



# NARUC Innovation Webinar The Energy-Transportation Nexus: Solar Highways and the Road to a Cleaner Grid

November 9, 2023 | 3:00-4:00pm (ET)

*NARUC thanks the U.S. Department of Energy for its support of this event.*

# ABOUT NARUC

- The National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization founded in 1889.
- Our Members are the state utility regulatory Commissioners in all 50 states & the territories. FERC & FCC Commissioners are also members. NARUC has Associate Members in over 20 other countries.
- NARUC member agencies regulate electricity, natural gas, telecommunications, and water utilities.



# NARUC'S CENTER FOR PARTNERSHIPS & INNOVATION

## Background & Focus

- NARUC staff dedicated to providing technical assistance to members.
- CPI identifies emerging challenges and connects state commissions with expertise and strategies to inform their decision making.
- CPI builds relationships, develops resources, and delivers trainings.
- All CPI support is federally funded via cooperative agreements with DOE and NIST.



Newly updated CPI fact sheet with recent publications, upcoming events, new member working groups located under Quick Links at:  
[www.naruc.org/cpi](http://www.naruc.org/cpi)

**NARUC Center for Partnerships & Innovation**  
*Identifying emerging challenges and connecting state commissions with expertise and strategies to navigate their complex decision-making*

The NARUC Center for Partnerships & Innovation (CPI) builds relationships, develops resources, and delivers training to assist state commissions with complex current and emerging issues. CPI is funded by cooperative agreements with the U.S. Department of Energy (DOE) and the U.S. Department of Commerce's National Institute of Standards and Technology (NIST). CPI works across five key areas:

Energy Generation	Energy Transmission	Energy Distribution	Energy Customers
<ul style="list-style-type: none"><li>• Coal &amp; Carbon Management*</li><li>• Nuclear Energy*</li><li>• Natural Gas*</li><li>• Hydrogen</li><li>• Off-Shore Wind</li><li>• Utility-Scale Renewables</li></ul>	<ul style="list-style-type: none"><li>• Transmission Infrastructure</li><li>• Transmission-Distribution Coordination*</li><li>• Storage</li><li>• Comprehensive Electricity Planning</li></ul>	<ul style="list-style-type: none"><li>• Integrated Distribution Planning</li><li>• Grid Modernization</li><li>• Microgrids*</li><li>• Performance-Based Regulation*</li><li>• Virtual Power Plants</li></ul>	<ul style="list-style-type: none"><li>• DER Integration &amp; Compensation*</li><li>• Demand Flexibility*</li><li>• Electric Vehicles*</li><li>• Stakeholder Engagement</li><li>• Energy Justice</li></ul>

Contact Kiera Zitelman | Contact Jeffrey Laiter

**Critical Infrastructure Preparedness, Response, and Resilience**

<ul style="list-style-type: none"><li>• Cybersecurity for Utility Regulators*</li><li>• Energy Emergency Preparedness</li></ul>	<ul style="list-style-type: none"><li>• Integrated System Resilience*</li><li>• Defense Community Partnerships</li></ul>
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Contact Lynn Cosentino

\*Contact us to join a members-only group on this topic for regular learning and peer exchange opportunities.

Sign up for the [CPI Newsletter](#) for monthly updates about new resources and forthcoming events.

The NARUC CPI team looks forward to engaging with NARUC's members throughout the year—your needs drive our priorities and activities. Reach out at any time!

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Dominic Liberatore, Finance and Logistics Manager dliberatore@naruc.org, 202-898-2448	Jessica Diaz, Events Coordinator jdiaz@naruc.org, 540-729-2854

NARUC CPI is hiring! Please contact us to learn more about exciting new opportunities.

[www.naruc.org/cpi](http://www.naruc.org/cpi) | Last updated February 2023

**Recent Publications**

- Demand Flexibility within a Performance-Based Regulatory Framework (Feb 2023)
- State Energy Justice Roundtable Series- Customer Affordability and Affordability: Participation in Decision-Making: Energy Justice Metrics (Feb 2023)
- Mini Guide on PUCs and the Investment Community (Feb 2023)
- Energy Resilience Reference Guide, Chapters 1 & 2 (Jan & Feb 2023)
- Potential State Regulatory Pathways to Facilitate Low-Carbon Fuels (Dec 2022)
- Digitalization in Electric Power Systems and Regulation: A Primer (Dec 2022)
- Interoperability for Electric Vehicle Charging: A Case Study (Dec 2022)
- Electric Vehicle Interoperability: Considerations for Utility Regulators (Nov 2022)
- Models for Incorporating Equity in Transportation Electrification (Nov 2022)
- Mini Guide on Transportation Electrification (Nov 2022)
- Grid Data Sharing: Brief Summary of Current State Practices (Nov 2022)
- Regulator's Financial Toolbox Briefs: Community Solar for LMI Customers; Electrification: ADMS/DERMS (Oct 2022)
- Defense Energy Resilience Resources Guide & FAQ for Commissioners (Oct 2022)
- Workforce Development Toolbox, Recruitment Templates and Social Media Engagement Materials (Sept 2022)

**Forthcoming Publications**

- Black Sky Playbook
- Energy Resilience Reference Guide Chapter 3: Climate Resilience
- State Microgrid Policy, Programmatic, and Regulatory Framework
- Renewable Energy Microgrids
- Considerations of Advanced Nuclear in Resource Planning

**Upcoming Virtual Learning Opportunities**

- Modern DER Capabilities and Deployment. March 8: Next in the virtual interconnection workshop series, NREL will address PUC questions on DER technical capabilities, deployment concerns, and benefits. Contact Jeff
- Resilience for Regulators Webinar Series. March 9: Climate Informed Mitigation Strategies. Find past presentations on critical infrastructure resilience, climate resilience, defense energy resilience, and more. Contact William
- Monthly Innovation Webinars. March 16: Advances in Resource Adequacy. Register | past recordings. Contact Jessica
- On-Demand, Video-Based Learning Modules: Dozens of training videos in English and Spanish on electricity system planning, distribution systems and planning, smart grid and EV interoperability. Contact Danielle

**Upcoming In Person Events Travel stipends available**

- Cybersecurity Training, Indianapolis, IN. March 22-24: Experts will provide content on cybersecurity topics through the lens of utility regulators with presentations, engaging activities, and more. (Commissioners and staff) Contact Lynn
- Nuclear Energy Partnership Pacific Northwest National Lab Site Visit. April 25-28: Tour PNNL and NW nuclear sites. Advanced Nuclear State Collaborative kickoff workshop will also take place. (Commissioners and staff) Contact Kiera
- Natural Gas Partnership Site Visit, Savannah, GA. May 2023: Tour the Elba Island liquefied natural gas export facility. Port of Savannah compressed natural gas fueling station, and more. (Commissioners only) Contact Kiera
- More Info Available Soon: Energy Justice Midwest Regional Workshop (early May); Grid Data Sharing Collaborative Demonstration Workshop (mid-May in Washington, DC); Resilience Planning Regional Workshops Contact Danielle

**Join a Member Working Group! For Commissioners and Commission Staff**

- Integrated Distribution System Planning. Register for presentations by subject matter experts and commissions followed by questions and facilitated discussions among members. Six sessions: Feb 27 - Jun 12. Contact Jeff
- NARUC-NASEO Advanced Nuclear State Collaborative. Exchange questions, needs, and challenges relating to the planning and deployment of new advanced nuclear generation. Contact Kiera
- NARUC-NASEO Microgrids State Working Group. Explore capabilities, costs, benefits, and deployment strategies for microgrids with PUCs and State Energy Offices. Contact Kiera
- Electric Vehicles State Working Group. Learn and discuss regulatory questions around transportation electrification, including charging infrastructure buildout, rate design, equity considerations, V2G, and more. Contact Danielle
- Performance-Based Regulation State Working Group. Examine approaches to performance-based regulation and alternative ratemaking across states in a collaborative peer group setting. Contact Elliott
- 12x Working Groups. DOE/National Lab effort for commissions and stakeholders to identify grid interconnection challenges and discuss solutions. Contact Jeff
- Workforce Development Peer Advisory Group. Supporting recruitment & retention for commissions. Contact Hyleah

[www.naruc.org/cpi](http://www.naruc.org/cpi) | Last updated February 2023



# NARUC Innovation Webinar Series



*One webinar, most months*

*All NARUC members and stakeholders are invited*

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*Join us next month for...*

**Powering the Future:  
Transforming Energy Distribution with Artificial Intelligence**

December 14, 2023 | 3:00-4:00pm (ET)

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<https://www.naruc.org/cpi-1/innovation-webinars/>

*NARUC thanks the U.S. Department of Energy for its support of this series.*



# NARUC Innovation Webinar

## The Energy-Transportation Nexus: Solar Highways and the Road to a Cleaner Grid

Moderator: **Jamie Barber** – *Director of Energy Efficiency and Renewable Energy Unit, Georgia PSC*

- **Allie Kelly** – *Executive Director, The Ray*
- **Terry Bills** – *Global Transportation Industry Director, Esri*
- **Julie Peacock** – *Advisor, Joint Office of Energy and Transportation*

T H E

RAY



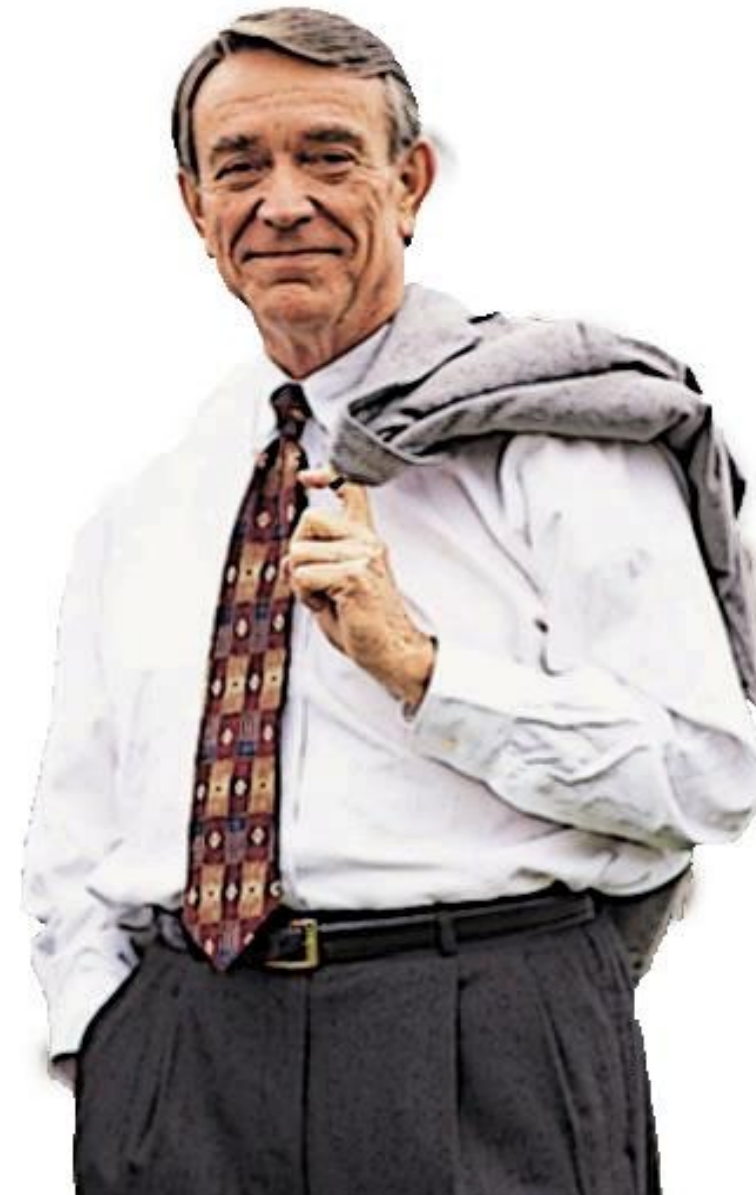
# WHO WE ARE

## Ray C. Anderson (1934-2011)

- “America’s Green Industrialist” at Interface
- Global pioneer of corporate sustainability
- Circular economy now mainstream

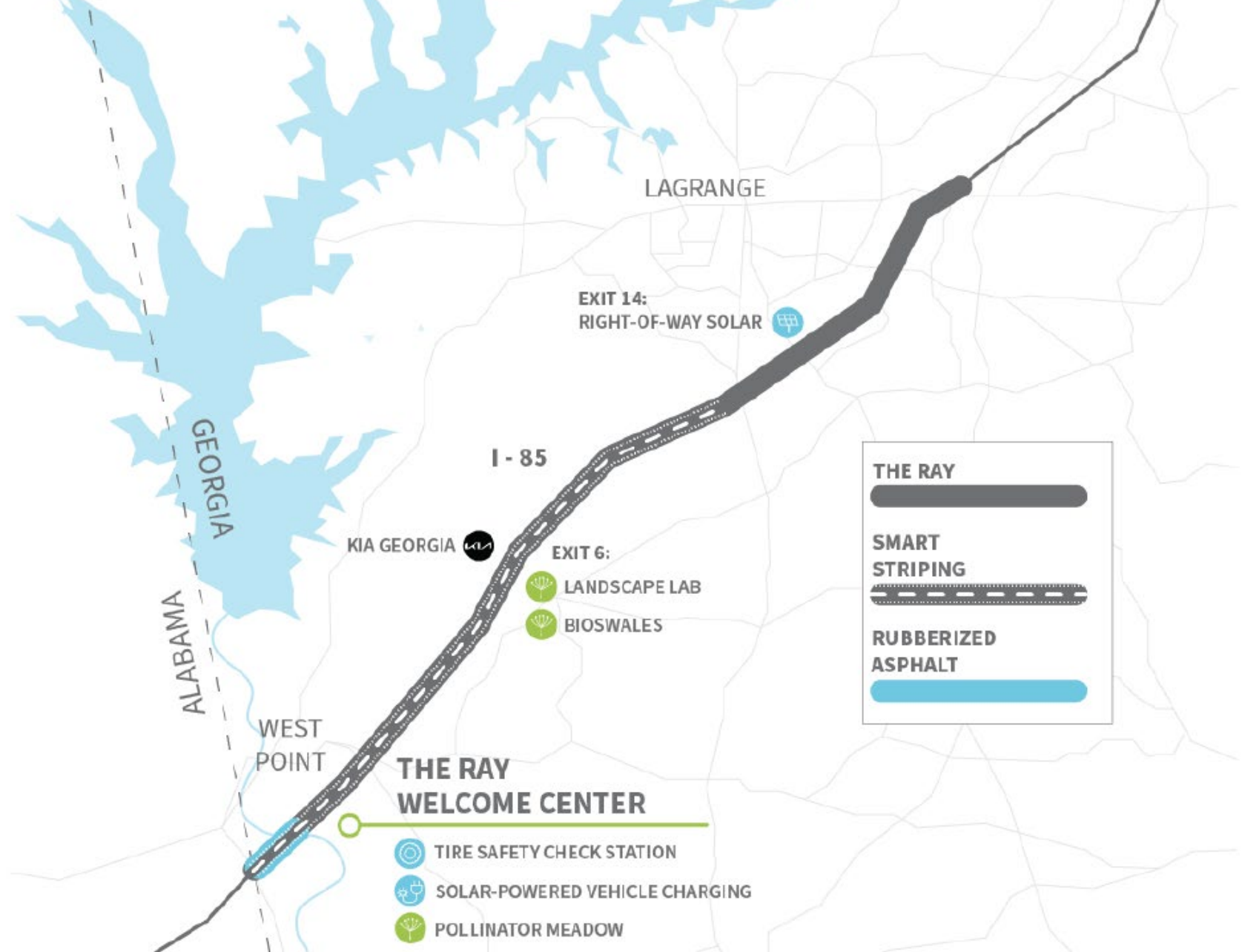
## The Ray Highway

- West Georgia I-85 renamed “Ray C. Anderson Memorial Highway”
- More than 12 projects since 2015
- A test bed for net-zero infrastructure



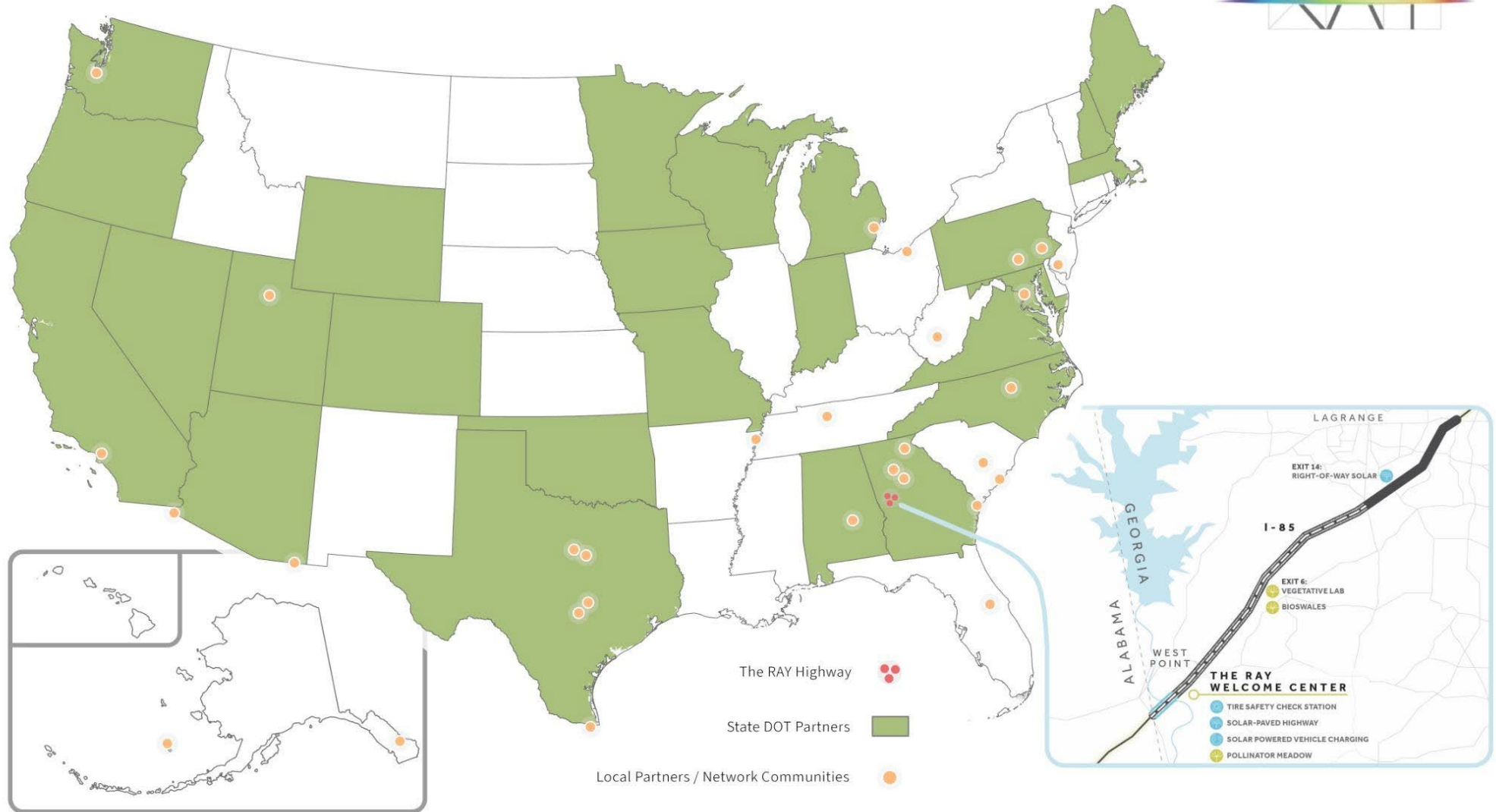


# The Ray Highway





# THE RAY PARTNERS





# Memorandum

U.S. Department of Transportation  
Federal Highway Administration

## Subject: State DOTs Leveraging Alternative Uses of the Highway Right of-Way Guidance

**From:**

Stephanie Pollack  
Acting Administrator

**Date:** April 27, 2021

**Reply to:** HEPR-40

**To:**

Directors of Field Services  
Division Administrators  
Division Directors

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### PURPOSE

The purpose of this guidance document is to provide clarification to FHWA Division Offices who work with State departments of transportation (State DOTs) on certain uses of the highway right-of-way (ROW) that can be leveraged by State DOTs for pressing public needs relating to climate change, equitable communications access, and energy reliability. This guidance document supports the consistent utilization of the ROW for renewable energy generation, electrical transmission and distribution projects, broadband projects, vegetation management, inductive charging in travel lanes, alternative fueling facilities, and other appropriate uses as identified herein. FHWA Division Offices should share this memo with their State DOTs for their consideration for these alternate uses of highway ROW.

These uses of the highway ROW, including the development of renewable energy projects, enable breakthrough transportation technology related to electrification and connected and autonomous vehicles. These uses of the highway ROW also better utilize the full value and productivity of the existing asset while also reducing or eliminating the ongoing maintenance expenses for State

# ROW Siting and Permitting

- **States own the rights-of-way**  
**No eminent domain**  
**Neutralize community opposition**
- **Streamlined permitting**  
**Categorical exclusion for “Projects... entirely within the existing operational ROW” (23 CFR 771.117(22))**
- **Streamlined “accommodations policy”**
- **Fair Market Value Exception for Renewable Energy Facilities**











**WisDOT Badger-Coulee overhead  
transmission in I- 90 / I- 94 ROW**



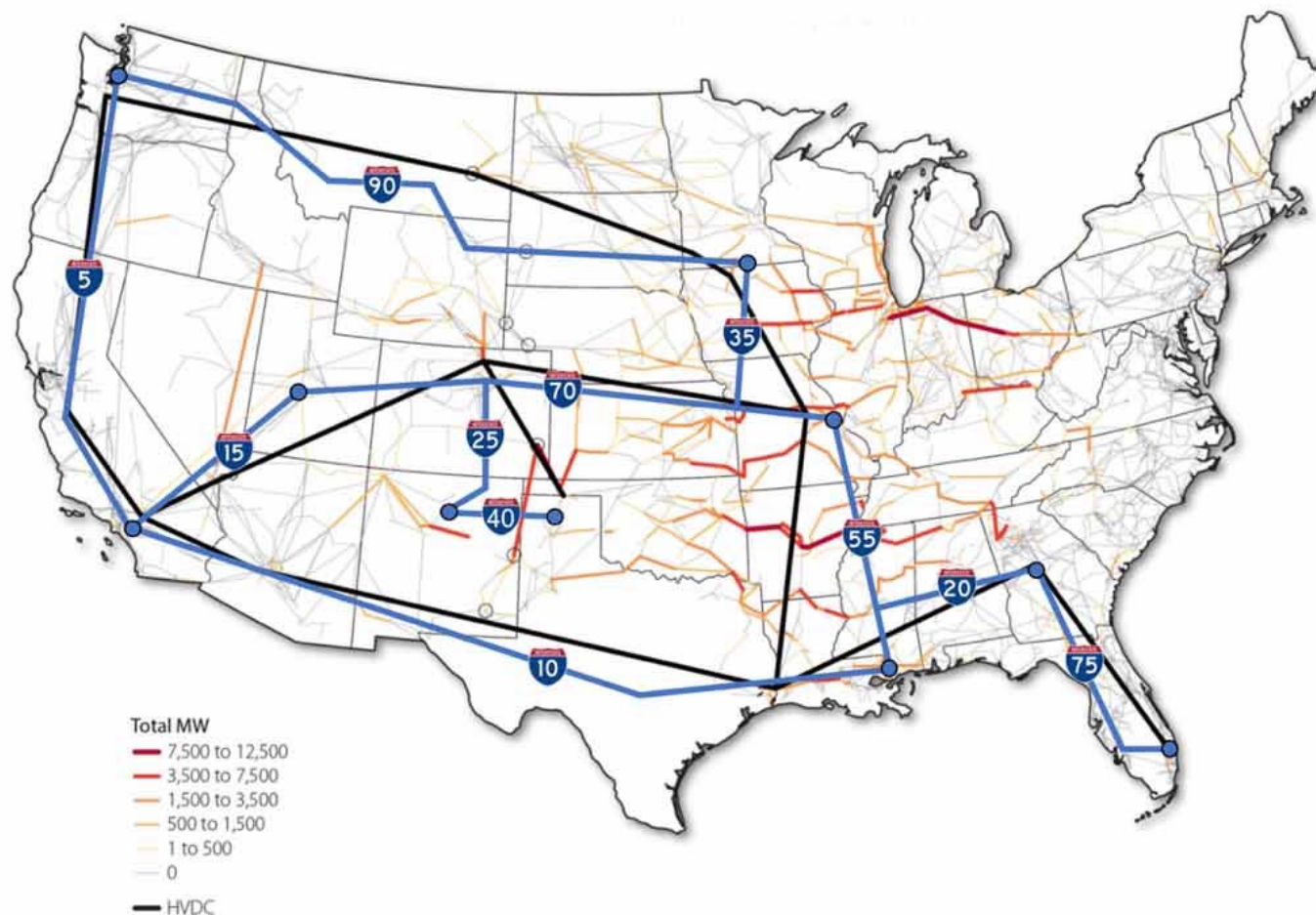
**Italy-France Interconnector: four 320  
kV HVDC transmission cables laid just  
outside the road surface**





# HVDC Macrogrid on Right-of-Way

**Blue lines are parts of the existing federal highway system** that could be used for installing a nearly equivalent HVDC grid.



Design and Valuation of High-Capacity HVDC Macrogrid Transmission for the Continental US

# ROW Solar





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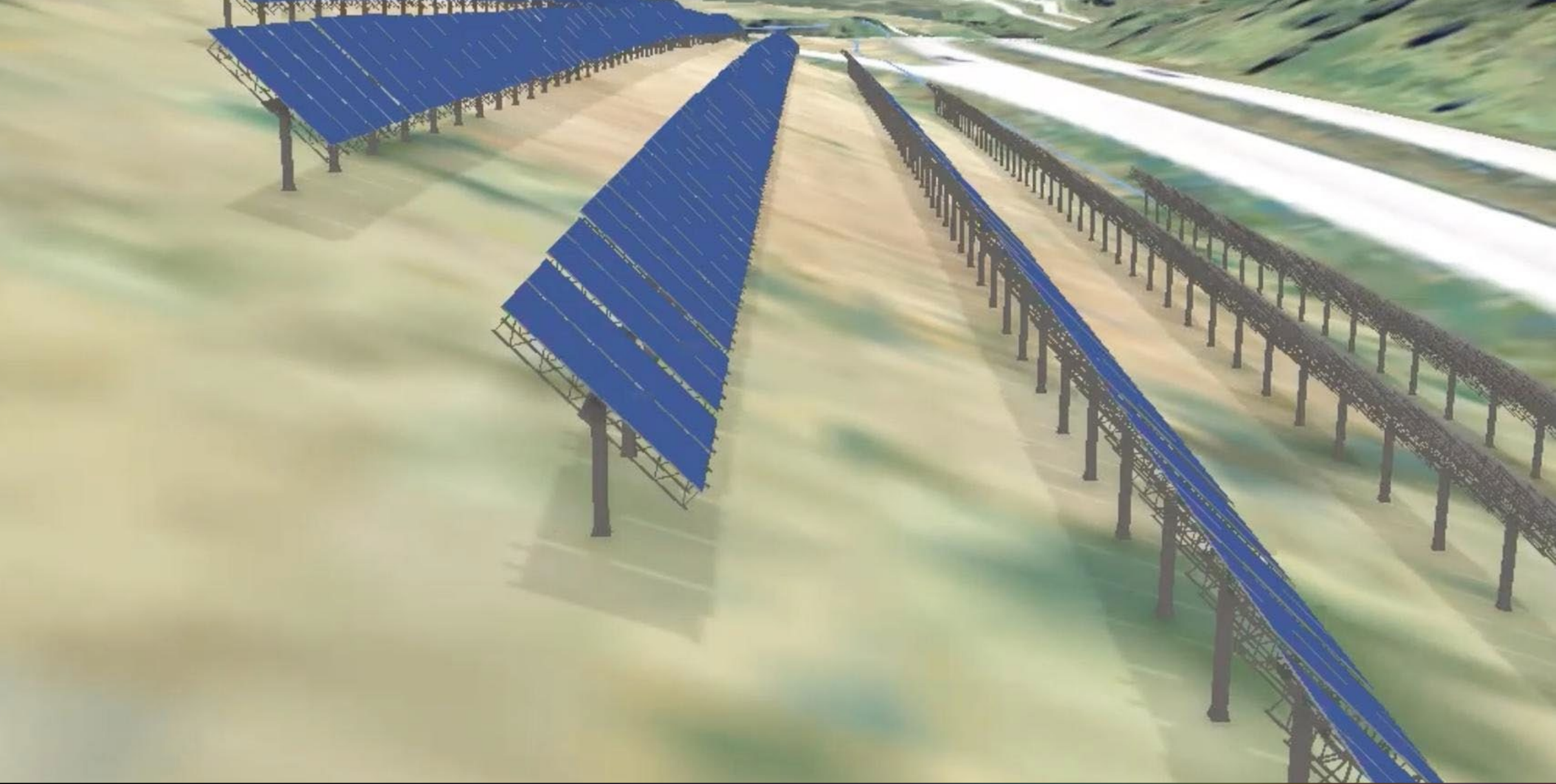


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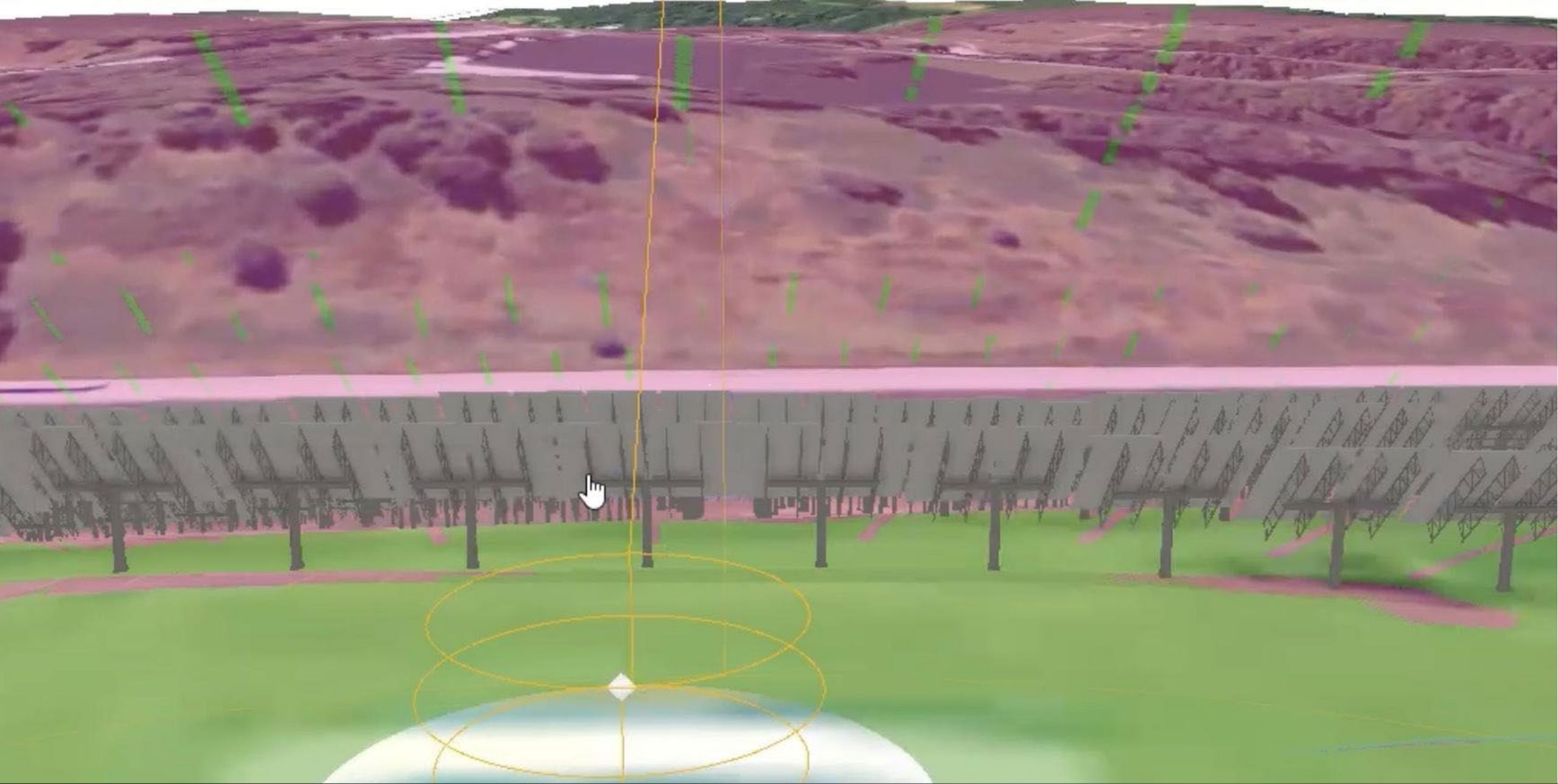
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This area has **2,744** solar panels (343 points) on **3.7 ac** that can generate 300 watts each.  
The total system size capacity is **0.82 MW**.  
This system has the potential to generate **1,163 MWH/Yr** of electricity valued at **\$129,977/Yr**.  
Using Peak Sun Hours calculation. Using the Georgia March 2023 commercial electricity price of 11.18 cents/KWH.





Homes powered for 1 yr 	<b>109</b> homes
Electric cars powered for 1 yr 	<b>237</b> electric cars

Equivalencies  
Based on the EPA Greenhouse Gas Equivalencies Calculator

Carbon reduction from 1,163 MWH/Yr of solar electricity:

**824**

Metric tons of CO2 avoided

Reduction in pounds of coal burned 	<b>911,429</b> pounds
Reduction in passenger vehicles driven for 1 yr 	<b>178</b> cars
Reduction in gallons of gasoline consumed 	<b>92,712</b> gallons
Carbon sequestered by acres of US forests in 1 yr 	<b>981</b> acres



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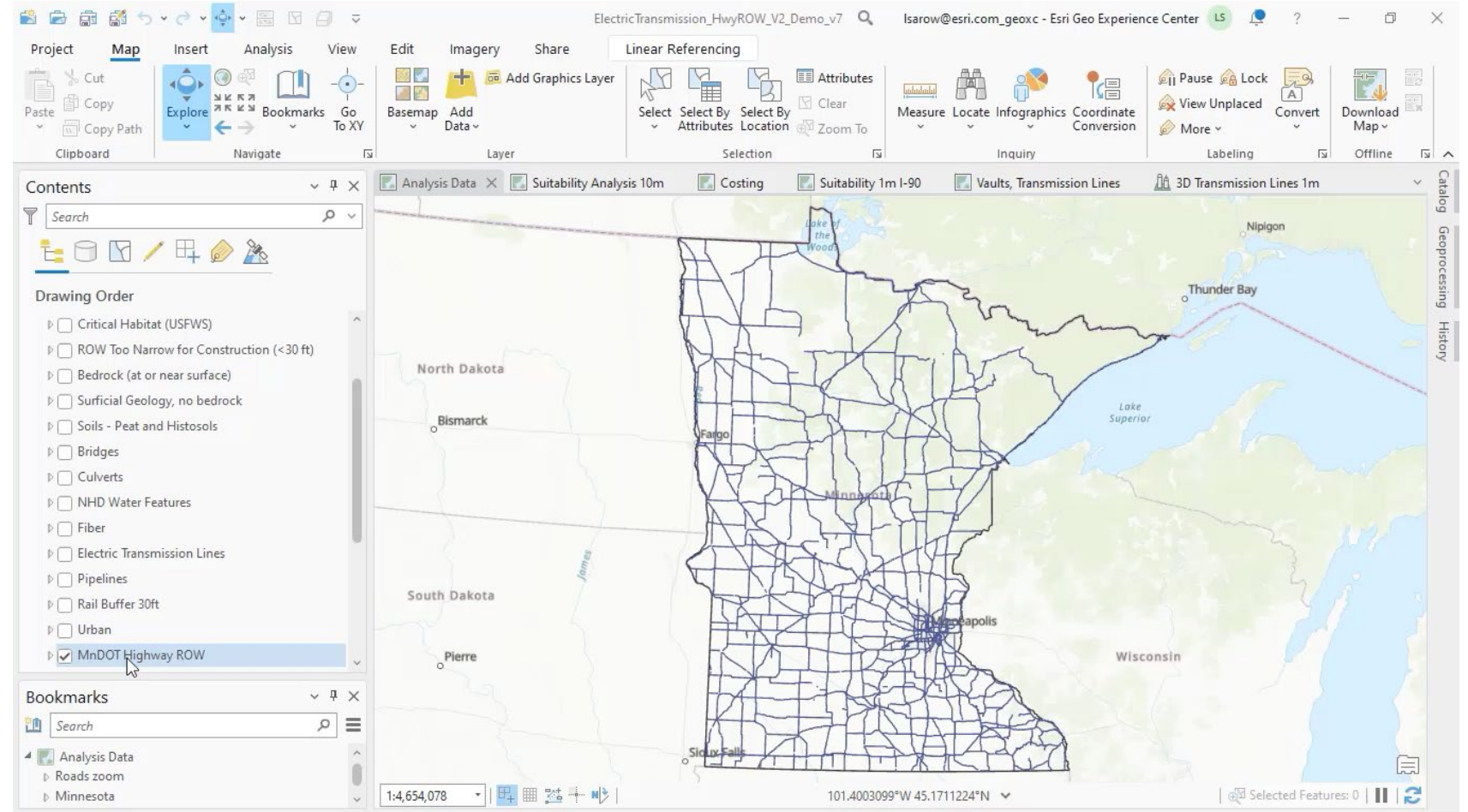
ZERO CARBON. ZERO WASTE. ZERO DEATH.

# ROW Transmission

# Highlights

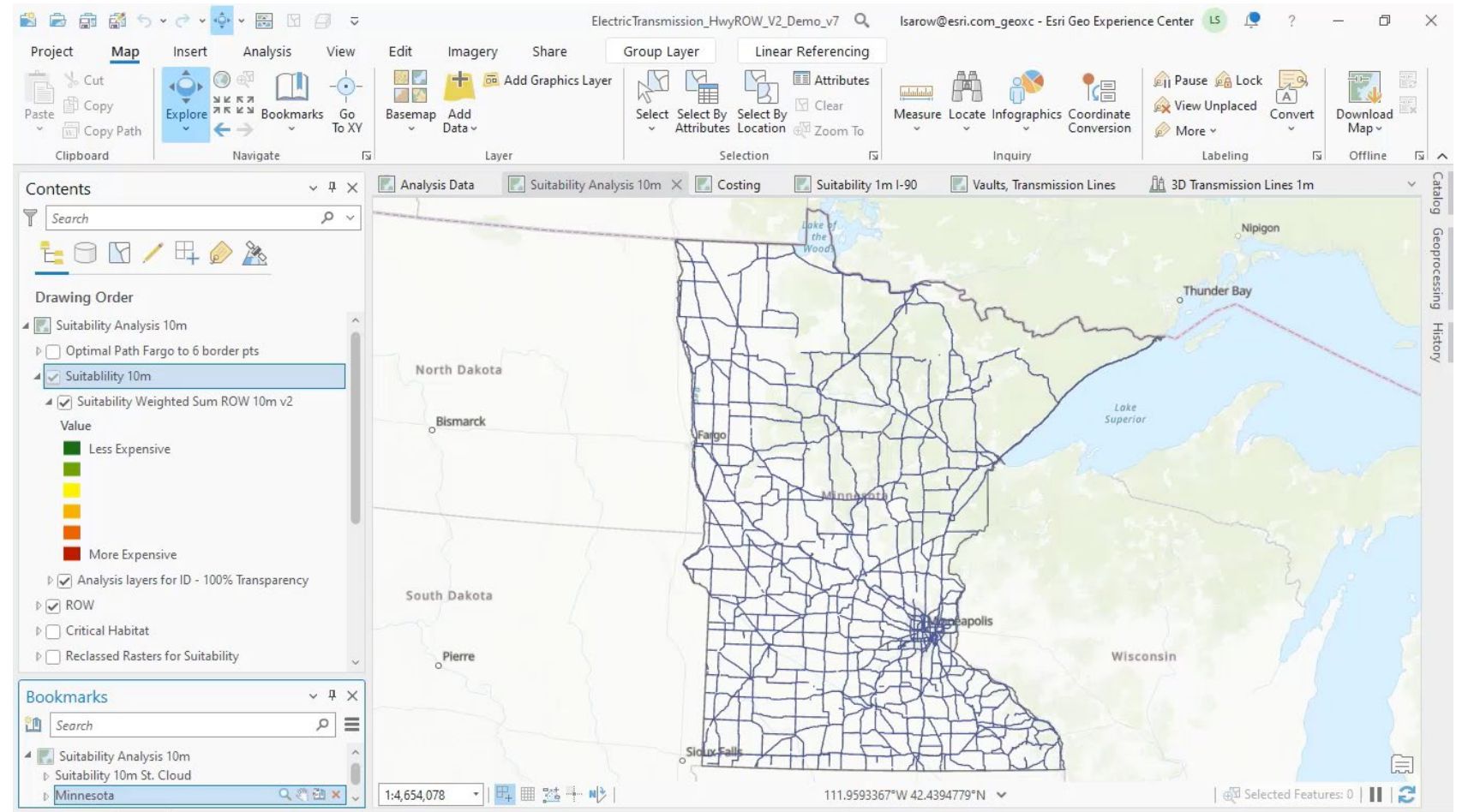
- **GIS presents complex data simply (data driven)**
- **Designed to develop a common understanding**
- **Evaluation of Alternatives**
- **Preliminary analysis and costing**

# Suitability at Scale

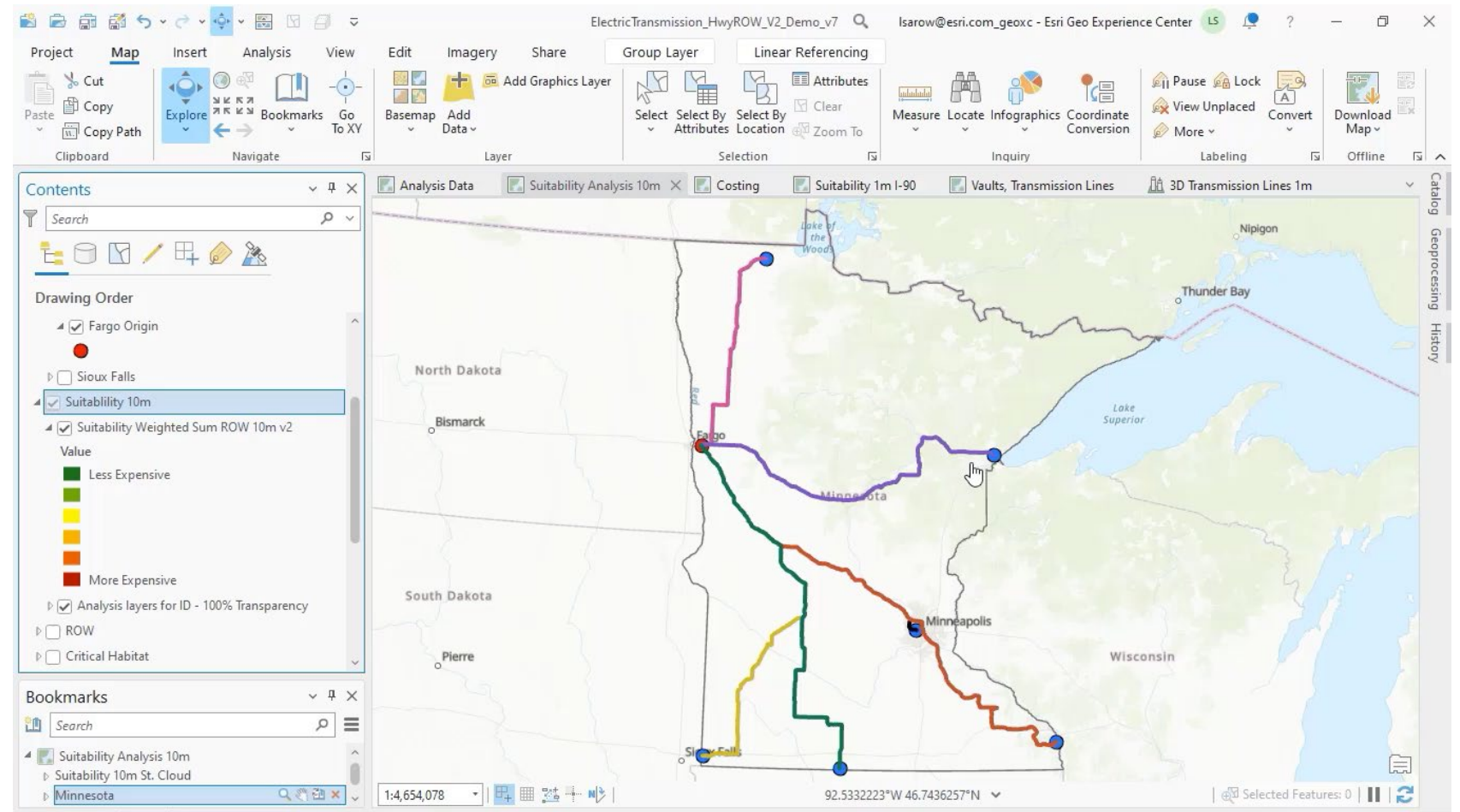




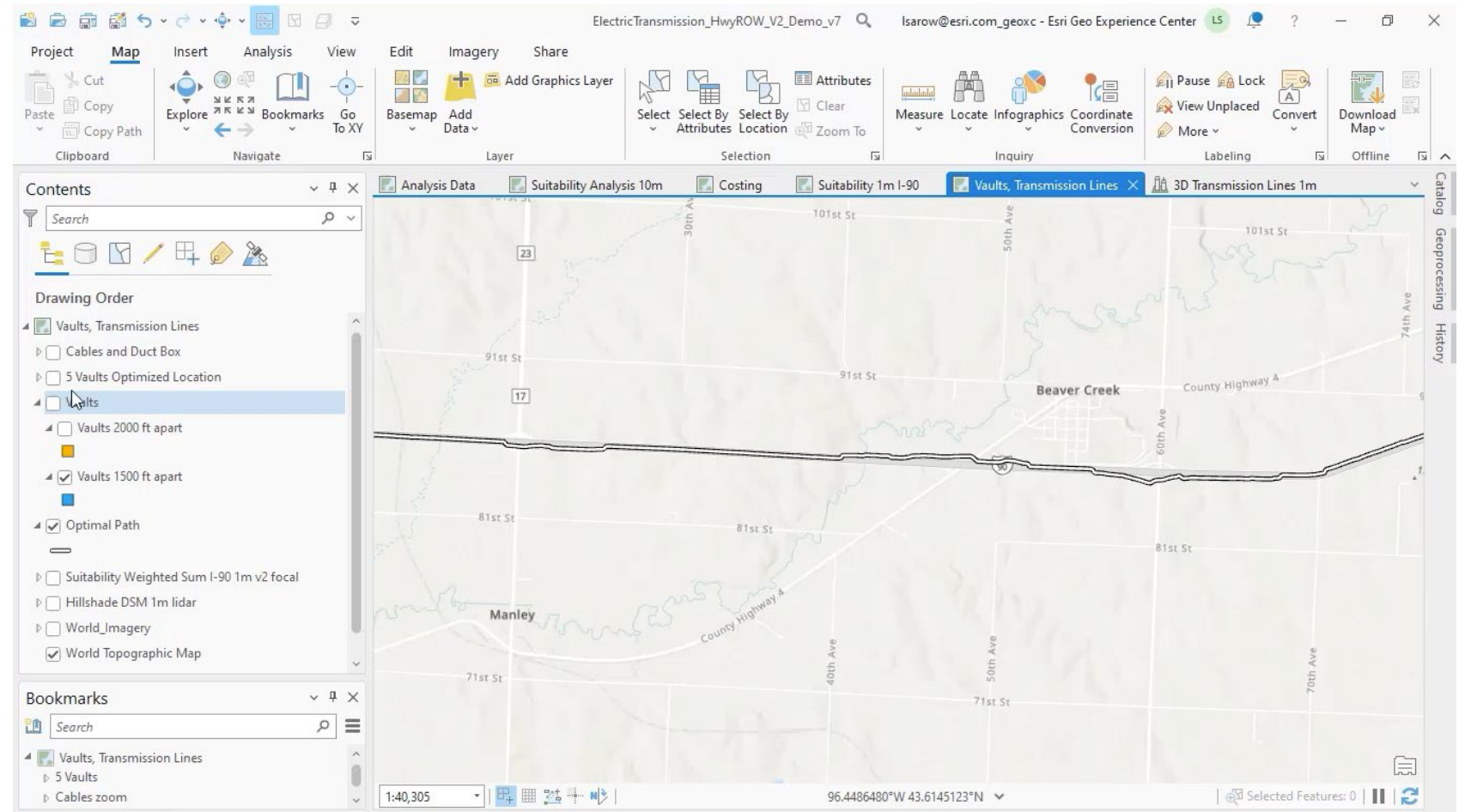
# Corridor Analysis



# Costing Analysis



# 3D Visualization





# Next Steps

- **Federal position is to encourage and facilitate “Clean Energy and Connectivity” projects**
- **What is needed:**
  - Interagency coordination in the States**
  - Geo-mapping of potential ROW projects**
- **Contact:** Allie Kelly, [allie@theray.org](mailto:allie@theray.org)  
Terry Bills, [tbills@esri.com](mailto:tbills@esri.com)

T H E

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Joint Office of  
**Energy and  
Transportation**

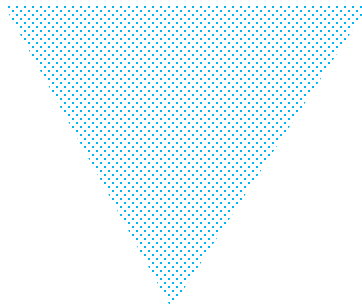
# **Supporting Clean Energy and Connectivity in ROWs**

**November 9, 2023**

[driveelectric.gov](https://driveelectric.gov)



# Mission and Vision



## Mission

To accelerate an electrified transportation system that is affordable, convenient, equitable, reliable, and safe.

## Vision

A future where everyone can ride and drive electric.

# Joint Office of Energy and Transportation

Established in the Bipartisan Infrastructure Law to address areas of joint interest to the Departments of Energy and Transportation

**\$300M**

in FY22 funds to DOT  
with transfer authority to DOE

**9**

major areas of emphasis



# Areas of Emphasis Summary

- 1) Technical assistance for zero emission vehicle charging and refueling infrastructure
- 2) data sharing
- 3) performance of a national and regionalized study vehicle charging
- 4) training and certification programs
- 5) a program to promote renewable energy generation, storage, and grid integration in transportation rights of way
- 6) Study and planning for high-voltage transmission; and pilots for medium and high-voltage transmission in the interstate rights-of-way
- 7) research, strategies, and actions to mitigate the effects of climate change
- 8) development of a streamlined utility accommodations policy for transmission in the transportation right-of-way
- 9) any other issues that the Secretary of Transportation and the Secretary of Energy identify as issues of joint interest

# BIL Language on ROWs

(5) establishment and implementation of a program to promote renewable energy generation, storage, and grid integration, including microgrids, in transportation rights-of-way;

(6) studying, planning, and funding for high-voltage distributed current infrastructure in the rights-of way of the Interstate System and for constructing high-voltage and or medium-voltage transmission pilots in the rights-of-way of the Interstate System;

(8) development of a streamlined utility accommodations policy for high-voltage and medium-voltage transmission in the transportation right-of-way

# Federal Government Coordination







Thank You

Contact: [Julie.Peacock@ee.doe.gov](mailto:Julie.Peacock@ee.doe.gov)