FHWA's INVESTment in Sustainability

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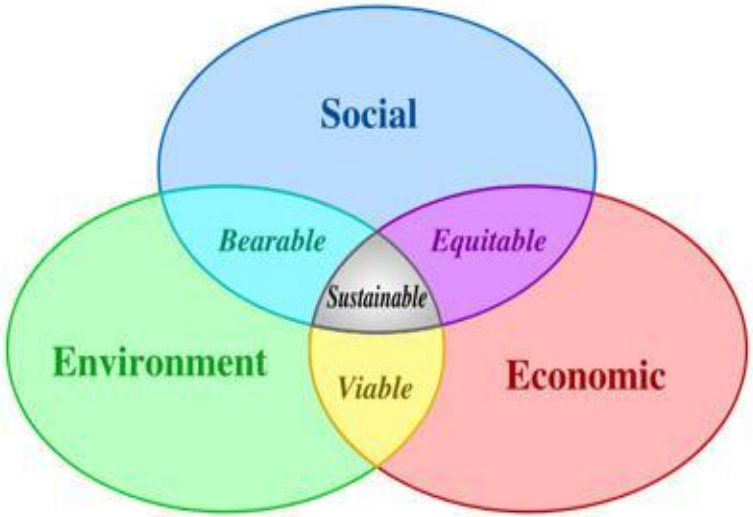
Overview of Sustainability

- The satisfaction of basic social and economic needs, both present and future, and the responsible use of natural resources, all while maintaining or improving the well-being of the environment on which life depends.

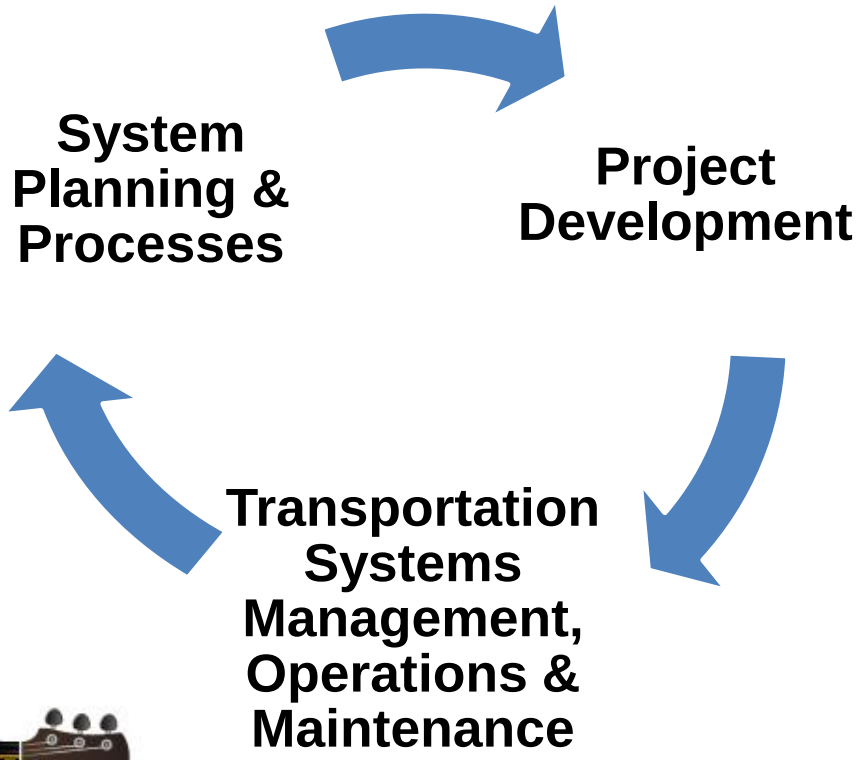


What is a Sustainable Highway System?

- Integral part of sustainable development
- Fulfills transportation goals and needs
- Addresses development and economic growth
- Avoids, minimizes, reduces impacts
  - Environment
  - Consumption of natural resources

Sustainability and the Project Lifecycle

- For sustainability to be fully integrated into highway and transit programs, it must be considered throughout the project lifecycle



Sustainability and FHWA

- Deliver the Federal Aid Highway and Federal Lands Programs in a more sustainable way
- Include sustainability throughout the decision making process
- Make wise investment decisions w/limited resources
- Encourage change in professional practice
- Go beyond compliance
- Seek balanced solutions
- Stress implementation of sustainable practices: sustainability = action

Sustainable Highways Initiative

- Promote coordination within FHWA and with other FHWA initiatives (e.g., Sustainable Pavements Program)
- Strengthen engagement with DOTs and MPOs
- Coordination with partners:
  - ASCE, ACEC, APWA, AASHTO, AMPO, etc.
  - FTA, EPA and other Federal agencies
- Case Studies to highlight sustainable practices
- Website to serve as portal to access information on activities and available resources: www.sustainablehighways.dot.gov
- Develop tools: INVEST

FHWA Sustainable Pavements Program Goals

- Support the US DOT goals for livability and sustainable transportation.
- Increase the body of knowledge regarding "sustainability" aspects of asphalt and concrete materials in pavement design, construction, preservation, and maintenance.
- Increase the use of "sustainable" technologies and practices in pavement design, construction, preservation and maintenance.

Current Program Framework

1) Establishment and Coordination of a Sustainable Pavements Technical Working Group (TWG)

2) Development of Reference Documents on Sustainable Pavements and Materials
   - Reference document is under development and will be published in 2013

3) Evaluation and Assessment of Existing Tools
   - Life Cycle Assessment and Rating Systems

4) Evaluation and Assessment of Sustainable Techniques
   - Materials, Design Practices, Construction Practices

5) Technology Transfer and Deployment

★*Subject to funding availability*

What is INVEST?

INVEST - Infrastructure Voluntary Evaluation Sustainability Tool

A voluntary, web-based self-evaluation tool for assessing sustainability over the life cycle of a transportation project or program — from system and project planning through design and construction, to operations and maintenance

INVEST Goals

- Help agencies assess sustainability and support internal improvement
- Provide a framework for communicating with stakeholders and decision makers about sustainability
- Establish a method for identifying sustainable highway systems, projects, programs
- Encourage sustainable practices

INVEST Structure and Criteria

- Project Development (PD) Criteria
  - Focus is on the development of a specific project once the general need and proposal for a solution to a transportation problem have been programmed
- Operations & Maintenance (OM) Criteria
  - Focus is on agency-wide practices, policies and procedures required for the overall functionality and efficiency of a highway network
- System Planning (SP) Criteria
  - Focus is on agency-wide management and planning of highway networks
  - Typically involve the owner-agency having policies, procedures and systems in place to address them

INVEST Uses

- Assess single or multiple projects
- Prospective vs. retrospective assessment of projects
- Planning or O&M programs and processes
- Inform SOP's at a program-level (e.g. standard specifications)
- Communicate sustainability goals and performance to stakeholders
- Other?

Evolution of INVEST

Beta Test Version

- Released Fall 2010
- Over 700 comments from AASHTO, EPA, SMEs, others

Pilot Test Version

- Released Fall 2011
- Over 1200 comments from pilot test participants, SMEs, FTA, others

Version 1.0

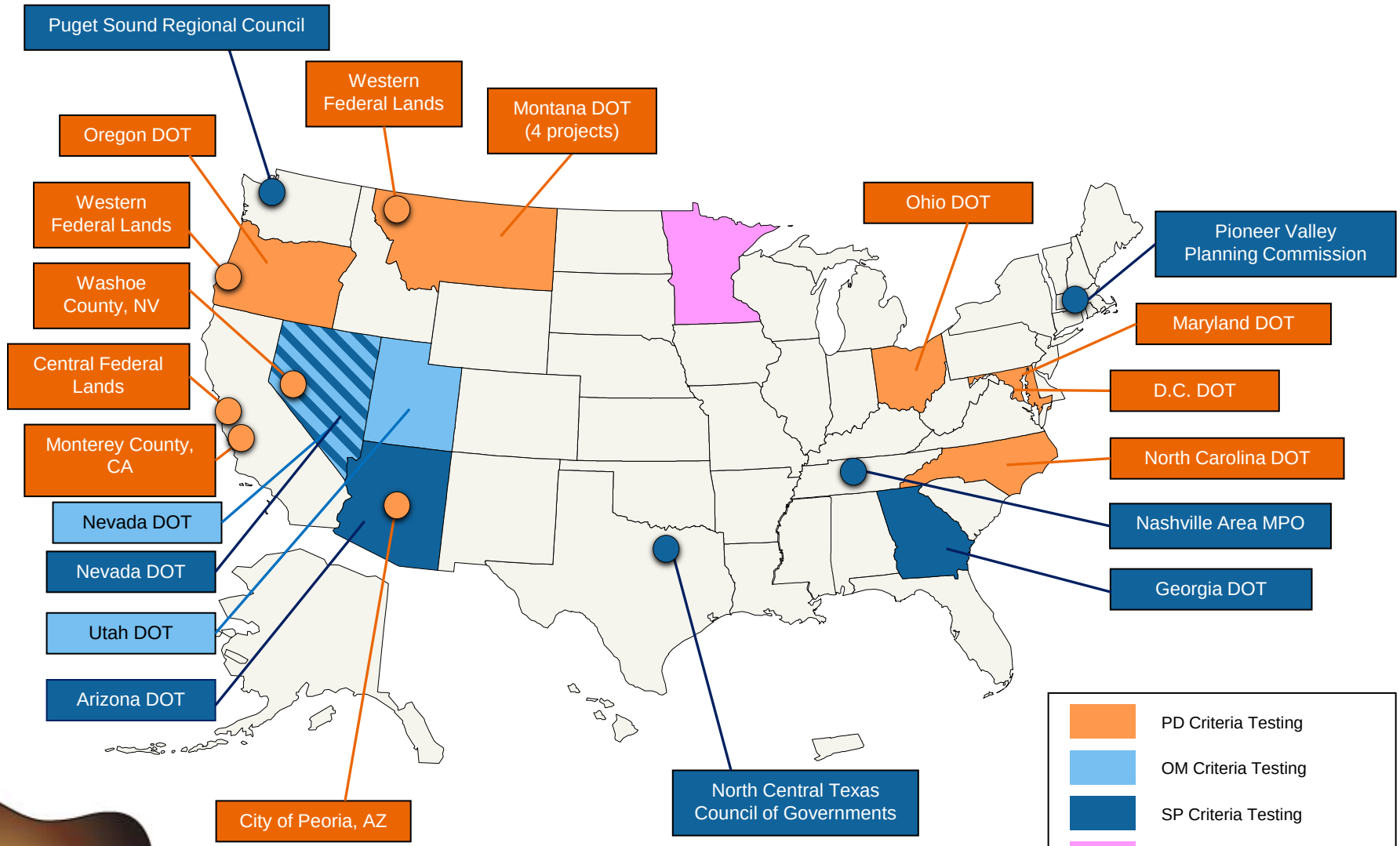
- Will be released on October 10th during Virtual Launch Webinar

Available on the web for public review and use

Pilot Testing of INVEST

- Testing done on the Project Development (PD), System Planning (SP) and Operations & Maintenance (OM) criteria from July 2011 – February 2012
- Objectives were to obtain input on:
  - further refinements to the criteria
  - scoring and achievement levels
  - making the tool easier to use
- Process varied across pilot test agencies

INVEST Pilot Test Locations



PD Pilot: Ohio DOT – Cleveland Innerbelt Bridge

- Reviewed while under construction → scored Silver
- Key Takeaways:
  - Early Planning is Key to ensure Sustainability Success: Establishing precedent provides clear expectations and allows innovative approaches.
  - Multi-Disciplinary Approach is Critical: Collaborative process allows people to directly contribute to the body of knowledge and documentation strategy.
  - Plan Ahead for Continual Monitoring and Documentation: Setting expectations and establishing documentation approach reduces overall efforts

Going-to-the-Sun Road Rehabilitation, Glacier National Park

- 50-mile highway through the heart of Glacier NP; National Historic Landmark
- Multi-year rehabilitation began in 2007; $70M in funding awarded thus far
- Major challenges related to terrain, seasonal access, and visitor impacts
- Gold rating in the Pilot Test version of INVEST

Source: http://www.wfl.fhwa.dot.gov/projects/mt/gtsr/gallery.htm

SP Pilot: North Central Texas Council of Governments (NCTCOG)

- Scored well in many areas, including integrated planning, travel demand management, and planning analysis methods
- Areas of improvement in asset management and infrastructure resiliency
- Suggested adding more gradation to scoring and adding public health and transportation criterion

2035 mobility

Lessons Learned from Pilots

- Overall pilot agencies were supportive and enthusiastic about INVEST
- Pilot agencies suggested many good technical and contextual changes to the criteria and web interface
- Pilot agencies would like to see:
  - More information and a guide for using the tool
  - Additional examples of sustainable practices, case studies, etc.
- Have made significant changes to INVEST as a result of pilot feedback

Changes for INVEST 1.0

- More flexibility in selecting relevant PD criteria to address urban vs. rural and large vs. small project concerns
- Separate scorecard for Paving projects

INVEST PROJECT DEVELOPMENT (PD) PROPOSED SCORECARD OPTIONS

BASIC

Basic projects are defined as small reconstruction or bridge replacement projects that do not expand capacity of the roadway. Basic projects do not include those devoted exclusively to pavement preservation or restoration (see Option 5 below).

1. Basic Urban

Urban projects are located ***within*** Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

2. Basic Rural

Rural projects are located ***oustide*** Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

EXTENDED

Extended projects are defined as:

- New construction projects for a new roadway facility or structure where nothing of its type currently exists; and
- Major reconstruction projects that add travel lanes to an existing roadway or bridge.

3. Extended Urban

Urban projects are located ***within*** Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

4. Extended Rural

Rural projects are located ***oustide*** Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

OTHER OPTIONS

Two additional scoring options have been developed for projects that do not fit into the Basic or Extended Scorecard options above.

5. Paving

Paving projects are defined as:

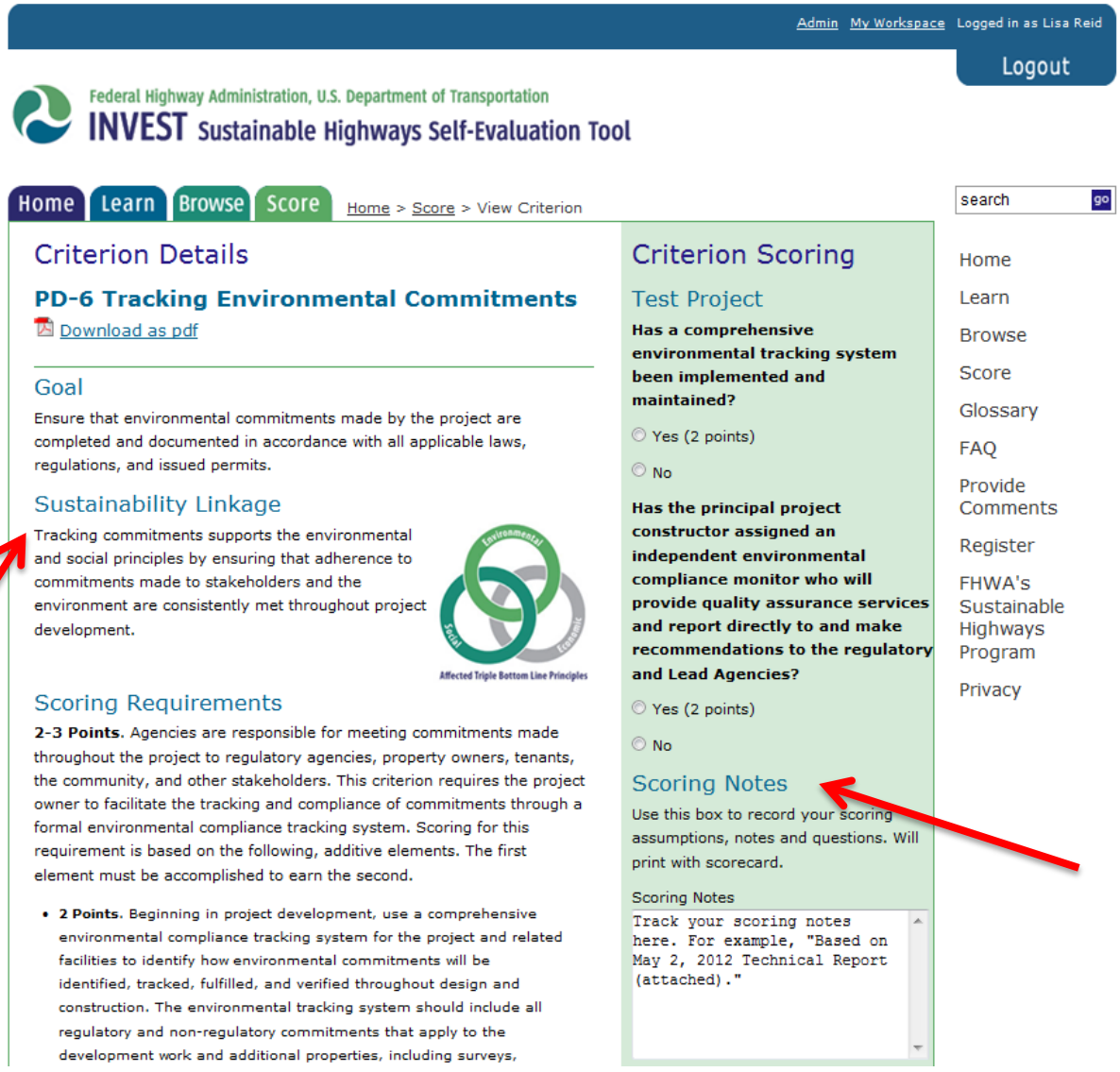
- Pavement preservation projects that extend the service life of exsiting facilities and enhance safety; and
- Pavement restoration projects that restore pavement structure, ride quality, and spot safety.

6. Custom

A Custom Scorecard may be developed for any project, provided a core set of criteria are included. Core criteria include...

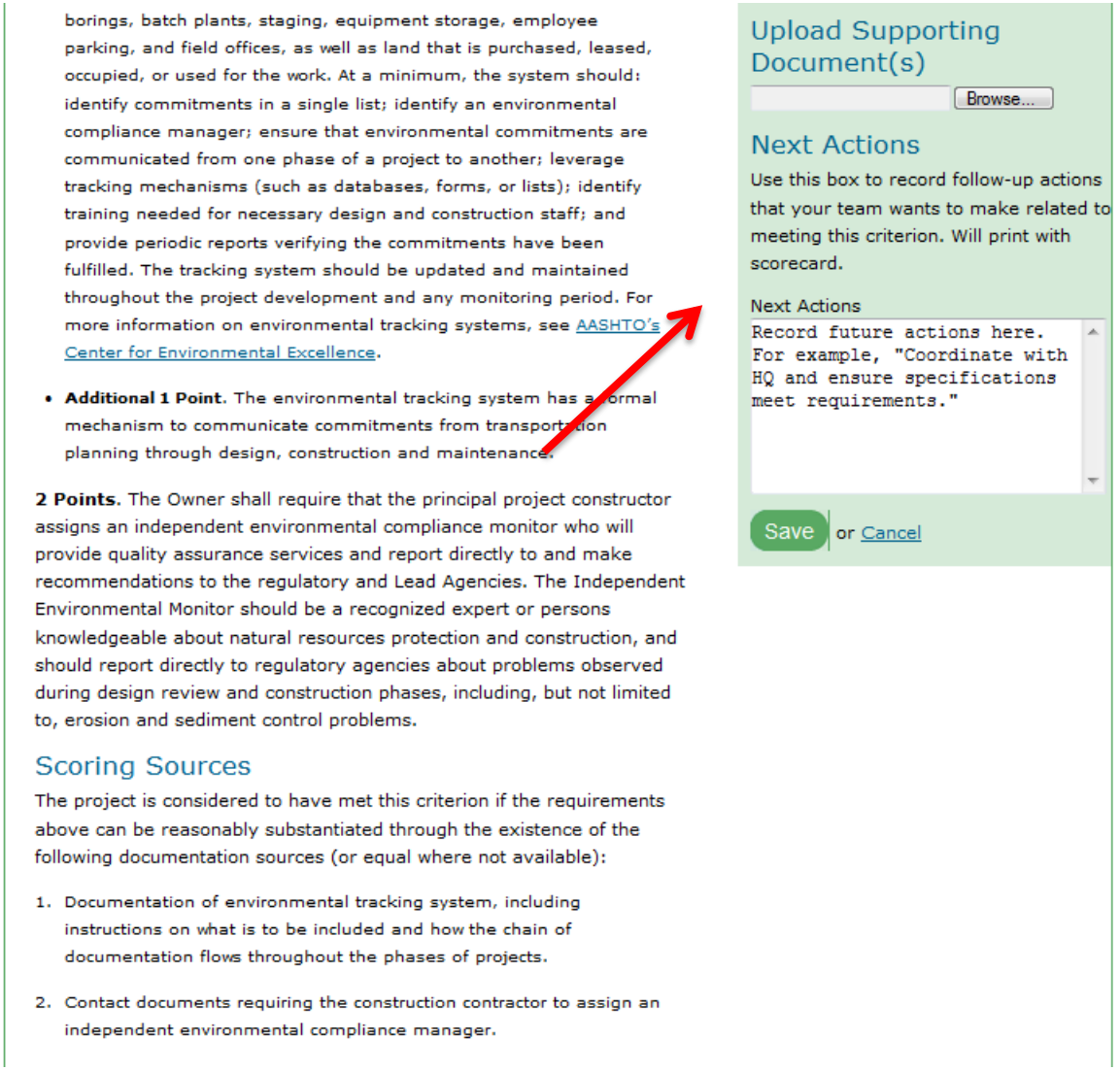
Changes for INVEST 1.0 (cont.)

- Improvements to web interface to make the scoring process easier to complete and clarify sustainability linkages



Changes for INVEST 1.0 (cont.)

- Provide ability to record notes or comments within INVEST



borings, batch plants, staging, equipment storage, employee parking, and field offices, as well as land that is purchased, leased, occupied, or used for the work. At a minimum, the system should: identify commitments in a single list; identify an environmental compliance manager; ensure that environmental commitments are communicated from one phase of a project to another; leverage tracking mechanisms (such as databases, forms, or lists); identify training needed for necessary design and construction staff; and provide periodic reports verifying the commitments have been fulfilled. The tracking system should be updated and maintained throughout the project development and any monitoring period. For more information on environmental tracking systems, see AASHTO's Center for Environmental Excellence.

- **Additional 1 Point.** The environmental tracking system has a formal mechanism to communicate commitments from transportation planning through design, construction and maintenance.

2 Points. The Owner shall require that the principal project constructor assigns an independent environmental compliance monitor who will provide quality assurance services and report directly to and make recommendations to the regulatory and Lead Agencies. The Independent Environmental Monitor should be a recognized expert or persons knowledgeable about natural resources protection and construction, and should report directly to regulatory agencies about problems observed during design review and construction phases, including, but not limited to, erosion and sediment control problems.

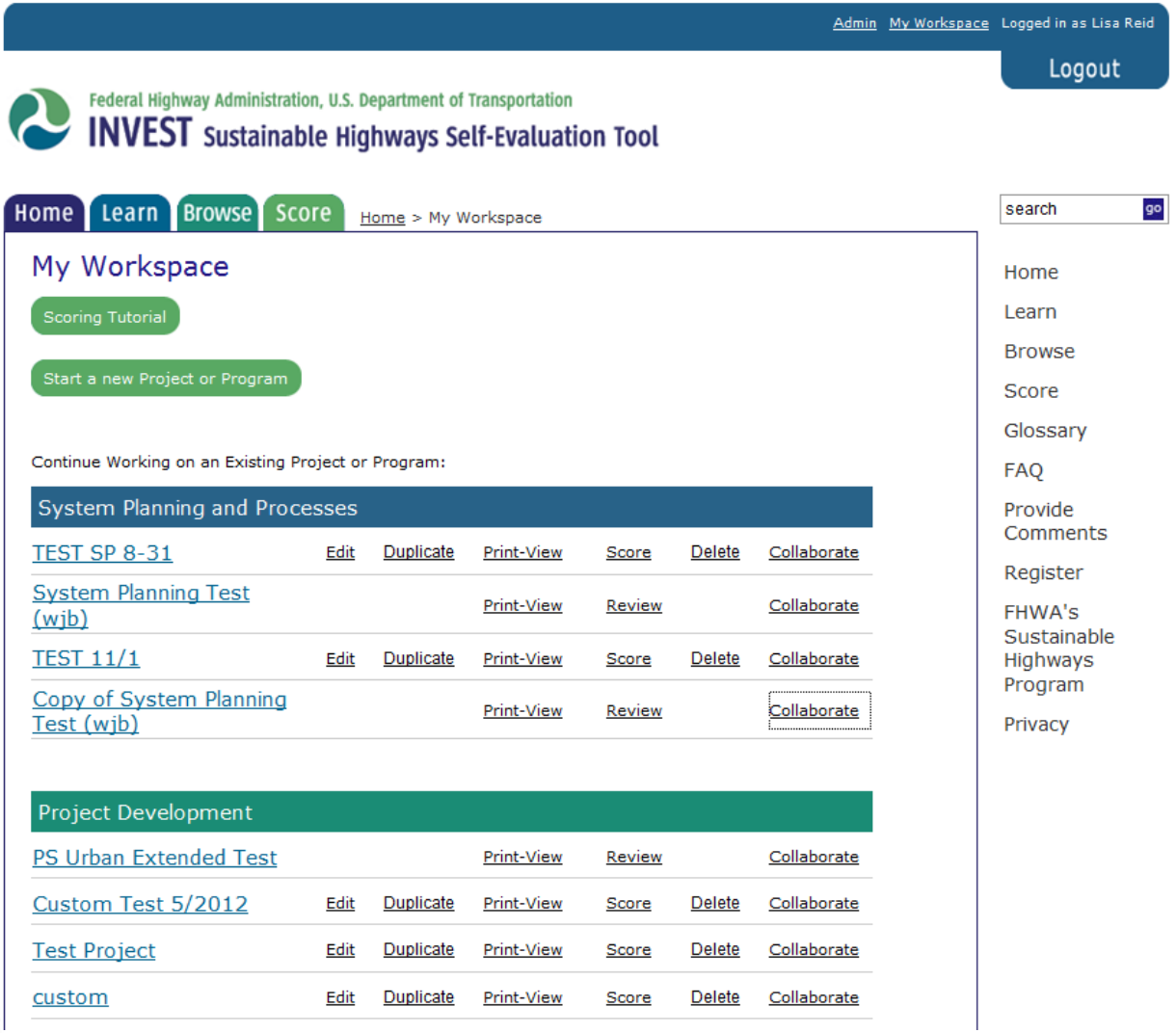
Scoring Sources

The project is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of the following documentation sources (or equal where not available):

1. Documentation of environmental tracking system, including instructions on what is to be included and how the chain of documentation flows throughout the phases of projects.
2. Contact documents requiring the construction contractor to assign an independent environmental compliance manager.

Changes for INVEST 1.0 (cont.)

- Added workspace area for users to see and edit multiple projects



Changes for INVEST 1.0 (cont.)

- Significant changes to the criteria in all three modules
- More opportunities for partial credit (i.e., gradation in point scale within criteria)
- Putting more emphasis on the process of using the tool and learning (not the score!)

INVEST 1.0 Project Development Criteria

- PD-1 Economic Analyses
- PD-2 Lifecycle Cost Analysis
- PD-3 Context Sensitive Project Development
- PD-4 Highway and Traffic Safety
- PD-5 Educational Outreach
- PD-6 Tracking Environmental Commitments
- PD-7 Habitat Restoration
- PD-8 Stormwater
- PD-9 Ecological Connectivity
- PD-10 Pedestrian Access
- PD-11 Bicycle Access
- PD-12 Transit & HOV Access
- PD-13 Freight Mobility
- PD-14 ITS for System Operations
- PD-15 Historical, Archaeological, and Cultural Preservation
- PD-16 Scenic, Natural, or Recreational Qualities
- PD-17 Energy Efficiency
- PD-18 Site Vegetation

INVEST 1.0 Project Development Criteria

- PD-19 Reduce and Reuse Materials
- PD-20 Recycle Materials
- PD-21 Earthwork Balance
- PD-22 Long-Life Pavement Design
- PD-23 Reduced Energy and Emissions in Pavement Materials
- PD-24 Contractor Warranty
- PD-25 Construction Environmental Training
- PD-26 Construction Equipment Emission Reduction
- PD-27 Construction Noise Mitigation
- PD-28 Construction Quality Control Plan
- PD-29 Construction Waste Management

Paving Project Scorecard

Included Criteria	Possible Points
PD-02 Lifecycle Cost Analyses	3
PD-04 Highway and Traffic Safety	1
PD-05 Educational Outreach	2
PD-06 Tracking Environmental Commitments	5
PD-19 Reduce and Reuse Materials	8
PD-20 Recycle Materials	8
PD-22 Long-Life Pavement Design	5
PD-23 Reduced Energy and Emissions in Pavement Materials	3
PD-24 Contractor Warranty	3
PD-26 Construction Equipment Emission Reduction	2
PD-28 Construction Quality Control Plan	5
PD-29 Construction Waste Management	3

Total Points Available: 57

- 17 points needed for Bronze
- 23 points needed for Silver
- 29 points needed for Gold
- 34 points needed for Platinum

PD-22 Long-Life Pavement Design

Goal	Minimize life cycle costs by promoting design of long-lasting pavement structures.
Points	5 points
Requirements	Both requirements must be met to achieve this criterion: Requirement 1: Design at least 75 percent of the total new or reconstructed pavement surface area for regularly trafficked lanes of pavement to meet long-life pavement design criteria. Compute the total surface area of all trafficked lanes and show that, at a minimum, 75 percent of that area is designed for long-life. Do not include shoulders, medians, sidewalks, and other paved areas in the computation. AND Requirement 2: Pavement design is in accordance with a design procedure that is formally recognized, adopted, and documented by the project owner. In many instances (but not all), this could be the process described in the 1993 AASHTO Design of Pavement Structures manual or the process described in AASHTO MEPDG-1 Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice.

Affected Triple Bottom Line Principles

PD-23 Reduced Energy and Emissions in Pavement Materials

Goal	Reduce energy use in the production of pavement materials.
Points	3 points
Requirements  Affected Triple Bottom Line Principles	**Asphalt Production:** Use Warm Mix Asphalt. Reduce the mixing temperature of hot mix asphalt by a minimum of 50°F from that recommended as the mixing temperature by the asphalt binder supplier. or Burn recycled oil, waste materials, or other fuel saving technologies in HMA plant to reduce conventional fuel usage by a minimum of 25 percent. **Cement Production:** Use an ENERGY STAR® certified cement production plant for cement materials used on the project. or Burn recycled oil, waste materials, or other fuel saving technologies in cement production plant to reduce conventional fuel usage by a minimum of 25 percent. **Continued on following slide…**

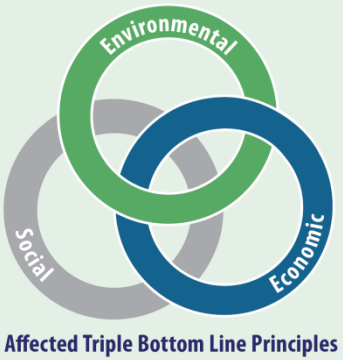
PD-23 Reduced Energy and Emissions in Pavement Materials (continued)

Requirements Con't.	**Concrete Production:** Concrete shall be supplied from a concrete plant that can demonstrate a carbon footprint and embodied energy 15 percent below the national averages as established in the National Ready Mixed Concrete Association's (NRMCA) Sustainable Concrete Plant Guidelines or Concrete shall be supplied from a concrete plant that is an NRMCA Sustainable Concrete Plant Certified Silver

INVEST 1.0 Operations & Maintenance Criteria

- OM-01: Internal Sustainability Plan
- OM-02: Electrical Energy Efficiency and Use
- OM-03: Vehicle Fuel Efficiency and Use
- OM-04: Reuse and Recycle
- OM-05: Safety Management
- OM-06: Environmental Commitments Tracking System
- **OM-07: Pavement Management System**
- OM-08: Bridge Management System
- OM-09: Maintenance Management System
- OM-10: Highway Infrastructure Preservation and Maintenance
- OM-11: Traffic Control Infrastructure Maintenance
- OM-12: Road Weather Management Program
- OM-13: Transportation Management and Operations
- OM-14: Work Zone Traffic Control

OM-7 Pavement Management System

Goal	**Leverage a pavement management system to balance activities that extend the life and function of pavements with impacts to the human and natural environment.**
Points	1-15 points
Requirements  Affected Triple Bottom Line Principles	**1 point.** The agency has a pavement management system (PMS). **3 points. Track pavement network performance:** • 1 point: Overall network condition using common metrics. • 2 points: Project timeliness. **2 points:** Set quantifiable goals relating to both condition and project timeliness, including when these goals are to be achieved, and monitor progress towards goals for at least one year after goal establishment. **Continued on following slide…**

OM-7 Pavement Management System (continued)

Requirements

Con't.

7 points. Leverage Data to Demonstrate Sustainable Outcomes:

- 2 points: Prioritize projects based on system modeling, scenario analyses, trade-off analyses, and system optimization rather than a "worst-first" approach.
- 2 points: Leverage life-cycle cost analysis (LCCA) techniques to predict costs and to perform short- and long-term budget forecasting.
- 1 point: Include routine pavement preservation needs in the annual UPWP or STIP/TIP that are based on the condition and timeliness goals set above.
- 2 points: Leverage PMS to link pavement repair, preservation, and maintenance projects to adjacent capital projects.

2 points. Sustainable Specifications:

- The agency has special provisions specific to at least one sustainable pavement solution

or

- 2 points: The agency has standard specifications and/or special provisions specific to at least one sustainable pavement solution and requires the consideration of sustainable pavements as a first solution.

INVEST 1.0 System Planning Criteria

- SP-01: Integrated Planning: Economic Development and Land Use
- SP-02: Integrated Planning: Natural Environment
- SP-03: Integrated Planning: Social
- SP-04: Integrated Planning: Bonus
- SP-05: Access & Affordability
- SP-06: Safety Planning
- SP-07: Multimodal Transportation and Public Health
- SP-08: Freight and Goods Movement
- SP-09: Travel Demand Management
- SP-10: Air Quality
- SP-11: Energy and Fuels
- SP-12: Financial Sustainability
- SP-13: Analysis Methods
- SP-14: Transportation Systems Management & Operations
- SP-15: Linking Asset Management and Planning
- SP-16: Infrastructure Resiliency
- SP-17: Linking Planning and NEPA

Next Steps

- INVEST 1.0 will be released October 10, 2012
- Marketing and communications plan
- National Initiative in FHWA PY2013 Strategic Implementation Plan to encourage use of INVEST 1.0 by State DOTs, MPOs, and Federal Land Management Agencies
- INVEST 1.0 deployment program in FY 2013
- Track use of INVEST 1.0 and assess extent to which it is inspiring action on sustainability
- INVEST 2.0?

Thank You!

www.sustainablehighways.org

www.sustainablehighways.dot.gov

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