

, October 27

🔗 Innovate Forward

**TRB Webinar:
Sustainability as an
Organizing Principle for
Transportation Agencies**

Purpose

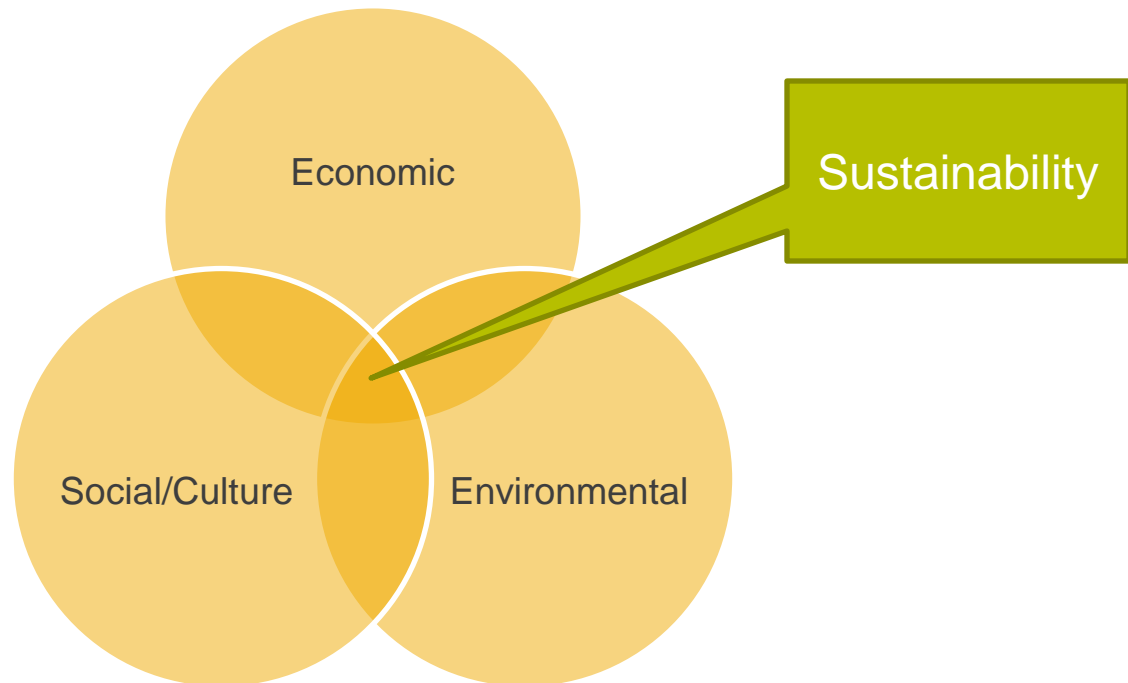
- + The presentation describes the results of NCHRP 20-83(07) “Sustainability as an Organizing Principle for Transportation Agencies” and the lessons learned from this work for transportation agencies interested in building a sustainability supporting organization
- + Specifically, it:
 - Provides background to this work and discusses its goals and purposes
 - Describes the general concept of sustainability as an organization principle
 - Identifies the main drivers for change in the next 30 years
 - Describes some plausible future worlds
 - Discusses the potential roles of transportation agencies in these worlds
 - Identifies immediate short-term initiatives that could help prepare transportation agencies for these future worlds

Background: NCHRP 20-83(07) “Sustainability as an Organizing Principle for Transportation Agencies”

- + Increasing awareness of the environmental, economic, and social effects of the transportation system has led to demands on transportation agencies to balance short-term cost effectiveness and long-term sustainability
- + In response, the Transportation Research Board (TRB) funded NCHRP 20-83(07) to provide a framework for transportation agencies to use to identify and understand the future trends and external forces that will increasingly put pressure on their ability to carry out their responsibilities
- + Specifically, the project:
 - Identifies likely alternative future scenarios in which transportation agencies will be asked to achieve sustainability goals in providing for economic vitality, social equity, and environmental integrity that reflect conditions 30 to 50 years in the future
 - Analyzes how transportation agencies’ existing fiscal, legal, and institutional structure(s) and decision-making processes encourage or inhibit them from optimizing their contribution to a sustainable society
 - Examines the variety of roles, and the nature of their related primary activities, that transportation agencies may be expected to play in the future
 - Explores linkages, and expectations, between transportation agencies and stakeholders, and the need to form new alliances and partnerships with other transportation providers and system users
 - Provides or identifies tools that individual agencies can use in designing their particular approach(es) to adapting to the demands and opportunities of the future and in describing, in broad terms, how “sustainable” transportation agencies might be organized.

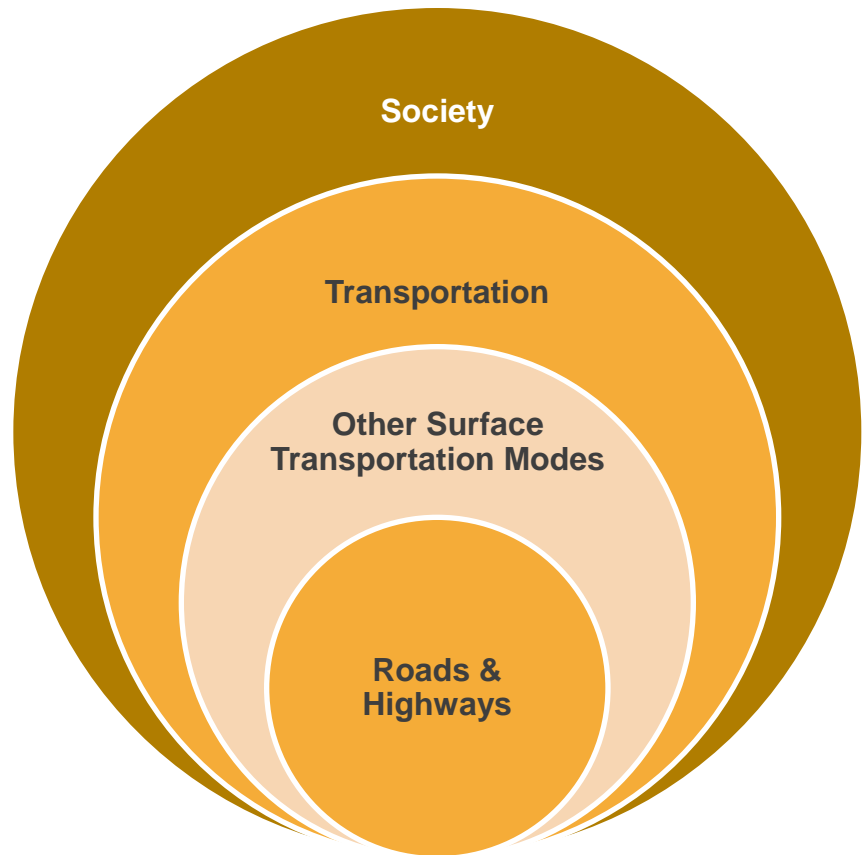
Background: Sustainability as an Organizing Principle – the Triple Bottom Line (TBL)

Sustainability as an organizing principle means that transportation agencies need to reconceive their functions, organization, process, people, culture and technology to support a broad societal sustainability conceived as the intersection of three elements:

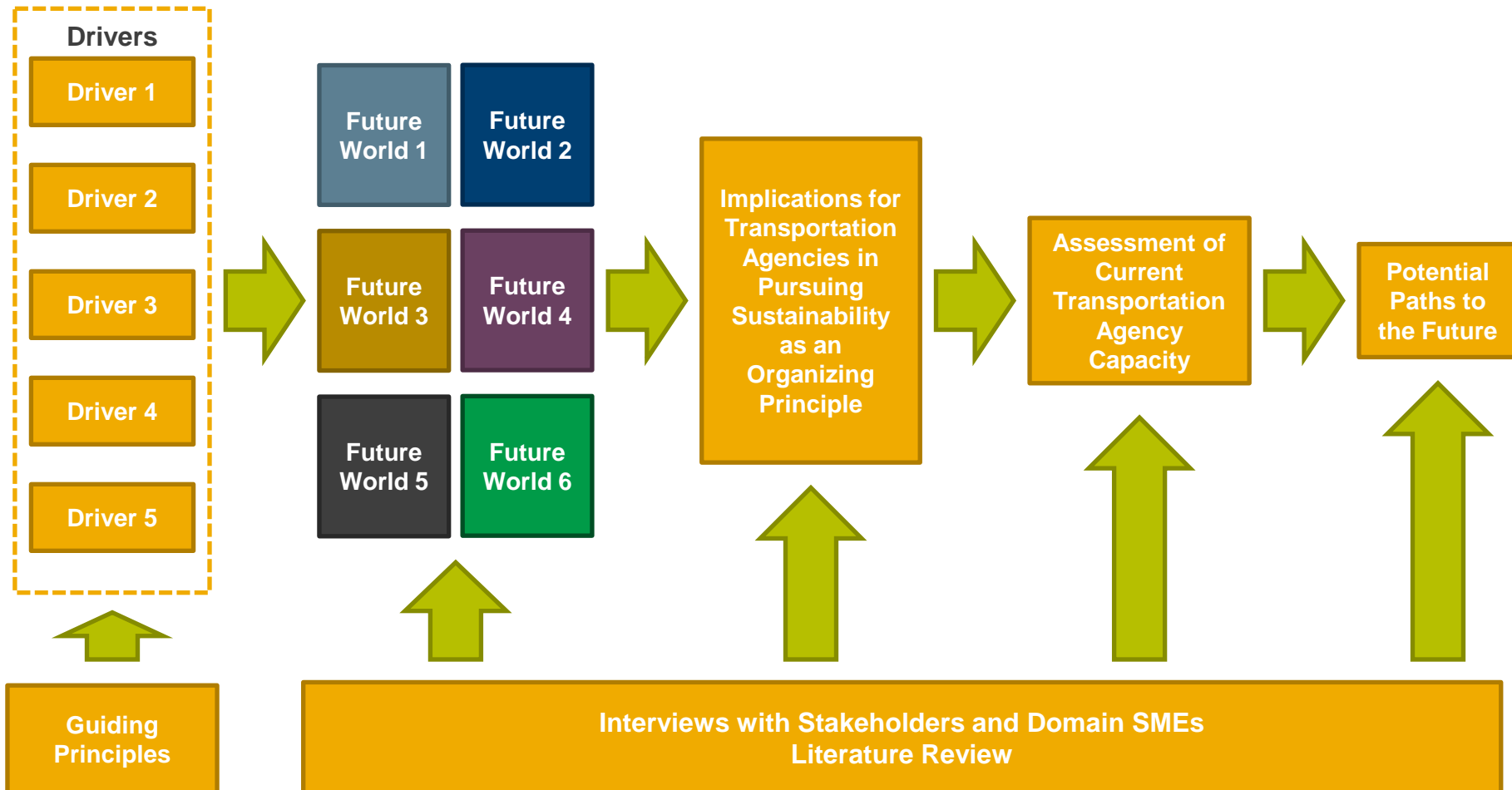


Background: Sustainability is more than roads and highways

- + Sustainability takes a broad societal, holistic of how transportation
- + Sustainability considers the impact of modal policy and operations on:
 - Other modes
 - Other policy areas (e.g., environment, health, energy)
 - Society as a whole



Change Drivers: Approach



Change Drivers: Guiding Principles

In developing potential futures that transportation agencies could encounter, we established three key guiding principals:

Diversity with Dominate

Neither Utopia nor Dystopia

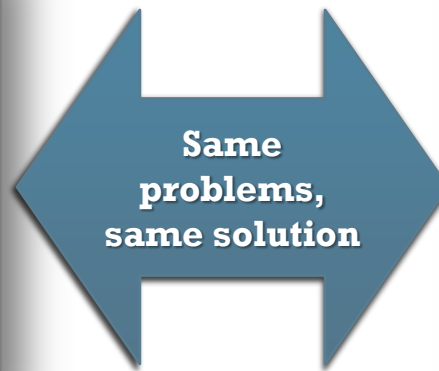
Sustainability is Always Possible

Change Drivers: Guiding Principles – Diversity will Dominate

At the height of the industrial era, common problems created common solutions



Dusseldorf



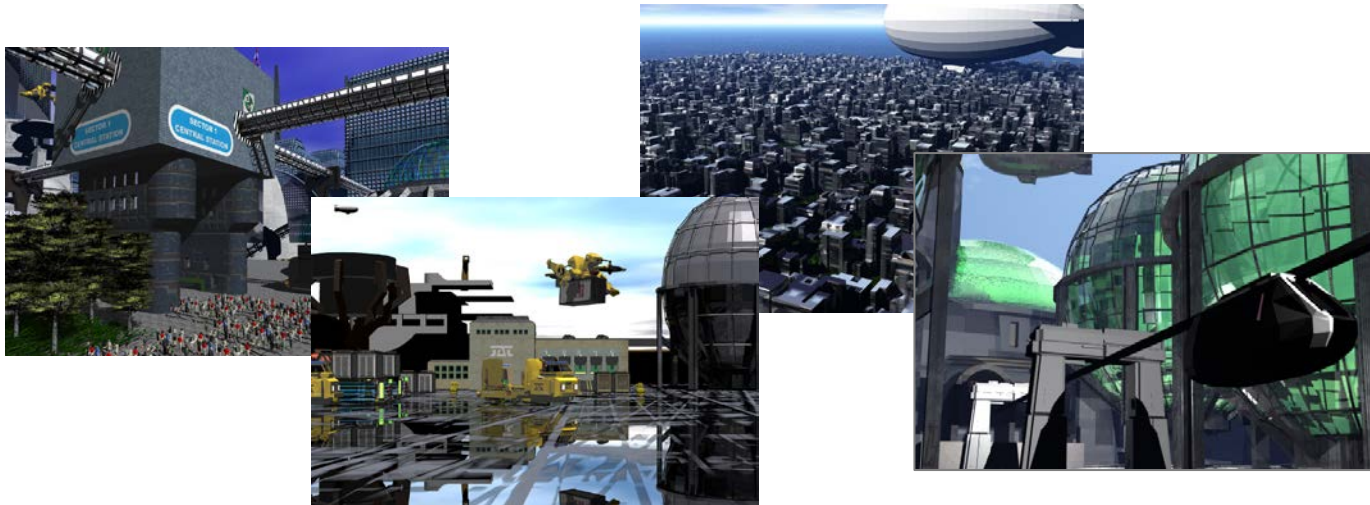
Dallas

Common Solution – the “Three Rs”

- **Roads: Car cities with massive road building**
- **Rebuild: Rebuild existing infrastructure to address environmental challenges**
- **Regulate: Command-and-control regulation**

Change Drivers: Guiding Principles – Diversity will Dominate

In the second half of the 21st Century environmental challenges will vary considerably depending on the economy and the physical location -- *No one set of challenges will dominate and no one solution will be appropriate*



Common Solution – the “Three Rs”

- **Reuse/Repurpose: Reuse and repurpose existing resources**
- **Reimagine: Reimagine relationships and build new organizational relationships**
- **Restore: Focus on restoration and improving the environment**

Change Drivers: Guiding Principles – The Future is Neither Utopian nor Dystopian

The future will be neither dystopian nor utopian – it will be mixed. For some it will feel dystopian and painful, for other it will be utopian. The question is, how widespread will these two states be and who will experience them?



If you are a fisherman living on the Gulf Coast, you may conclude the future looks dystopian



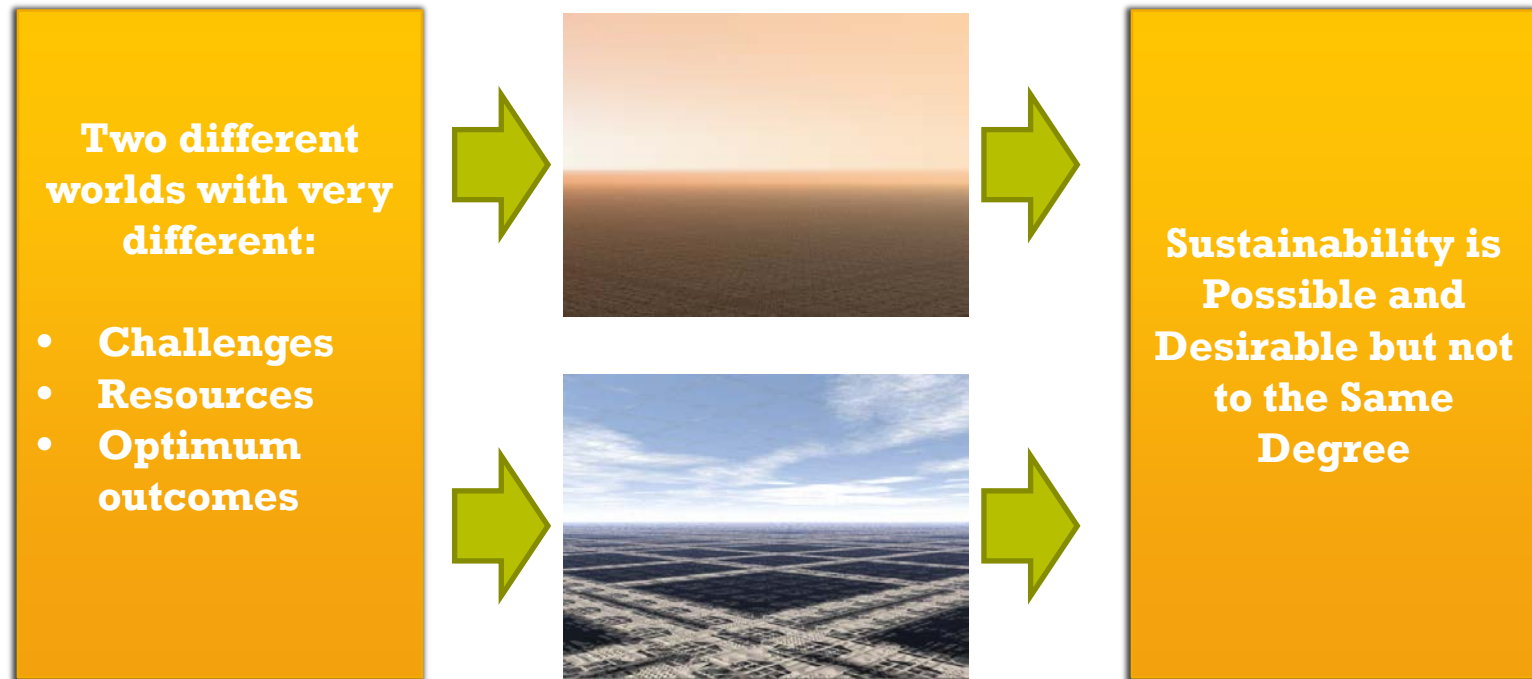
If you are a software engineer in Marin County, CA, you may conclude the future looks utopian

Key Insights

- *There will be winners and losers – question is how many and who*
- *Utopia and dystopia will not be evenly distributed*
- *Good and bad times will bring good and bad things –*
- *The poor will still be with us – in absolute and relative terms*

Change Drivers: Guiding Principles – No Matter What the Future, Sustainability is Desirable and Possible

No matter what the future brings, sustainability (defined as balancing economic, social and environmental goals within the context of the future world) will be both desirable and possible



Change Drivers

Economy (e.g., rate of economic growth, geographic distribution of growth, distribution of wealth and income)

Demography (e.g., overall population growth, geographic distribution, age, concentration of population and land use)

Energy and the Environment (e.g., climate change, use of fossil fuels, new energy sources)

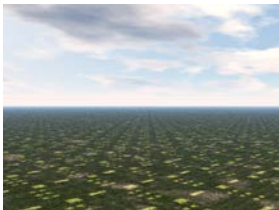
Technology (e.g., e.g., data and analytics revolution, stagnation and stall, moving to the singularity and take-off)

Society (e.g., social preference for different settlement patterns, mobility versus virtually)

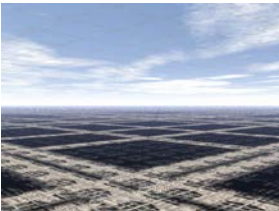
Future Scenarios



Dirty World: Economic growth is low; wealth concentrated in few dynamic areas and among elites; population ages with lower workforce participation; technology stagnates and stalls; rapid climate change and increasing environmental problems; megacities, sprawl and declining rural areas; fossil fuels dominate



Mega World: Economic growth follows traditional levels (2-3 percent); wealth/growth concentrated in megaregions; new industries and skills create new opportunities leading to general wage growth, population growth; improvements in health and immigration increase workforce participation; technology at current rates; manageable climate change; gradual transition from fossil fuels dominate



Wonder World: Economic growth increases dramatically; wealth/growth concentrated in megaregions; new industries and skills create new opportunities leading to general wage growth, population growth; improvements in health and immigration increase workforce participation; technology improves at dramatic rates; manageable climate change; growth focused on megaregions; dramatic shifts in energy use and supply



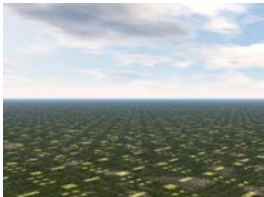
Green World: Economic growth focused towards green economy; wealth/growth decentralized with dense urban cores; new green industries and skills create new opportunities leading to general wage growth, population stabilization; improvements in health increase workforce participation; technology focuses on green technologies; manageable climate change; dramatic shifts in energy use and supply toward green alternatives

Future Scenarios: Challenges are always with us

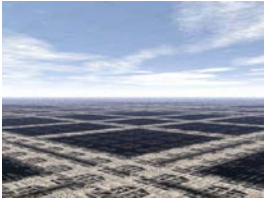
SAMPLE CHALLENGES



- Achieving sustainability with declining resources
- Retirement of existing infrastructure
- Adapting to rapid climate change



- Increasing concentration of people and resources in the megaregions – managing growth and changing demands outside the megaregions



- Adapting to rapid technology change and “picking the winners”
- Responding to new industries, new demands and new growth regions



- Adapting to green technology and green social demand
- Responding to new industries, new demands and new growth regions

Transportation Agency Roles: A Success Story -- Dynamic Evolution in Response to Emerging Social and Economic Challenges

LEVEL 0 – SAFE MOBILITY

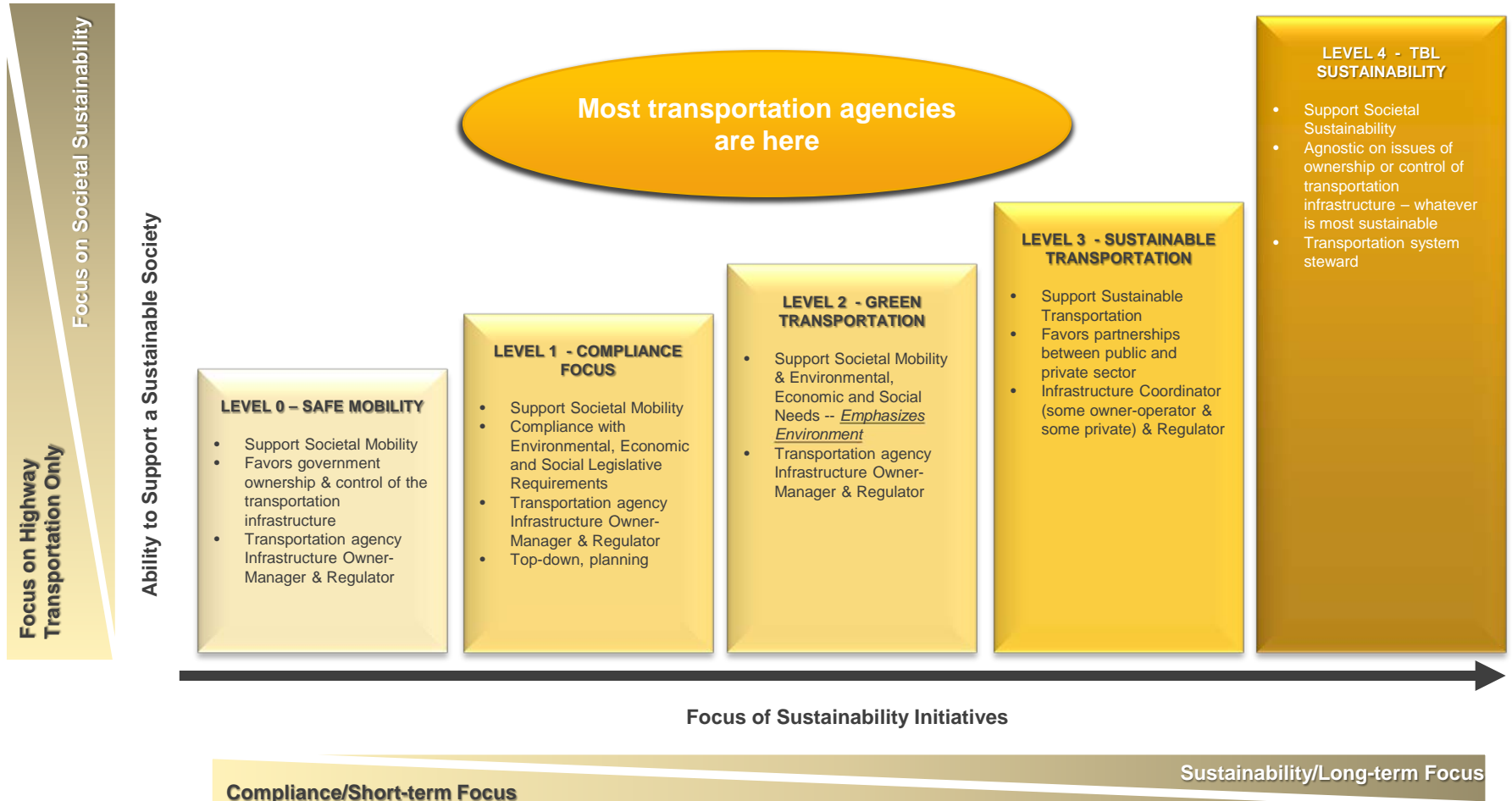
LEVEL 1 - COMPLIANCE FOCUS

LEVEL 2 - GREEN TRANSPORTATION

LEVEL 3 - SUSTAINABLE TRANSPORTATION

LEVEL 4 - TBL SUSTAINABILITY

Building Sustainable Organizations



Building Sustainable Organizations: Lessons from the Past and Challenges from the Future

- + **Increasing complexity:** Based on past experience and under any scenario we see:
 - **Service Demands:** Demands constantly expand – old demands do not go away, new demands are layers on top
 - **Constituency Demands:** Constituencies and policy actors do not go away – old actors remain, new actors appear
 - **Technology and Modes Demands:** New modes and technology constantly change and demand agencies respond
- + **Inadequate Resources:** Based on past experience and under any scenario we see:
 - **Always Inadequate/Never Enough:** Resources are likely to be insufficient to meet all demands – choices must be made and tools need to be developed to prioritize projects that have broad societal support
 - **New Funding Mechanisms:** Increasing demands and inadequate resources means agencies must seek out new funding sources
- + **Coordination and Cooperation:** Based on past experience and under any scenario we see:
 - **Regionalism:** The emergence of megaregions suggests that regional planning – even multi-state planning will become ever more important
 - **Multi-Mode/Multi-Domain:** Transportation plan cannot be limited to a single mode or policy domain (e.g., energy, environment, economic development, health) – intermodalism and a multi-domain coordination are the future
 - **Dealing with the Left-Behinds:** Equity issues remain a challenge for TBL and sustainability – how we deal with them will be one of the key challenges of the future

Thank You for Your Attention

+ For more information, please contact:

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"The obligation of any component is to contribute its best to the *system*, not to maximize its own production, profit, or sales ... "

- Dr. W. Edwards Deming

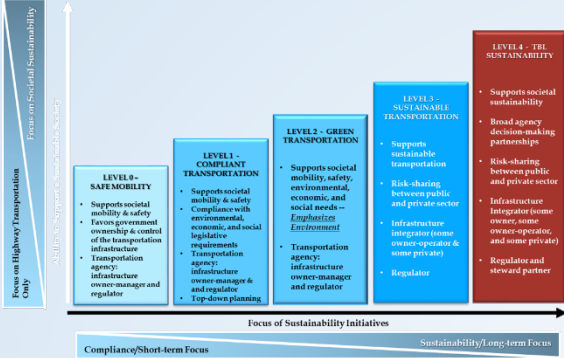
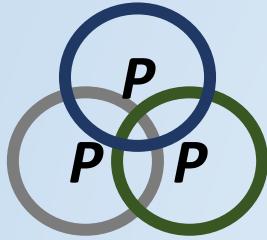


Sustainability as an Organizing Principle for Transportation Agencies - TRB Webinar 10/27/15

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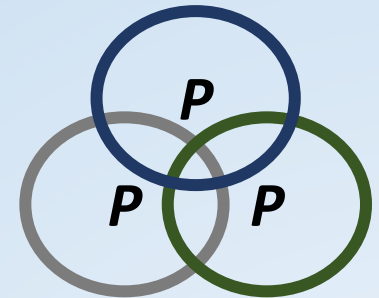
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NCHRP 750 Vol. 4 - Sustainability Maturity Model: Framework, Tools, and Application

- Objective: Support for a More Sustainable Society...
- Maturity Levels / Tools
- Organizational Assessment
- Case Studies: Caltrans, NYSDOT



NCHRP REPORT 750

Strategic Issues Facing Transportation

Volume 4



50+ years
out

Sustainability as an Organizing Principle for Transportation Agencies

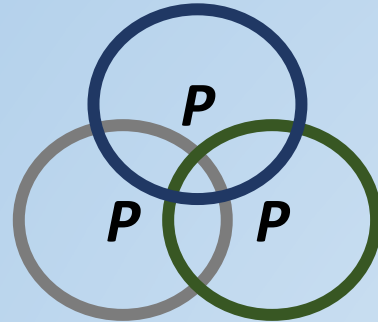
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_750v4.pdf

Why



Objective: Support for a More Sustainable Society...

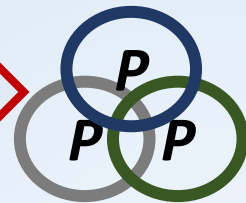
What



How!

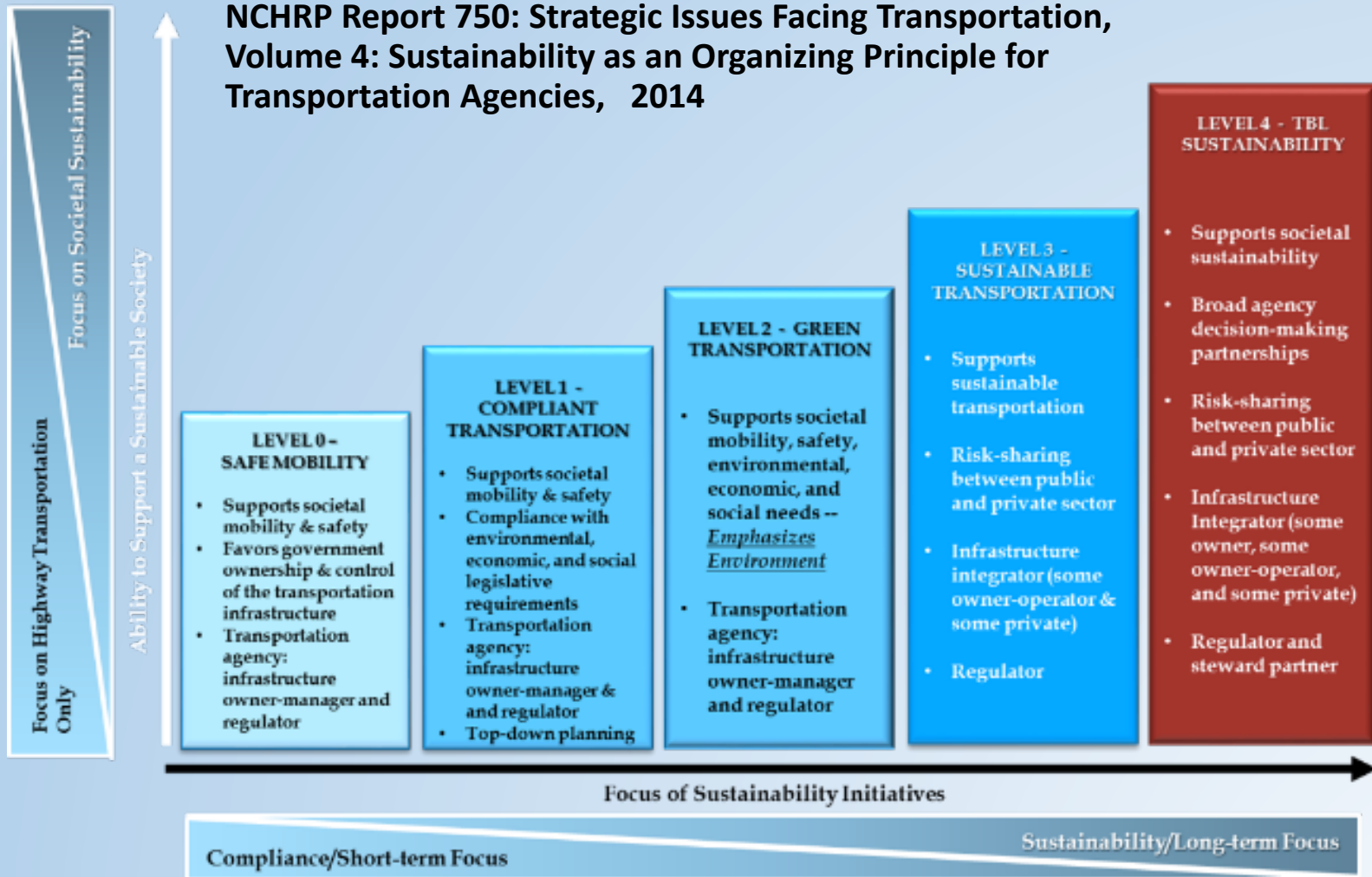


		Governance and Policymaking	Decision-making	Enterprise Management
High-Level Functions		Consensus on Needs and Goals	Planning and Programming	Service and Product Delivery
		Regulation and Rulemaking		
		Outreach and Communications	Budgeting and Resource Allocation	
	Compliance and Dispute Resolution			
	Education, Training, and Culture Change			



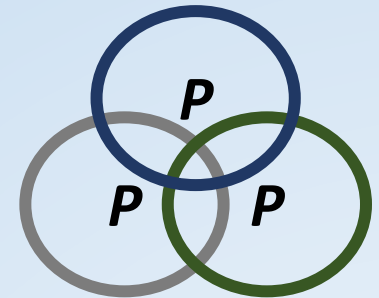
Transportation Agency Sustainability Maturity Model

NCHRP Report 750: Strategic Issues Facing Transportation, Volume 4: Sustainability as an Organizing Principle for Transportation Agencies, 2014



NCHRP 750 Vol. 4 - Sustainability Maturity Model: Framework, Tools, and Application

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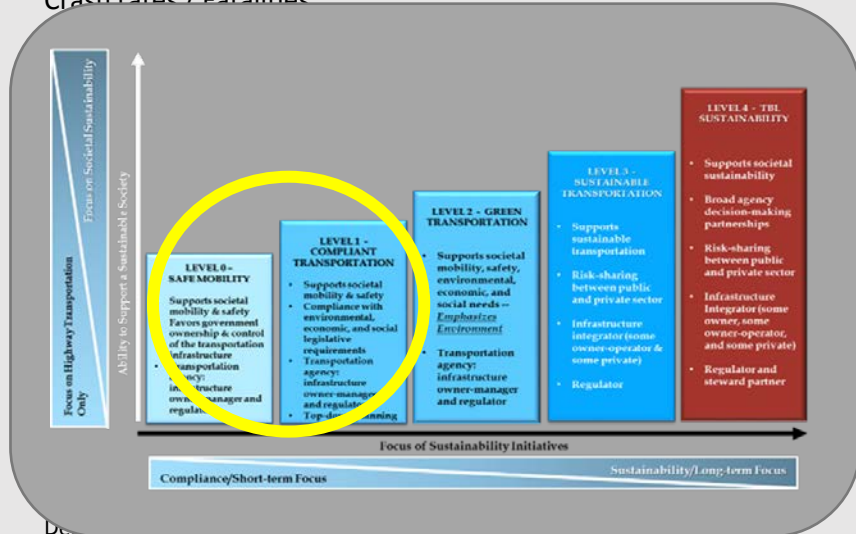
NCHRP Report 750, Vol. 4, App F. Sustainability Maturity Level

<i>(As Supplemented)</i>				
Maturity Level	objective	metrics	~ year	Characteristics
Safe Mobility	Build Interstate	miles built	1954 - 1970	<ul style="list-style-type: none"> Support societal mobility Government ownership & control of infrastructure Transportation agency as owner–manager & regulator
	Reduce Fatalities	# crashes		
Compliant Transportation	Make Letting Goal	\$ spent	1970 - 2000	<ul style="list-style-type: none"> Support societal mobility Compliance - environmental, economic, and social legislative Transportation agency as owner–manager & regulator Top-down, planning
	Reduce Fatalities	# crashes		
	Reduce Congestion			
Green Transportation	Reduce Congestion	\$ spent	1985 - 2015	<ul style="list-style-type: none"> Support societal mobility & environmental, economic, and social needs—emphasizes environment Transportation agency as owner–manager & regulator
	Reduce Fatalities	# crashes		
	Make Letting Goal	\$ spent		
	Be Green	Wetlands, CO2		
Sustainable Transportation	Improve Mobility	passenger mi.	2010 - 2030	<ul style="list-style-type: none"> Support sustainable transportation Favors partnerships between public and private sector Transportation agency as coordinator & regulator
	Reduce Congestion	delay hours		
	Reduce Fatalities	# crashes		
	Make Letting Goal	\$ spent		
	Green & Sustainable	CO2, Rating score		
Support Triple Bottom Line (TBL) Sustainability	Improve Mobility	passenger mi.	2025 -	<ul style="list-style-type: none"> Support societal sustainability Agnostic on issues of ownership or control Transportation agency as transportation system steward in service to a more sustainable society
	Reduce Congestion	delay hours		
	Reduce Fatalities	# crashes		
	Green & Sustainable	CO2, Rating score		
	<i>Better Society</i>	TBL in \$ Equivalent for Economy (life cycle costs, travel savings, jobs, etc.), Env. (CO2, Air & Water Quality, Habitat, etc.), Social (Health, Safety, Access, etc.). See also "Appendix H".		

Maturity Level / Goals / Metrics

<p>Level 0 Safe Mobility</p>	<ol style="list-style-type: none"> Mobility Safety Economic development 	<p>AADT / Speed Crash rates / Fatalities Stakeholder Satisfaction</p>
<p>Level 1 Compliant Transportation</p>	<ol style="list-style-type: none"> Mobility Safety Economic development Environmental Public participation 	<p>AADT / Speed / delay Crash rates / Fatalities Stakeholder Satisfaction NEPA / Project delay Compliance</p>
<p>Level 2 Green Transportation</p>	<ol style="list-style-type: none"> Mobility Accessibility Safety Economic development 	<p>AADT / Congestion / Emissions Transit Ridership Crash rates / Fatalities</p>

“Transportation with a minimum of litigation & collateral damage...”



Level
Tran

Level
TBL Susta

2. Accessibility
3. Connectivity
4. System efficiency
2. Public Participation

De
Valuation BCA

Beyond Regulatory



“....an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions.”

http://www.fhwa.dot.gov/context/css_primer/intro.htm#way

Maturity Level / Goals / Metrics

Level 0
Safe Mobility

1. Mobility
2. Safety

AADT / Speed
Crash rates / Fatalities

“Doing the project right...”

Level 1 Compliant
Transportation

Level 2
Green
Transportation

1. Mobility
2. Accessibility
3. Safety
4. Economic development
5. Environmental
6. Public participation

AADT / Congestion / Emissions
Transit Ridership
Crash rates / Fatalities
Stakeholder Satisfaction
NEPA / Appearances / Inform / Comply

} ~Ratings 1.0

Level 3 Sustainable
Transportation

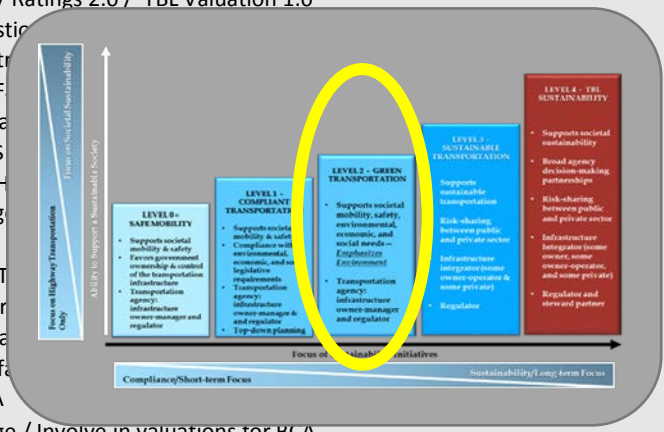
1. Sustainability (Green)
2. Mobility
3. Accessibility
4. Safety
5. Economic Development
6. Connectivity
7. System efficiency
8. Public Participation

Appearances / Ratings 2.0 / TBL Valuation 1.0

Level 4
TBL Sustainability

1. Sustainability (TBL):
 1. Mobility and safety
 2. Accessibility
 3. Connectivity
 4. System efficiency
2. Public Participation

Ratings 3.0 / TBL Valuation 2.0
AADT / Crash rates / Stakeholder Satisfaction / Demand satisfaction / Valuation BCA
Inform / Engage / Involve in valuations for BCA



National and State Level Rating Systems

System	Sponsor	Scope	Organization	Review	link
Envision™	Institute for Sustainable Infrastructure	Infrastructure	checklist includes 60 credits in five categories (Quality of Life, Leadership, Resource Allocation, Natural World and Climate and Risk);	Fee-based review	http://www.sustainableinfrastructure.org/rating/
GreenLITES	New York State DOT	Highways	checklist includes 180 criteria planning through operations and maintenance	Self-assessment	https://www.dot.ny.gov/programs/greenlites
INVEST	FHWA (USDOT Federal Highway Administration)	Highways	checklist includes 64 Criteria planning through operations and maintenance	Self-assessment	https://www.sustainablehighways.org/
GreenRoads™	Greenroads Foundation	Highways	checklist includes 48 criteria focused on design and construction	Fee based review	https://www.greenroads.org/
STARS	North American Sustainable Transportation Council (STC)	Multi-Modal Transportation	checklist includes 29 credits planning through operations	Fee-based review	http://www.transportationcouncil.org/
TIGER	USDOT	Transportation - All Modes	Benefit / Cost - dollar based valuation across many aspects of the Triple Bottom Line	Grant Program Application	http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2014



INVEST

ECONOMIC • SOCIAL • ENVIRONMENTAL

INVEST

Self-assessment tool for transportation sustainability

- Voluntary
- Web based
- Best practices for highways
- Includes planning, project development, operations and maintenance



U.S. Department of Transportation
Federal Highway Administration





NYS DOT Tool

- measure performance,
- foster improvement



Earth Day Award Cycle



Programmatic approach:

- Applies to all projects
- Recognizes Operations for innovations and best practices
- Promotes optional planning tools










Duplicated elsewhere

<https://www.dot.ny.gov/programs/greenlites>



What Types Of Infrastructure Will Envision™ Rate?

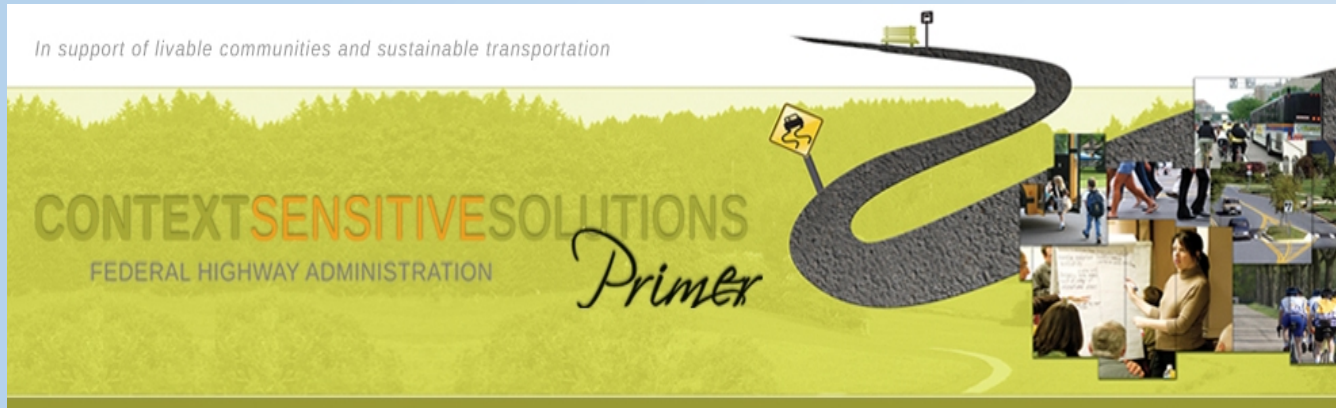
					
ENERGY	WATER	WASTE	TRANSPORT	LANDSCAPE	INFORMATION
Geothermal Hydroelectric Nuclear Coal Natural Gas Oil/Refinery Wind Solar Biomass	Potable water distribution Capture/Storage Water Reuse Storm Water Management Flood Control	Solid waste Recycling Hazardous Waste Collection & Transfer	Airports Roads Highways Bikes Pedestrians Railways Public Transit Ports Waterways	Public Realm Parks Ecosystem Services	Telecommunications Internet Phones Satellites Data Centers Sensors



Checklist System Characteristics

1. Project focused
2. “Best Practice” Driven (*Beyond avoidance!*)
3. Process oriented ~ no quantification
4. Limited number of practices
5. One size ~ fits all
6. Excel based – limited rollup / comparables
7. Some knowledge management
8. Variable taxonomy

Beyond Regulatory - Consensus



“...The context sensitive way plans for and responds to the unique needs and qualities of individual communities....”

http://www.fhwa.dot.gov/context/css_primer/intro.htm#way

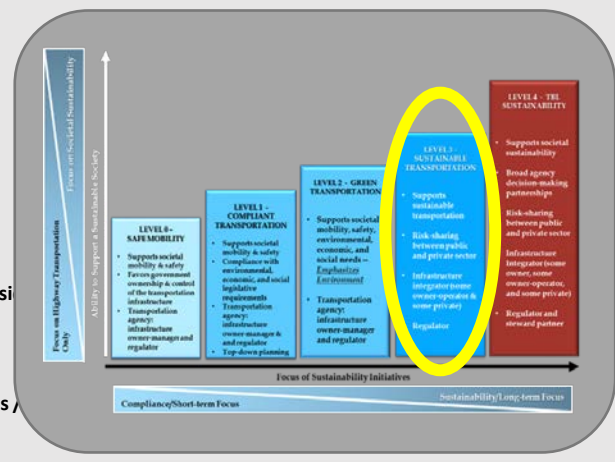
Maturity Level / Goals

Metrics

Level 0 Safe Mobility	<ol style="list-style-type: none"> 1. Mobility 2. Safety 3. Economic development
Level 1 Complete	
Level 2 Green Transportation	

AADT / Speed Crash rates / Fatalities Stakeholder Satisfaction
Speed / delay Crash rates / Fatalities Stakeholder Satisfaction Hours of delay Congestion
Congestion / Emissions Ridership Crash rates / Fatalities Stakeholder Satisfaction Appearance / Appearances / Inform / Comply

“Doing the project right. Starting with context and consensus...”



Level 3 Sustainable Transportation	<ol style="list-style-type: none"> 1. Sustainability (~Green) 2. Mobility 3. Accessibility 4. Safety 5. Economic Development 6. Connectivity 7. System efficiency 8. Public Participation
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<p>Ratings 2.0 / TBL Valuation 1.0</p> <ul style="list-style-type: none"> • AADT/ Congestion / Emissions • Transit / Paratransit Ridership • Crash rates / Fatalities • Stakeholder Satisfaction • Multi-modal \$ • Congestion / Hours of delay • Inform / Engage

Level 4 TBL Sustainability	<ol style="list-style-type: none"> 1. Sustainability (TBL): <ol style="list-style-type: none"> 1. Mobility and safety 2. Accessibility 3. Connectivity 4. System efficiency 2. Public Participation
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<p>Ratings 3.0 / TBL Valuation 2.0</p> <p>AADT / Crash rates / Fatalities Stakeholder Satisfaction BCA Demand satisfaction Valuation BCA Inform / Engage / Involve in valuations for BCA</p>
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INVEST Scoring Templates

INVEST User Guide

In This Guide:

- ▶ Quick Start Guide
- ▶ Introduction 1
- ▶ Overview of Modules
 - System Planning 3
 - Project Development 3
 - Operations & Maintenance 5
- ▶ Useful Functions 6
- ▶ Usage Tips 7
- ▶ Criteria In Action 8

<https://www.sustainablehighways.org/120/learn.html>

Project Development by Criteria Scorecard

	Paving	Urban Basic	Urban Extended	Rural Basic	Rural Extended	Custom Core Criteria ¹
PD-1 Economic Analyses			●		●	
PD-2 Life-Cycle Cost Analyses	●	●	●	●	●	●
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		●	●	●	●	●
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	●	●	●	●	●	●
Total Number of Criteria in Scorecard	12	24	29	21	25	19

CHECKLISTS ~ 2.0: Context and Opportunity

SUSTAINABILITY CHECKLIST TOOL: DECISION AND SCORING AID					
		Refinement with PROJECT STAGE ---->			
Scoping		30%	50%	70%	Final
Importance	Opportunity	Utility	Degree	Absolute & Relative Scores	
0-3	0-3	I x O	0-5	U x D	
e.g. ~0 for habitat in Downtown Manhattan vs. ~3 for habitat at Nature Preserve	e.g. ~1 for storm water retention in Downtown Manhattan vs. Greenfield	0-3~unimportant and difficult vs. 6-9 ~important and easy to accomplish	0 ~ not done 1~ std. practice 2~ well done 3~ exceptional 4~ zero impact 5~ restorative	Total score = summation vs. (?) project adjusted score = Total / A x E	

CHECKLISTS ~ 3.0: Programmatic Approach

Data Bases / Knowledge Management

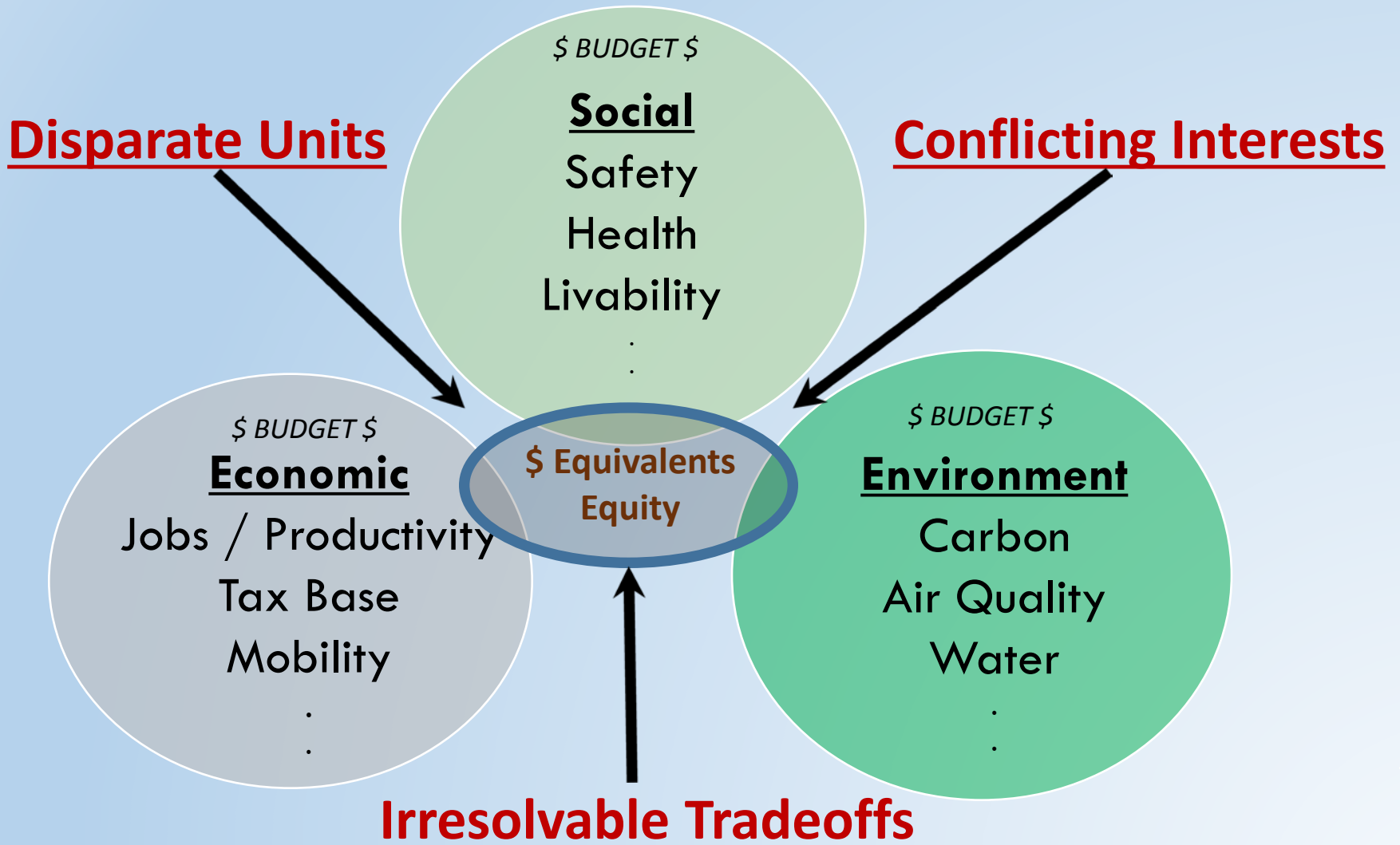
SUSTAINABILITY CHECKLIST ON <i>DATA BASE PLATFORM</i>									
	Refinement with PROJECT STAGE ---->								
Scoping	30%	50%	70%	Final					
Importance	Opportunity	Utility	Degree	Absolute & Relative Scores	Units	# Units	Project eg's	Guidance <i>http:xyz</i>	
0-3	0-3	1 x 0	0-5	U x D					
e.g. ~0 for habitat in Downtown Manhattan vs. ~3 for habitat at Nature Preserve	e.g. ~1 for storm water retention in Downtown vs. Greenfield	0-3~unimportant and difficult vs. 6-9 ~important and easy to accomplish	0 ~ not done 1~ std. practice 2~ well done 3~ exceptional 4~ zero impact 5~ restorative	Total score = summation vs. (?) project adjusted score = Total / A x E	Acres		X...	Y...	Z...
					Tons				
					Meters				



“CSS processes build consensus... stakeholders recognize that an outcome is best for the community as a whole - even if it does not completely serve individual interests....”

http://www.fhwa.dot.gov/context/css_primer/intro.htm#way

\$\$\$ -- “The Dismal Science” -- \$\$\$

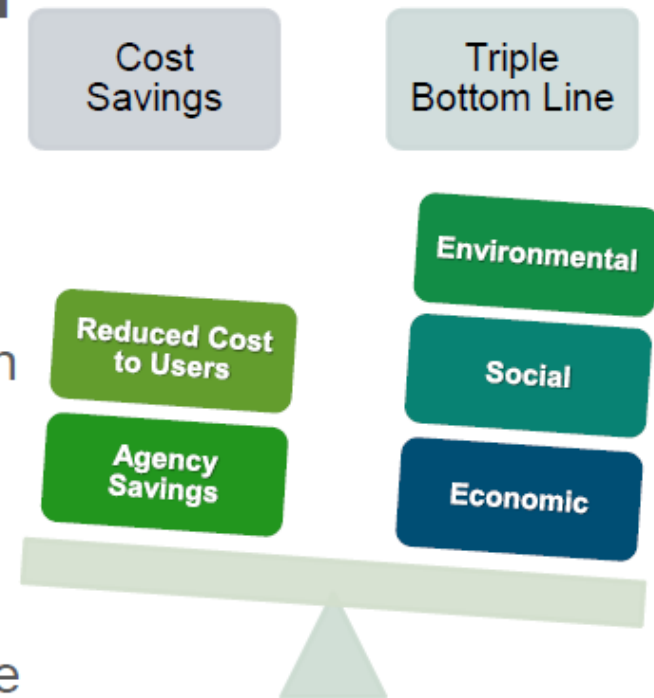


The Triple Bottom Line: Benefits and Costs



Balancing TBL benefits with cost savings:

- Implementing sustainable practices can be cost neutral or result in cost savings while benefiting the natural and human environment.
- Benefits were realized by agencies and users.
- In many cases, more savings are realized over time.





October 7, 2015

M-16-01

MEMORANDUM FOR EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shaun Donovan, Director
Office of Management and Budget

Christina Goldfuss, Managing Director
Council on Environmental Quality

John Holdren, Director
Office of Science and Technology Policy

SUBJECT: Incorporating Ecosystem Services into Federal Decision Making

Specifically, this memorandum:

(1) Directs agencies to develop and institutionalize policies to promote consideration of ecosystem services, where appropriate and practicable, in planning, investments, and regulatory contexts. (Consideration of ecosystem services may be accomplished through a range of qualitative and quantitative methods to identify and characterize ecosystem services, affected communities' needs for those services, metrics for changes to those services and, where appropriate, monetary or nonmonetary values for those services.)

Example: USDOT - TIGER

TIGER Grants | Department of Transportation - Windows Internet Explorer

http://www.dot.gov/tiger

Google usdot tiger

United States Department of Transportation

GO

About DOT Our Activities Areas of Focus

Home > Policy Initiatives > Tiger

TIGER Grants

Program Details

- [Driven by Performance](#)
- [Innovation & Project Acceleration](#)
- [Safety & State of Good Repair](#)
- [Livability & Sustainability](#)
- [Planning Activities](#)

FY 2012 TIGER Awards in 34 states, District of Columbia

On June 22, the U.S. Department of Transportation awarded nearly \$500 million from the

TIGER GRANTS

SHARE

Related Links

- [Application Resources \(FAQ\)](#)
- [Lessons Learned Webinar](#)
- [TIGER 2012 Notice of Funding Availability](#)

Related Documents

[+] Feedback

Tiger Criteria ~ Triple Bottom Line (TBL)

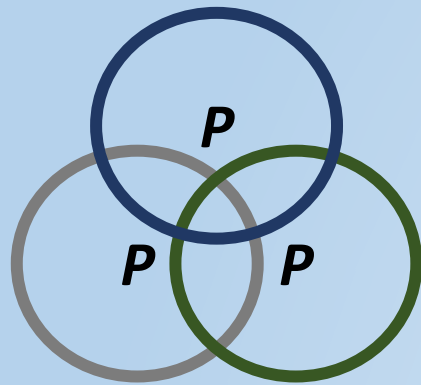


TABLE 3 U.S. DOT TIGER Considerations

Long-Term Outcome	Type of Societal Benefits
Livability	Land Use Changes that reduce VMT Accessibility Property Value Increases
Economic Competitiveness	Travel Time Savings Operating Cost Savings
Safety	Prevented Accidents (property damage), Injuries and Fatalities
State of Good Repair	Long Term Replacement Maintenance & Repair Savings Reduced VMT from not closing bridges
Environmental Sustainability	Environmental benefits from reduced emissions

Source: Federal Register Volume 77, No. 20, January 2012.

TIGER BENEFIT-COST ANALYSIS (BCA) RESOURCE GUIDE

How to Use This Guide

This BCA Resource Guide is a supplement to the *2015 Benefit-Cost Analysis Guidance for Tiger Grant Applicants* also found on this site (<http://www.dot.gov/tiger/guidance>). It provides technical information that Applicants will need for monetizing benefits and costs in their Benefit-Cost Analyses, as well as guidance on methodology and a selection of frequently asked questions from past TIGER grant applicants.

This guide is divided into three sections:

I. Recommended Monetized Values

For the purposes of providing as fair an “apples-to-apples” comparison as possible, applicants should use standard monetization values recommended in this section, which represent some of the values that are accepted for common practice at the U.S. Department of Transportation.

Cost/Benefit Category	Recommended Monetized Value(s)																				
Value of Emissions	<table border="1" data-bbox="666 792 1777 1170"> <thead> <tr> <th data-bbox="666 792 1246 892">Emission Type</th> <th data-bbox="1246 792 1516 892">\$ / short ton (\$2013)</th> <th data-bbox="1516 792 1777 892">\$ / metric ton (\$2013)</th> </tr> </thead> <tbody> <tr> <td data-bbox="666 892 1246 942">Carbon dioxide (CO₂)</td> <td data-bbox="1246 892 1516 942">(varies)*</td> <td data-bbox="1516 892 1777 942">(varies)*</td> </tr> <tr> <td data-bbox="666 942 1246 999">Volatile Organic Compounds (VOCs)</td> <td data-bbox="1246 942 1516 999">\$1,813</td> <td data-bbox="1516 942 1777 999">\$1,999</td> </tr> <tr> <td data-bbox="666 999 1246 1056">Nitrogen oxides (NO_x)</td> <td data-bbox="1246 999 1516 1056">\$7,147</td> <td data-bbox="1516 999 1777 1056">\$7,877</td> </tr> <tr> <td data-bbox="666 1056 1246 1113">Particulate matter (PM)</td> <td data-bbox="1246 1056 1516 1113">\$326,935</td> <td data-bbox="1516 1056 1777 1113">\$360,383</td> </tr> <tr> <td data-bbox="666 1113 1246 1170">Sulfur dioxide (SO_x)</td> <td data-bbox="1246 1113 1516 1170">\$42,240</td> <td data-bbox="1516 1113 1777 1170">\$46,561</td> </tr> </tbody> </table> <p data-bbox="666 1220 1506 1270">* See “Social Cost of Carbon (3%)” values below.</p>			Emission Type	\$ / short ton (\$2013)	\$ / metric ton (\$2013)	Carbon dioxide (CO ₂)	(varies)*	(varies)*	Volatile Organic Compounds (VOCs)	\$1,813	\$1,999	Nitrogen oxides (NO _x)	\$7,147	\$7,877	Particulate matter (PM)	\$326,935	\$360,383	Sulfur dioxide (SO _x)	\$42,240	\$46,561
Emission Type	\$ / short ton (\$2013)	\$ / metric ton (\$2013)																			
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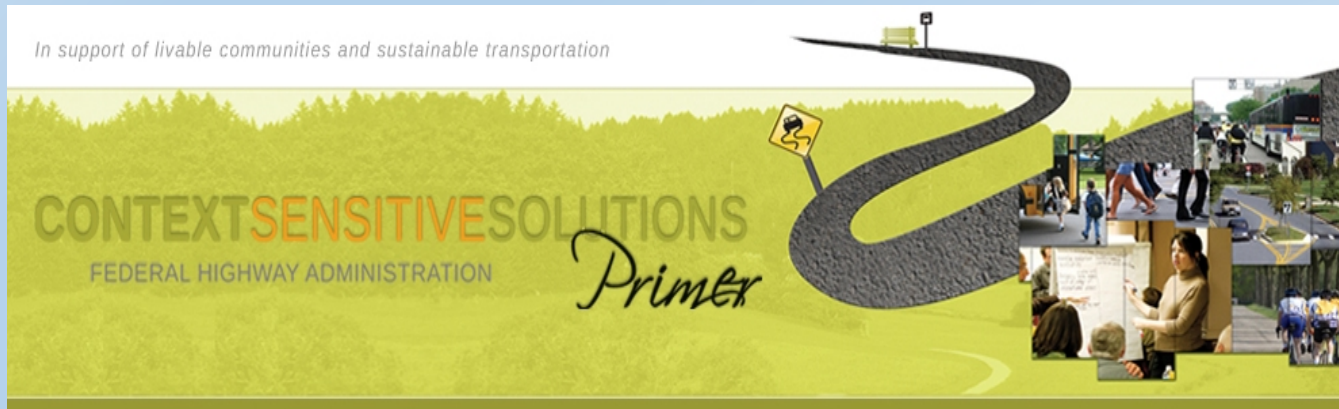
Cost/Benefit Category	Recommended Monetized Value(s)		
Value of Travel Time	Recommended Hourly Values of Travel Time Savings (2013 U.S. \$ per person-hour)		
	Category	Surface Modes* (except High-Speed Rail)	Air and High-Speed Rail Travel
	Local Travel		
	Personal	\$12.50	
	Business	\$24.40	
	All Purposes **	\$13.00	
	Intercity Travel		
	Personal	\$17.50	\$33.20
	Business	\$24.40	\$60.70
	All Purposes **	\$19.00	\$44.30
Truck Drivers	\$25.80		
Bus Drivers	\$26.70		
Transit Rail Operators	\$46.30		
Locomotive Engineers	\$38.70		
Airline Pilots and Engineers	\$84.20		

Cost/Benefit Category	Recommended Monetized Value(s)
Value of Statistical Life (VSL)	\$9,400,000 per fatality (\$2013)

Cost/Benefit Category	Recommended Monetized Value(s)			
Value of Injuries	AIS Level	Severity	Fraction of VSL	Unit value (\$2013)
	AIS 1	Minor	0.003	\$ 28,200
	AIS 2	Moderate	0.047	\$ 441,800
	AIS 3	Serious	0.105	\$ 987,000
	AIS 4	Severe	0.266	\$ 2,500,400
	AIS 5	Critical	0.593	\$ 5,574,200
	AIS 6	Not survivable	1.000	\$ 9,400,000

TBL Valuation System Characteristics

1. Stimulates and facilitates communication
2. Currently bound by BCA conventions
3. Precision tends to trump accuracy
4. Precedents and examples limited
5. Highly complex and technical
6. Limited knowledge management
7. Unused, suspect, and uncomfortable



“...The CSS approach to project development is to simultaneously engage stakeholders and interdisciplinary teams to resolve transportation problems together. It is not only a better way to solve the problem, it often produces a better solution...”

http://www.fhwa.dot.gov/context/css_primer/intro.htm#way

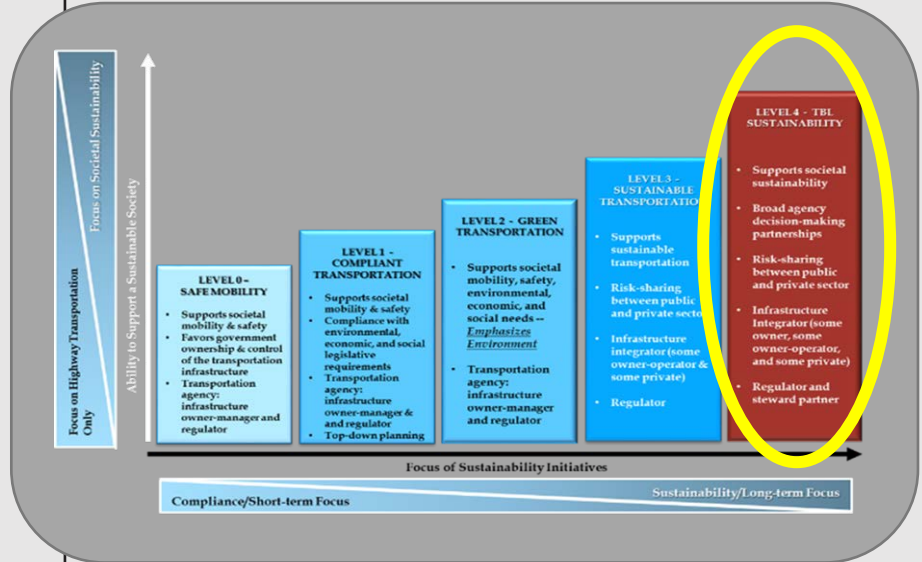
Maturity Level / Results / Metrics

Level 0 Safe Mobility	<ol style="list-style-type: none"> 1. Mobility 2. Safety 3. Economic development
Level 1 Compliant Transportation	<ol style="list-style-type: none"> 1. Mobility 2. Safety

AADT / Speed
Crash rates / Fatalities
Stakeholder Satisfaction

“Doing the project right. And, doing the right project ...”

Lev Tra



Level 3 Sustainable Transportation	<ol style="list-style-type: none"> 1. Sustainability (Green) 2. Mobility 3. Accessibility 4. Safety 5. Economic Development 6. Connectivity 7. System efficiency 8. Public Participation
------------------------------------	--

Crash rates / Fatalities
Stakeholder Satisfaction
Multi-modal \$
Congestion / Hours of delay
Inform /Engage

Level 4 TBL Sustainability	<ol style="list-style-type: none"> 1. Sustainability (TBL): <ol style="list-style-type: none"> 1. Mobility and safety 2. Accessibility 3. Connectivity 4. System efficiency <p>Public Participation</p>
----------------------------------	---

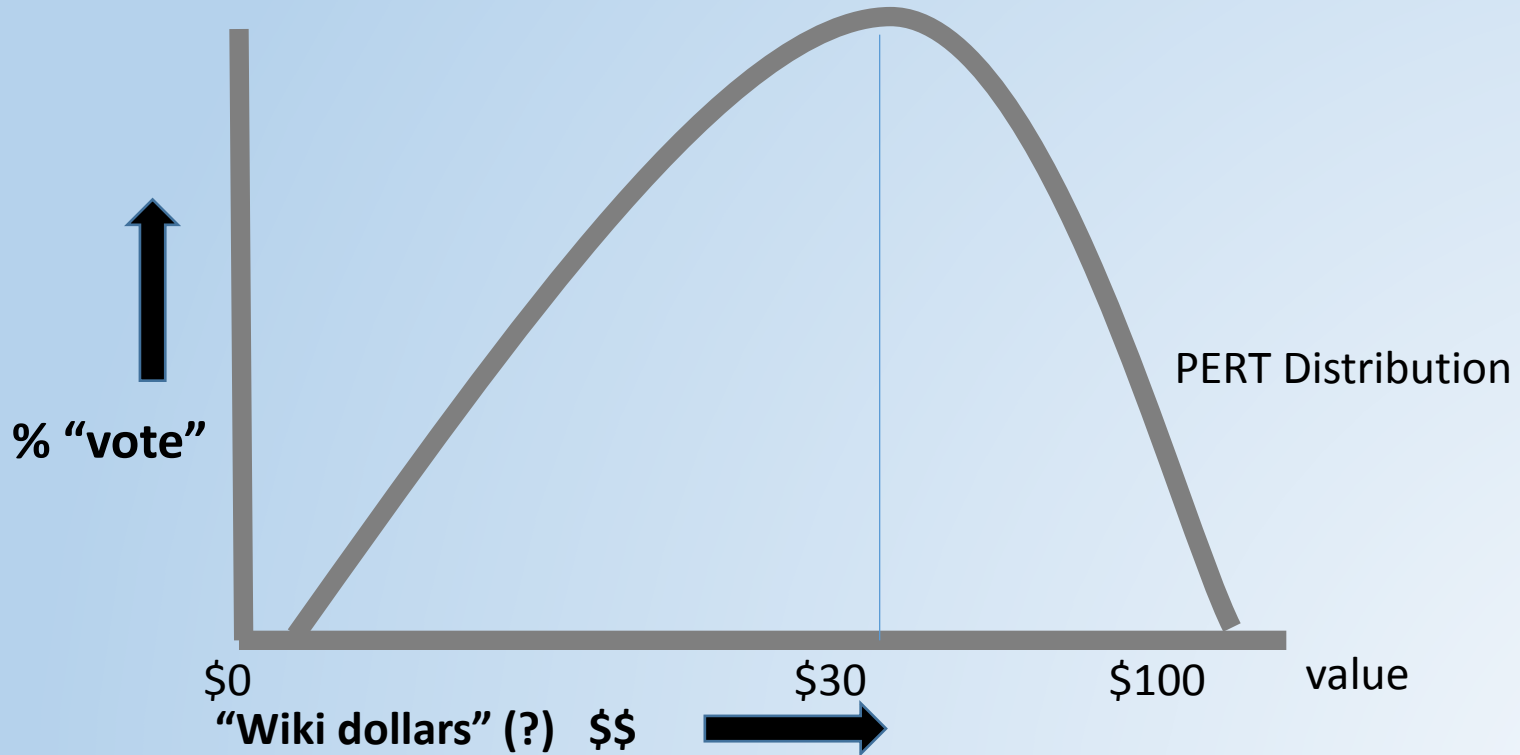
Ratings 3.0 / TBL Valuation 2.0

- **AADT / Crash rates / Fatalities**
- **Stakeholder Satisfaction BCA**
- **Demand satisfaction**
- **Valuation BCA**
- ***Involve in valuations for BCA***

Community input / values...

Low Most Likely High

Value of a Paratransit Ride?



“Delphi Methods” to communicate value

“What is your estimate or sense of the value for your Goal Area?” , i.e.

For your team area, “What % of annual project cost is (min, max &/or likely) expected?”

Minimum

Likely

Maximum

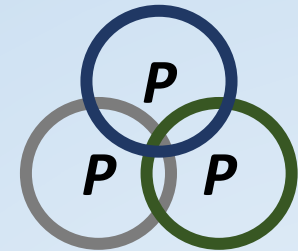
- | | | |
|---|-----------------------|-----------------------|
| <input type="radio"/> 1000% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> -100% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> -10% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> 0 | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> +10% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> +100% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> +1000% | <input type="radio"/> | <input type="radio"/> |
| <input type="radio"/> Other _____%, or absolute _____\$ | | |

Please select one from each column & / or specify some other value. Explain / elaborate on reasoning behind your “likely” selection as time permits. “Group consensus” is perfectly acceptable as a response.

Comments:

NCHRP 750 Vol. 4 - Sustainability Maturity Model: Framework, Tools, and Application

- Objective: Support for a More Sustainable Society...
- Maturity Levels / Tools
- ***Organizational Assessment***
- Case Studies Caltrans, NYSDOT



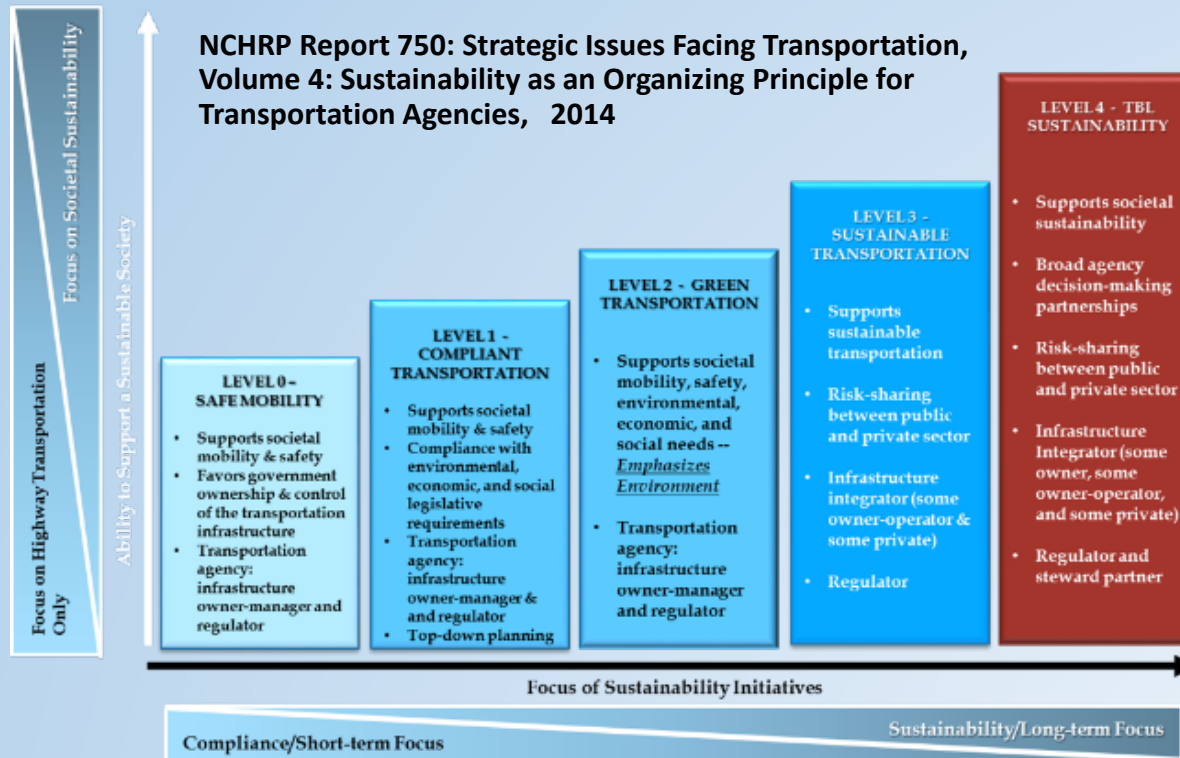
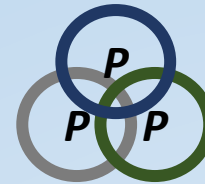
Benchmarking Tool (Conversation Starter)

Maturity level	Characteristics	Score
Safe Mobility	<ul style="list-style-type: none"> • Support societal mobility • Favors government ownership & control of the transportation infrastructure • Transportation agency as infrastructure owner–manager & regulator 	8 to 11
Compliant Transportation	<ul style="list-style-type: none"> • Support societal mobility • Compliance with environmental, economic, and social legislative requirements • Transportation agency as infrastructure owner–manager & regulator • Top-down, planning 	12 to 19
Green Transportation	<ul style="list-style-type: none"> • Support societal mobility & environmental, economic, and social needs—<i>emphasizes environment</i> • Transportation agency as infrastructure owner–manager & regulator 	20 to 27
Sustainable Transportation	<ul style="list-style-type: none"> • Support sustainable transportation • Favors partnerships between public and private sector • Transportation agency as infrastructure coordinator & regulator 	28 to 36
Support TBL Sustainability	<ul style="list-style-type: none"> • Support societal sustainability • Agnostic on issues of ownership or control of transportation infrastructure—whatever is most sustainable • Transportation agency as transportation system steward 	37 to 40

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_750v4.pdf

Transportation Agency Sustainability Maturity Model

Open Source Version 1.1



<https://www.surveymonkey.com/r/8BKKZ3H>

Maturity Model List of Functions

6 / 15

40%

Appendix F, TBL Maturity Assessment Tool from NCHRP Report 750 Volume 4 assesses sustainability maturity by high level agency function to map where the agency is and where it might want to go by function on a progressive 0-4 maturity scale. The agency functions described below are the definitions used in Appendix F of the NCHRP report. They will be used in the survey questions that follow and are provided below for context.

A. Consensus on Needs and Goals

Processes by which transportation policy systems identify needs, gaps, and requirements; build consensus around a prioritized ranking of potential needs; and develop acceptable goals and priorities for transportation.

B. Planning and Programming

Processes by which transportation plans are created to carry out the goals developed in the consensus building, needs assessment, and goals setting processes. These plans are then turned into processes, which are created and authorized to carry out the goals set in the consensus building, needs assessment, project prioritization, and goals and objectives setting processes.

C. Budgeting and Resource Allocation

Processes by which transportation policy systems determine how to collect and distribute resources among different projects and programs (includes budgeting and allocation).

D. Rulemaking and Regulation

Processes by which rules, regulations, standards, and guidelines are established for compliance with legislated mandates and laws.

E. Service and Product Delivery

Processes by which transportation policy systems deliver transportation goods and services to the public and ensure that the level and quality of services meet goals and established standards.

F. Compliance and Dispute Resolution

Processes by which the transportation community sees that the intent of legislation, standards, and regulations are complied with—and processes by which disagreements over interpretations or tradeoffs can be resolved.

G. Education and Training

Processes by which the transportation community is educated to understand and embrace evolving organizing principles and to adopt (and invest in) behavioral norms associated with those principles.

Please check all that apply routinely

Function A. Consensus on Needs and Goals

5. (A.0) Base Case

- Needs driven by political decision makers and major stakeholders
- Goals constrained by funding and regulations (including environmental)
- Public participation limited to formal regulated processes

6. (A.1) Level 1

- Significant attention to regulatory compliance (including environmental)
- Some formal outreach and consensus-building

7. (A.2) Level 2

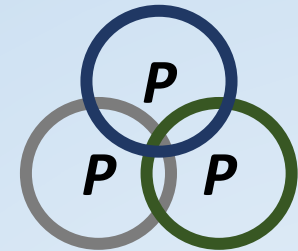
- Needs shaped by political decision makers and major stakeholders, and assessment of public sentiment
- Clear focus on environmental improvement, stewardship, and social context
- Significant formal outreach and consensus-building

8. (A.3) Level 3

- Needs driven by public sentiment, performance, and sustainability considerations
- Goals focus on sustainable transportation services and programs
- Substantial transparency and active outreach and two-way public dialogue

NCHRP 750 Vol. 4 - Sustainability Maturity Model: Framework, Tools, and Application

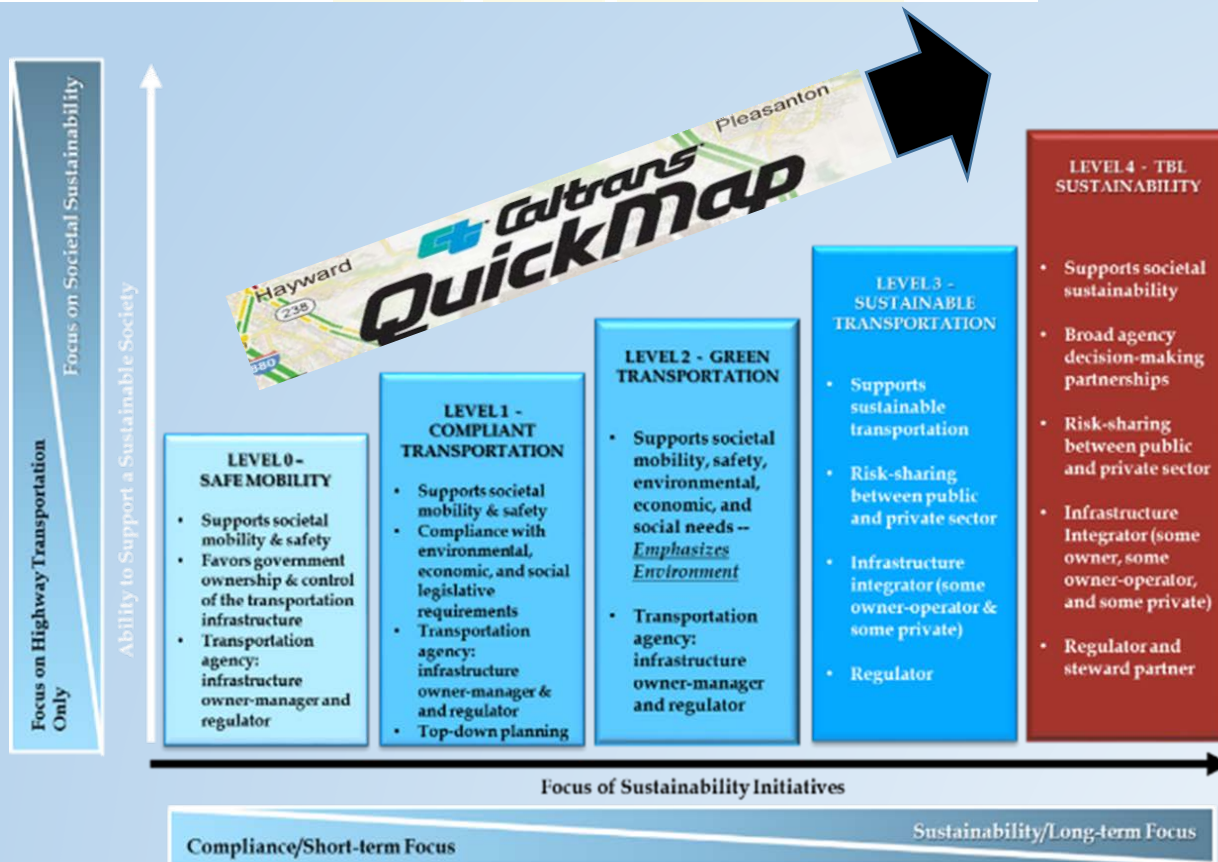
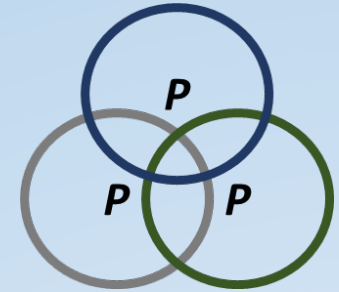
- Objective: Support for a More Sustainable Society...
- Maturity Levels / Tools
- Organizational Assessment
- ***Case Studies Caltrans, NYSDOT***





Our Mission

Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.



NCHRP 750 Vol 4 Sustainability Maturity Model (Caltrans Version)

SUSTAINABILITY MATURITY MODEL		Source: NCHRP Report 750, Volume 4 (Appendix F) With a few modifications.				
		LEVEL 0 –	LEVEL 1 –	LEVEL 2 –	LEVEL 3 –	LEVEL 4 –
		SAFE MOBILITY	COMPLIANT TRANSPORTATION	GREEN TRANSPORTATION	SUSTAINABLE TRANSPORTATION	TRIPLE BOTTOM LINE (TBL) SOCIETAL SUSTAINABILITY
Type		Safety Mobility	Compliant Environmental	Begin Environmental, Economic, and social Equity (3E) – Emphasizes Environment	Supports Balanced Sustainable 3E Transportation	Supports societal sustainability (TBL) that integrates transportation with societal quality of life
Support & Infrastructure		<ul style="list-style-type: none"> Supports societal mobility & safety Favors government ownership & control of the transportation infrastructure Transportation agency: infrastructure owner-manager and regulator 	<ul style="list-style-type: none"> Supports societal mobility & safety Compliance with environmental, economic, and social legislative requirements Transportation agency: infrastructure owner-manager & regulator Top-down planning 	<ul style="list-style-type: none"> Supports societal mobility, safety, environmental, economic, and social needs – Emphasizes Environment Transportation agency: infrastructure owner-manager and regulator 	<ul style="list-style-type: none"> Supports balanced sustainable transportation Risk-sharing between public and private sector Infrastructure integrator (some owner-operator & some private) Cross-Asset Optimization Transportation Asset Management Regulator 	<ul style="list-style-type: none"> Supports societal sustainability TBL Broad agency decision-making partnerships Risk-sharing between public and private sector Infrastructure Integrator (some owner, some owner-operator, and some private) Regulator and steward partner
A. Consensus on Needs & Goals (Drivers)		<ul style="list-style-type: none"> Needs driven by political decision-makers and major stakeholders Strategic goals determined by high-level decision-makers and constrained by funding and regulations (including environmental) Public participation limited to formal regulated processes 	<ul style="list-style-type: none"> Needs driven by political decision-makers and major stakeholders Strategic goals determined by high-level decision-makers and constrained by funding and greater focus on regulatory compliance (including environmental) Some outreach and public consensus building 	<ul style="list-style-type: none"> Needs driven by political decision-makers, major stakeholders, and assessment of public sentiment Greater focus on environmental improvement, stewardship, and social context Significant [formal] outreach and consensus-building efforts 	<ul style="list-style-type: none"> Needs more driven by public sentiment, performance, and sustainability considerations Goals focus on sustainable transportation services and programs More transparency and active outreach and two-way public dialogue 	<ul style="list-style-type: none"> Cross-agency TBL decision-makers, stakeholders, and the public participate actively in needs determination and goal-setting Goals and policies focused on TBL sustainability Active two-way public engagement and consensus in strategic decisions
D. Rulemaking & Regulatory	Governance & Policy Making	<ul style="list-style-type: none"> Highly politicized Informal brokering between powerful stakeholders 	<ul style="list-style-type: none"> Highly politicized Informal brokering between powerful stakeholders Dependence on law and judicial system Adversarial relationship between key stakeholder groups 	<ul style="list-style-type: none"> Less influenced by powerful stakeholders in the decision-making process Dependence on law and judicial system Less adversarial relationship between key stakeholder groups and more constructive dialogue 	<ul style="list-style-type: none"> Emphasizes “deliberate and decide” and constructive engagement Avoids dependence on law and judicial system 	<ul style="list-style-type: none"> Politics minimized—public involvement and transparency in compliance issues Emphasizes “deliberate and decide” and emphasis on constructive engagement to solve problems Avoids dependence on law and judicial system
H. Outreach & Communication (& Partnership)		<ul style="list-style-type: none"> One-way communication to explain transportation priorities and plans 	<ul style="list-style-type: none"> One-way communication to explain transportation priorities and plans with formal requirements to present plans but limited feedback 	<ul style="list-style-type: none"> One-way communication to explain transportation priorities and plans with highly structured presentation and feedback 	<ul style="list-style-type: none"> Sustainable Transportation two-way active engagement and communication between transportation agencies, public, stakeholders, and decision-makers 	<ul style="list-style-type: none"> Full TBL regular two-way active engagement and communication between transportation agencies, public, stakeholders, and decision-makers Involvement of stakeholders at all stages of the decision-making and planning process Active outreach to identify and include previously underrepresented groups
						Shared Infrastructure & Decisions
						Shared Goal-setting & Public Consensus
						Shared Transparency
						Shared Engagement & Communication

<http://1drv.ms/1GjKsJb>

Caltrans Strategic Management Plan -



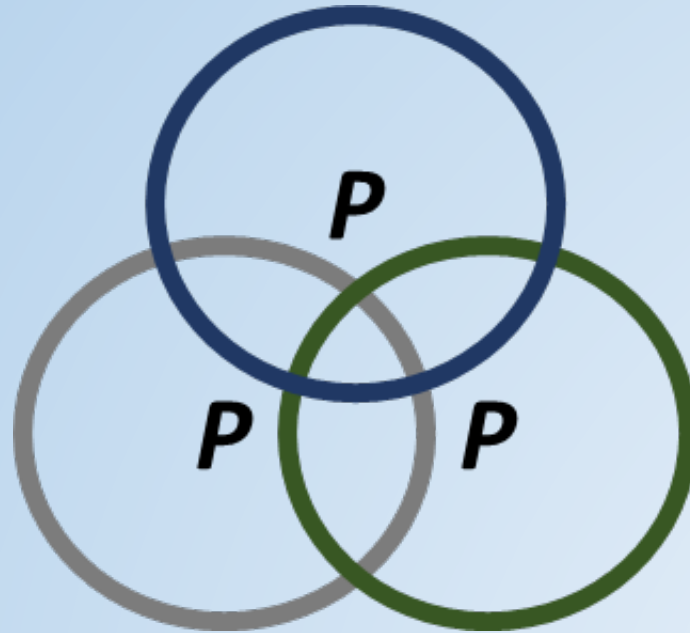
Good

Better

Best...

Safety and Health

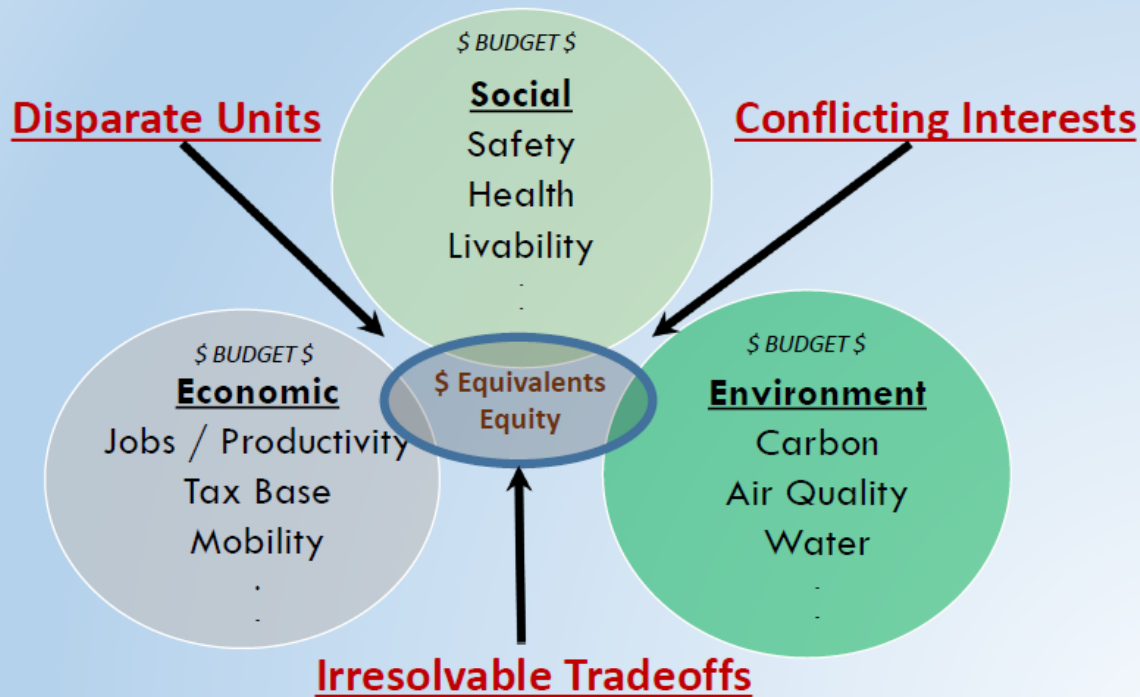
Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.



Stewardship and Efficiency

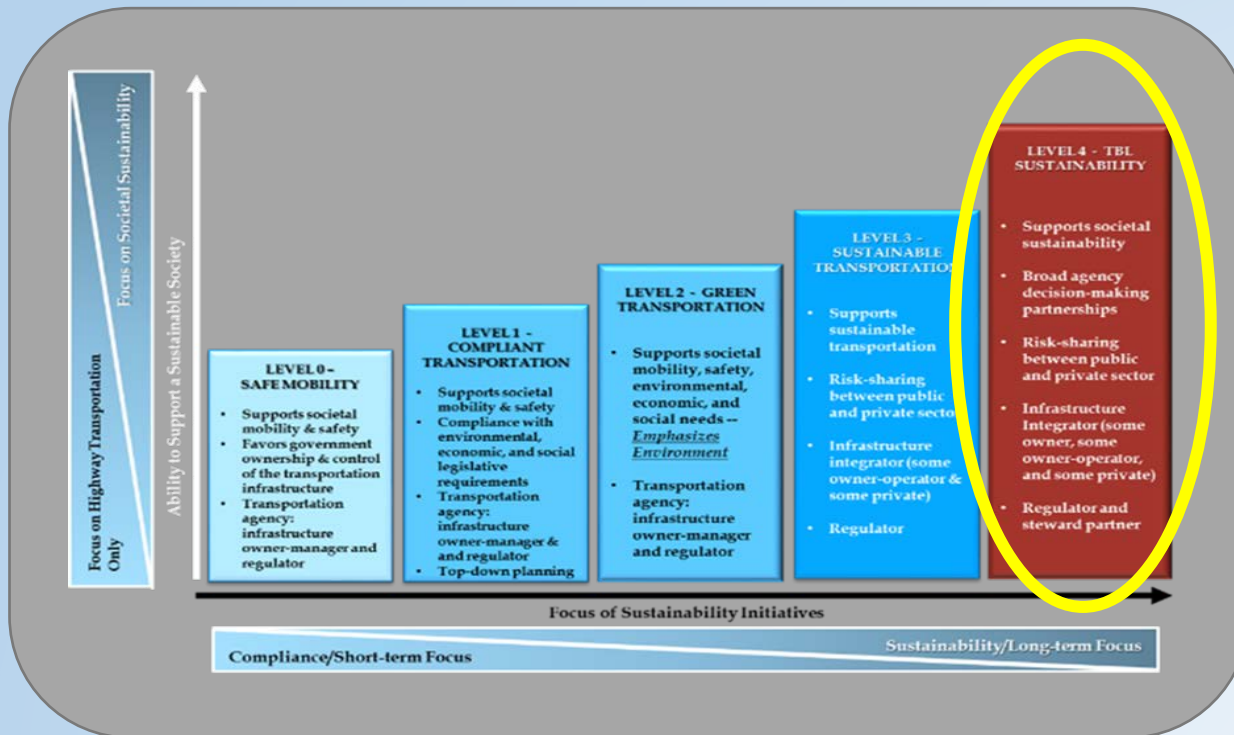
Money counts. Responsibly manage California's transportation-related assets

\$\$\$ -- "The Dismal Science" -- \$\$\$



Sustainability, Livability and Economy

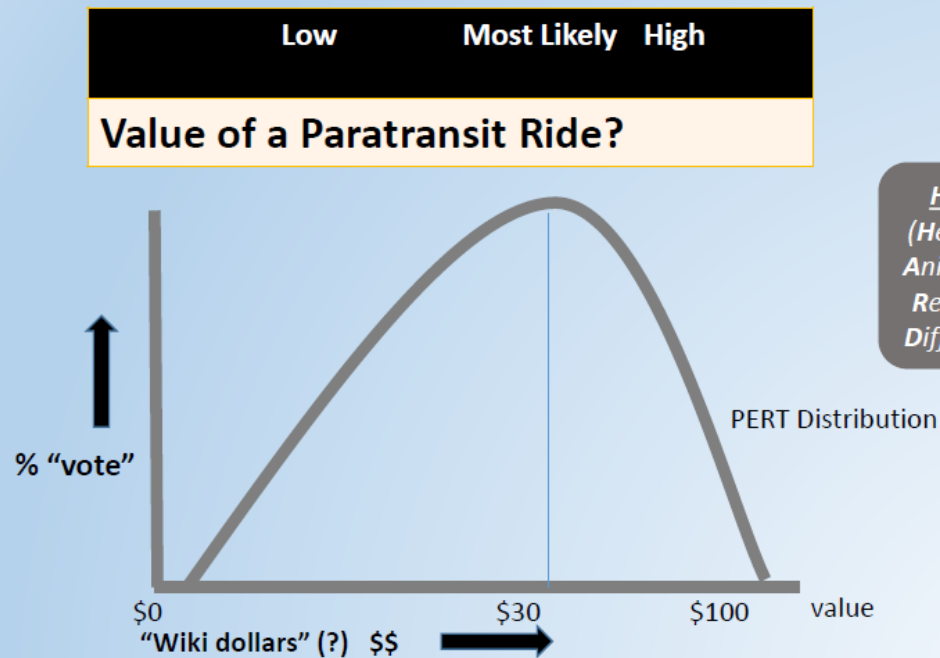
Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.



System Performance


Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.

Community input / values...

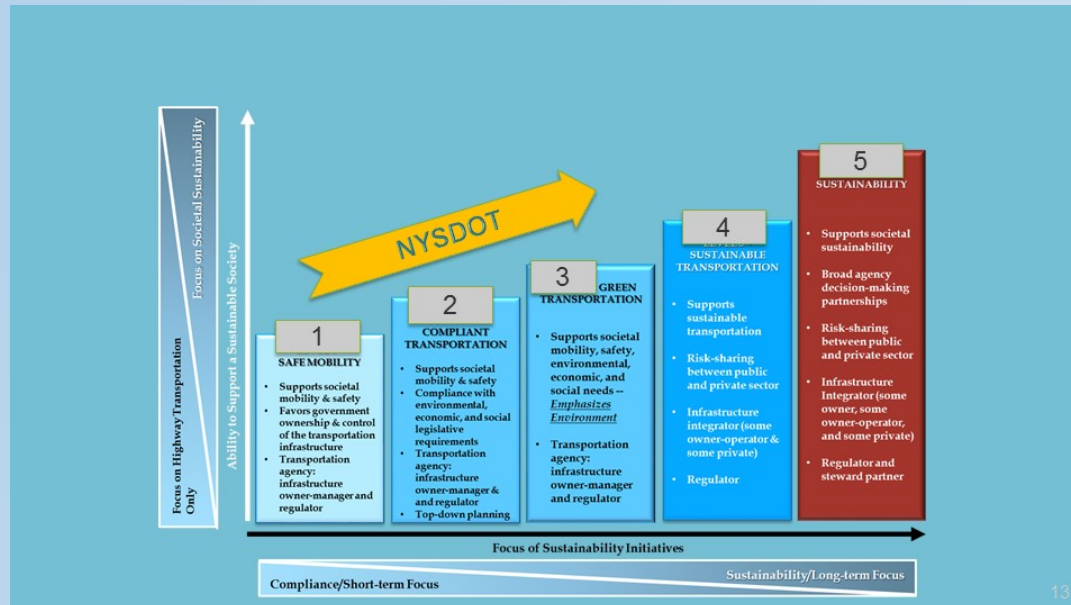


Organizational Excellence

Be a national leader in delivering quality service through excellent employee performance, public communication and accountability.

	Governance and Policymaking	Decision-making	Enterprise Management
 <p>High-Level Functions</p>	Consensus on Needs and Goals	Planning and Programming	Service and Product Delivery
	Regulation and Rulemaking		
	Outreach and Communications	Budgeting and Resource Allocation	
	Compliance and Dispute Resolution		
	Education, Training, and Culture Change		

NYSDOT APPLICATION



Sustainability as an Organizing Principle
 Survey: NCHRP 750, Volume 4
 November 2014

Please check all that apply routinely at NYSDOT.

Questions were edited & regrouped
by topic to better illustrate
progression

3. Needs

- Needs driven by political decision makers and major stakeholders
- Needs shaped by political decision makers and major stakeholders, **and assessment of public sentiment**
- Needs driven by **public sentiment, performance, and TBL sustainability (Triple Bottom Line - economic, social, environmental)**
- Cross-agency decision makers, stakeholders, and the public participate actively** in needs determination and goal-setting

4. Goals

Functions remained intact

- Goals constrained by funding and regulations (including environmental)
- Goals **focus on sustainable (TBL - Triple Bottom Line - economic, social, environmental) transportation services and programs**
- Goals and policies focus on TBL sustainability, i.e. goals and policies advance economic, social and environmental conservation**

5. Public Participation

Three additional questions were
added to gain input on next steps

- Public participation limited to formal regulated processes
- Some formal outreach and consensus-building**
- Significant formal outreach** and consensus-building
- Substantial transparency and active outreach** and two-way public dialogue
- Active two-way public engagement** and consensus in strategic decisions

6. Environment

Observations on NYSDOT Assessment:

1. Useful for benchmarking
2. Helped discover staff sustainability perceptions
3. Helpful in charting next steps
4. Illustrated the importance of external factors, e.g.. Budget, Laws, Staffing, Expectations
5. *Stimulated dialog*

Additional Information:

- http://events.webcastingconferences.com/600_trb_sustainability/lobby/04_br2/ Transportation for Sustainability- An International Conference May 7-8, 2015 Washington, D.C.
- <http://www.trb.org/Main/Blurbs/173034.aspx> TRB Webinar: The Vital Role of Operations and Maintenance in Supporting and Enhancing Sustainability October 15, 2014
- McVoy, Gary (2015) , VALUATION ANALYSIS IN SUPPORT OF TRANSPORTATION ORGANIZATIONS ADOPTING SUSTAINABILITY AS AN ORGANIZING PRINCIPLE, TRB Annual meeting 2015 <http://amonline.trb.org/trb57535-2015-1.1793793/t008-1.1817812/305-1.1802574/15-1912-1.1802598?qr=1>
- McVoy, Gunasekera, Sousa, and Schaffner, Proceedings of the 2013 International Conference on Ecology and Transportation (ICOET 2013) An Analytical Framework For Sustainability Analysis Of Transportation Investments Across The Triple Bottom Line Using A Common Metric http://www.icoet.net/ICOET_2013/documents/papers/ICOET2013_Paper202C_McVoy_et_al.pdf
- McVoy, G. and Schaffner, P. (2014) Means and Methods for Making the Business Case for Infrastructure Projects in Support of a Sustainable Society. ICSI 2014: pp. 312-322. <http://ascelibrary.org/doi/abs/10.1061/9780784478745.027>
- McVoy, Gary (2010), et al. “Moving Towards Sustainability: NYS Department of Transportation’s GreenLITES Story”. ASCE, <https://www.dot.ny.gov/programs/greenlites/repository/ASCE%2520GreenLITES%2520Final%2520Paper%25207-12-10.pdf>

"The obligation of any component is to contribute its best to the *system*, not to maximize its own production, profit, or sales ... "

- Dr. W. Edwards Deming



NCHRP 750 Vol. 4 - Sustainability Maturity Model:

- ✓ Objective: Support for a More Sustainable Society...
- ✓ Maturity Levels / Tools
- ✓ Organizational Assessment
- ✓ Case Studies: Caltrans, NYSDOT

Transportation in support of a more sustainable society...

NCHRP Webinar - Sustainability as an Organizing Principle for Transportation Agencies

NYSDOT Experiences

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Director Policy, Planning and Performance

Testing the Tool

NCHRP Sustainability Maturity Survey per 750 Vol 4, Sustainability as an Organizing Principle 1.01

Maturity Model List of Functions

Functions remained intact

6 / 15

40%

Appendix F, TBL Maturity Assessment Tool from NCHRP Report 750 Volume 4 assesses sustainability maturity by high level agency function to map where the agency is and where it might want to go by function on a progressive 0-4 maturity scale. The agency functions described below are the definitions used in Appendix F of the NCHRP report. They will be used in the survey questions that follow and are provided below for context.

A. Consensus on Needs and Goals

Processes by which transportation policy systems identify needs, gaps, and requirements; build consensus around a prioritized ranking of potential needs; and develop acceptable goals and priorities for transportation.

B. Planning and Programming

Processes by which transportation plans are created to carry out the goals developed in the consensus building, needs assessment, and goals setting processes. These plans are then turned into processes, which are created and authorized to carry out the goals set in the consensus building, needs assessment, project prioritization, and goals and objectives setting processes.

C. Budgeting and Resource Allocation

Processes by which transportation policy systems determine how to collect and distribute resources among different projects.

D. Rulemaking and Regulation

Processes by which rules, regulations, standards, and guidelines are established for compliance with legislated mandates.

E. Service and Product Delivery

Processes by which transportation policy systems deliver transportation goods and services to the public and ensure that they are accessible to all.

F. Compliance and Dispute Resolution

Processes by which the transportation community sees that the intent of legislation, standards, and regulations are complied with and any resulting tradeoffs can be resolved.

G. Education and Training

Processes by which the transportation community is educated to understand and embrace evolving organizing principles and practices.

H. Outreach and Communication

Processes by which information on needs, strategies, expectations, and results are shared broadly by stakeholders in the transportation community to support consensus-building, policy-making, planning, and decision making.

SurveyMonkey Preview & Test: Sustainability as an Organizing Principle 1.01
SurveyMonkey, Inc [US] <https://www.surveymonkey.com/create/survey/preview?sm-t>

Please check all that apply routinely at NYSDOT.

3. Needs

- Needs driven by political decision makers and major stakeholders
- Needs shaped by political decision makers and major stakeholders, and assessment of public sentiment
- Needs driven by public sentiment, performance, and TBL sustainability (Triple Bottom Line)
- Cross-agency decision makers, stakeholders, and the public participate actively in needs definition

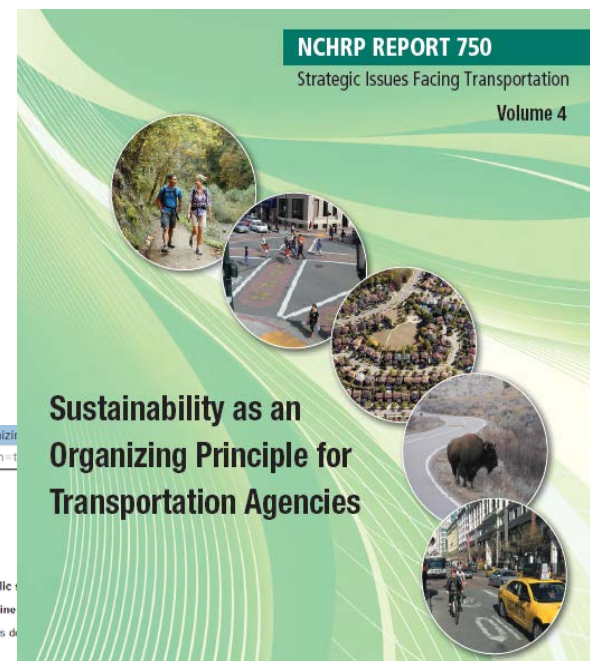
4. Goals

- Goals constrained by funding and regulations (including environmental)
- Goals focus on sustainable (TBL - Triple Bottom Line - economic, social, environmental) transportation services and programs
- Goals and policies focus on TBL sustainability, i.e. goals and policies advance economic, social and environmental considerations

5. Public Participation

- Public participation limited to formal regulated processes
- Some formal outreach and consensus-building
- Significant formal outreach and consensus-building
- Substantial transparency and active outreach and two-way public dialogue
- Active two-way public engagement and consensus in strategic decisions

6. Environment



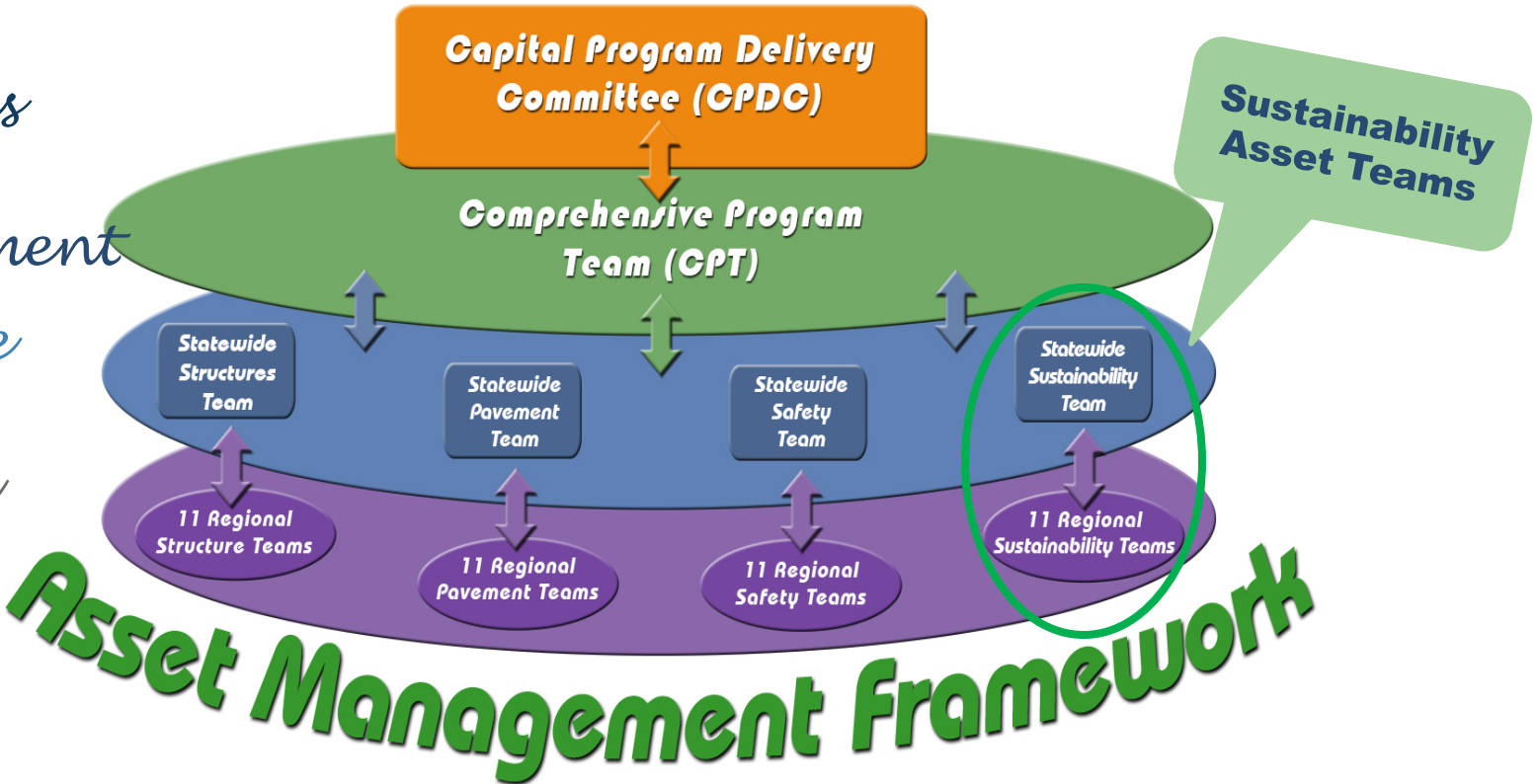
Edited questions were regrouped by topic to better illustrate progression

NYSDOT's Additional Survey Questions

- ➔ What is one action NYSDOT can take now that would significantly advance the agency's statewide sustainability efforts in a tangible way?
- ➔ What is one action you or your program area can take now that would significantly advance sustainability efforts in your Region/Program Area?
- ➔ Given where you think the agency is in its sustainability journey, do you see anything holding back NYSDOT from making continuous improvement? If yes, what?

NYSDOT Asset Management & Sustainability Teams

NYSDOT Executives
Senior Management
Statewide Teams
Regional Teams



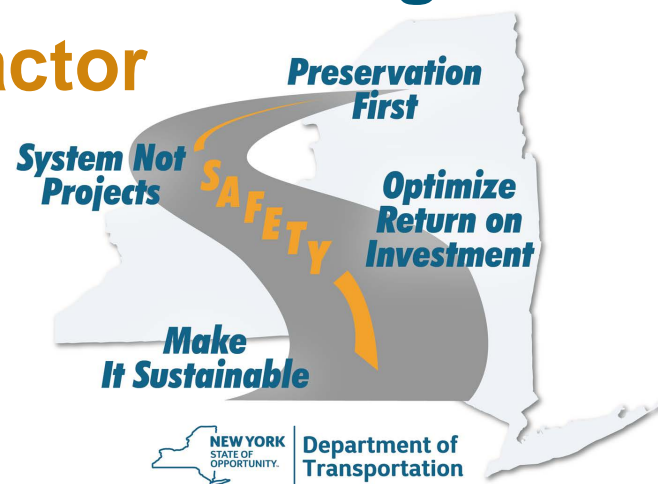
Recent Sustainability Developments

⇒ New Capital Program decision making tools:

❖ Corridor Importance Factor

❖ SMART Evaluations

- Safety
- Mobility
- Access
- Resiliency
- Transportation



Corridor Importance Factor

	%	Value (0-5)	Score
Freight	10.00%	0	0
Agriculture	15.00%	0	0
Economic	70.00%	0	0
Func. Class	5.00%	0	0
Corridor Importance Score 0 - 25			

New Project Input Form

Enter SPP Candidate **SMART** Projects
Submit Cancel Close

Region

Special Circumstance or Critical Linkage?

If Yes, Explain (255):

Public Friendly Description

PIN County

Project Description

SFY Letting Year

Treatment Cost Construction Cost Total Cost

Smart Project Primary Reason

- Safety
- Mobility
- Accessibility
- Resiliency
- Multi-Purpose

PavementData BridgeData Corridor Importance Factor

Select Route

From To

Select County Order County Order

Select Begin MP To Select End MP

Lane Miles

No. of Segments

Functional Classification

Asset Ownership

Pavement Work Type

Pavement Index

	%	Value	Score
Surface Rating	20.00%		
IRI	20.00%		
Dominant Distress	10.00%		
Rutting	5.00%		
Bumping	5.00%		
AADT	25.00%		
Trucks	15.00%		
Total Pavement Index		0 - 100	

Work in Progress...

Safety	Mobility	Accessibility	Resiliency	Transportation
<p>Crash Pattern Addressed? N/A</p> <p>Explain (255)</p>	<p>ITS Technologies (check all that apply)</p> <p><input type="checkbox"/> Detection Systems</p> <p><input type="checkbox"/> Cameras</p> <p><input type="checkbox"/> Network communication</p> <p><input type="checkbox"/> VMS Installations</p> <p><input type="checkbox"/> Travel Time Signs</p> <p><input type="checkbox"/> WIM/e-screening</p> <p><input type="checkbox"/> Other (Explain)</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>	<p>Pedestrian and Bicyclist facilities (check all that apply)</p> <p><input type="checkbox"/> Sidewalks</p> <p><input type="checkbox"/> Shoulders</p> <p><input type="checkbox"/> "Road Diet" modifications</p> <p><input type="checkbox"/> Pavement markings</p> <p><input type="checkbox"/> Signage (way finding, high visibility)</p> <p>Appurtenances/street furniture (e.g., benches, bike racks, energy efficient safety lighting, etc)</p> <p><input type="checkbox"/> Traffic calming (e.g., bulb outs, raised pedestrian refuge medians and corner islands, raised crosswalks, mid block crossings, consolidate driveways, etc.</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>	<p>Flood/Scour Risk (check all that apply)</p> <p><input type="checkbox"/> Addresses a risk due to flooding, storm surge or sea level rise at an at-risk location in CAMCI Viewer</p> <p><input type="checkbox"/> Improves a scour critical bridge</p> <p><input type="checkbox"/> Improves a culvert</p> <p><input type="checkbox"/> Other (Explain)</p> <p>These strategies: N/A</p> <p>Explain (255)</p>	<p>Leverages other funds beyond standard match requirements (check all that apply)</p> <p><input type="checkbox"/> Partners with other government agency or NGO beyond standard NYS DOT practice</p> <p><input type="checkbox"/> Leverages an REDC or other grant</p> <p><input type="checkbox"/> Match is above minimum requirement</p> <p>These strategies: N/A</p> <p>Explain (255)</p>
<p>Systemic treatments Addressed (check all that apply)</p> <p><input type="checkbox"/> Centerline Audible Roadway Delineator (CARD)</p> <p><input type="checkbox"/> Pedestrian Countdown Timers</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>	<p>System Optimization (check all that apply)</p> <p><input type="checkbox"/> Signal Upgrades/Life Cycle Replacement</p> <p><input type="checkbox"/> Signal Timing & Coordination</p> <p><input type="checkbox"/> Transit Signal Priority</p> <p><input type="checkbox"/> ICM/ATDM</p> <p><input type="checkbox"/> Intersection Improvements (Alignment, Turning Lane, Channelization, roundabouts, etc.)</p> <p><input type="checkbox"/> Other (Explain)</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>	<p>Improves access to transit or transit operations (check all that apply)</p> <p><input type="checkbox"/> Shelter/stops</p> <p><input type="checkbox"/> Bypass lanes</p> <p><input type="checkbox"/> Pullouts</p> <p><input type="checkbox"/> Transit signal priority</p> <p><input type="checkbox"/> Connection to a transit system (e.g., park & Ride)</p> <p><input type="checkbox"/> Other (Explain)</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>	<p>Emergency Route Redundancy (check all that apply)</p> <p><input type="checkbox"/> Signed emergency evacuation route or access to an emergency facility (hospital, etc)</p> <p><input type="checkbox"/> Facility is part of a redundant transportation system</p> <p>These strategies: N/A</p> <p>Explain (255)</p>	<p>Elements to protect or enhance the environment (check all that apply) GreenLITES Scorecard</p> <p><input type="checkbox"/> Improves air quality (e.g., roundabouts, increased use of transit/intermodal connection – CMAQ eligible activities)</p> <p><input type="checkbox"/> Uses GreenLITES scorecard Sustainable Site (S) category S-1, S-2, S-3 items.</p> <p><input type="checkbox"/> Uses GreenLITES scorecard Water Quality (W) category item.</p> <p><input type="checkbox"/> Protects, restores or enhances natural habitats or uses a GreenLITES scorecard Sustainable Site (S) S-4 or S-5 items</p> <p><input type="checkbox"/> Wetland protection/stream restoration</p> <p><input type="checkbox"/> Incorporates green energy or energy efficiency techniques (e.g., solar lighting, LED street lights, removing lighting and replacing with highly reflective signs)</p> <p><input type="checkbox"/> Other (Explain)</p> <p>These Treatments are: N/A</p> <p>Explain (255)</p>
<p># fatal/serious injury crashes reduced annually: <1</p> <p># PDO crashes reduced annually: <1</p> <p>B/C Ratio: <1</p>			<p>Green Infrastructure (Storm Water Mgt) (check all that apply)</p> <p><input type="checkbox"/> Bioretention/rain gardens</p> <p><input type="checkbox"/> Porous pavement</p>	