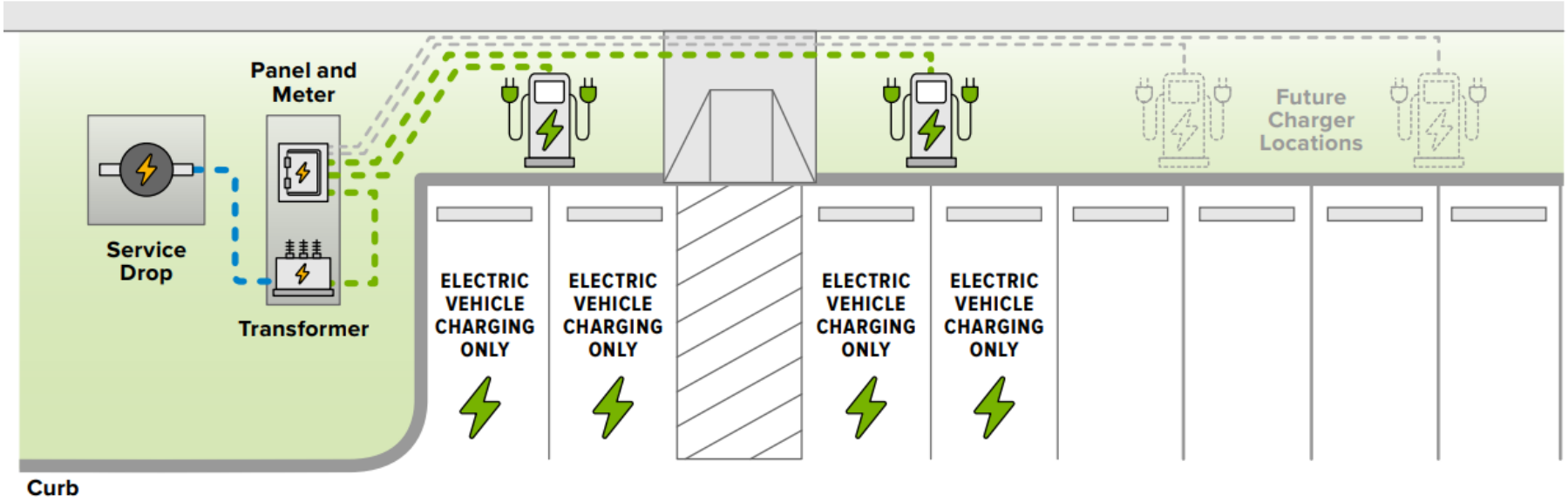
*Including engineering and design, installation, shipping, permitting, etc.

GENERIC L2 STATION



- Existing service assumed unable to handle increased load. Transformer upgrade to 90% of charger maximum power.
- No future proofing assumed in default case. User input required.
- 3 chargers (2 ports/cords per charger).
- Trenching/boring from transformer to cabinet to chargers. Default assumes 75 ft at $80/ft.
- ADA compliance, retractable cords, signage, bollards/curbs and striping/sidewalks.

GENERIC DCFC 50KW STATION



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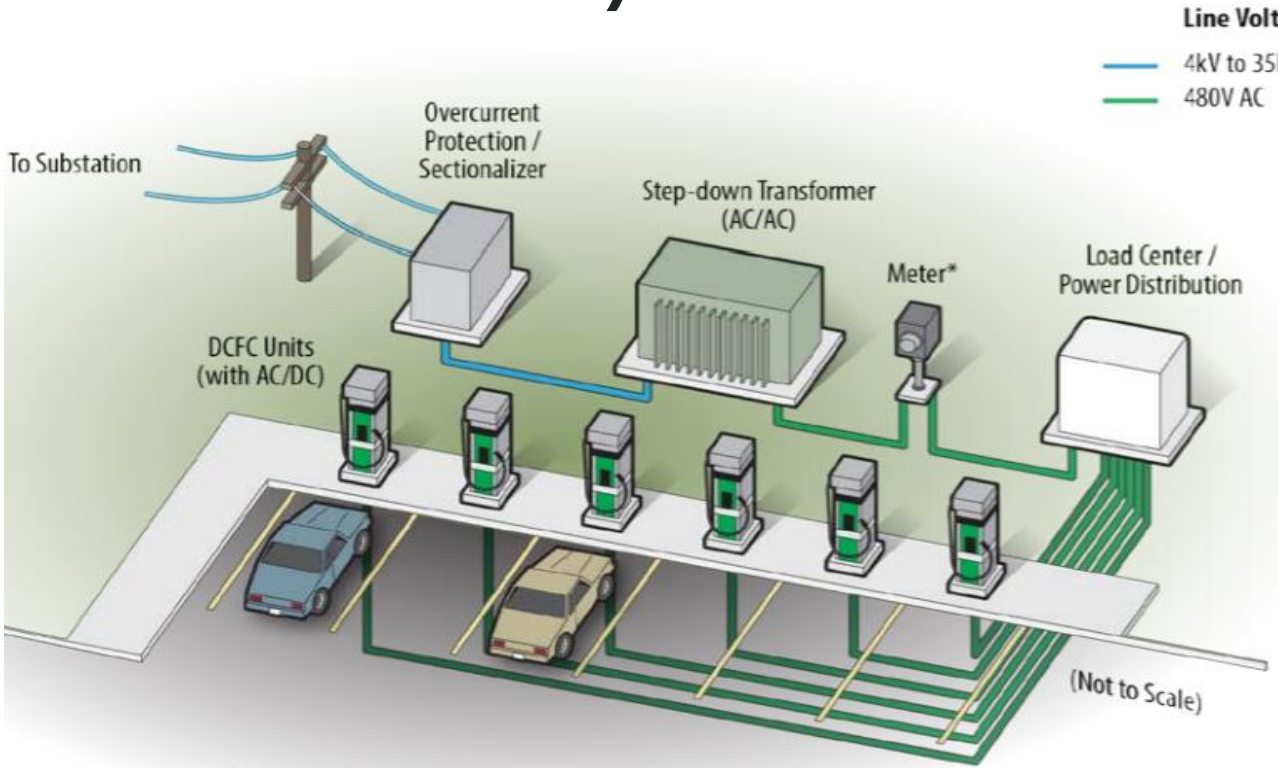
- 3 chargers (2 ports/cords per charger).
- Trenching/boring from transformer to cabinet to chargers. Default assumes 75 ft at $80/ft.
- ADA compliance, retractable cords, signage, bollards/curbs and striping/sidewalks.

GENERIC DCFC 150KW STATION (ULTIMATE CONFIGURATION)



- **Existing service assumed unable to handle increased load. Transformer upgrade to 90% of maximum charger power.**
- **No future proofing assumed in default case. User input required.**
- **3 chargers (1 port/cord per charger).**
- **Trenching/boring varies by site. Default assumes 75 ft at $80/ft.**
- **ADA compliance, retractable cords, signage, bollards/curbs and striping/sidewalks.**

Francfort, J. at al., *Considerations for Corridor and Community DC Fast Charging Complex System Design*, Idaho National Laboratory, INL/EXT-17-40829, May 2017.

JOBS EVSE 1.0 TOOL

START PAGE

DIRECTIONS: This page is the first page to be completed for each scenario. On this page choose the geographic region for analysis, and scenario type for the economic impact study. Choosing an economic impact scenario in Rows 14 through 16 will highlight the sheets that need to be completed. You can navigate to those sheets using the navigation buttons in columns E and F, or by clicking on the relevant sheet in the workbook. Additional Information about using JOBS EV is available on the JOBS EV 'User Guide' and 'Default Values & Definitions' sheet.

Please choose Region and Economic Impact Scenario below

Choose Region

Category	Select Option	
Select State or Region	USA-National	Using the drop down menu, choose National, Census Region, or State. This will be the region for analysis for all calculations. Please refer to the 'User Guide' sheet for a breakdown of states in each Census Division.

Choose Economic Impact Scenario

Scenario		GO TO 1	GO TO 2
○ Station Development ONLY (incl. construction, equipment, etc.)		Station Development-INPUTS	
○ Stations in Operation ONLY (EVSE station sales and expenses)		Station in Operation-INPUTS	
◉ **Station Development & Stations in Operation**	Go to the 'Station Development-INPUTS' sheet. Then go to the 'Stations in Operation-INPUTS' sheet.	Station Development-INPUTS	Stations in Operation-INPUTS

JOBS EVSE 1.0 TOOL (CONT'D)

STATION DEVELOPMENT - INPUTS

DIRECTIONS: This sheet is for specifying expenses for the development and construction of natural gas fuel stations including equipment, shipping, construction and installation, and the amount of expenditures being spent in the selected region. First, specify the station type and size in Step 1. Next, in Step 2, indicate how many new stations are completed each year. In t
values in white cells. Cells with other formatting contain formulas which should not be changed. To reset all values on this sheet, use

Clear All User-Specified Values

GENERAL STATION DEVELOPMEN

Step 1 - EV Station Type and Station Capacity

Notes: In this step, specify the type of chargers used in the station using the dropdown (cell C11), and input the average monthly usage i

Step 1a - Station Type	Select station type		Notes
Select station type	Level 2		Dropdown Menu
Step 1b - Station Capacity	***User-specified value***	**Default**	**Notes**
	Average Usage		
Average Usage - Sessions/Month		60	
Average Usage - kWh/Session		10.9	
Potential annual sales per station (kWh/station-year)	***Calculated value***	**654**	Value calculated bas

Step 2 - Number of New Stations Completed Each Year

Notes: Please enter the number of stations completed in each given year. (Example: If two stations will be completed in 2021, please e

Year	*User-specified value*	Notes
2021	10	The total per station development expens
2022	10	equipmer
2023	10	
2024	10	
2025	10	
2026	10	
2027	10	
2028	10	
2029	10	
2030	10	

STATION DEVELOPMENT RELATED

All dollar values are in 2020$. All user-specified entr

Step 3 - Station Equipment Expenses (uninstalled) and Quantities

Notes: In this step, specify the expenditure and quantity for each equipment category. Equipment expenses are in 2020$ and should no

ORGANIZATION OF JOBS EV | OVERVIEW AND BACKGROUND | DEFAULT VALUES & DEFINITIONS | START | Station Development INPUTS

STATIONS IN OPERATION - INPUTS

DIRECTIONS: This sheet is for specifying expenses related to station operation and fuel sales, including the amount of expenditures being spent in the selected region. First, specify the station type and size in Step 1 if it has not already been specified on the 'Station Development-INPUTS' sheet. In Step 2, indicate the number of stations in operation each year. In the remainder of the steps, specify values for each item or use defaults. ***Users should only enter or change values in white cells.*** Cells with other formatting contain formulas which should not be changed. To reset all values on this sheet, use the "Clear All User-Specified Values" button below.

Clear All User-Specified Values

STATIONS IN OPERATION INPUTS

Step 1 - EV Station Type and Station Capacity

Notes: Step 1 is available for use on this sheet for a Stations in Operation ONLY scenario. **Value used in model** (Column K) will equal the values specified in Step 1 on the 'Station Development-INPUTS' sheet if Station Development & Stations in Operation scenario was selected on the 'START' page. Values should be entered in Column C only if Station Development is NOT part of the selected scenario on the 'START' page. For a Stations in Operation ONLY scenario, please select station type in Step 1a. Station capacity is calculated in Step 1b.

Step 1a - Station Type	Select station type		Notes	Value used in model
Select station type	Station type as defined on 'Station Development' sheet		Dropdown menu	Level 2
	User-specified value	Default	Notes	Value used in model
Average Usage - Sessions/Month		60	Per Station	60
Average Usage - kWh/Session		10.9		10.9
Potential monthly fuel sales per station (kWh/station-month)	Calculated value	1,800	Value calculated based on sessions/month (H14) and kWh/session (H15).	**654**

Step 2 - EVSE Stations in Operation

Notes: Step 2 is available for use on this sheet for a Stations in Operation ONLY scenario. Values can be entered in Column C only if Station Development is NOT part of the selected scenario on the 'START' page. For a Stations in Operation ONLY scenario, please specify the cumulative (or total) number of stations in operation each year. For a Station Development & Stations in Operation scenario, **Value used in model** (Column K) will equal the cumulative value from Step 2 on the 'Station Development-INPUTS' sheet.

Enter the total number of stations in operation by year	Level 2	Notes	Level 2
	User-specified value		Value used in model
2021			10
2022			20
2023			30
2024			40
2025			50
2026			60
2027			70
2028			80
2029			90
2030			100

Step 3- Average Monthly Sales per Station

Notes: Please enter the average monthly sales per station in 2020$.

3a - Average Monthly Sales - Electricity, Induced Purchases, Ad Revenue

Enter average monthly sales per station by year	Level 2	Defaults	Induced Purchases	Defaults	Ad Revenue	Defaults	Level 2	Induced Purchases	Ad Revenue
	User-specified value (kWh)		*User-specified value ($)*		*User-specified value ($)*		Value used in model	Value used in model	Value used in model
2021		654		$1,200		$1,400	654	$1,200	$1,400

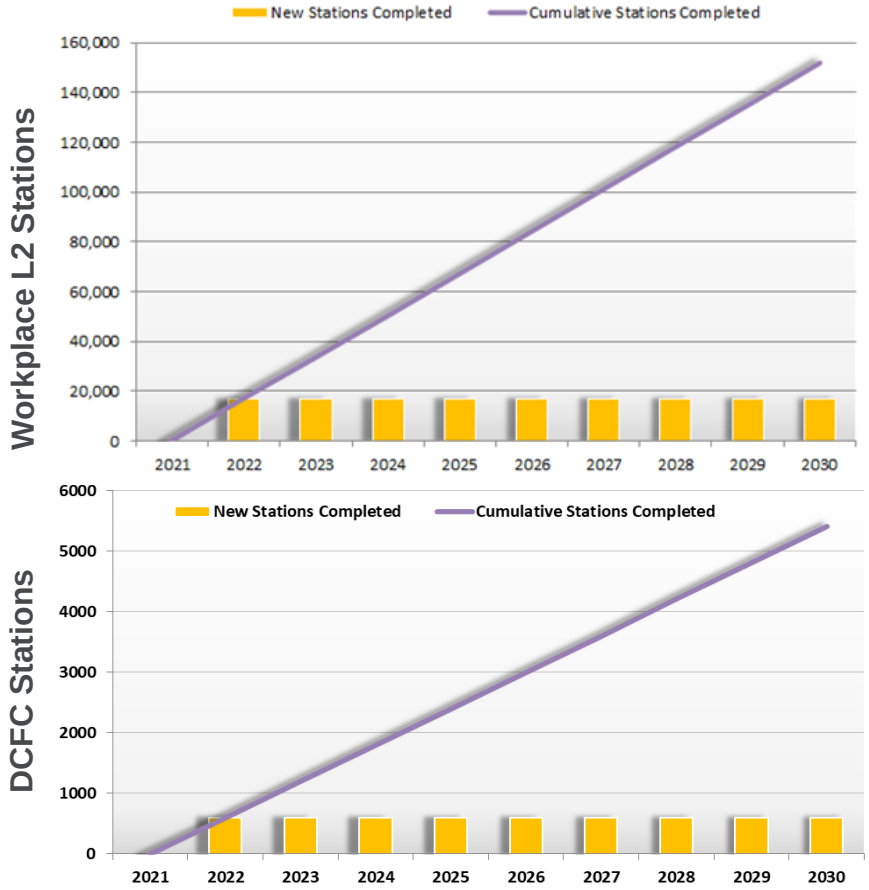
ILLUSTRATIVE SCENARIO: VIRGINIA ELECTRIFICATION PLAN (DRAFT)

VA ELECTRIFICATION TARGETS/ASSUMPTIONS

- 4 million home L2 plugs by 2040
- 1 million workplace L2 plugs by 2040
- 580,000 public L2 plugs by 2040
- 65,000 public DCFC plugs by 2040
- 2 plugs/ports per charger
- 2 chargers per work or public station
- 33% of targets by 2030
- On-site electric storage for DCFCs
- All components made in USA, outside VA

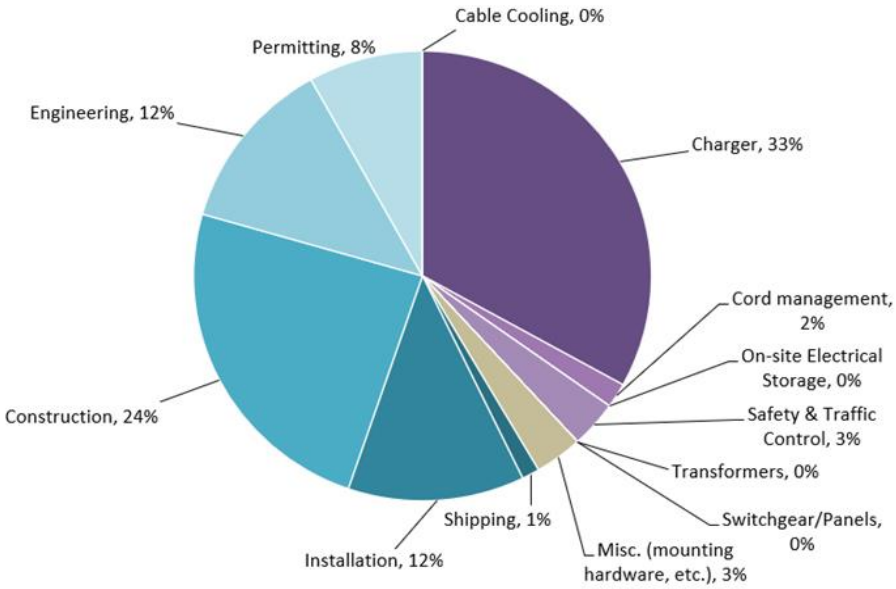
Plugs In Place by 2030

	Level 2	DCFC
Workplace	303,860	
Public	193,200	21,613
Home	1,333,333	

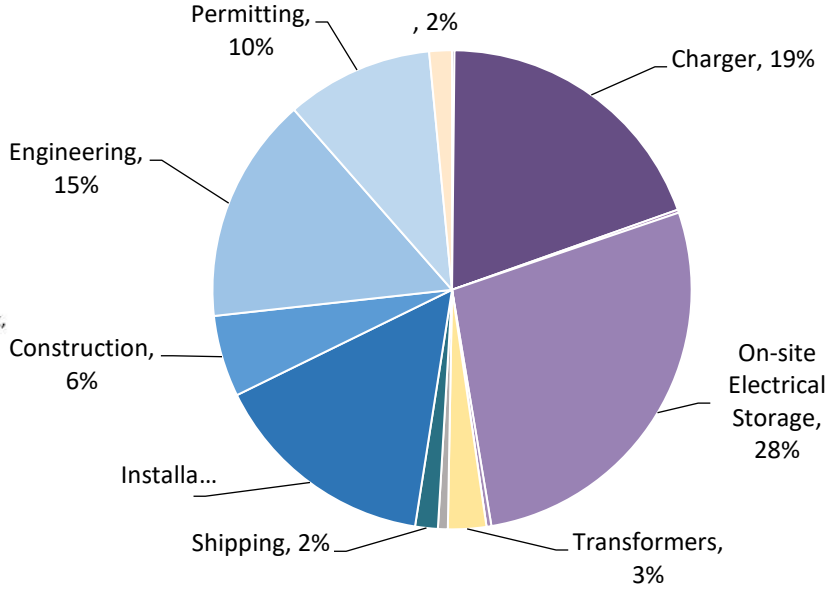


VA STATION DEVELOPMENT EXPENDITURES

Level 2 Stations



DCFC Stations



VA PUBLIC STATION OPERATION EXPENDITURES

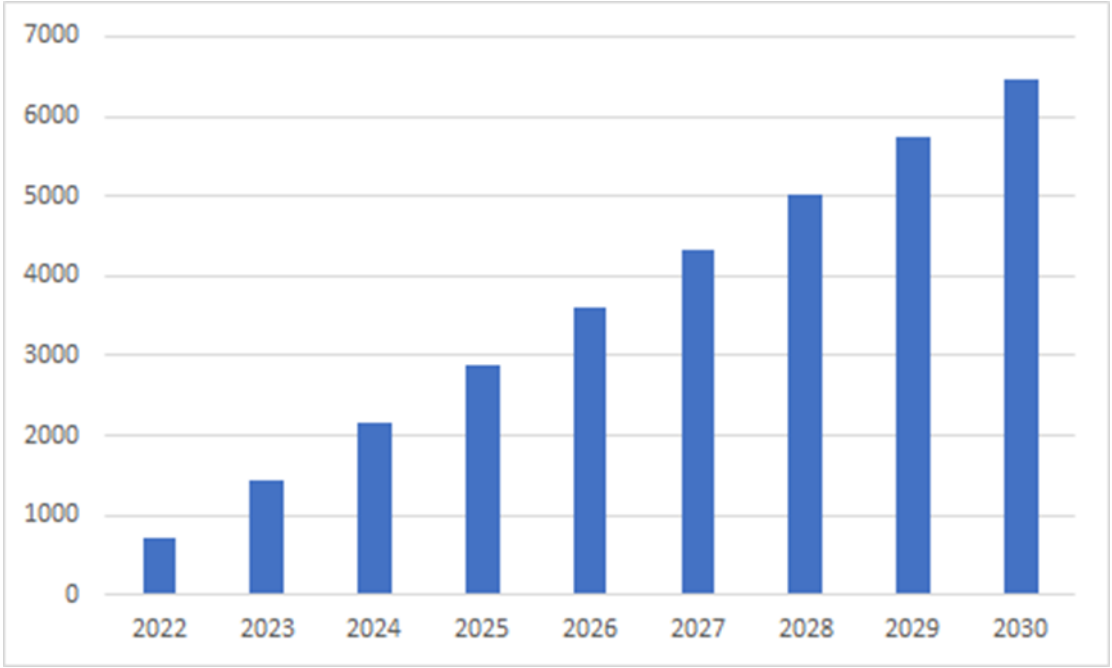
Public Stations

Monthly Revenues	
Type	**Amount**
Retail sales	$1,200.00
Ad sales	$1,400.00
Access Fees	$0.00

Monthly Expenses	
Type	**Amount**
Electricity*	varies
Administration	$10.00
Maintenance	$ 5.00
Warranty	$10.00
Data & Networking	$30.00

*Utilization dependent ($.33/kWh).

Electricity (gWh/year)



VA RESULTS

Supply Chain Jobs – Directly involved in producing, shipping, installing, constructing and operating stations and in supplying inputs to those activities

Induced Jobs – Associated with re-spending of wages/incomes by supply-chain job-holders

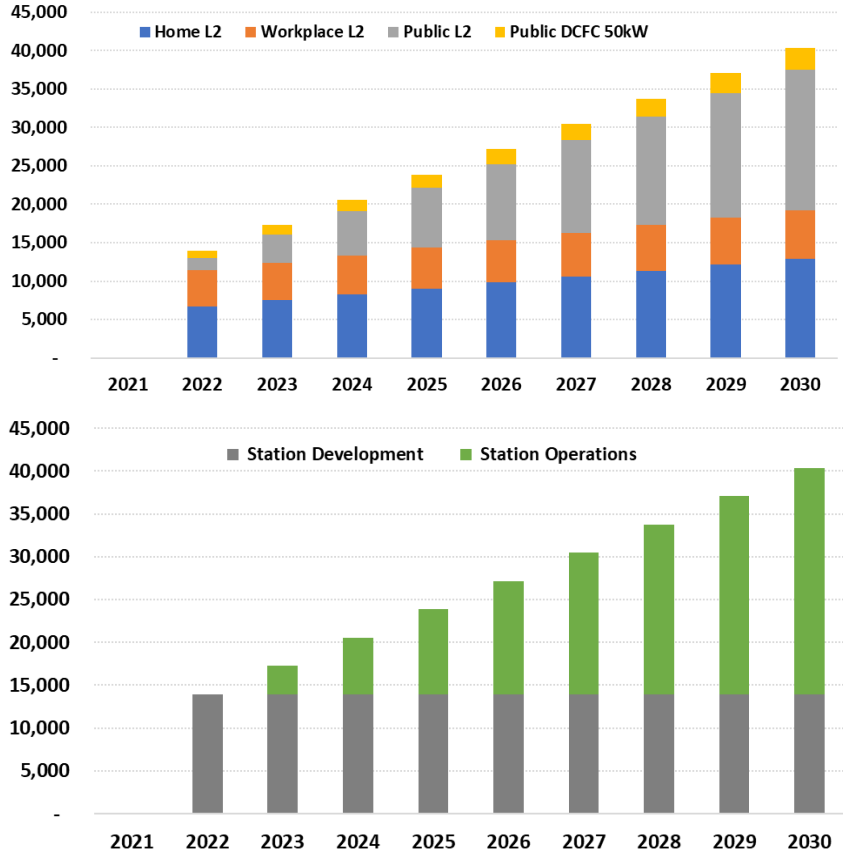
Total employment:

- By charger type & location (top graph)
- By development vs. operation (bottom graph)

Job Creation:

- ~14,000 jobs/year from station development
- ~0.2 jobs/yr per cumulative charger in operation
- 274,000–291,000 jobs created over 10 years
- ~40,000 jobs in 2030

Total Employment Associated with VA Electrification Program



NEXT STEPS

JOBS EVSE: FY 22

- Sensitivity analysis
- Posting version 1.0, tutorial and presentation materials to Argonne JOBS MODELS website with link from AFDC “tools” page
- JOBS EVSE 1.1:
  - Higher power and heterogenous charger types
  - More granular defaults
  - Other revenue sources (e.g., parking, vehicle leasing/rental, V2G, TNC hubs, etc.)
- JOBS EV 1.0:
  - EV manufacturing
  - Battery supply chain
  - Upgraded platform

THANK YOU!

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QUESTIONS?

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