



PENNSYLVANIA TURNPIKE COMMISSION

ACEC Leadership Academy
June 3, 2024

Keith Jack, Director of Facilities Operations

Economic Engine

The PA Turnpike Commission is more than a roadway.

- A billion-dollar enterprise driving our state and national economies
- Generates, collects, and manages \$1.5 billion annually



565+
MILES



10
TUNNELS



136
FACILITIES



NEARLY **90**
INTERCHANGES

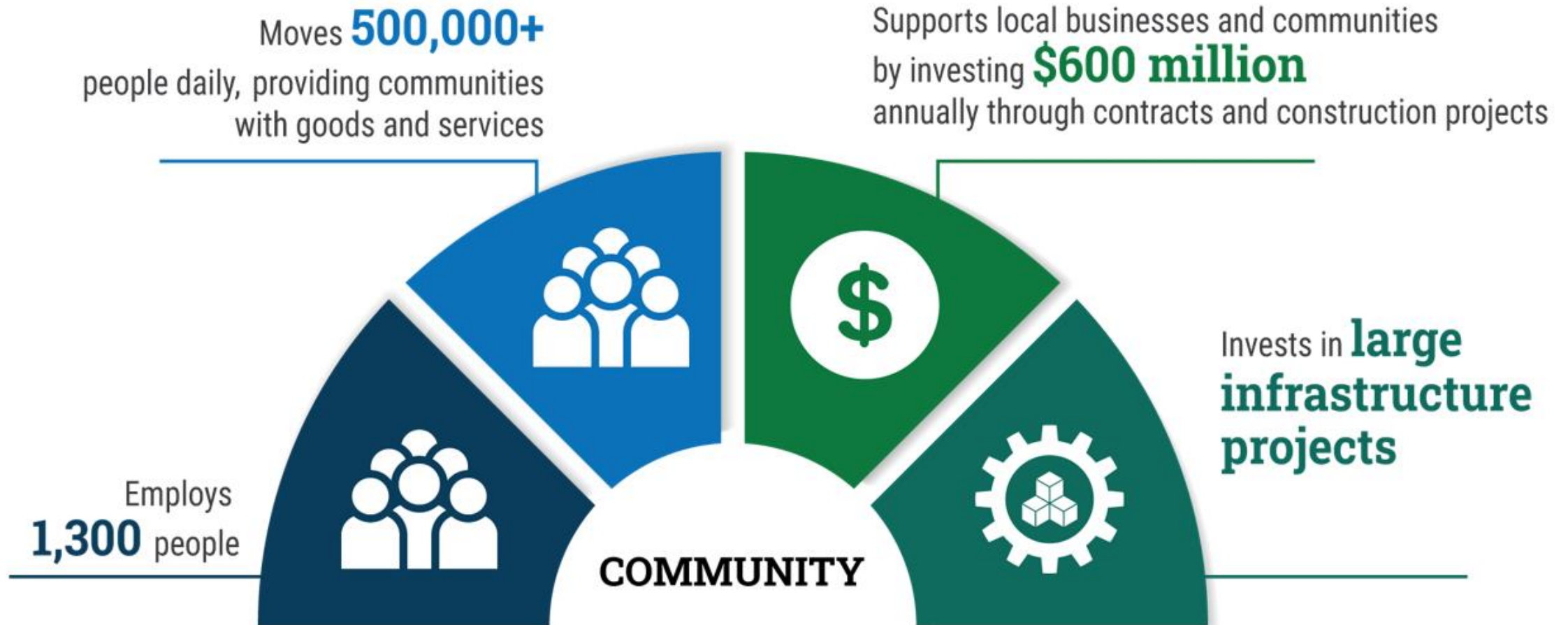


851
BRIDGES



1,300+
EMPLOYEES

Strengthening Communities





SAFETY FOCUSED.
CUSTOMER DRIVEN.
AMERICA'S FIRST SUPERHIGHWAY

OUR VISION

Driving the standard for safety,
customer service and mobility.

OUR COMMITMENT



Improve safety—zero fatalities, no
work-zone injuries, reduced incidents



Manage all assets in
a restorative manner



Achieve accessible, reliable,
and uninterrupted travel



Be the leader in
transportation services

OUR VALUES

SAFETY ALWAYS

We care deeply
about the safety of
our colleagues and
customers.

COMMUNICATE OPENLY

We listen and
collaborate to
connect people with
one another.

CUSTOMER DRIVEN

We provide our
customers with
premium service.

RESPONSIBILITY MATTERS

We embody
diversity, integrity
and sustainability in
all of our practices.

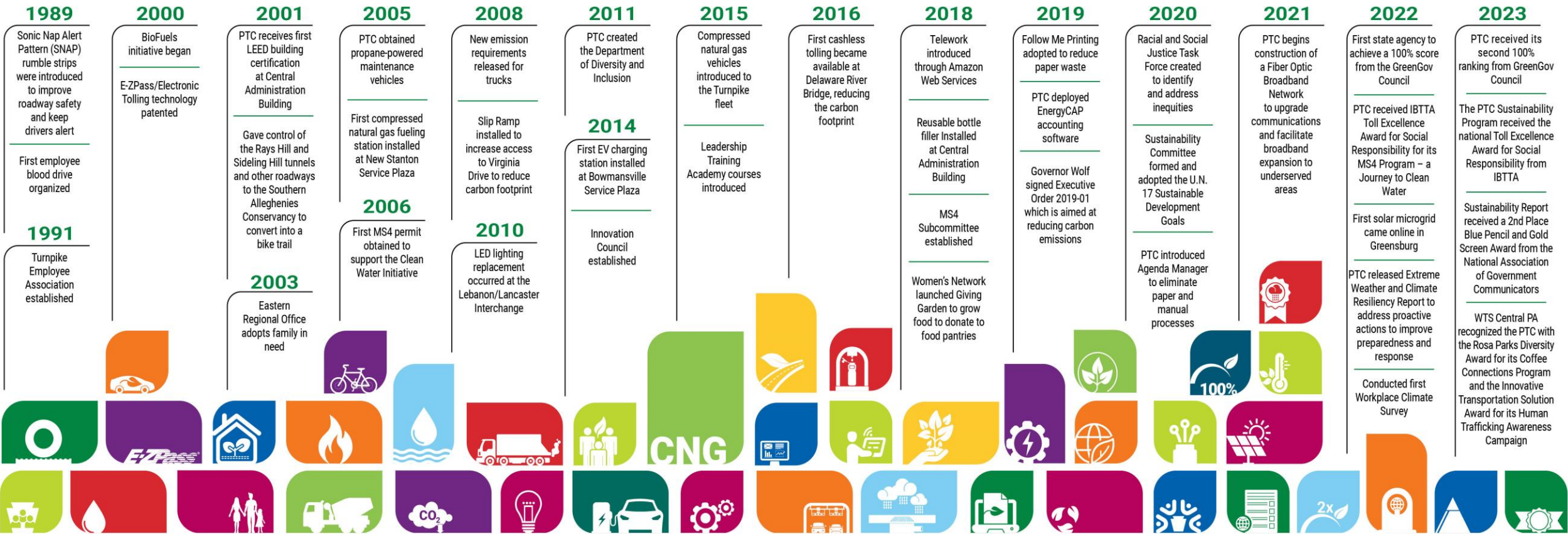
TEAMWORK DELIVERS

We are accountable
to one another and
succeed when we
work together.

MISSION

To operate a safe, reliable, customer-valued toll road system that supports national mobility and commerce.

The PTC's 30-Year Commitment to Sustainability



Sustainability Committee

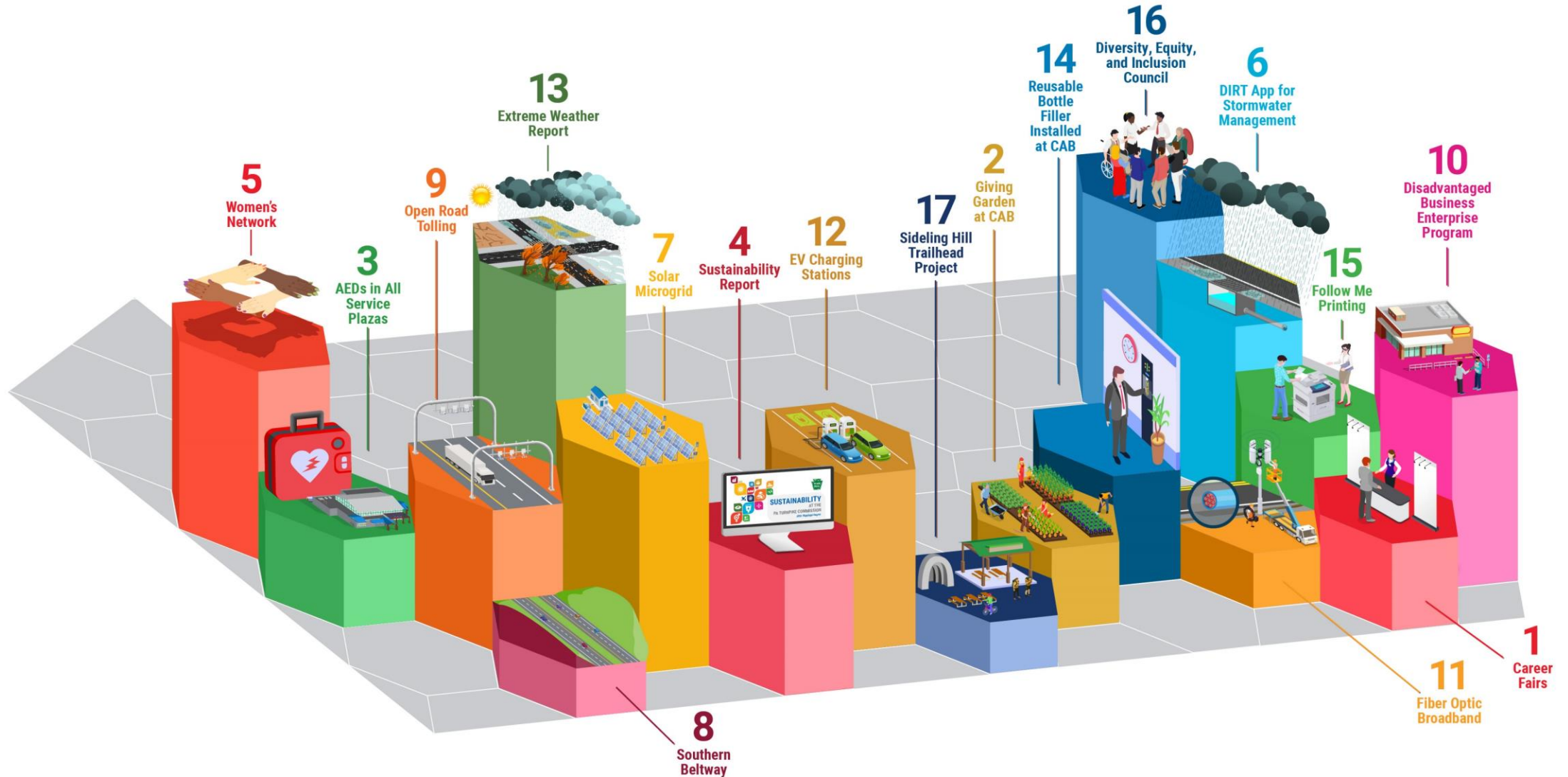
Mission: to build an organization-wide culture where all projects consider economic, environmental, and social impacts as identified by the United Nations' 17 Sustainable Development Goals and adopted by the Pennsylvania Green Gov Council.



PA TURNPIKE SUSTAINABLE DEVELOPMENT



Our Commitment to Achieve a Better and More Sustainable Future for All



Sustainability Principles & Analysis



Sustainability Scale	1 – Lowest10 - Highest									
	1	2	3	4	5	6	7	8	9	10
Planet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Profit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Commitment to Social Responsibility

Agencywide

- SECA Campaign

Sustainability Committee

- Making Sustainable Attainable
- Earth Day Litter Pick Up
- Hunger Action Month &
- Quarterly Food Drives

Women's Network

- Human Trafficking Awareness Campaign
- Giving Garden
- Women's Conference
- STEAM Day

Turnpike Employee Association

- Pick an Angel Program
- Toys for Tots
- Food Drives
- Blood Drives
- Wounded Warriors



Pollinator Gardens

- Five pollinator gardens
 - Central Administration Building
 - Harrisburg West
 - Hickory Run
 - Bensalem
 - Irwin



Open Road Tolling Conversion – 2025/26

All tolling points move to the roadway, using overhead gantries to replace traditional exit/entry points.

- Phased Implementation 2025/27
 - East of Reading and the N.E. Extension early 2025
 - Western Implementation 2026 (tent.)
- Interchange building demolition in 2025-2027



Open Road Tolling Benefits



Meets customer expectation

- Clear preference for electronic tolling methods; 85+ adoption of E-ZPass
- National standard

Increases access



- Built at a fraction of the cost of an interchange
- Increases ability to fulfill the access requests we receive from communities across the Commonwealth
- \$25 million in savings per year on operations and maintenance



Safer

- Eliminates confusion and lane switching at exit/entry



Increases mobility

- Eliminates travel-time impacts of traditional tolling

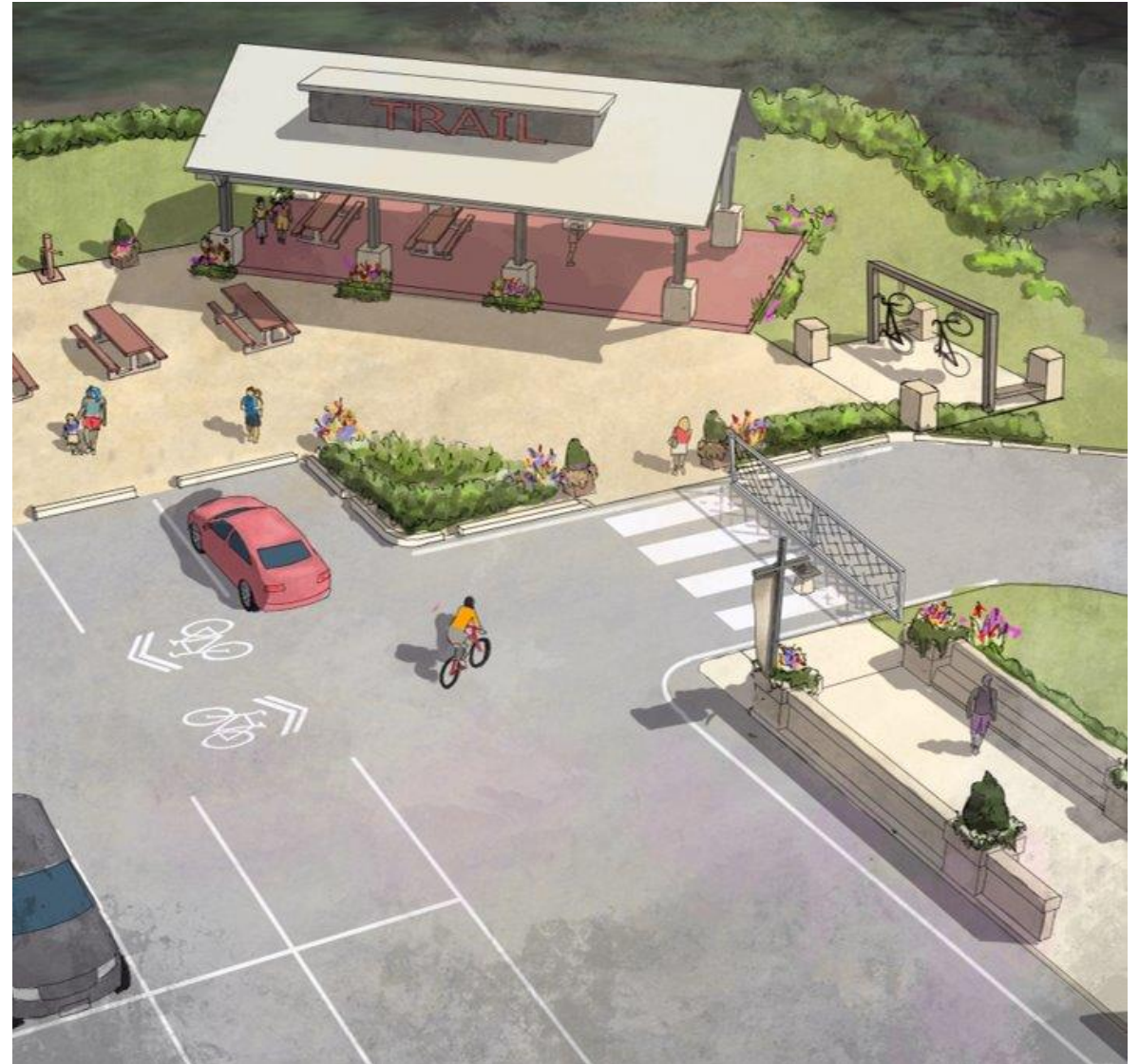


Better for the environment

- Continuous travel results in lower carbon emissions
- Smaller physical footprint

Sideling Hill Trailhead Project

- PTC's proximity to the Abandoned Turnpike and Tunnels of The Old PA Pike (TOPP) Trail.
- Incorporation into the existing Parking Expansion Project.
- Excess 67-acre Turnpike parcel allows for amenity expansion.
- Connections with PA Bike Route S and State Forest trail network.



Gateway to The Alleghenies

25 Mile Radius

675.6 Miles of Trails

20 Mile Radius

490.5 Miles of Trails

15 Mile Radius

309.2 Miles of Trails

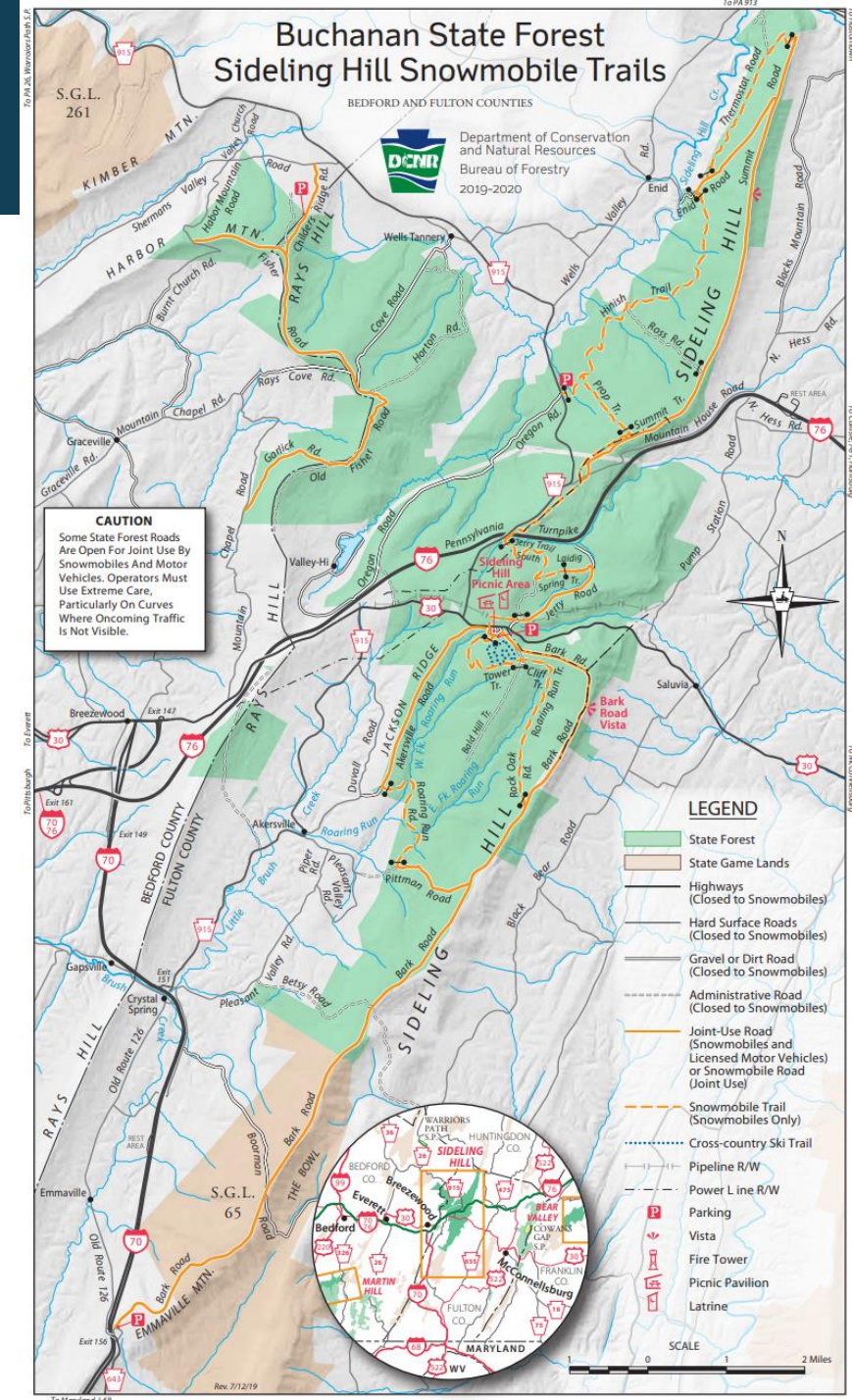
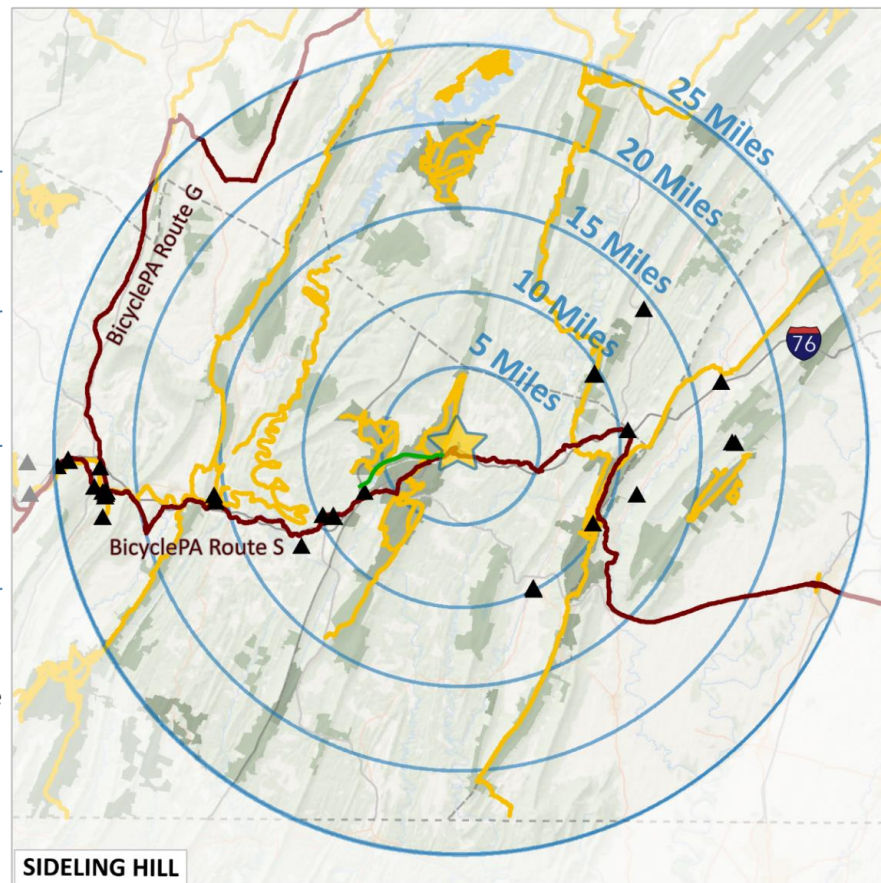
10 Mile Radius

168.4 Miles of Trails

5 Mile Radius

64.4 Miles of Trails

- Abandoned PA Turnpike
- Off-Road Trails
- On-Road Trails
- ▲ Destination Sites



Diversity, Equity, and Inclusion Council

Healing &
Education
Committee



DIVERSITY, EQUITY,
AND INCLUSION
COUNCIL



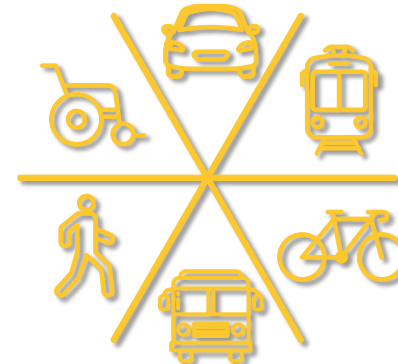
Marketing &
Public
Engagement
Committee



Equitable Hiring &
System Reform
Committee



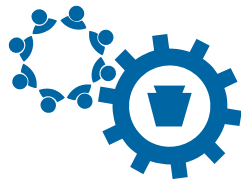
Transportation
Justice &
Equities
Committee



Diversity, Equity, and Inclusion



Expanding Community and College Outreach to Highlight Employment Opportunities



Improving Business Supplier Diversity Program



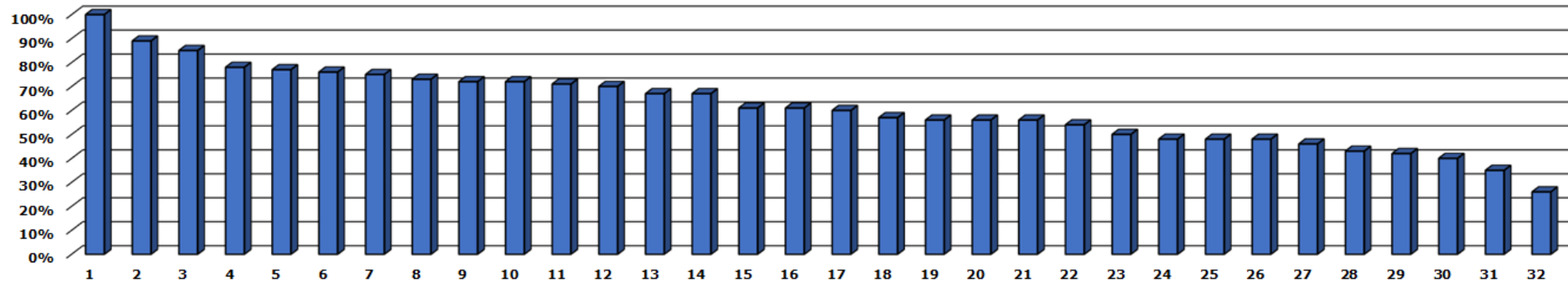
Expanding Internal and Public Cultural Programming

GreenGov Council – 100% Certification Score



GreenGov Checklist Agency Overall Scores - 2023

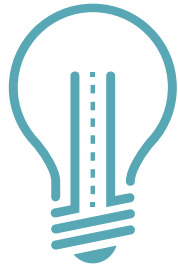
State Agency																																
Turnpike Commission																																
Department of Transportation																																
Department of Banking and Securities																																
Department of State																																
Public School Employees Ret. System																																
Office of Human Services																																
Office of Administration																																
Department of General Services																																
Department of Environmental Protection																																
Dept. of Military and Veterans Affairs																																
Office of the Budget																																
Historical and Museum Commission																																
PA Emergency Management Agency																																
Dept. of Drug and Alcohol Programs																																
Pennsylvania State Police																																
Department of Education																																
Pennsylvania Insurance Department																																
Liquor Control Board																																
Office of General Counsel																																
Environmental Hearing Board																																
Pennsylvania Game Commission																																
Department of Labor and Industry																																
Public Utility Commission																																
Department of Revenue																																
Office of State Agriculture																																
Department Inspector General																																
Department of Health																																
Dept. of Community and Economic Dev.																																
Points Applicable	160	173	108	124	179	79	61	185	183	161	178	46	166	180	178	85	173	69	88	89	170	87	40	181	186	108	119	185	77	165	97	87
Points Earned	160	154	92	97	137	60	46	135	132	116	126	32	112	120	109	52	104	39	49	50	96	47	20	87	90	52	55	80	32	66	34	23
Score	100%	89%	85%	78%	77%	76%	75%	73%	72%	72%	71%	70%	67%	67%	61%	61%	60%	57%	56%	56%	56%	54%	50%	48%	48%	48%	46%	43%	42%	40%	35%	26%



100% Certification Score from the PA GreenGov Council in 2022 and 2023



Internal Outreach



Innovation Council



Earth Week



Engineering Design Form



Making Sustainable Attainable



Mileposts

External Outreach Partners



Municipal
Associations



Parks/Recreation/
Environment



Business/
Main Streets



Sustainable Construction



Sustainable Construction



Sustainable Construction



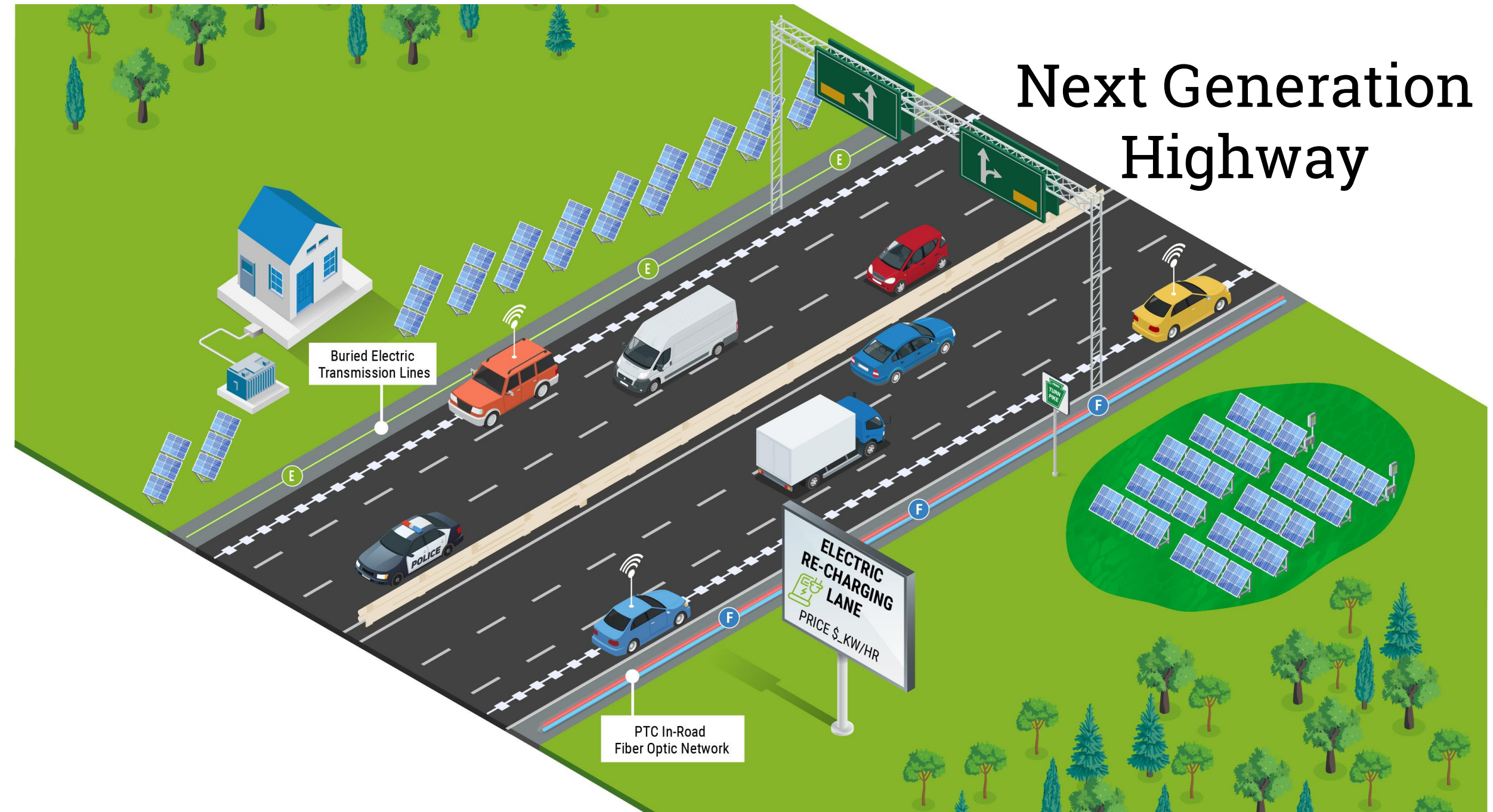
Our Commitment to Sustainability





Sustainable Roadway 2040

Next Generation Highway





VISION FOR A SUSTAINABLE ROADWAY 2040



Microgrid/Solar

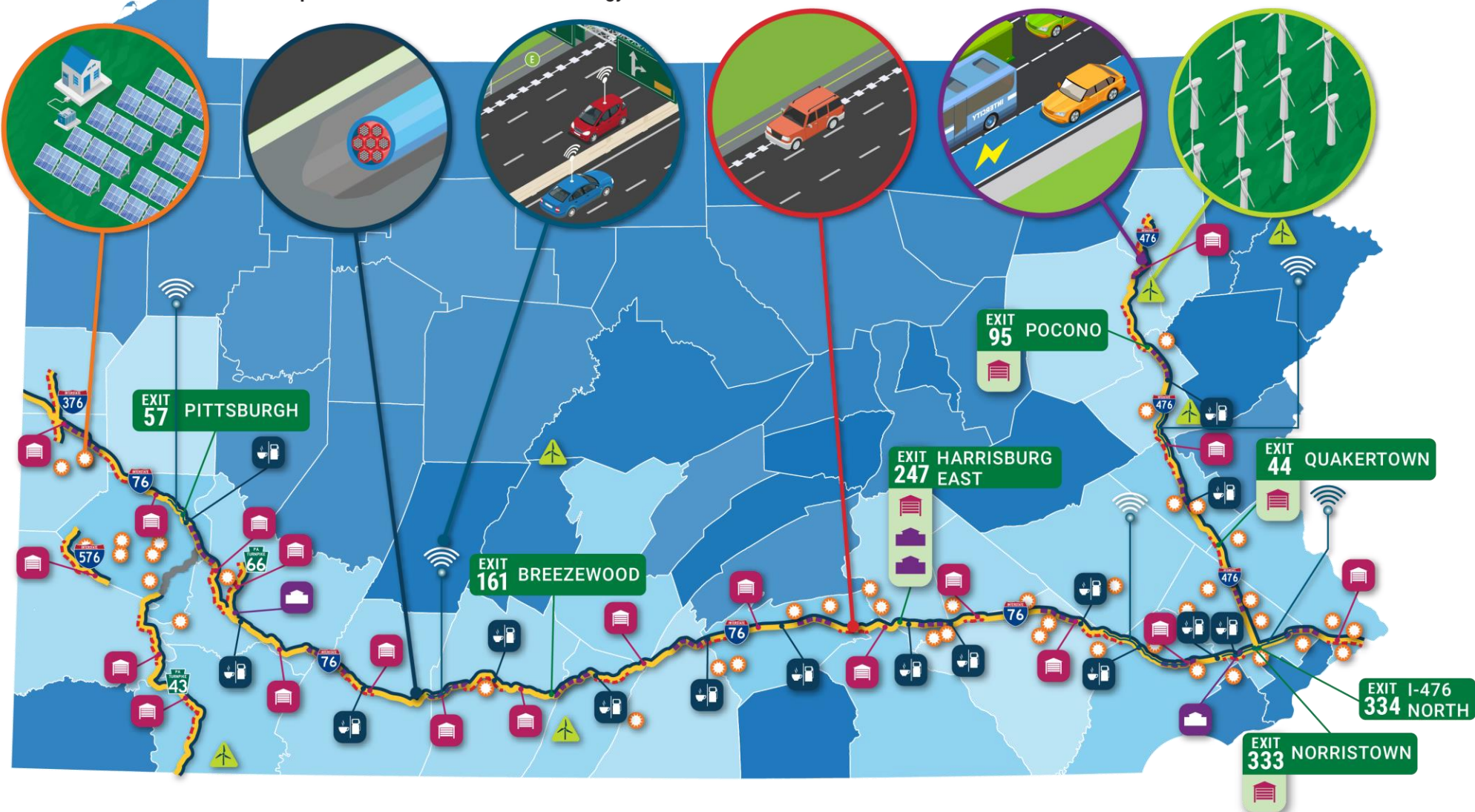
In-Road Fiber Optic Network












Connected Vehicle Technology

Buried Electric Transmission Lines

Inductive Charging

Silent Wind Plant



-  SERVICE PLAZA
-  MAINTENANCE FACILITY
-  PTC ADMINISTRATIVE BUILDING
-  EXIT
-  ROADWAY
-  MICROGRID/SOLAR
-  IN-ROAD FIBER NETWORK
-  CONNECTED VEHICLE TECHNOLOGY
-  BURIED ELECTRIC TRANSMISSION LINES
-  INDUCTIVE CHARGING
-  SILENT WIND PLANT

PA TURNPIKE FIBER OPTIC NETWORK



Planned Construction Completion & Network Activation



EASTERN NETWORK

- Contract #1**
Construction 2022
Go-Live 2023
- Contract #2**
Construction 2023
Go-Live 2024

WESTERN NETWORK

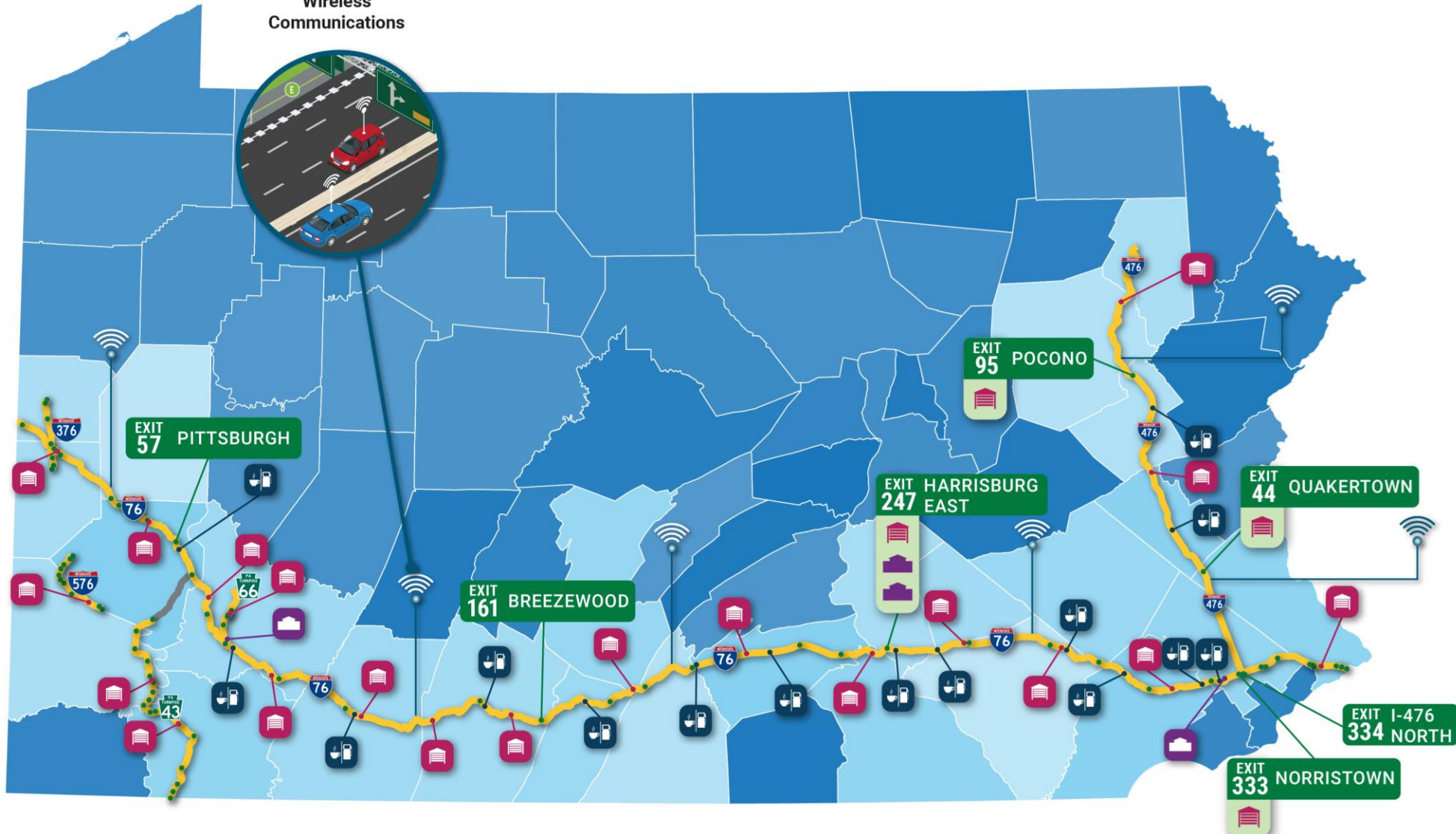
- Contract #2.5**
Construction 2024
Go-Live 2025
- Contract #3**
Construction 2025
Go-Live 2026
- Contract #4**
Construction 2025
Go-Live 2026
- Contract #5**
Planned Completion
To Be Determined
- Southern Beltway & Existing Fiber Optic Cable**



Vision FOR A SUSTAINABLE ROADWAY 2040



Wireless
Communications



- SERVICE PLAZA
- MAINTENANCE FACILITY
- PTC ADMINISTRATIVE BUILDING
- SILENT WIND PLANT
- PV PLANT + ENERGY STORAGE
- WIRELESS CONNECTIVITY
- EXIT
- ROADWAY
- IN-ROAD FIBER NETWORK
- INDUCTIVE CHARGING
- BURIED ELECTRONIC TRANSMISSION LINES

Pennsylvania Safety Transportation and Research Track (PennSTART)



PennSTART Site

RIDC Westmoreland Innovation Center

RIDC Westmoreland Innovation Center is the center for technology and value-added manufacturing within the region. Located 40 miles from downtown Pittsburgh.

- 2.8 million sqft of Manufacturing Space
- Current Tenants: Siemens Energy, DNP, Cenveo, Intervala, McCollister, and WCCC Advanced Technology Center, StackAV and more.
- BBBRC Innovation Accelerator under construction
- Site prep for PennSTART company attraction needed

PennSTART Construction Timeline

Fall 2023: Track Design Begins

Winter 2023 - Spring 2024: Conceptual Design / Design Development

Summer 2024: Phase 1 Final Design

Summer 2024 - Spring 2025: Site Grading, Utilities & Phase 1 Track Delivery

Summer 2025: Test Track (high speed oval) construction & Technology Integration

Spring 2026: Test Track Construction Complete





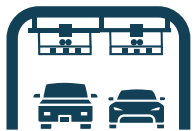
Traffic Incident Management

- Law Enforcement / Fire / Rescue / EMS
- Towing & Recovery / Public Works / Utilities
- Unmanned Aerial Vehicles (Drones Application Training)



Connected and Automated Vehicles

- Research Institutions
- Automotive & Equipment Manufacturers
- IT Data Solutions
- Railway & Intersection Safety



ITS / Tolling Technologies

- Tolling Agencies
- EZPass Group
- Toll Tech Manufacturers & Integrators



Work Zone Safety

- Maintenance Workers
- Contractors
- OSHA and ANSI Work Zone Safety Training



Commercial Vehicles

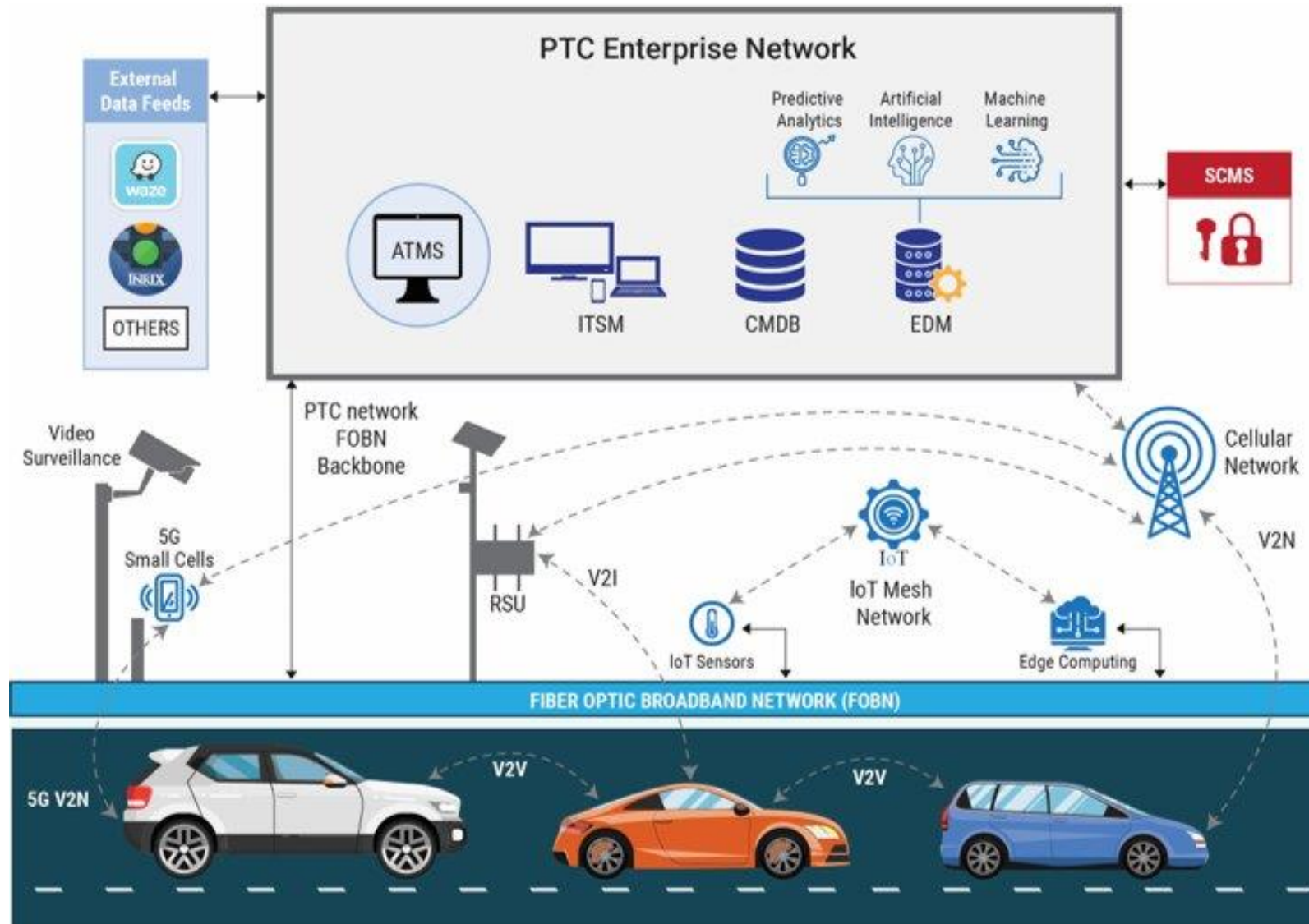
- Motor Truck Carrier Association
- Bus and Motor Coach Association
- Manufacturers & Integrators

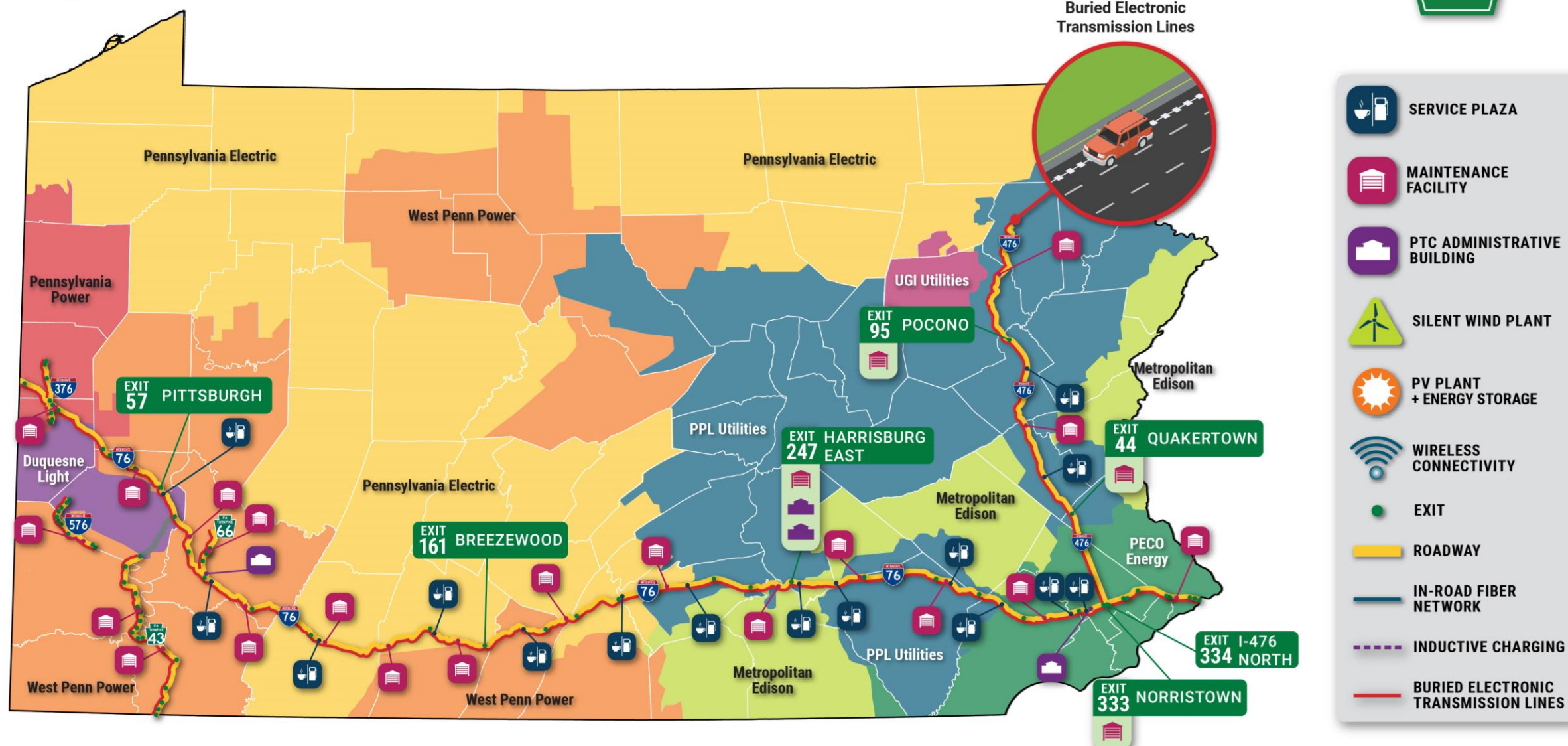


Transit Vehicles

- Federal Transit Administration
- State DOTs
- Transit Agencies
- Bus Technology Manufacturers

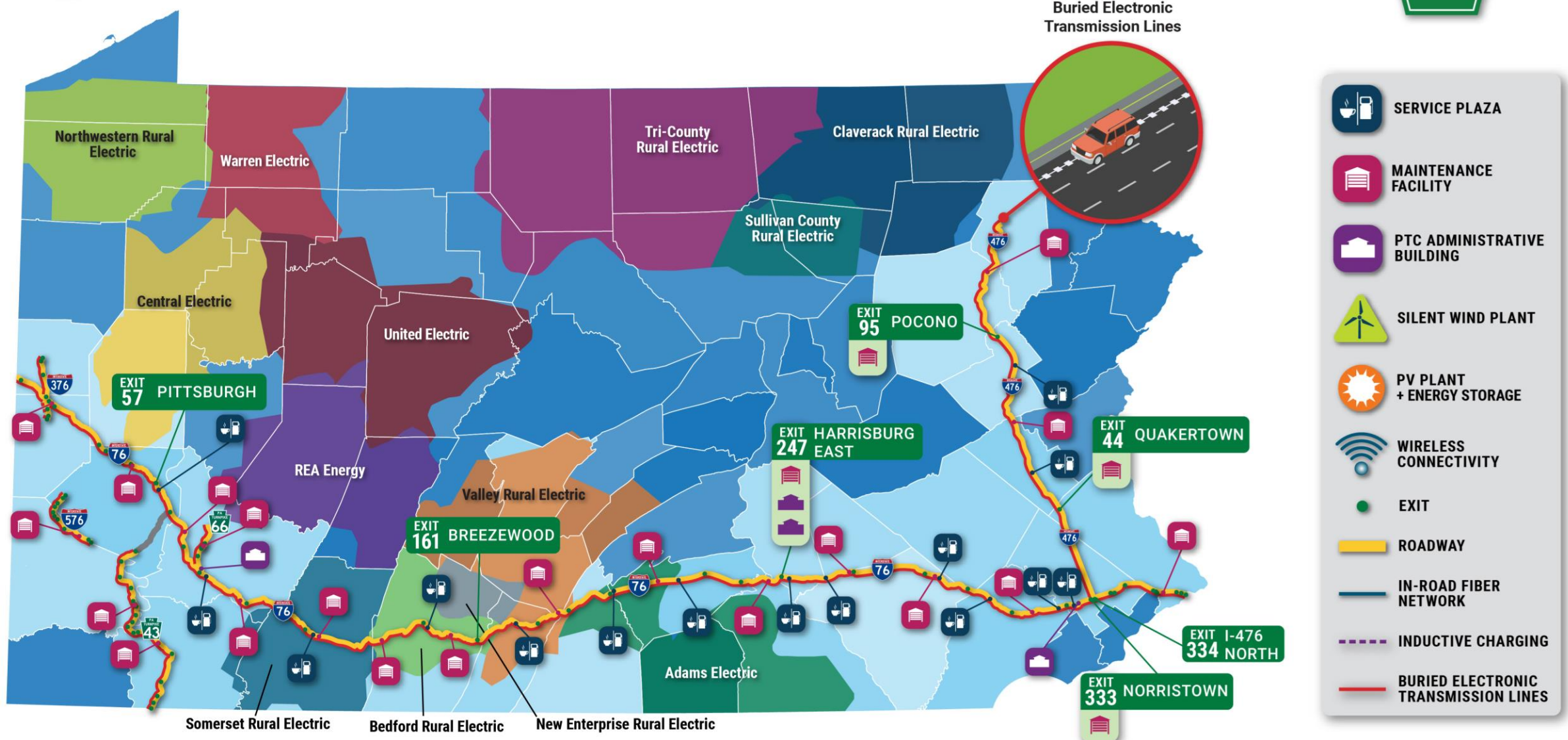
Future Connection With Customers

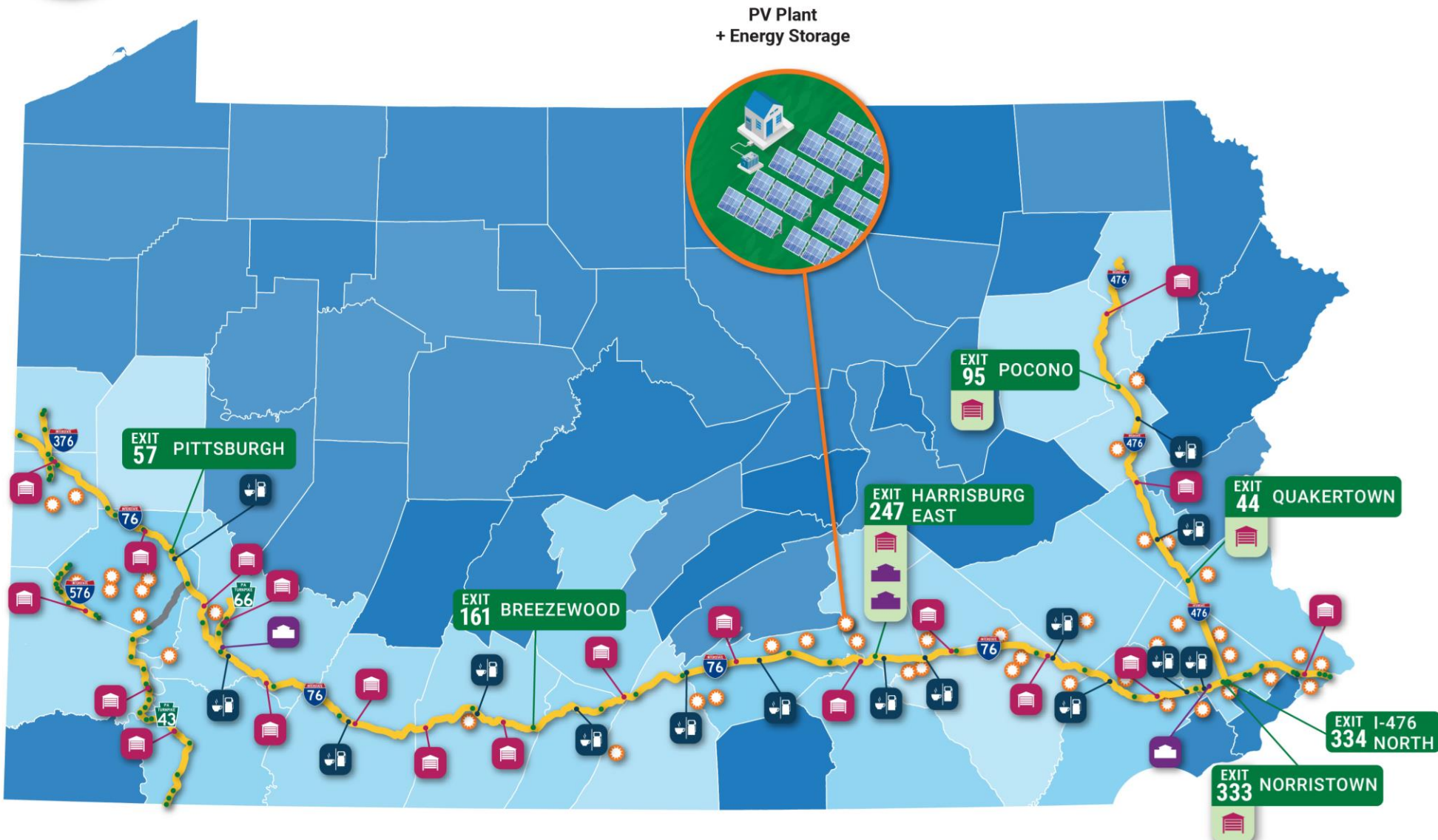

















Vision FOR A SUSTAINABLE ROADWAY 2040





-  **SERVICE PLAZA**
-  **MAINTENANCE FACILITY**
-  **PTC ADMINISTRATIVE BUILDING**
-  **SILENT WIND PLANT**
-  **PV PLANT
+ ENERGY STORAGE**
-  **WIRELESS
CONNECTIVITY**
-  **EXIT**
-  **ROADWAY**
-  **IN-ROAD FIBER
NETWORK**
-  **INDUCTIVE CHARGING**
-  **BURIED ELECTRONIC
TRANSMISSION LINES**

Solar Canopy

- 2025 Fall Completion at the Central Administration Building
- 2 E Transit (Ford Van)
- Installation of stationary inductive charger for E transit
- Installation level 2 chargers for employee and fleet use.
- Public facing chargers would help comply with NEVI guidelines



Solar & Microgrids

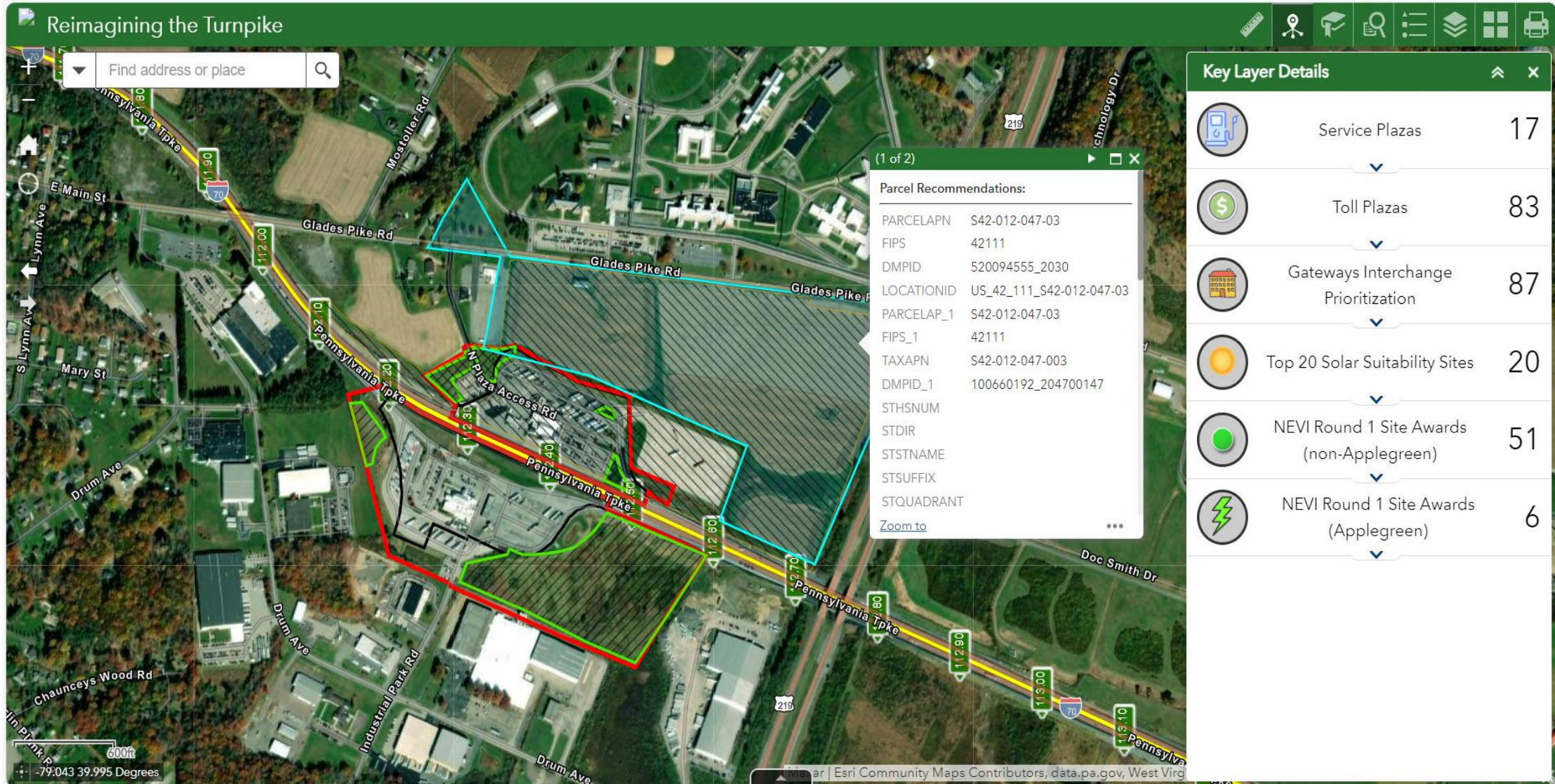
- Identified a site with lucrative electricity value east of Brownsville Township
- Parcels worth over \$1.5 million in electricity value
- Hilly area, but may be non-issue due to horizontal structure of parcels



Solar



Somerset Service Plaza
















Vision FOR A SUSTAINABLE ROADWAY 2040



Inductive Charging



-  SERVICE PLAZA
-  MAINTENANCE FACILITY
-  PTC ADMINISTRATIVE BUILDING
-  SILENT WIND PLANT
-  PV PLANT + ENERGY STORAGE
-  WIRELESS CONNECTIVITY
-  EXIT
-  ROADWAY
-  IN-ROAD FIBER NETWORK
-  INDUCTIVE CHARGING
-  BURIED ELECTRONIC TRANSMISSION LINES



NSF Engineering Research Center



Driving Electrification – Empowering Progress

- Maintenance
- Traffic intelligence
- Billing

Roadside box

- Power
- Communications

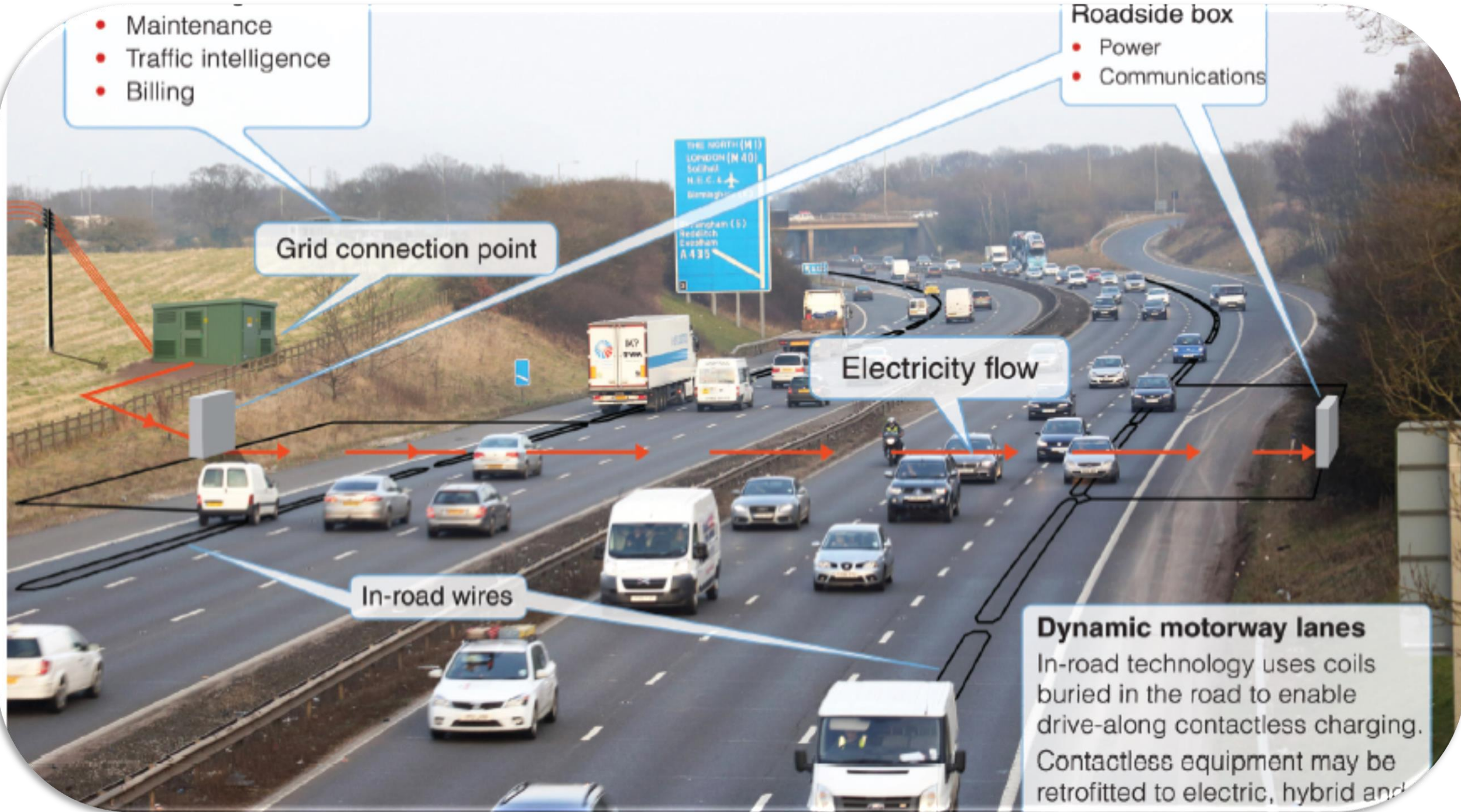
Grid connection point

Electricity flow

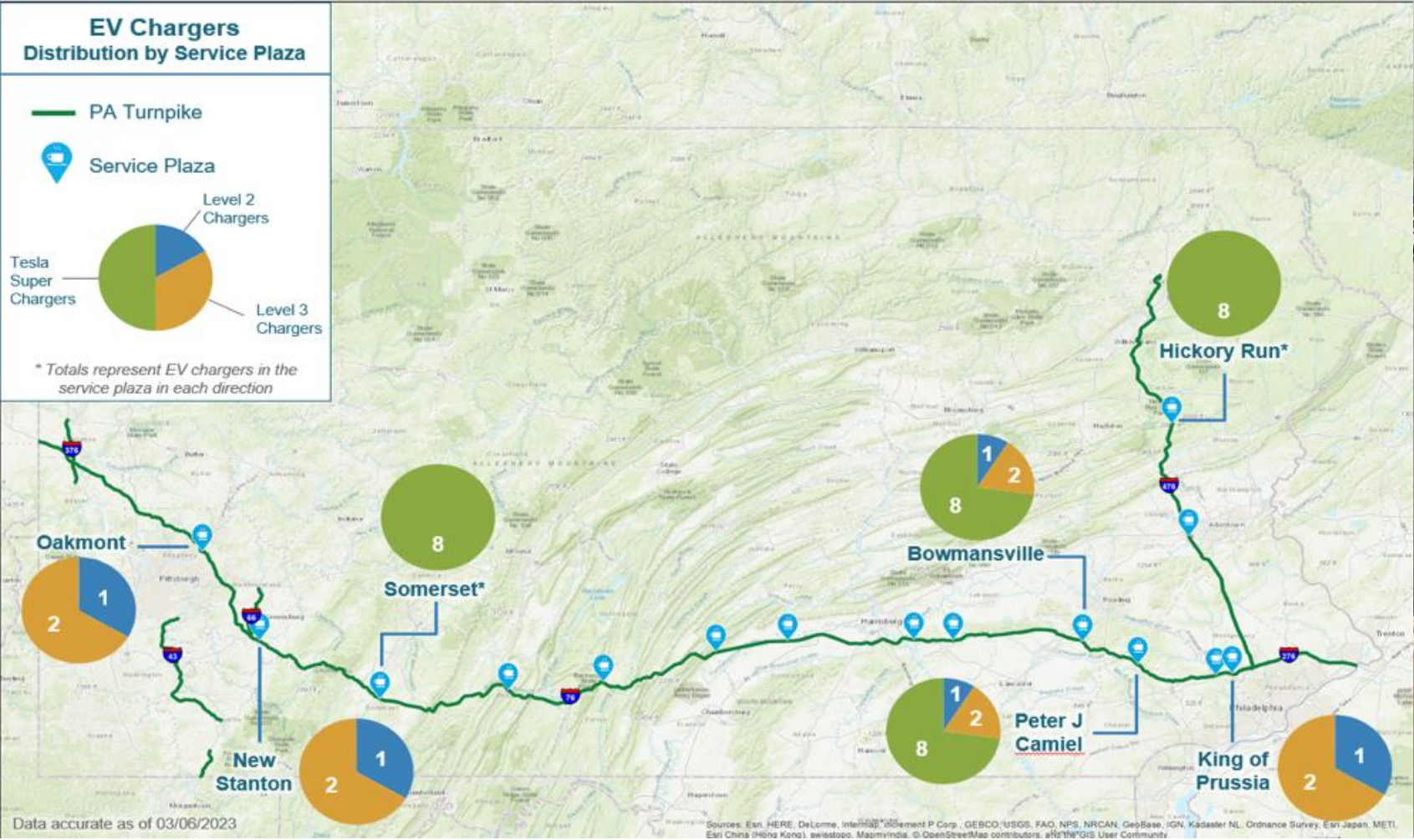
In-road wires

Dynamic motorway lanes

In-road technology uses coils buried in the road to enable drive-along contactless charging. Contactless equipment may be retrofitted to electric, hybrid and



Service Plazas



Electric Vehicle Charging Stations



Accelerates EV adoption



Minimizes infrastructure and maintenance on Plugin infrastructure



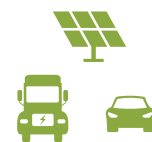
Eliminates any physical issue with plugging in



Decentralized power sources add resiliency to EV transportation



13% of loss of energy through transmission lines



New opportunities with the collaboration of vehicle manufacturers, trucking customers, and electric companies

Dynamic Inductive Charging Discussion Points



Can be limited by speed high and low Traffic Flows and Safety



Light indicators for responders



Emergency power shut-offs on site and remote



Holiday travel numbers



Deployment can be combined with other roadway activities



Inductive charging worksheet

Stationary Inductive Showcase

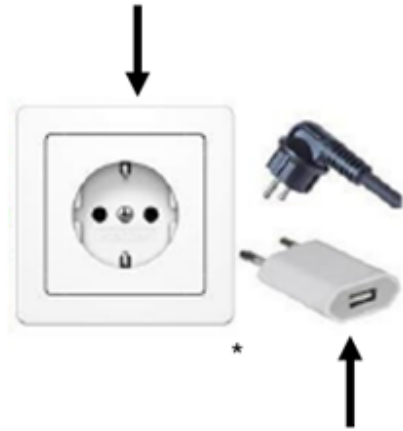


SAE J2954 DIPS Overview

Basic interoperability concept

Ground Assembly

GA: H-Field source description ('receptacle')



'Plug' Analogy:

- plug/receptacle does not care which connector is used
- GA/VA can be developed independently

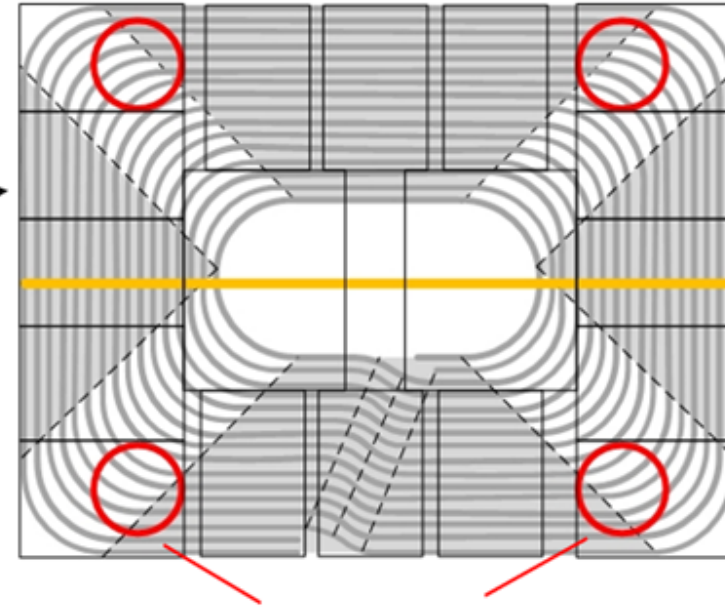
Vehicle Assembly

VA: free choice of VA ('plug')

Provided by

Test Station GA

SAE J2954 Test Station GA



Horizontal Field Coil:

- Solenoid Coil wound around the ferrite (and litz wire) of power transfer coil with defined
- Flux defined to: $0.26 \text{ At}_{\text{rms}}$

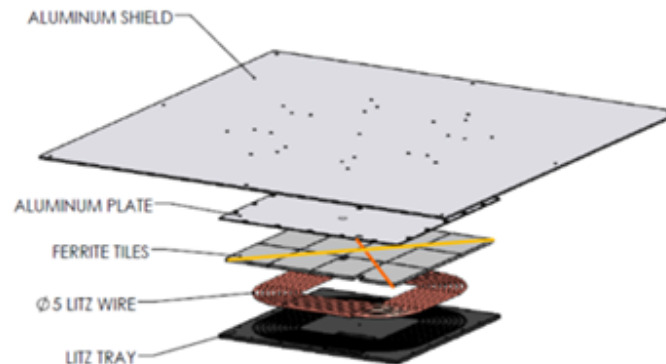
Vertical Field Coils :

- 4 flat coils (with different frequencies 111.5 kHz .. 113.5 kHz) placed above the winding and the ferrite from the power transfer
- Flux defined to: $2.8 \text{ At}_{\text{rms}}$

Basic working principle of DIPS:

- Standardized H-Field provided by GA
- VA is free to decide how the evaluation is realized

VA Example



VA example for static charging:

Coils wound around the ferrite of the energy coil with 45° to driving direction

One Hardware for evaluation of magnetic field from horizontal and vertical field coils in GA

Dynamic Inductive Charging





Dynamic Inductive Charging 2030 Mon/Fayette Expressway Pilot Project

Objectives



Multiple type of inductive charging manufacturers



Shared infrastructure for multiple classes



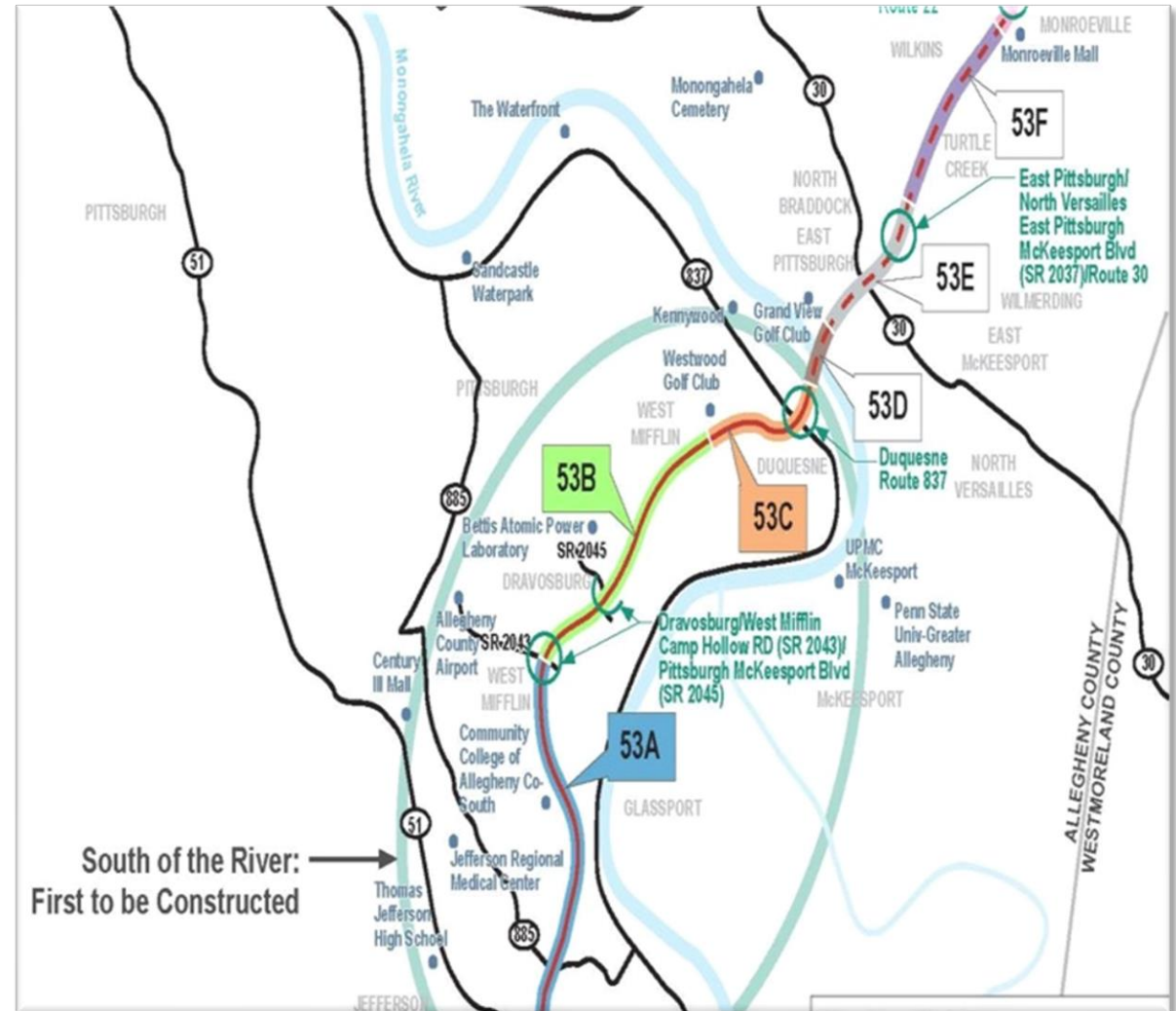
Open communication platform



Charge for the charge



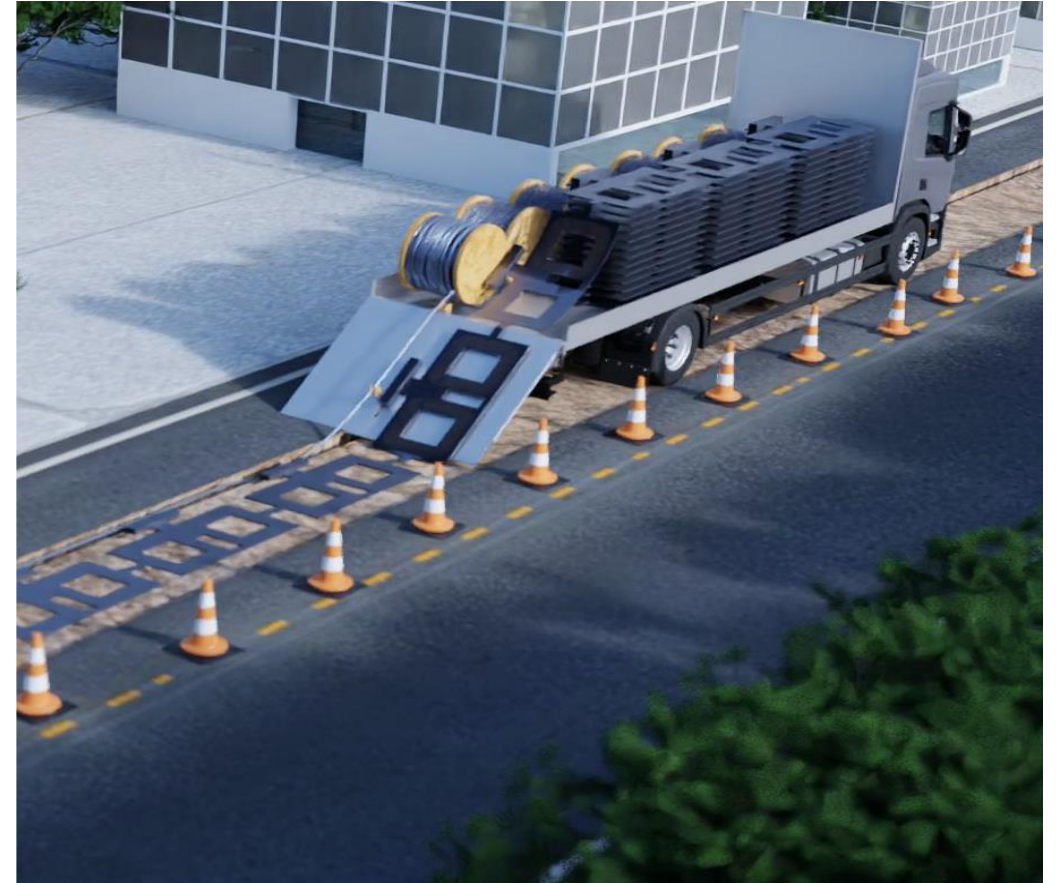
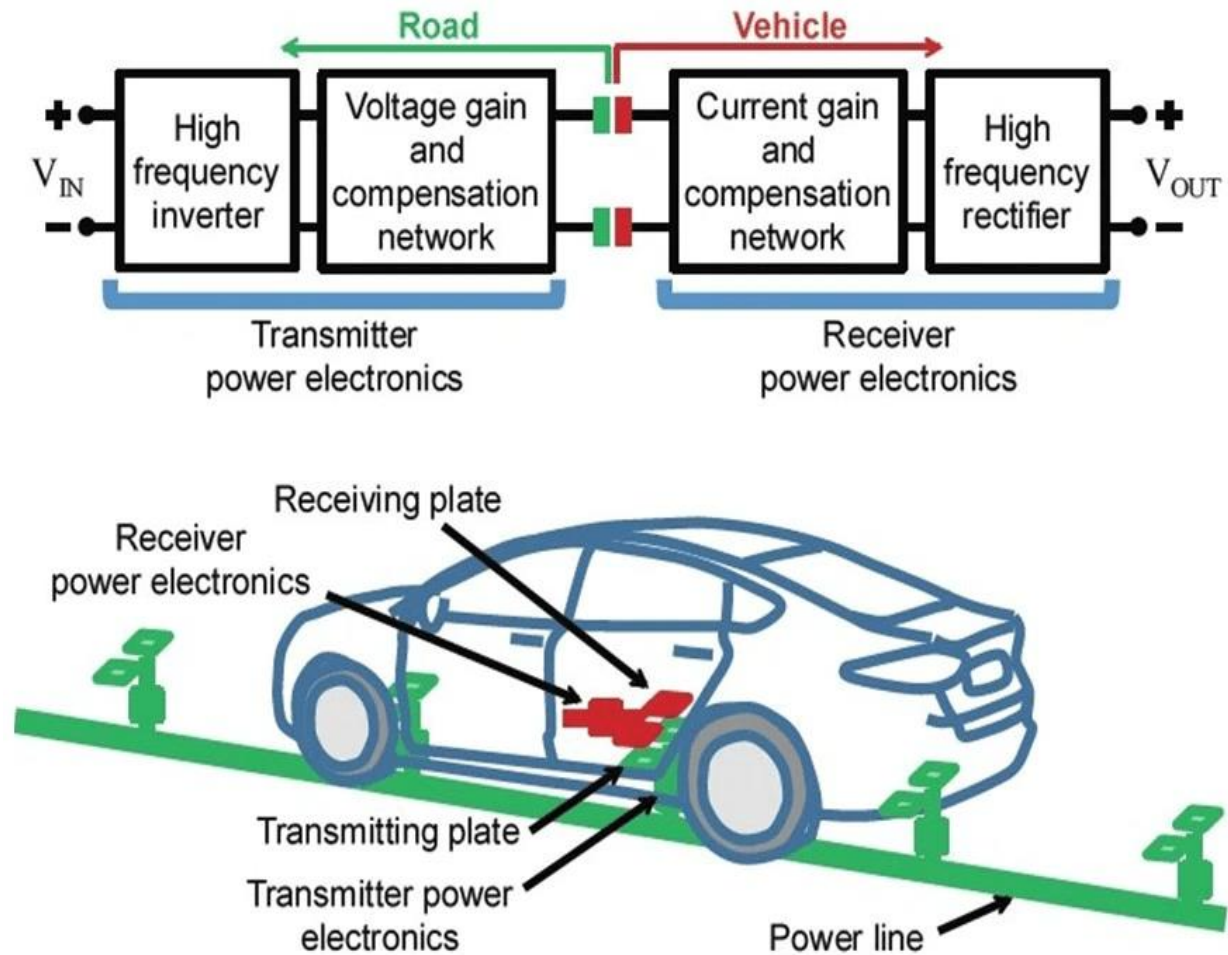
3 to 5 miles of inductive charging



Somerset Microgrid Training Center



Inductive Charging Infrastructure Deployment



Car Model

- EV can travel 3 to 5 miles on 1 Kwh.
- 1 car consume 1.16 Kwh if pass through 3 miles of inductive charger - increase battery capacity by 4 miles.

EV battery Kwh	80	Tesla battery capacity
Total Miles	221	Miles driven from Harrisburg east to Warrendale
Inductive Charger length (Miles)	51	3 miles of Road Inductive charger at all 17 Interchange
Kwh consume through Inductive charger	19.72	$= (51 * 1.16) / 3$
Batter capacity (miles increase)	68	$= (19.72 * 4) / 1.16$
% Battery charge	25%	$= 19.72 / 80$

Truck Model

- Electric truck uses 2 kilowatt-hours per 1 mile
- 1 truck consume 16.2 Kwh if pass through 3 miles of inductive charger - increase battery capacity by 8 miles.

EV battery Kwh

490

Battery capacity

Total Miles

221

Miles driven from Harrisburg east to Warrendale

Inductive Charger length (Miles)

51

3 miles of Road Inductive charger at all 17 Interchange

Kwh consume through Inductive charger

275.4

$= (51 \times 16.2) / 3$

Batter capacity (miles increase)

136

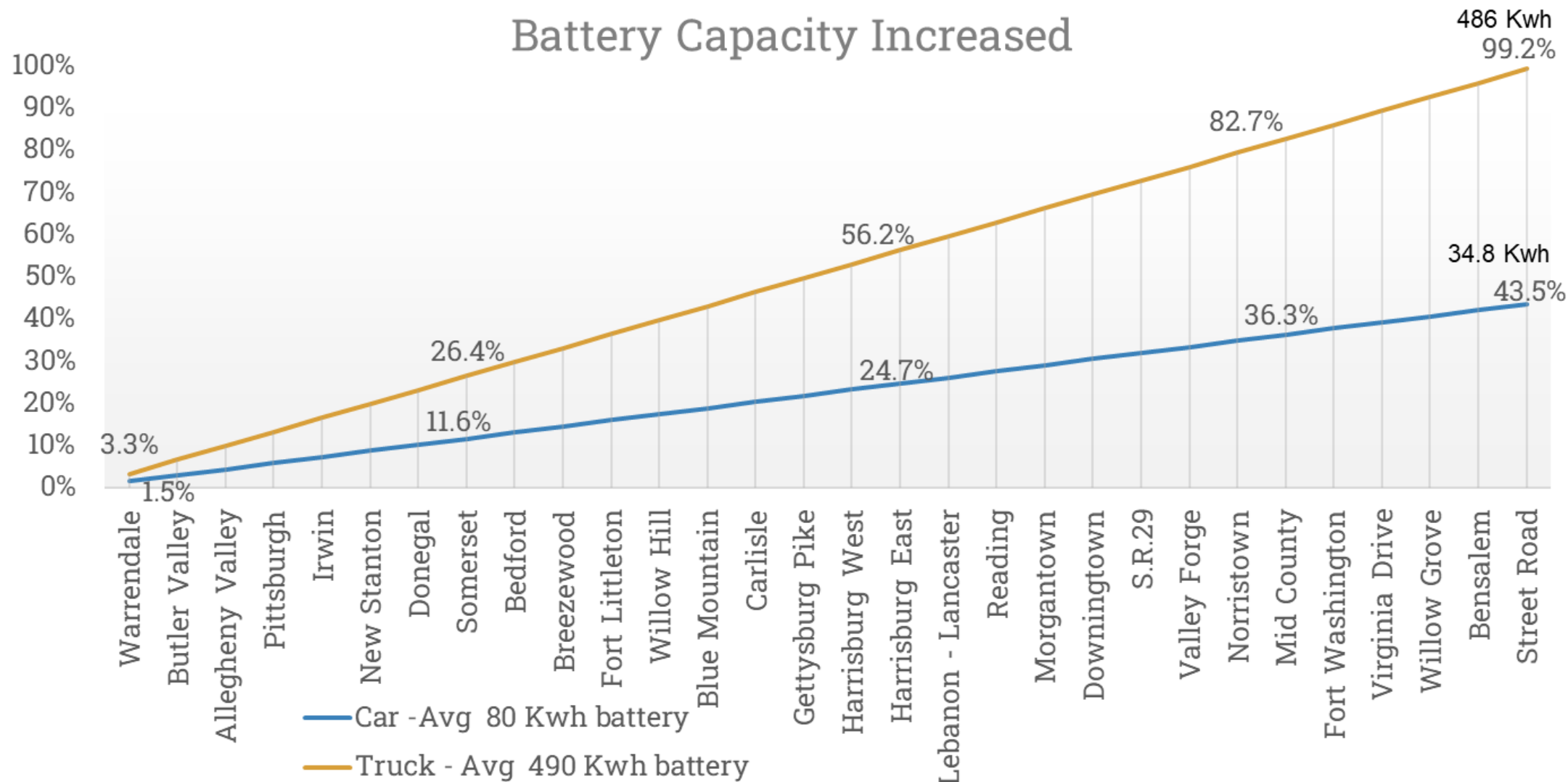
$= (275.4 \times 8) / 16.2$

% Battery charge

56%

$= 275.4 / 490$

Reduced Carbon Emissions



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Road Ahead e-Newsletter

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PTC Speakers' Bureau



Making Sustainable Attainable

