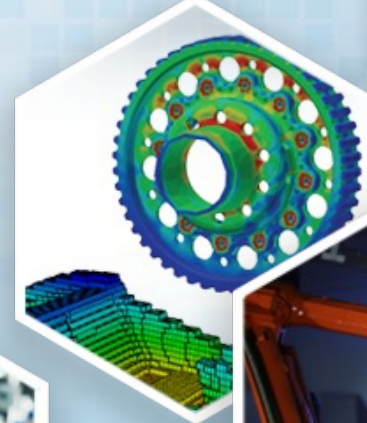


# Infrastructure & Construction (I&C) Working Group

Joe Fox, FX Consulting, LLC

John Unser, Composite Applications Group

June 20, 2023



# Infrastructure: The Opportunity



ASCE | ISSUES & ADVOCACY

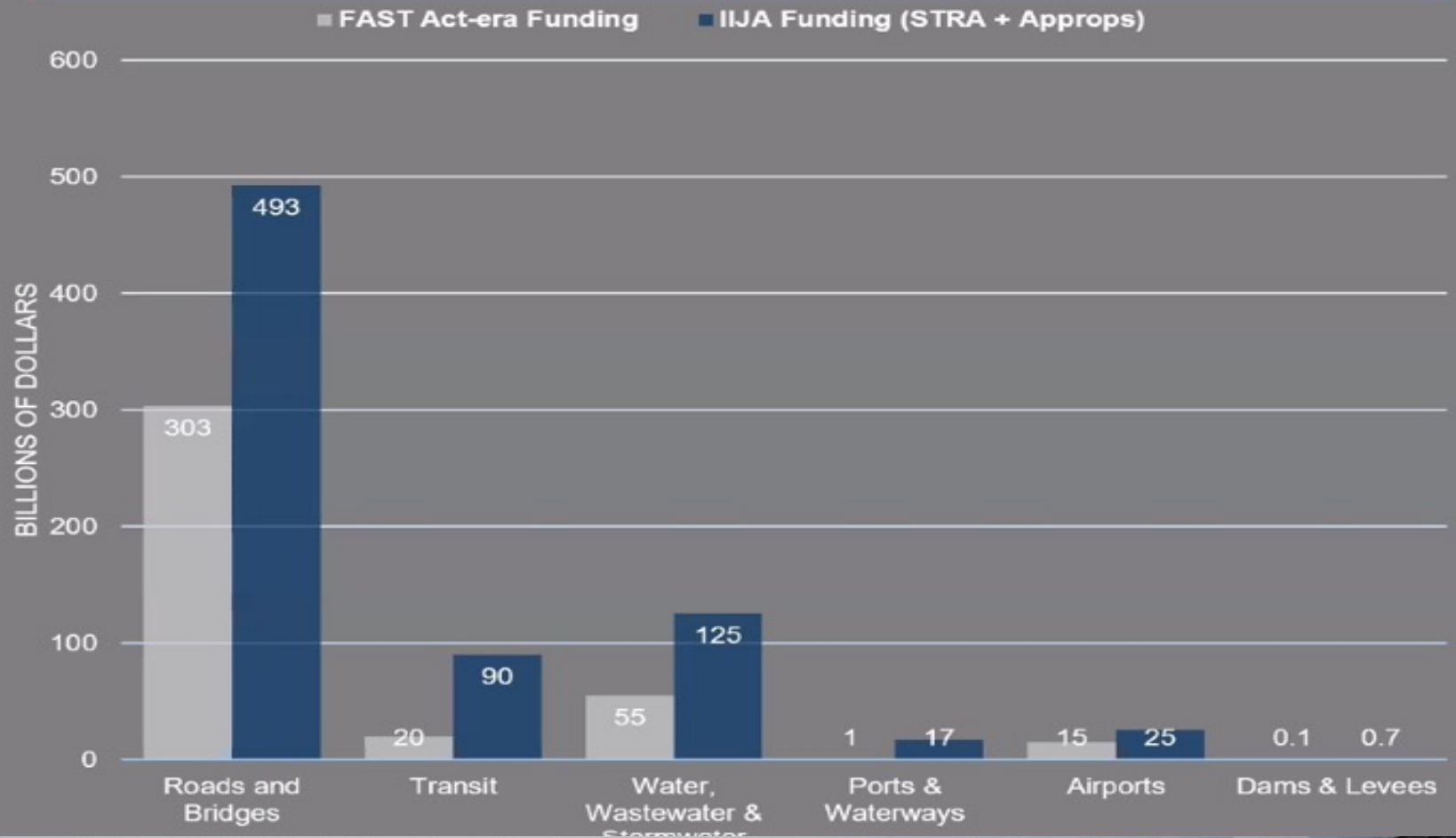
## The Infrastructure Investment & Jobs Act

**\$1.2 trillion**

**5 years**

Invests in all 17 Report Card categories

The largest investment in the resilience of physical and natural systems in American history.





There is an extremely good fit  
between FRP composites  
and our nation's infrastructure needs,  
today and in the future.

# Objectives of the I&C Working Group



Spur the use of FRP composites in Infrastructure & Construction applications by reducing or removing barriers to their adoption. This will be accomplished by:

## Cost

- Illustrating the life cycle and life cycle cost benefits of FRP composites relative to traditional materials of construction

## Education

Increasing the awareness of FRP composites in the civil engineering and construction communities

## Standards & Tools

Assisting in the creation and dissemination of new standards, specifications and modeling & simulation tools that help design engineers become more comfortable designing with composites

## Performance

- Creating, managing and publicizing industry-led demonstration projects that illustrate the benefits of FRP composites
- Research projects that improve the performance of FRP composites

# A Parallel Path Strategy for R&D Projects



1. Identify & secure funding for I&C-related projects
  2. Develop a list of potential I&C projects
    - ◆ Research projects or
    - ◆ Demonstration projects
- ◆ Rationale: Have projects that are already well-defined once funding becomes available



# R&D Projects Submitted for Consideration



9 projects have been considered to date

Presented Yesterday



## Summary of Ratings

Normalized by % of votes

	Date Proposed	Normalized vote
Benefit-Cost Analysis	6/28/22	368
Rural infrastructure	8/17/21	315
Trimer resin	8/17/21	294
Recycled wind blades	10/5/21	196
SOG applications of FRP rebar	4/27/22	190
Elium rebar	8/17/21	160
Creep of FRP rebar	10/5/21	155
Pedestrian/bike walkways for bridges	4/27/22	119
Graphene for I&C	10/5/21	14

# Trimer Resin Project



- ◆ **Project Title:** Fire Resistance (FR) Testing of Trimer Resin for Infrastructure & Construction Applications
- ◆ **Project team:** Orenco Composites, Trimer Technologies, UDRI, SWRI, and IACMI
- ◆ First project to receive funding from IACMI's Resource Pool

**Henry Sodano from Trimer  
will give an update  
on this project tomorrow**

# “Blades to Buildings”: Funding Source






- ◆ **Re-use** of End-of-Life Wind Turbine Blades in I&C Applications
- ◆ Funding plan;
  - ◆ Seek funding from the DOE renewal funding for IACMI 2.0, not from the Resource Pool
  - ◆ Need to clarify who can receive funding
    - ◆ Not necessarily organization specifically participating in wind energy today.
    - ◆ Application developers that process/transform EOL wind blades
  - ◆ Solicit “White Papers”/Proposals from stakeholders including this Working Group



# Moving toward Higher TRLs

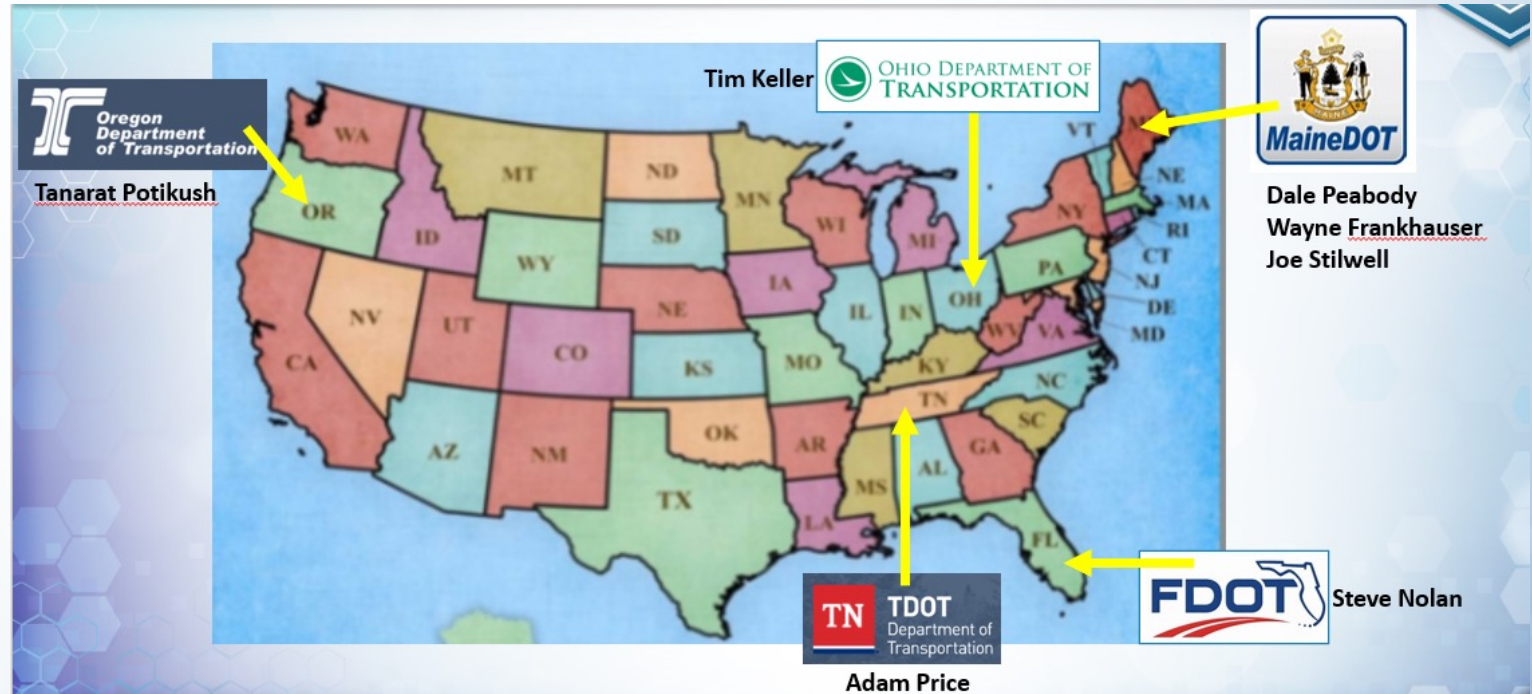


Technology	Current Status	Current TRL	Target TRL for IACMI 2.0 Project	What's Needed?
	4 x 4 panels made at REC with phenolic resin	4	7-8	Scale-up to 4 x 8, Technoeconomic analysis, Mechanical & FR properties
	Variety of Panels made by GreenTex, higher value performance product	4	7	Identify application (trailer floor), build subcomponents for test/optimization, Build full-scale units for installation
	CIPP liner prepared	3	7	Scale to full size liner, Identify installer, Demonstrate Installation

# Lifetime Predictions Project: History



- To help define the project, the project team recruited a DOT “sounding board”
  - 7 representatives from 5 states
  - Meetings in Oct '22 & April '23
  - Valuable “Voice of the Customer” feedback





# Defining a Project



- Roberto Lopez-Anido submitted a request for Resource Pool funding based on his proposal to the sounding board

Lifetime Predictions Project  
An Update with the DOT Sounding Board  
April 10, 2023

**Design life prediction for the GBeam composite materials**

Roberto Lopez-Anido<sup>1,2</sup>, and Bill Davids<sup>1,2</sup>

<sup>1</sup> Dept. of Civil and Environmental Engineering  
<sup>2</sup> Advanced Structures and Composites Center  
University of Maine



**IACMI Project Funding Request**

*It is strongly recommended for proposers to work with an IACMI core partner(s) to formulate a project idea. Upon completion, please submit this Funding Request to the IACMI Consortium Executive Director to initiate the review process.*

**Date:** 5/30/23

**Project Title:** Data-driven Model for Predicting the Lifetime of Fiber-Reinforced Polymer (FRP) Composite Structural Components in Bridges

**Project Partner Lead Organization:** The University of Maine  
POC Name: Prof. Roberto Lopez-Anido  
E-mail: rla@maine.edu  
Phone: 207-581-2119

**Core IACMI R&D Partner(s):**  
POC Name: Prof. Bill Davids  
E-mail: william.davids@maine.edu  
Phone: 207-581-2116

- The Consortium Council approved **\$50K** of IACMI Resource Pool funding **yesterday!**



# Decarbonization is a “Hot Topic”

- ◆ The federal government wants to lower emissions of greenhouse gases (GHGs)
- ◆ The Inflation Reduction Act provides grants for the use of low carbon materials in construction
  - ◆ \$2.15B for buildings
  - ◆ \$2.0B for infrastructure
- ◆ One of the DOT’s Every Day Counts (EDC) initiatives is focused on **reducing greenhouse gas emissions** from infrastructure projects
  - ◆ Steel and cement production are big emitters of CO<sub>2</sub>
  - ◆ This represents an opportunity for composites!



FHWA Home / OIPD / Accelerating Innovation / Every Day Counts / EDC-7 Innovations

CAI Home    **Every Day Counts**    STIC Network    AID Demonstration    AMR Program    Resources

**Every Day Counts**  
Innovation for a Nation on the Move

EDC-7 Innovations (2023-2024)

**Nighttime Visibility for Safety**  
The nighttime crash fatality rate is three times the daytime rate. Enhancing visibility along corridors, intersections, and pedestrian crossings can help reduce fatalities. This initiative promotes traffic control devices and properly designed lighting to improve safety for all users.

**Next Generation TIM: Technology for Saving Lives**  
Over six million crashes a year in the U.S. put responders and other vulnerable road users at risk. Next-Generation Traffic Incident Management programs promote emerging technologies such as emergency vehicle lighting and queue warning solutions. These and other tools can advance safety and operations to mitigate incident impacts.

**Integrating GHG Assessment and Reduction Targets in Transportation Planning**  
Transportation is the largest emitter of greenhouse gases in the U.S. This initiative provides resources to help agencies quantify greenhouse gases and set goals to decrease motor vehicle, construction, and life-cycle emissions through planning and project development.

**Contact**  
[View list of EDC-7 contacts](#)  
[EDC-7 Overview Video](#)  
[Fact sheet](#)  
[EDC-7 Summit](#)

**EDC Rounds**  
[EDC-1 \(2011-2012\)](#)  
[EDC-2 \(2013-2014\)](#)  
[EDC-3 \(2015-2016\)](#)  
[EDC-4 \(2017-2018\)](#)

**John Schweitzer will talk about ACMA’s Climate Impacts project on Thursday**

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**Increasing the awareness of FRP composites in the civil engineering and construction communities**

## Education

## Standards & Tools

- Assisting in the creation and **dissemination of new standards, specifications** and modeling & simulation tools that help design engineers become more comfortable designing with composites

- Creating, managing and publicizing industry-led

## Performance

- Demonstration projects that illustrate the benefits of FRP composites
- Research projects that improve the performance of FRP composites



# Infrastructure Panel at SAMPE



## Current & Emerging Applications of Composites in Infrastructure

SAMPE Annual Meeting  
Seattle, WA  
April 19, 2023



# Decarbonization Presentation



## Lowering CO<sub>2</sub> Emissions with FRP Composites

Joe Fox  
President  
FX Consulting, LLC

Thomas Cadenazzi  
Assistant Professor & Program Manager  
Life-Cycle Facilities Management  
Frostburg State University

March 28, 2023



# Spreading the Word about Decarbonization with FRP

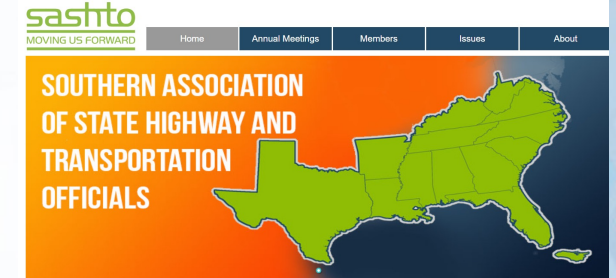


Joe Fox is scheduled to present at these conferences:

- Transportation Infrastructure Durability Center (TIDC) annual meeting
  - August 8 at the University of Maine



- Southeastern Peer Exchange for Resilient & Sustainable Bridges
  - During the SASHTO meeting in Mobile, AL in August



- US Army Corps of Engineers
  - Virtual webinar on September 20



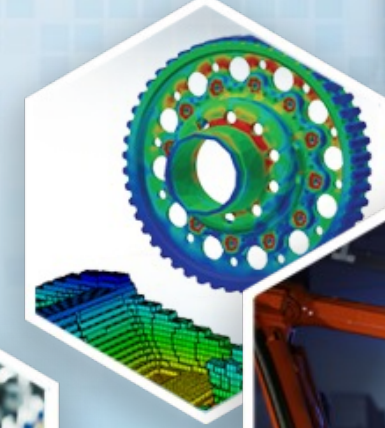
**We need to spread the word !!**



# Funding Subcommittee Update

John Unser, Composite Applications Group

June 20, 2023





# Active NOFOs



NAME	DESCRIPTION	OPEN	CLOSE	TYPE
Economic Adjustment Assistance Program	The EDA's Economic Adjustment Assistance (EAA) program funds the creation and implementation of activities in an applicant's Comprehensive Economic Development Strategy (CEDs) intended to mitigate the financial impacts of adverse events.	3/14/2023	1/0/1900	Air, Bike/Ped, Bridge, Maritime, Pipeline, Railway, Roadway, Transit
Charging and Fueling Infrastructure Grant Program	The Charging and Fueling Infrastructure Grant Program funds the strategic deployment of publicly-accessible electric vehicle charging infrastructure and other alternative fueling infrastructure.	3/14/2023	6/13/2023	Pipeline, Railway
Safe Streets and Roads for All (SS4A) Grant Program	The Safe Streets and Roads for All (SS4A) program funds a range of initiatives to prevent death and serious injury on multimodal roads and streets involving all roadway users.	3/30/2023	7/10/2023	Bike/Ped, Roadway, Transit
Airport Improvement Program (AIP)	The Airport Improvement Program (AIP) supports planning and capital projects for more than 3,300 public-use and rural airports.	4/17/2023	7/14/2023	Bike/Ped, Roadway
Natural Gas Distribution Infrastructure Safety and Modernization Grant	The Natural Gas Distribution Infrastructure Safety and Modernization (NGDISM) program supports mitigating the risk profile of existing pipeline systems with pipes prone to leakage of methane, creating good-paying jobs.	5/23/2023	7/24/2023	Bike/Ped, Roadway, Transit
Wildlife Crossing Pilot Program	The Wildlife Crossing Pilot Program supports construction projects which improve habitat connectivity and reduce wildlife-vehicle collisions.	4/4/2023	8/1/2023	Roadway
Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT)	The Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Grant program supports planning and construction projects which improve surface transportation and community resilience to natural disasters.	4/21/2023	8/18/2023	Air



# Upcoming NOFOs



June 2023	Multimodal Project Discretionary Grant Opportunity ( <a href="#">Mega</a> , <a href="#">INFRA</a> , and <a href="#">Rural</a> )	Office of the Secretary
Summer 2023	Thriving Communities	Office of the Secretary
Summer 2023	<a href="#">Reconnecting Communities Program and Neighborhood Access and Equity Grant Program</a>	Office of the Secretary/Federal Highway Administration
Late Spring/Early Summer 2023	<a href="#">Aviation's Sustainable Transition through Sustainable Aviation Fuels (FAST-SAF) and Technology (FAST-Tech) Programs</a>	Federal Aviation Administration
Summer 2023	<a href="#">Bridge Investment Program</a>	Federal Highway Administration
Summer 2023	<a href="#">Railroad Crossing Elimination Program</a>	Federal Railroad Administration
August 2023	<a href="#">Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program</a>	Office of the Secretary
Fall 2023	<a href="#">Consolidated Rail Infrastructure &amp; Safety Improvements Grant Program</a>	Federal Railroad Administration
May 31, 2023		

**No mention of TRACE centers**



# TRACE Centers



- ◆ Infrastructure Investment & Jobs Act (IIJA) aka BIL = Bipartisan Infrastructure Law authorized 10 regional centers at \$10M per year

- **Transportation Resilience and Adaptation Centers of Excellence (TRACE) Grant Program (Authorized at \$550M, new)** - Competitive research and development grant program that supports institutes of higher education to improve resilience to natural disasters and extreme weather by promoting the resilience of surface transportation infrastructure. The program supports ten regional Centers of Excellence and one national Center of Excellence. TRACE grants are authorized in the Bipartisan Infrastructure Law, but funding has not yet been appropriated.

*More than \$4.5 Billion in Research Activities across DOT's Operating Administration*

- ◆ Authorized but not appropriated yet
- ◆ Next step: Continue to watch for the NOFO!

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