

Federal Highway Administration (FHWA)

Scenario Planning Applications for Freight Transportation

July 30, 2014
1:00 – 2:30 pm ET



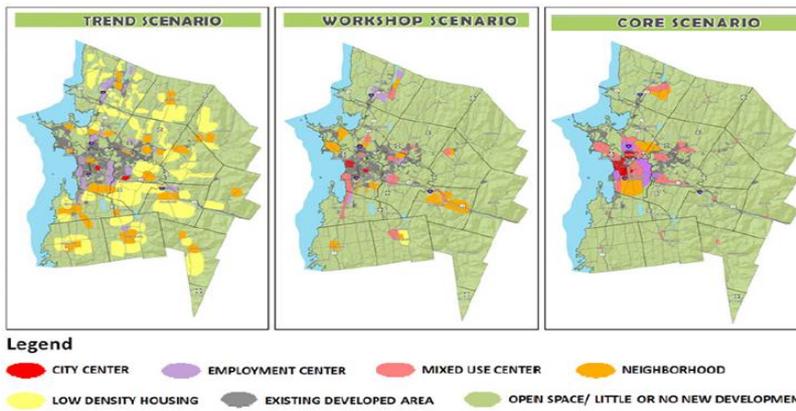
Webinar Agenda

- Overview of Scenario Planning
 - What is Scenario Planning?
 - FHWA / FTA Scenario Planning Program
 - Applying Scenario Planning for Freight Transportation
- Freight Transportation Scenario Planning Overview: Understanding the Possible Impact Factors
 - **Dr. Chris Caplice**, Massachusetts Institute of Technology
- Understanding Hypothetical Future Scenarios to Enhance Freight Transportation Planning – DOT/MPO Perspectives
 - **Barbara Ivanov**, Washington State Department of Transportation
 - **Ted Dahlburg**, Delaware Valley Regional Planning Commission
- Q&As / Discussion



What is Scenario Planning?

- Scenario planning is a process that **identifies, explores, and assesses future alternatives** for transportation, growth, land use, economic development, and other issues.
- Scenario planning **proactively engages stakeholders and the public.**



What are Some Benefits of Scenario Planning?

- Scenario planning can support:
 - More strategic transportation and land use decision-making.
 - Active stakeholder involvement.
 - Dialogue among transportation and land use professionals, and members of the community.
 - Consensus building.



MAP-21 Language

- (4) *OPTIONAL SCENARIO DEVELOPMENT.* —

(A) IN GENERAL.—A metropolitan planning organization may, while fitting the needs and complexity of its community, voluntarily elect to develop multiple scenarios for consideration as part of the development of the metropolitan transportation plan, in accordance with subparagraph (B).

- Subtitle B—Performance Management
SEC. 1201. METROPOLITAN
TRANSPORTATION PLANNING



MAP-21 Performance Management

- *SEC. 1201. METROPOLITAN TRANSPORTATION PLANNING*

Subparagraph B

Recommended Components:

- Regional investment strategies;
- Population and employment;
- Maintains or improves baseline conditions for the performance measures identified in subsection (h)(2);
- Revenue constrained scenarios; and
- Estimated costs and potential revenues available to support each scenario.



How Does FHWA Support Scenario Planning?

- FHWA / FTA Scenario Planning Program:
 - Sponsors scenario planning workshops and webinars.
 - Provides guidance and assistance to agencies using scenario planning.
 - Collects and shares innovative practices and lessons learned through case studies and research.
 - Provides information on tools and resources.

FHWA Scenario Planning Program Website:
www.fhwa.dot.gov/Planning/scenplan/index.htm



Applying Scenario Planning to Freight Transportation

- It is important to understand how freight works when conducting freight scenario planning activities.
 - Freight transportation is multimodal and often long distance.
 - Freight transportation volumes are driven by company and ultimately consumer demand.
 - Freight transportation demand has a close tie to the types of land uses in communities and other locations.





Understanding Freight Scenario Planning Factors

- Freight transportation demand, while often consistent over time, can sometimes change significantly due to a variety of factors:
 - Natural or human-induced disasters or events
 - Macro-scale economic changes
 - Demographic changes
 - Political and/or regulatory changes
 - Infrastructure availability changes
 - Technological developments
- Understanding the factors that can impact freight transportation and the implications of changes related to those factors can enhance transportation planning efforts.



Resources

- **FHWA Scenario Planning Website**

www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning

- **FHWA-FTA Transportation Planning Capacity Building – Scenario Planning Website**

<http://www.planning.dot.gov/scenario.asp>

- **FHWA Office of Freight Management and Operations**

<http://www.ops.fhwa.dot.gov/freight/index.cfm>





For Additional Information

FHWA/FTA Scenario Planning Program Contacts:

- FHWA Headquarters
 - Rae Keasler at (202) 366-0329 or Rae.Keasler@dot.gov
 - Dave Harris at (202) 366-2825 or Dave.Harris@dot.gov
- FTA Headquarters
 - Jeff Price at (202) 366-0843 or Jeff.Price@dot.gov
- FHWA Resource Center
 - Brian Betlyon at (410) 962-0086 or Brian.Betlyon@dot.gov
 - Jim Thorne at (708) 283-3538 or Jim.Thorne@dot.gov

FHWA Freight Contacts:

- FHWA Headquarters
 - Chip Millard at (202) 366-4415 or Carl.Millard@dot.gov
- FHWA Resource Center
 - Vidya Mysore at (404) 562-3929 or Vidya.Mysore@dot.gov





Future Freight Flows:

Using Scenario Planning to
Assist in Long-Term
Transportation Infrastructure
Planning
NCHRP 20-83(1)

Dr. Chris Caplice
Executive Director, MIT CTL
Founder, MIT FreightLab

NCHRP 20-83(1) Project Objectives

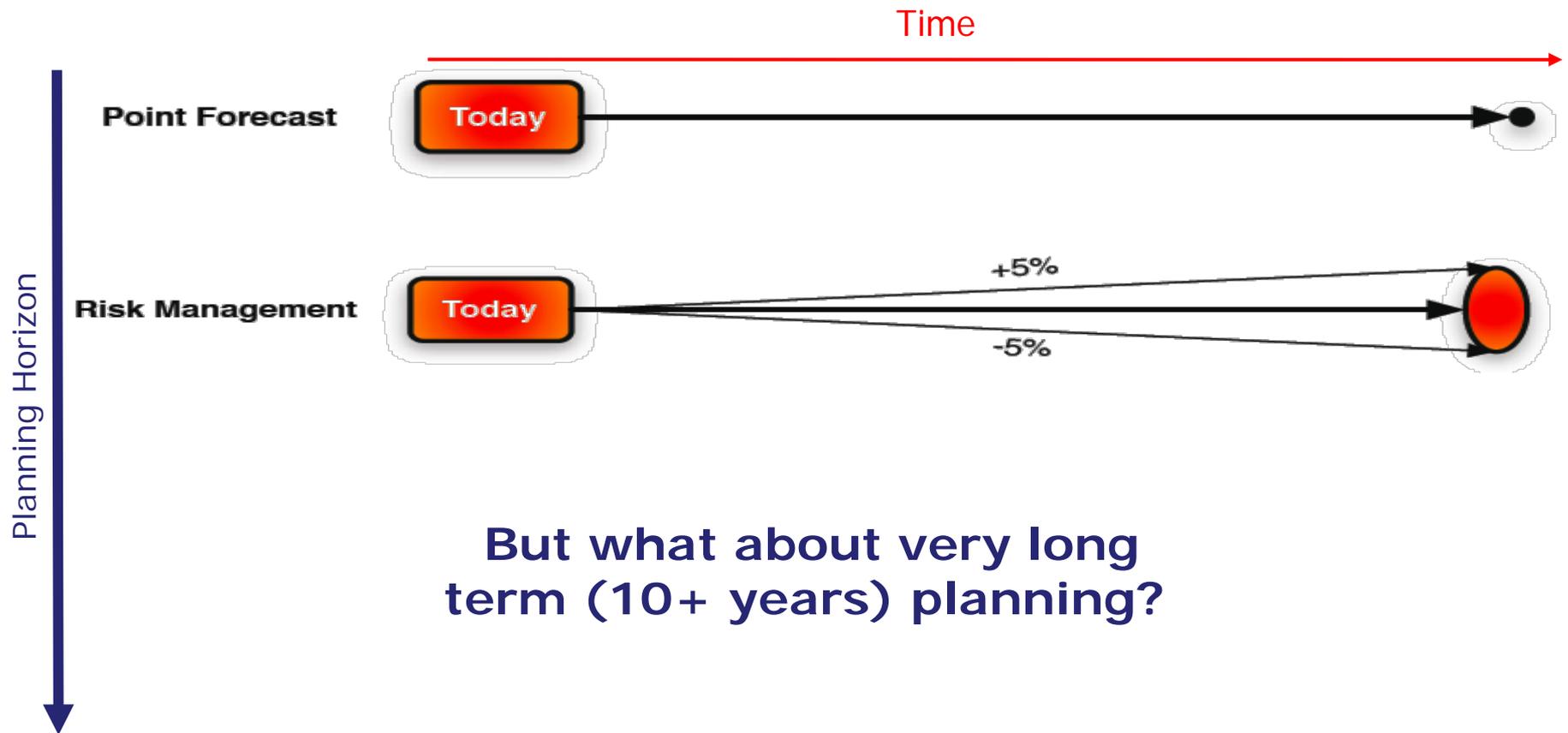
- Two Objectives

1. “Provide decision makers [state DOTs] with a critical analysis of the driving forces behind high-impact economic changes and business sourcing patterns that may effect the US freight transportation system [in the year 2030 & beyond].”
2. “Better enable informed discussions of national, multi-state, state, and regional freight policy and system investment priorities.

- Two Key Lessons

1. Macro-economic and technology forces are impossible to predict and can have tremendous impact on supply chains
 2. **Preparing** for potential effects is more effective than **Predicting** future events
-

Different Methods for Planning



Longer term planning is impacted by events



Source: Scenarios: An Explorer's Guide, Shell International 2003.

Our major limitation for planning

We all tend to be “Provincials in Time”

1. We look to the future through today's lenses.
2. We forget how we got to today
 - it seems pre-ordained
3. We think today will go on for forever
 - change happens slowly

Classic Cases of Short Sightedness

Great Horse Manure Crisis of 1894

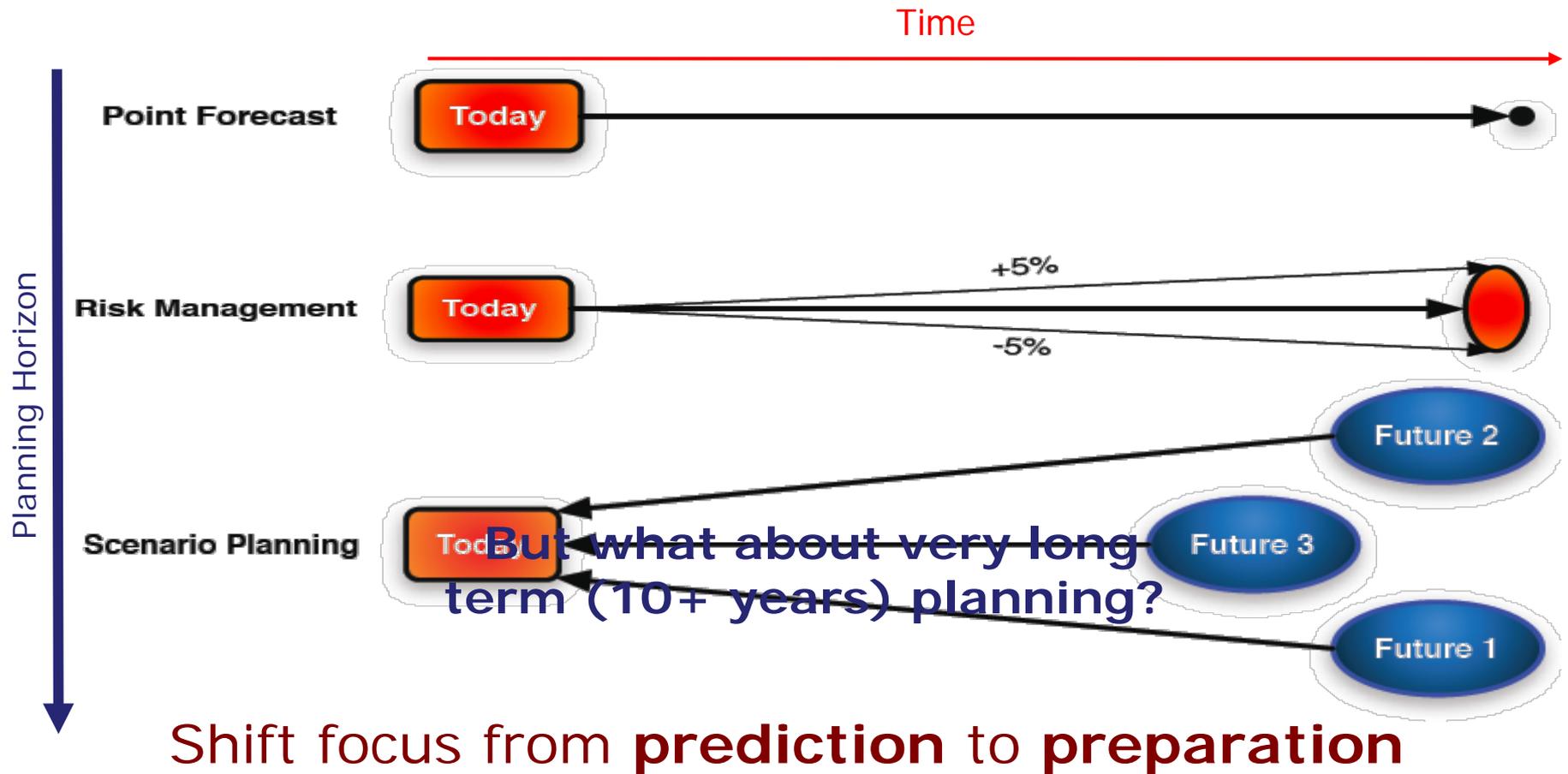
- More than 150,000 horses in NYC producing over 2,000 tons of manure per day
- Estimates of manure reaching 3rd floors by 1930 & nine feet in London by 1950
- 1st International Urban Planning Conference held in NYC in 1894



Interestingly, over 4000 cars were sold in the US in 1900. By, 1916 more cars than horses were registered in NYC



Different Methods for Planning



So many potential futures, so little time . . .

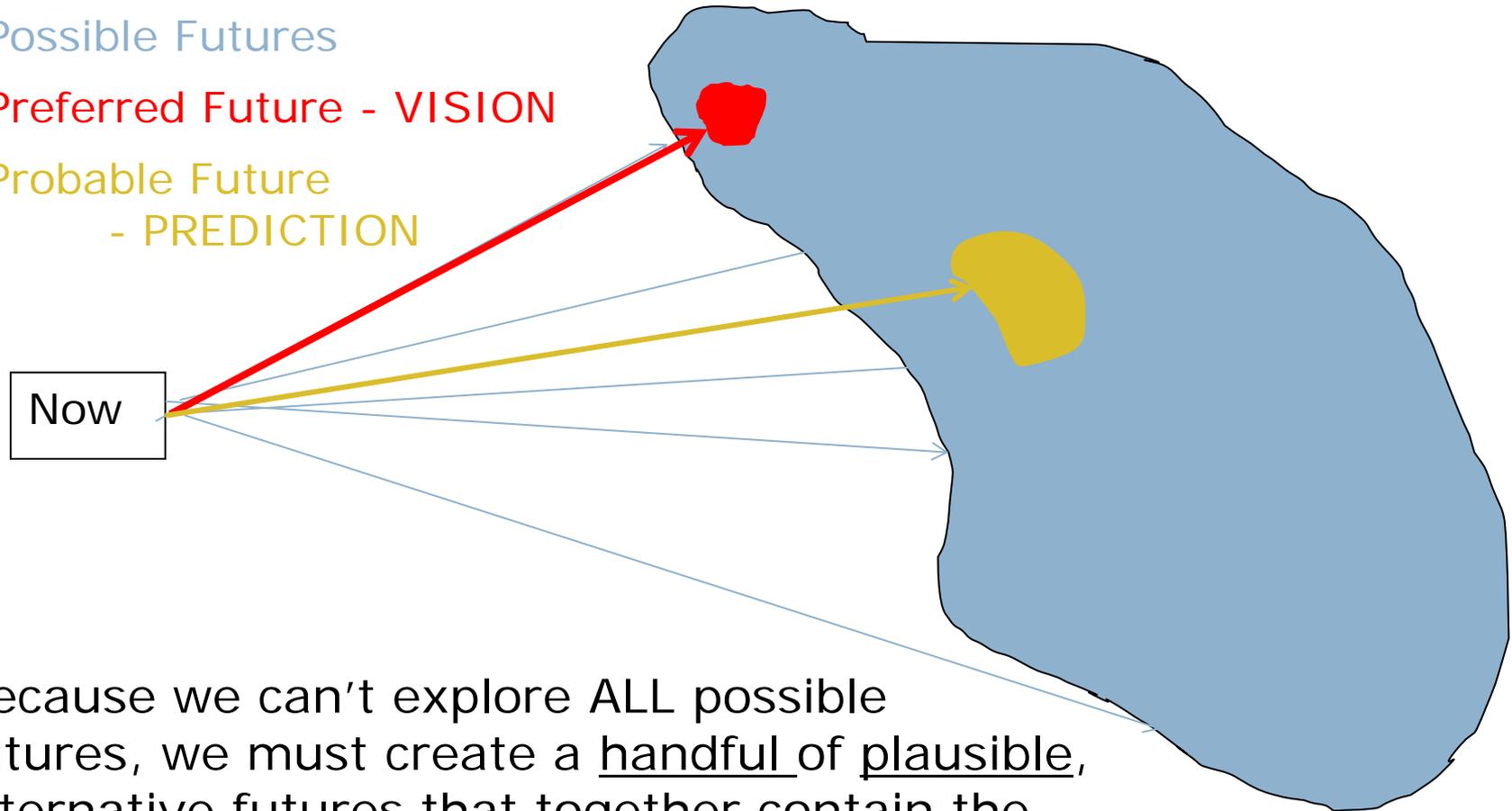


Preferred vs. Probable vs. Plausible

Possible Futures

Preferred Future - VISION

Probable Future
- PREDICTION



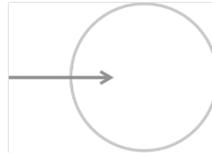
Because we can't explore ALL possible futures, we must create a handful of plausible, alternative futures that together contain the most relevant uncertainty dimensions

Scenario Planning

- **Criteria for a good set of scenarios**
 - Decision Making– capture right decision
 - Plausibility – within realistic limits
 - Alternatives – no favorites or preferred (Unofficial/Official)
 - Consistency – internal logic is aligned
 - Differentiation – structurally different
 - Memorability – easy to recall after event (name helps)
 - Challenge – push against established wisdom
- **Accuracy of event forecasting is not important**
 - The skill we are developing is preparation not predicting
 - The focus is on effects not on individual events

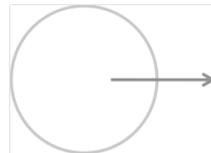
Translating Events into Effects: Freight Flow Patterns

How can an event impact freight flows?



Impact on sourcing patterns

Where are raw products and WIP sourced from?
Are materials sourced in or out of the region?



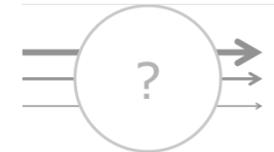
Impact on flow destination

Where is the demand located? How are final destination locations distributed?



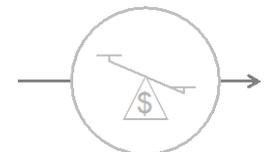
Impact on routing

How is freight moved within the region? Are there intermediate shipment points or mode switches?



Impact on flow volume

How will the total volume of freight shipped in and through the region change?



Impact on value density

How will the product characteristics change? How does the value density change?

The Real Value of Scenario Planning

- **Forecasting Challenges**

- Without step changes, forecasting would be easy!
- Step changes are driven by events, and . . .
- Events are next to impossible to predict, but . . .
- Planners do a pretty good job preparing, so . . .

Scenario planning allows us to shift from:

Predicting future **Events**

To

Preparing for potential **Effects**

So, what did we do?

We created four scenarios for November 2, 2037

ONE WORLD ORDER



MILLIONS
OF MARKETS



Naftástique!



Scenarios built from industry analysis,
expert interviews, extensive surveying, etc.

Ran Six One-Day Workshops



Workshop Toolkit

A complete toolkit for using scenario planning.

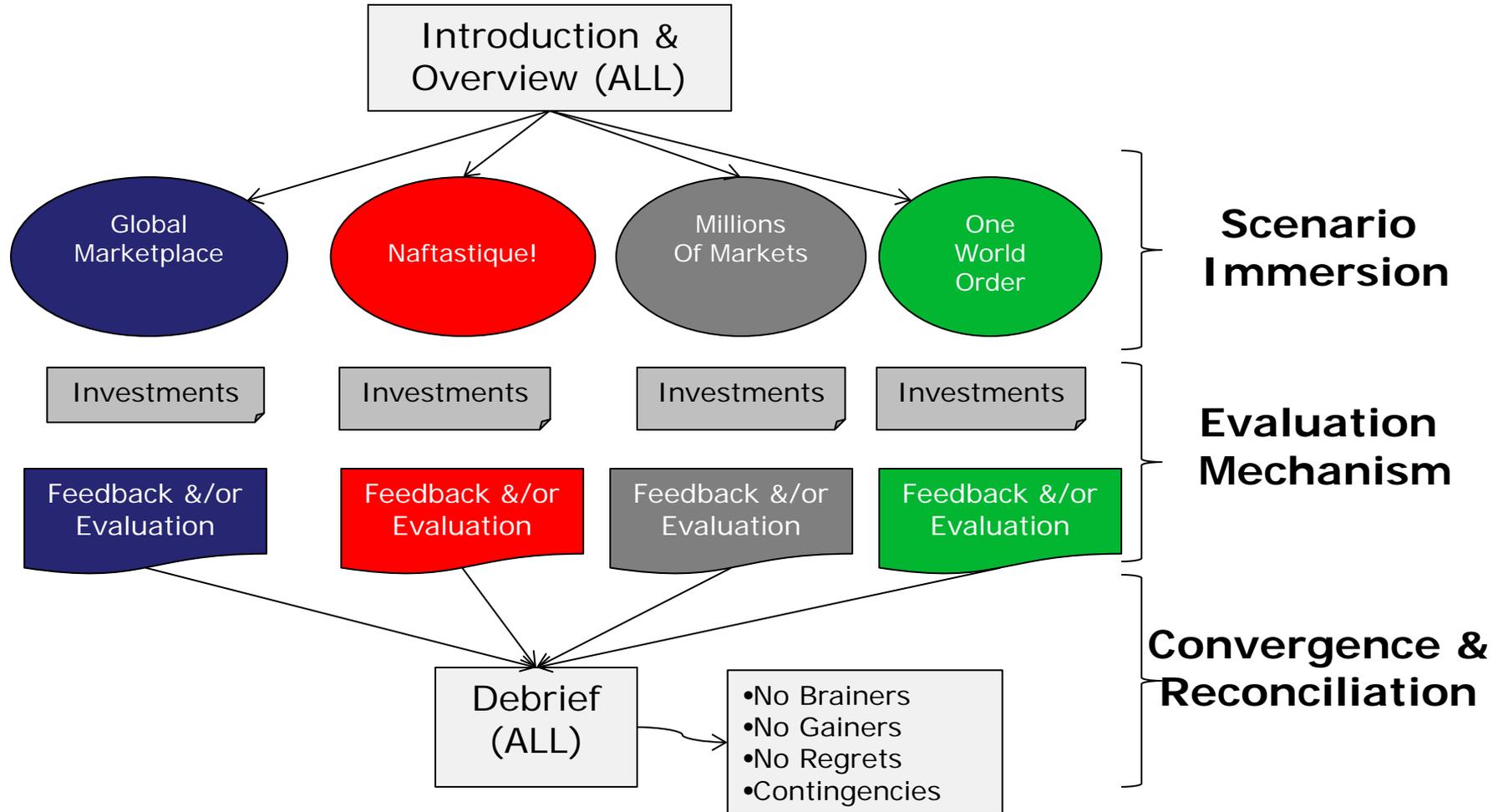
Includes guidelines and all needed materials for designing, planning, and running scenario planning engagements.

<http://www.trb.org/Main/Blurbs/168694.aspx>

Scenario Planning for Freight Transportation Infrastructure Investment



Workshop Structure



Learnings

- **Process & Method**

- Attendee selection is key – sets group dynamic for discussion
- Group facilitation is the most critical skill
- Positive/Negative voting mechanisms work
- Immersion works with portfolio of collateral – videos especially

- **Insights & Outcomes**

- System connections (intermodal) were always robust
- Flexible use of existing facilities frequently robust

- **Challenges to Overcome**

- How can we enable DOTs to conduct these workshops by themselves?
- How can scenario planning be incorporated into existing processes?

Using Scenario Planning to Prepare for the Future: The Washington State Freight Plan

Barbara Ivanov

Washington State Department of Transportation
Freight Systems Division Director



FHWA Office of Planning and FHWA Office of Freight Management and Operations
“Scenario Planning Applications for Freight Transportation“ Webinar

July 30, 2014

What are the Goals of the Washington State Freight Mobility Plan?

The Washington State Freight Mobility Plan will develop and prioritize freight transportation system improvement strategies that support and enhance trade and sustainable economic growth, safety, the environment, and goods delivery needs in the state.

Through the State Freight Plan, the Washington State Department of Transportation (WSDOT) will:

- Meet federal MAP-21 guidance for State Freight Plans.
- Make a strong case for funding Washington state's freight priority projects in future federal and state transportation budget bills and programs.
- Guide capital and operating investments in the state's freight systems.

The 2014 Washington State Freight Plan Has:

1. Identified the Washington State Multimodal Freight Economic Corridors.
2. Integrated freight elements of other state transportation plans into one multi-modal freight plan.
3. Set measurable freight performance goals for the State Truck and Waterway Freight Economic Corridors.
4. Developed and tested methods to analyze the economic impacts of truck freight improvements on highways.
5. Systematically analyzed current performance gaps and needs on highways in State Truck Freight Economic Corridors.
6. **Tested Freight Analysis Framework (FAF) forecasts against the results of near-term trends analysis, and used scenario planning to prepare for the long-term.**
7. Developed a new process to include Tribal, Metropolitan Planning Organization (MPO), Regional Transportation Planning Organization (RTPO), port and state freight strategies to improve performance on the Washington State Economic Freight Corridors in the Plan.

Why Are Freight Trade Forecasts Always Wrong?

- Trade forecasts take historical economic trends and project them forward based on a set growth rate. But we are planning transportation projects that won't be built for 10 years or more, and are then used for another 50 years.
- Think about global economic conditions 60 years ago. In 1954 did anyone imagine how trade lanes would connect the global economy in 2014? Or which industries would drive the U.S. economy?
- In the next 60 years it is likely that U.S. and global industries and economic centers will reorganize, collapse, grow in unknown areas and radically change.
- When we predict we often focus on our preferred future, what we want to have happen, instead of other possibilities.

How can we know where to invest today to meet industries' future needs?

How Did WSDOT Use Scenario Planning for the Freight Plan?

- We used scenario planning to prepare for long-term (30-year) freight demand, not to predict it.
- We immersed over 60 attendees at a statewide Future of Freight workshop in four different long-range scenarios:
 - **One World Order** - A highly-regulated green world
 - **Naftastique!** - A North American trading bloc
 - **Technology Savior** – A world of plenty
 - **Global Marketplace** – Global free trade, much like today
- It doesn't matter if the scenarios don't happen as imagined. Remember we're not predicting, we're learning to prepare for multiple possible futures.
- We did not focus on particular events, but on the effects of many possible events.

What Happened at the WSDOT Freight Scenario Planning Workshop?

- Attendees considered how their scenario would impact demand on the state's multimodal freight corridors, and selected key corridors that would matter most in their future world.
- There are only five supply chain outcomes any event can impact:
 1. Sourcing patterns
 2. Freight flow destination
 3. Routing – choice of trade lanes
 4. Freight flow volume
 5. Value density (the value of goods per ton shipped)
- Participants also discussed potential investment 'bundles' to meet demand:
 - Land use solutions
 - Policy and regulatory initiatives
 - Infrastructure
 - Operational improvements

Strategic Highway Freight Corridors - Washington State 2037

Major State Corridors

- North/South
 • I-5 corridor and neighboring highways
 • US 395
- East/West
 • I-90
 • I-82

Regional Corridors that provide Washington State access-

- North/South
 • BC Route 99 and neighboring highways
- East/West
 • I-84
 • BC Route 3
 • Highway 1 (Trans-Canada Highway)

Please feel free to consider other corridor segments as part of preparing for the future of freight in Washington State.

Potential Investment Bundles

Please consider the following bundles as part of your solutions:

Land Use Solutions

This bundle improves overall freight mobility through changes in zoning and land use. Possible changes include designation of specific industrial centers, mandating the inclusion of freight transportation in the municipal/regional comprehensive planning process, and development of a state-wide intermodal terminal plan.

Policy and Regulatory Initiatives

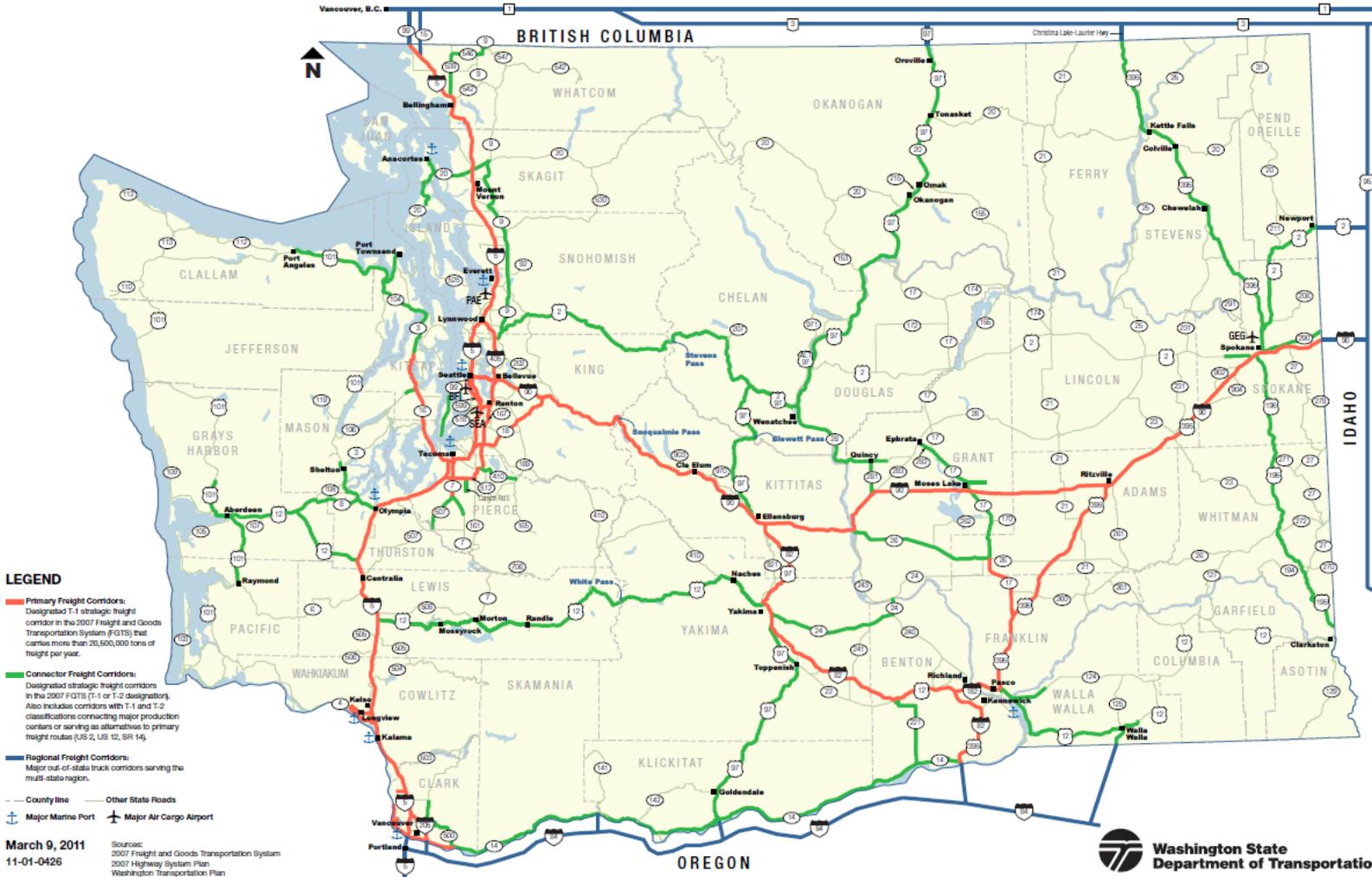
This bundle reduces regulatory restrictions on freight transportation. Potential initiatives include increasing the weight capacities and/or trailer configurations across the state, streamlining licensing procedures, etc.

Infrastructure

This bundle improves overall freight mobility through improvements in infrastructure. Potential solutions include improvements to existing infrastructure and the addition of new infrastructure (extension of SR 167; SR 509; US 395; grade separation projects).

Operational Improvements

This bundle facilitates smoother and more efficient transfer between modes of freight transportation. Improvements could encompass truck to rail, rail to air, truck to barge, as well as truck to air operations. Also improvements to existing facilities through the use of technology (ITS), dedicated facilities, and improved truck parking.



Strategic Rail, Waterway and Pipeline Corridors - Washington State 2037

LEGEND

Strategic Rail Corridors

- I-5 North-South Corridor
- Columbia River East-West Corridor UP
- Columbia River East-West Corridor BNSF
- Stevens Pass East-West Corridor
- Stampede Pass East-West Corridor
- Grays Harbor-Chehalis Corridor
- Major Rail Terminals

Strategic Waterway Corridors

- Snake/Columbia River Strategic Waterways
- Strait of Juan de Fuca - Puget Sound Strategic Waterways

Strategic Pipeline Corridors

- Olympic Pipeline
 - Yellowstone Pipeline
 - Chevron Pipeline
 - Terminals
- County line --- Other State Roads
⚓ Major Marine Port ✈ Major Air Cargo Airport ⌋ Dam or Locks



March 9, 2011
11-01-0426

Source:
WSDOT State Rail and Marine Office
rail@wsdot.wa.gov 360-705-7900

 Washington State
Department of Transportation

How Did WSDOT Combine the Power of Scenario Planning with a Trends Analysis in the Freight Plan?

- **Long-term Scenario Planning for Freight Systems:**

- As an example, the FHWA Freight Analysis Framework (FAF) forecast predicts that rapid truck growth along the north-south Interstate-5 corridor will continue to be the dominant trend in Washington State.

Viewed in 2014, this appears to be the only possible outcome.

- However, the scenario workshop caused highway-centric participants to grasp how demand on the east-west transcontinental freight rail, intermodal and waterway systems will be in the forefront no matter what actually occurs in the next 20 years; whether:
 - Governmental regimes enforce much stricter environmental policies,
 - U.S. trade is not focused on China, but within the NAFTA trading block, or
 - Advances in technology disburse goods production and produced material abundance.

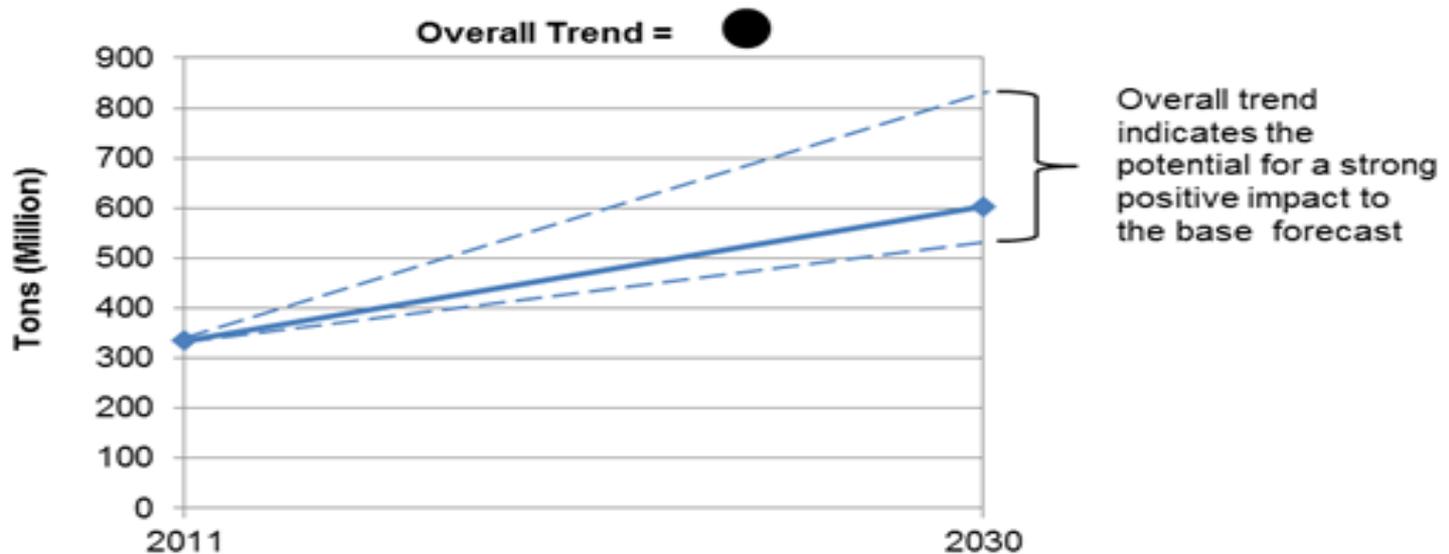
How Did WSDOT Analyze Near-term Industry Trends?

- WSDOT interviewed over 150 shippers, goods receivers and carriers across the state to understand near-term (six-year) industry trends.
- Interviewing people with deep expertise in manufacturing, agribusiness, construction, and retail-wholesale trade gives us a much better understanding of demand trends.
- Information from those interviews provide the ‘sensors in the ground’ we need to see if the world is actually moving towards an imagined long-term scenario, and lean into preparing for it.

WSDOT Used Near-term Industry Trends To Test Straight Growth Projections

We also used the trends analysis to test assumptions in the Freight Plan's 20-year Forecasts, and to identify a range of forecasted demand.

Truck Forecast in Washington State: FAF projection overlaid with results of WSDOT's Trends Analysis



What Lessons Did We Learn?

- Although a large scenario planning workshop brings in multiple points of view, several smaller events with higher-level industry supply chain experts may provide better information. The value of scenario planning is completely reliant on the level of attendees' expertise.
- To deliver value to State Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs) we need to develop business processes along the critical decision path that make use of this new knowledge.
- Under the Moving Ahead for Progress in the 21st Century (MAP-21) Act, FHWA guidance for State Freight Plans calls for a 20-year forecast of freight demand and recommends that it be based on FHWA's forecast. FHWA could consider more sophisticated planning tools in future guidance.
- DOTs and MPOs need research into how and when to integrate information from freight forecasts, trends analysis, and scenario planning to help us understand where to invest today.

We're very interested in your feedback.

Questions?

For more information, please contact:

Barbara Ivanov, Director

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Washington State Freight Mobility Plan website:

<http://www.wsdot.wa.gov/Freight/freightmobilityplan>



“Scenario Planning Applications for Freight Transportation” Webinar

July 30, 2014

Ted Dahlburg

Delaware Valley Regional Planning Commission

Delaware Valley Regional Planning Commission

- Serves as the officially designated MPO for the Philadelphia-Camden-Trenton region
- Serves the 6th largest U.S. metropolitan area with 5.4 million residents
- Works collaboratively with 3 state DOTs and several adjacent MPOs highly active in freight planning



Delaware Valley Region
highlighted in yellow

Workshop Purpose*

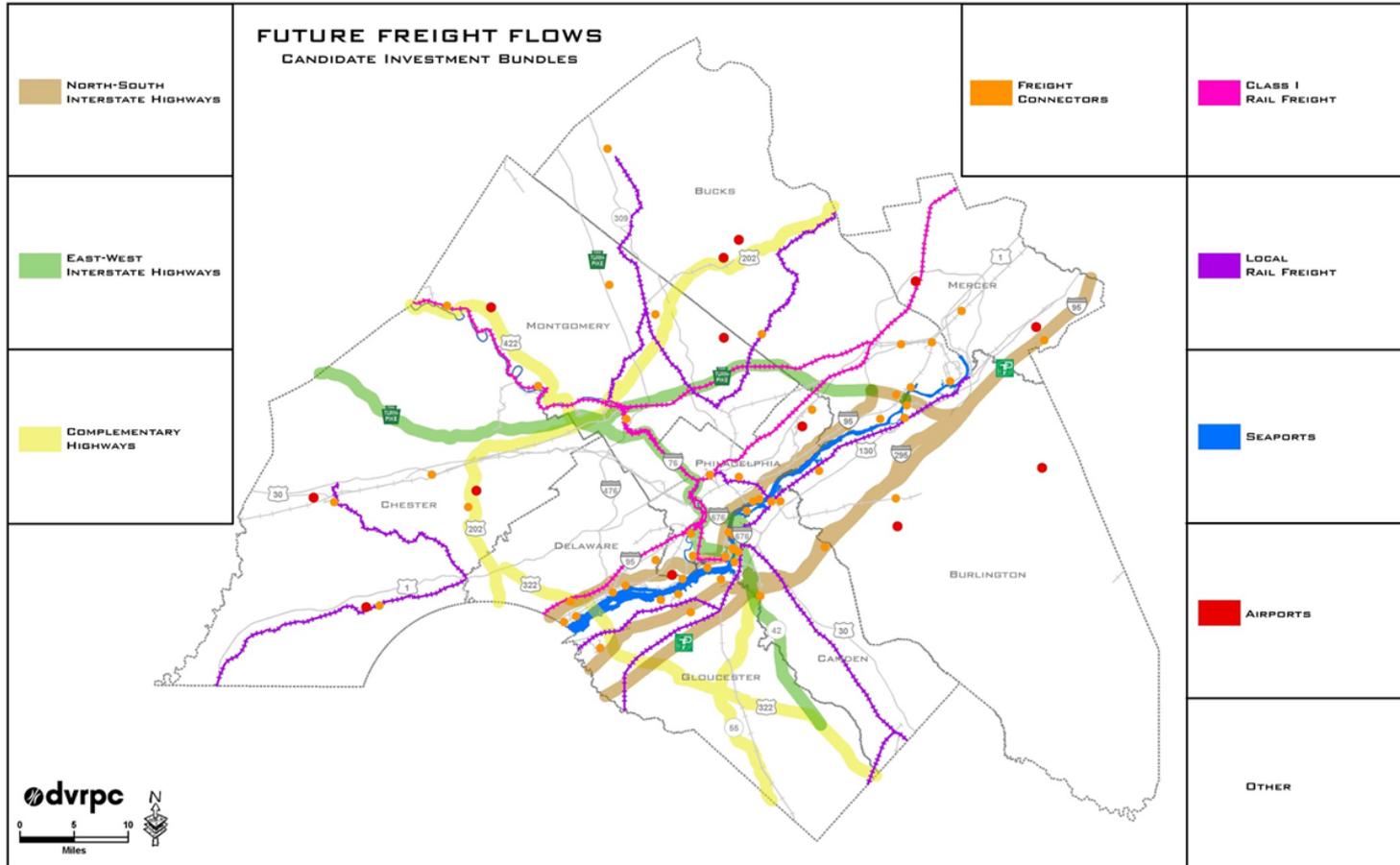
- Promote understanding of global freight forces and trends
- Foster public-private cooperation and partnerships
- Reinforce the linkage of land use and transportation
- Lay the groundwork to fund freight projects and projects that help freight move
- Derive results to guide future MPO freight planning activities

*As established by DVRPC for the November 4, 2010 workshop



Attendance Highlights

Investment Bundles



Synthesized Voting Themes

- Invest in a multi-modal transportation system.
- Emphasize north-south Interstate highways over east-west Interstate highways.
- Emphasize interstate highway and rail facilities over local/regional highway and rail facilities.
- Fortify connectors to both intermodal facilities and industrial centers.

DVRPC Freight Mapping Tool

PHILLY FREIGHT FINDER

FREIGHT MAPPING & DATA PLATFORM FOR THE DELAWARE VALLEY

AVAILABLE AT:
www.dvrpc.org/webmaps/phillyfreightfinder

DELAWARE VALLEY
REGIONAL
PLANNING COMMISSION

Why a web map?

- Unique regional tool
- Public access to data
- Improve region-wide data-sharing
- Better identify & justify funding priorities

Application is an integrated system that allows for exploration on various levels, including links to existing reports

What kind of data?

Standard Data
To build consistency in the information about facilities throughout the region

- Name
- Size
- Owner
- Municipal
- Operator
- Location

Indicators
To better understand the use and role of facilities in the larger regional system

- Capacity
- Related Reports
- Activity

Standard data and indicators establish a framework for creation of performance measures and an improved DVRPC counting program

Trucking/Highways	Freight Rail	Ports/Waterways	Airports	Freight Centers	Pipelines
Freeway <small>(Interstate + Limited Access)</small>	Rail Lines <small>(Interstate + Extension + Intrastate)</small>	River <small>(Downriver + Upstream)</small>	Commercial	Mega Center	Pipeline
Truck Parking	Class 1 Grade Crossing	Anchorage	Reliever	Major Center	Communities
NHS Connector	Rail Yard	Port Terminal	Helipoint	Intermediate Center	Freight as a Good Neighbor
Highway River Crossing	Intermodal Rail Yard				
	Rail River Crossing				

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Ports/Waterways



River (Delaware + Schuylkill)

Capacity: Channel Depth, Width, Air Draft

Activity: Ship Count



Anchorage

Capacity: Length

Activity: Annual Ships



Port Terminals

Capacity: Berths- count, length, depth;

Cranes, Warehouse, Acres

Activity: Ship Arrivals



Data Interface

dvrpc PHILLY FREIGHT FINDER FREIGHT MAPPING & DATA PLATFORM FOR THE DELAWARE VALLEY

Home Our Region About

Search by facility/place name

- Trucking/highways
- Freight Rail
- Ports/waterways
- Airports
- Freight Centers
- Energy & Utilities
- Community

Philadelphia Forest Products Center [Piers 78/80]

Philadelphia Regional Port Authority
Owner

Penn Warehousing & Distribution
Operator(s)

Philadelphia City
Municipal Location

Capacity	Activity
Qty of Berths:	4
Total Berth Length:	3,892 linear ft
Berth Depth (MLW):	35 feet
Available Cranes:	0
Warehouse Space:	1.27 million sq. ft.

2013 Maritime Exchange, 2014 DVRPC

Type: General Cargo Terminal

Submit Feedback



North-South Interstate Highways

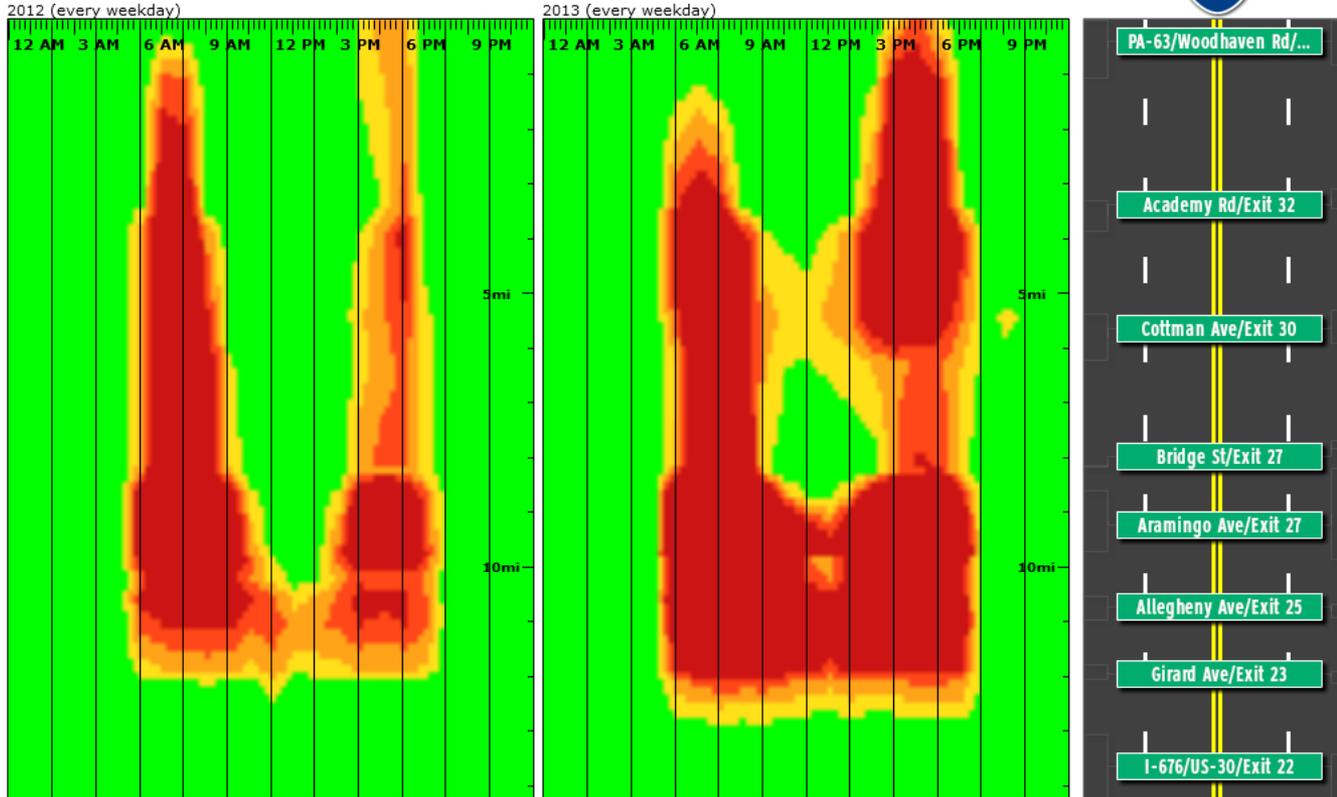


Performance Measures

Planning time index on I-95 between I-676/US-30/Exit 22 and PA-63/Woodhaven Rd/Exit 35

Averaged by 1 hour for 2013 (every weekday) and for 2012 (every weekday)

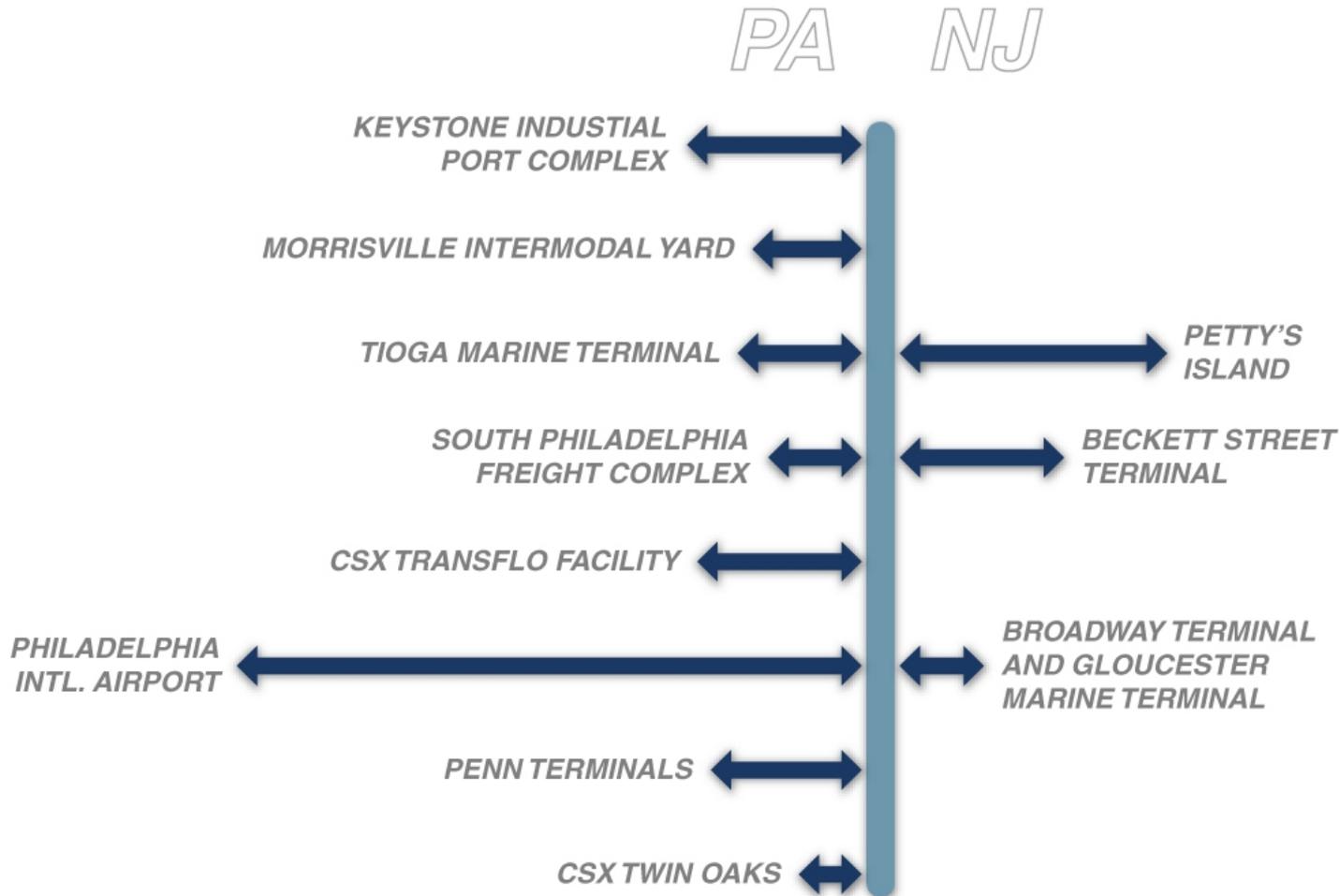
↓ Southbound ↓



The total travel time that should be planned when an adequate buffer time is included (95% Travel Time / Free-flow Travel Time).

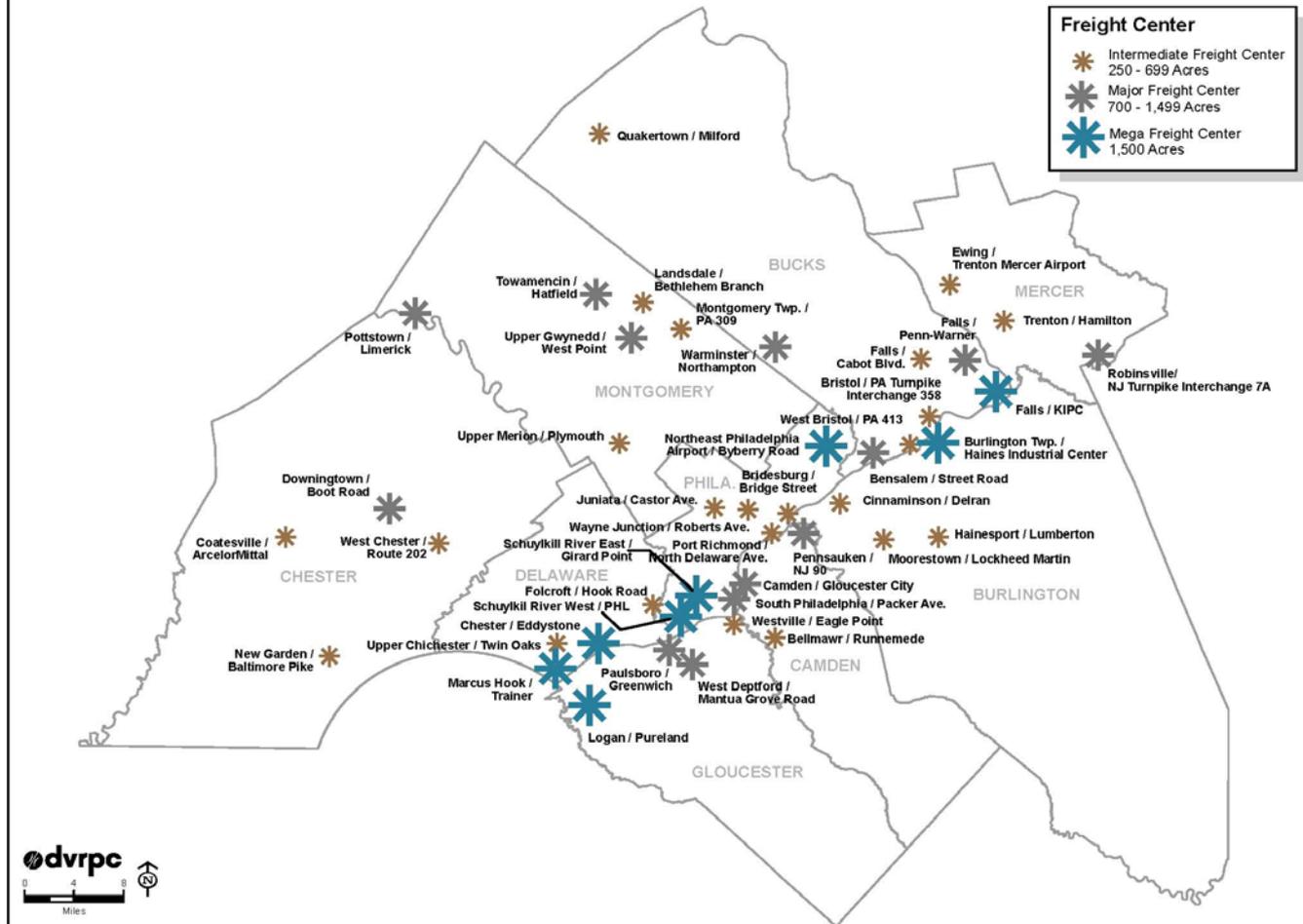


Connectors: Intermodal Facilities



Connectors: Freight Centers

FIGURE 5: DELAWARE VALLEY FREIGHT CENTERS



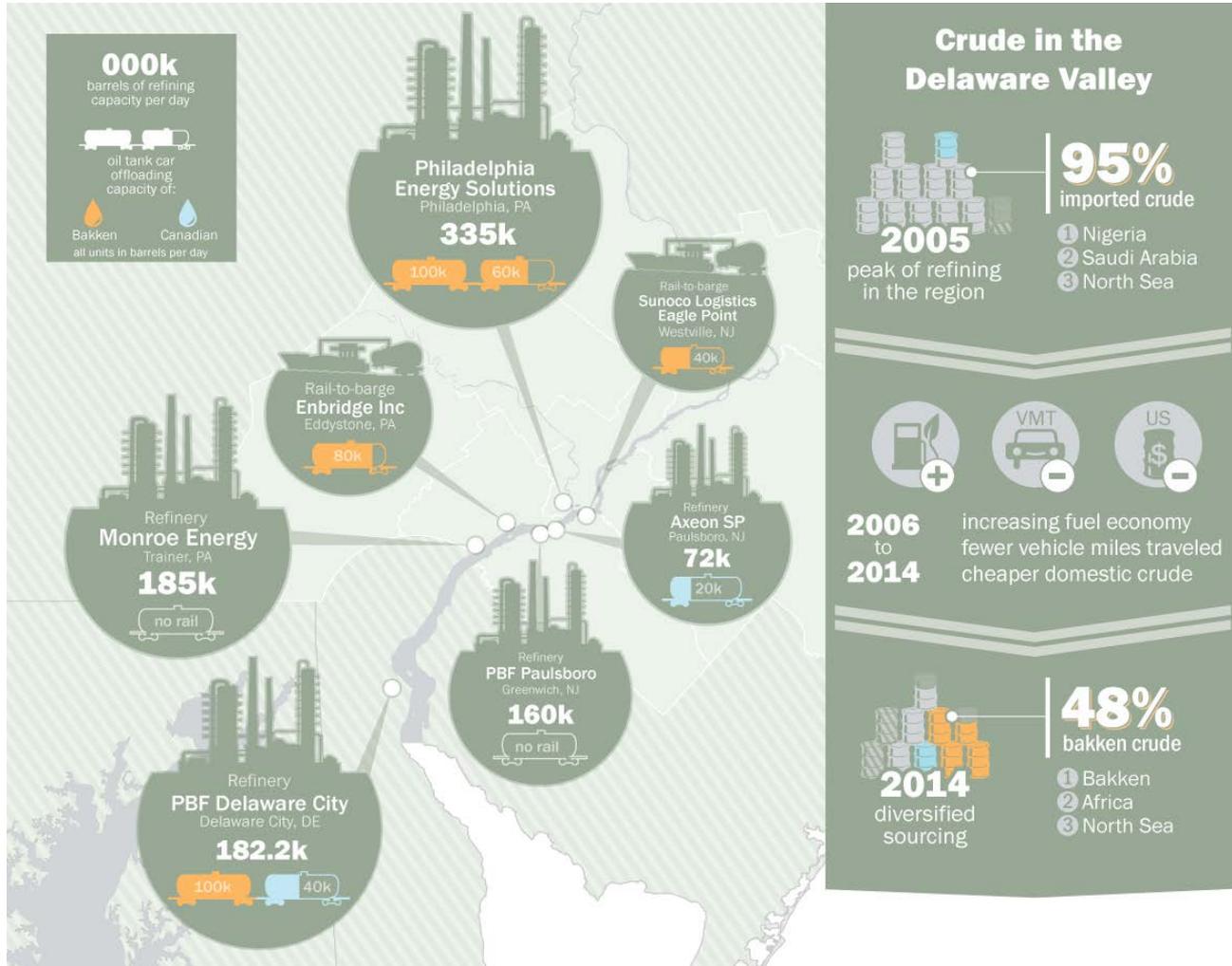
Freight Rail Research



Freight Rail Education



Commodity Profile



Freight Scenario Planning Benefits and Lessons

- Promotes education of unique freight system needs
- Instills greater awareness of global forces and broader perspectives
- Fosters new planning partners
- Can be used to integrate freight into “the bigger picture”

Thank You!

Questions?

For more Information, please contact:

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DVRPC's Freight Planning website:

<http://www.dvrpc.org/Freight/>

