

# Research Need Statement 643

## I. Need Statement Champions and Information

### I.A. Need Statement Champion Information

- I.A.1. First and Last Name of Research Champion: Curt Turgeon
- I.A.2. Research Champion's Office: MnDOT Materials & Road Research
- I.A.3. Research Champion's Phone Number: 651-366-5535
- I.A.4. Research Champion's Email: curt.turgeon@state.mn.us

### I.B. Research Co-Champion

- I.A.1. First and Last Name of Research Co-Champion:
- I.A.2. Research Co-Champion's Office:
- I.A.3. Research Co-Champion's Phone Number:
- I.A.4. Research Co-Champion's Email:

### I.C. Research Needs Title (115 Characters): **Development of Process to Lower GWP of Construction Materials**

### I.D. Project Sponsor: **MnDOT Research Program**

## II. Research Need Background and Description

### II.A. Research Need Background

#### II.A.1. Describe the problem or opportunity.

Minnesota is in position to lead the way towards resilient infrastructure construction and the materials used in construction. Resilient construction considers the lifecycle of products in evaluation of indicators like Global Warming Potential (GWP). A measurement tool for construction materials already exists in the form of Environmental Product Declarations (EPDs). The currently unmet challenge is finding a way to use EPDs in the public bidding process in a manner that meets reasonable target reductions, is fair to all bidders, and is practical to implement.

The first hurdle is massive and requires significant partnership between industry and agency. Development, collection, and analysis of the data in the EPDs must be addressed before we can establish a process for reductions. One EPD must be developed for each individual formulation or mix of materials within a specific product category. For example, one EPD represents the data for a specific concrete mix produced by a specific ready-mix plant. Every ready-mix plant in the State (and there are hundreds) could have about a dozen or more different mixes that could be used on MnDOT projects. For concrete alone, there are thousands of EPDs that need to be developed, before we can even begin to analyze the data, develop a system to reduce GWP, and determine target thresholds by project or year or location.

II.A.2. If applicable, describe how this project will build on previous research.

The most efficient and effective manner to develop, collect, and analyze the data would be to engage industry. Specifically, start with the ready mixed concrete industry in Minnesota and develop online and direct EPD assistance for ready mix producers around the state. The Oregon Department of Environmental Quality (DEQ) has piloted this type of partnership with the Oregon Concrete and Aggregate Producers Association (OCAPA). The EPDs are each developed by the producers, using the same online tool, and are verified by a third-party. MnDOT and the Aggregate and Ready Mix (ARM) Association of Minnesota should launch a similar program.

II.A.3. If applicable, include the title/s or previous research.

II.A.4. What is the **objective** of the proposed research?

While in the process of developing and collecting the data from EPDs, we must also establish the intended method for use of the data. One method would be to employ an incentive system. This system is already a familiar one for both MnDOT and the industry. It has proven to be successful in achieving quality goals in construction. Any method, incentive or otherwise, needs to be developed in partnership with industry in order for data collection to be successful. Industry will need to have confidence in the ultimate method in order to expedite development and collection of data.

In summary, the proposed study would include the following items in partnership with industry association (ARM of Minnesota).

1. Establish web-based resources for ready mixed concrete EPD support
2. Provide technical support and assistance for development of EPDs by ready mix producers
3. Identify process for incorporating EPDs in the public bidding process
4. Analyze EPD data
  - a. Acceptance levels
  - b. Incentive levels
  - c. Incentive amounts
  - d. Consider regional approach for above

### III. Strategic Priorities, Benefits, and Expected Outcomes

**Section III. is for MnDOT sponsored and co-sponsored projects only; all LRRB projects proceed to section IV.**

#### III.A. MnDOT Strategic Priorities

*Instructions:* Briefly describe how the project aligns with the following MnDOT Research Strategic Priorities. Complete all that apply.

III.A.1. Innovation & Future Needs:

III.A.2. Advancing Equity:

III.A.3. Asset Management: **Establish web-based resources for ready mixed concrete EPD support**

III.A.4. Safety:

III.A.5 Climate Change & Environment: **Development of a system that would allow for continual decrease in Global Warming Potential (GWP) of construction materials, as let within the competitive bidding system and without negatively impacting desired engineering properties.**

#### III.B. Expected Outcomes

*Instructions:* Check all expected direct outcomes of this research.

- New or improved technical standard, plan, or specification
- New or improved manual, handbook, guidelines, or training
- New or improved policy, rules, or regulations
- New or improved business practices, procedure, or process
- New or improved tool or equipment
- New or improved decision support tool, simulation, or model/algorithm (software)
- Evaluation of a new commercial product
- New or improved technical standard, plan, or specification
- Other. Please specify below:

III.C. Expected Benefits

*Instructions:* Select all expected benefits that may be realized if the findings and recommendations from this research is adopted or implemented

III.C.1. Construction Savings Choose an item.

III.C.2. Decrease Engineering/Administrative Costs Choose an item.

III.C.3. Environmental Aspects **Other environmental impact. Please describe below.**  
Decrease Global Warming Potential of Construction Materials

III.C.4. MnDOT Policy **Changed or inform a policy**

III.C.5. Lifecycle Choose an item.

III.C.6. Operations and Maintenance Savings Choose an item.

III.C.7. Reduce Risk Choose an item.

III.C.8. Reduce Road User Cost Choose an item.

III.C.9. Safety Choose an item.

III.C.10. Technology **Other technology related benefit. Please describe below.**  
Establish web-based resources for ready mixed concrete EPD support

III.C.11. Other, please describe below:

## IV. Technical Advisory Panel

*Instructions:* Please list the name and affiliation of individuals to consider for the Technical Advisory Panel.

Your assigned Project Advisor is available to answer questions and provide guidance (assigned by the Office of Research & Innovation).

Your Project Advisor is: Marcus Bekele, (651)366-3903, [marcus.bekele@state.mn.us](mailto:marcus.bekele@state.mn.us)