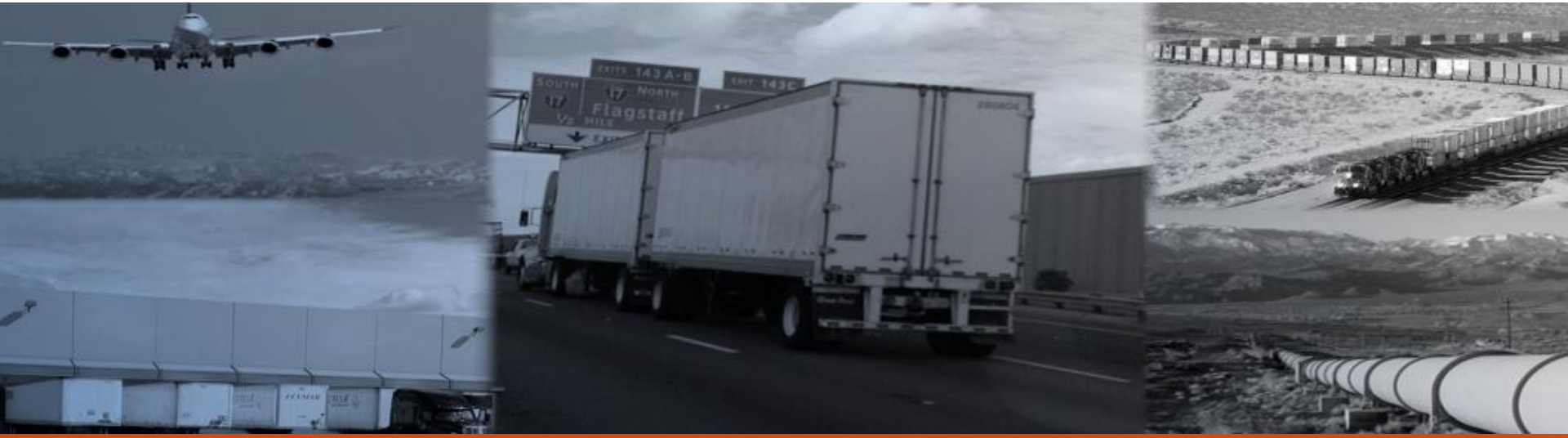
Arizona Freight Advisory Committee

Arizona State Freight Plan: Scenario Planning, Goals and Performance Measures

August 19th, 2015



Meeting Agenda

1:00 – 1:15 Welcome and introductions

1:15 – 2:10 Introduction to scenario planning

2:10 – 2:25 Arizona State Freight Plan policy and strategies

2:25 – 2:50 Industry performance measures

2:50 – 3:00 Future meeting and ongoing tasks

The Purpose of FAC Meetings

- Overview key points from work to date
- Validate conclusions and provide industry perspective

Meeting Objectives

- Summarize key findings since last meeting
- Obtain input on supply chain performance measures

Role of the Freight Advisory Committee

- Primary role
  - Provide industry input to ADOT (for State Freight Plan and other issues)
  - Validate conclusions with industry knowledge
- Secondary role
  - Deliverables review and comment
- Expectations for the FAC
  - Meeting attendance and participation
  - Insight into the transportation issues/needs/challenges

FAC Meeting and Deliverable Schedule

FAC Meeting Date	FAC Meeting Theme	FAC Homework	FAC Deliverables Received During Previous Period
19-Aug-15	Validation of System Assets Freight Policy and Strategies Introduction to Scenario Planning	Define important Factors for Freight (economy, fuel, etc.)	Working Paper: Policies and Strategies Suggested for Arizona (Phase 4)
5-Nov-15	Future Freight Scenarios	Define Transportation System Strengths and Weaknesses	Working Paper: Inventory on State Freight Transportation System Assets, Nodes and Corridors (Phase 2)
17 Feb 16	Validate Transportation System Strengths and Weaknesses	Define Key Issues for Transportation Efficiency in your Industry	Working Paper: Proposed Performance Measures, Data, Approach for Assessing System Conditions and Performance (Phase 5)
			Report on Economic Context of Freight Movement in Arizona (Phase 3)
			Report on Condition and Performance of Freight Transportation System (Phase 5)
			Working Paper on Potential Freight Scenarios, and Implications (Phase 7)
18 May 16	Define Drivers of Private Industry Efficiency and Performance	Implementation Strategies and Potential Funding Methods	Working Paper on Trends, Needs and Issues, Including Assessment of Policy Responses (Phase 7)
			Report on Arizona Freight Forecasts (Phase 6)
			Working Paper on Arizona freight transportation system strengths and weaknesses and policy priorities (Phase 8)
			Working Paper on Key Strategic "Screens" Through which to Assess Freight Transportation Investments (Phase 9)
17 Aug 16	Implementation Strategies and Funding Approaches	How can the FAC Promote the Freight Plan and Increase the Importance of Freight in Arizona	Working Paper on Arizona`s Strategic Framework for Decision Making Process, Prioritization (Phase 9)
			Working Paper on Strategic Options, Rationale, Linkage to Goals, Expected Outcomes (Phase 9)
11 Jan 17	Next Steps and FAC role in Implementation	Identify the Next Steps for the FAC	Arizona Freight System Improvement Strategy (Phase 10)
			Working Paper on Funding and Financing Options to Implement State Freight Plan (Phase 11)
			Arizona State Freight Plan - Implementation Plan (Phase 11)

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Arizona State Freight Plan:
Enabling Economic Competitiveness and Growth

Introduction to Scenario Planning

Freight Advisory Committee Meeting
August 19, 2015
Phoenix, AZ

25 Year Time Horizon for Statewide Freight Plan

What future should Arizona be planning for?

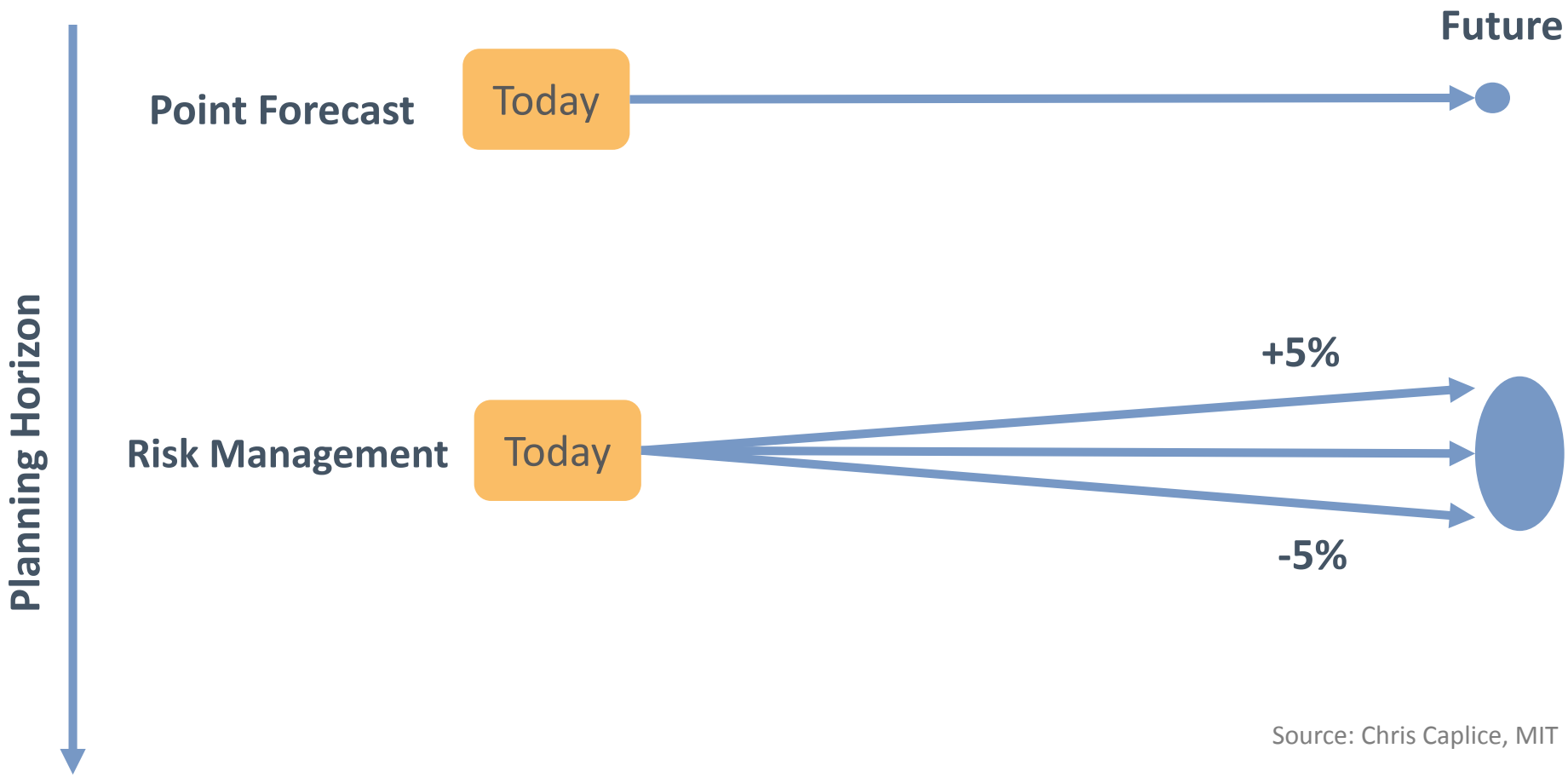
Overview

Need to look beyond point forecasting

Introduction to scenario planning

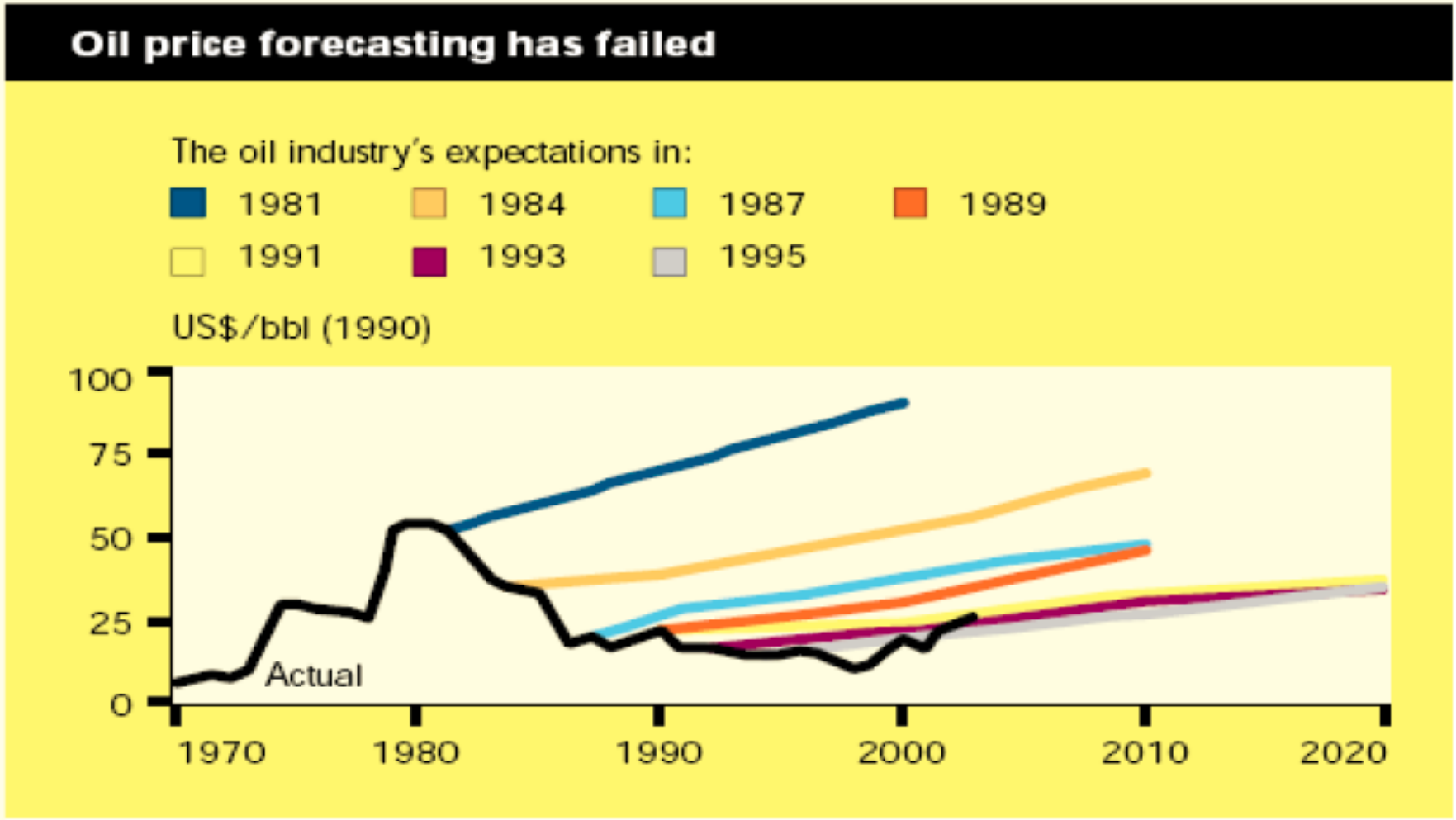
Homework

Basic Approach to Point Forecasting (in a Nutshell)



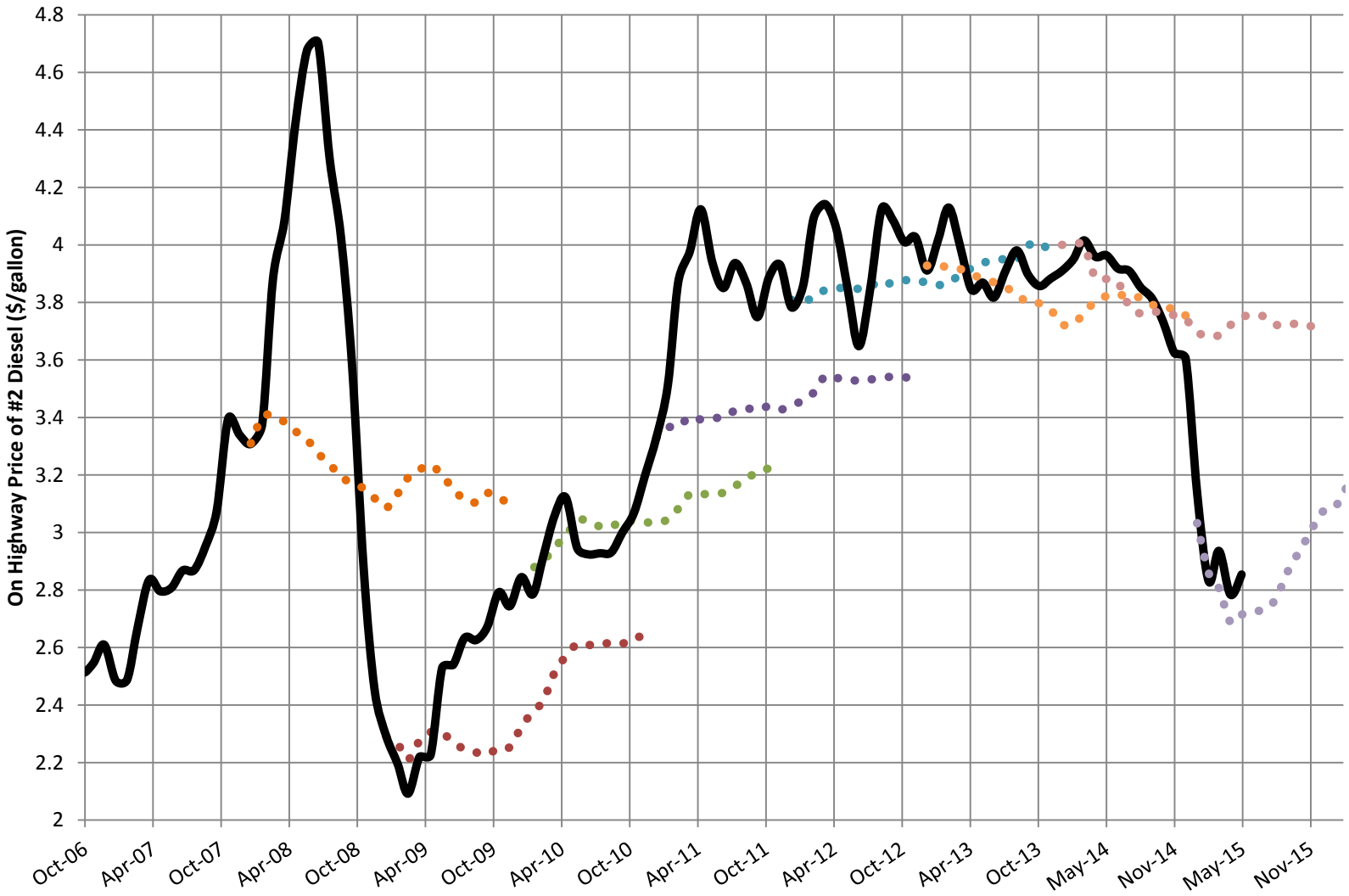
Source: Chris Caplice, MIT

How Accurate are Long-Term Point Forecasts?



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

Even Short-Term Forecasts are Often Way Off….



Source: Chris Caplice, MIT

CPCS Solutions for growing economies

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

Source: Chris Caplice, MIT

The Problem with Point Forecasting

- We are inherently influenced by [recent] history
- History is not a good predictor of the future
- Point forecasts ignore the “known unknowns”, are blind to the “unknown unknowns”…and sometimes even overlook the “known knowns”

Bottom line: point forecasts are always wrong and are on their own an inadequate tool to plan for the future.

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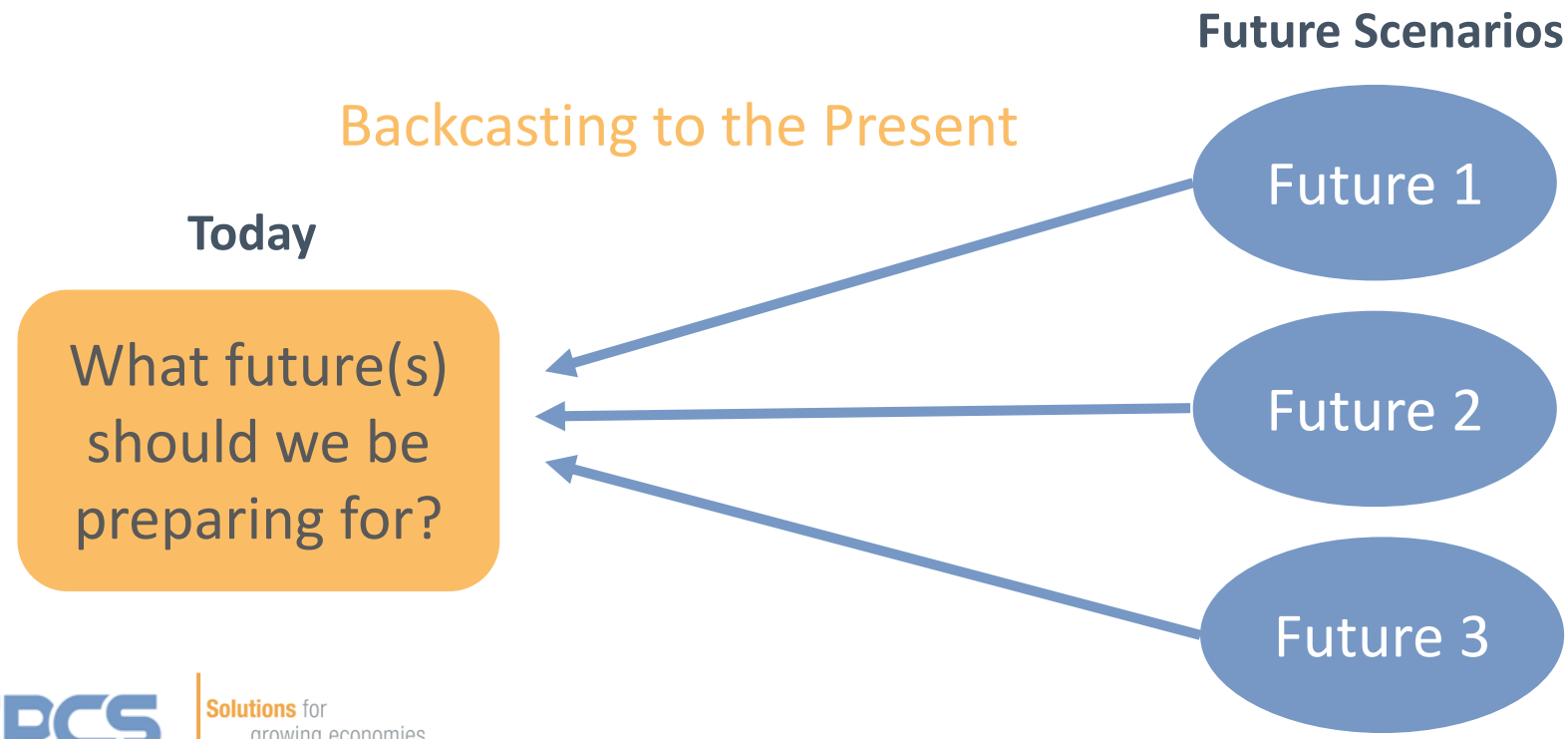
Scenario Planning Provides an Useful Complement to Point Forecasting

Two key lessons from TRB's NCHRP 750 project:

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



Source: Chris Caplice, MIT

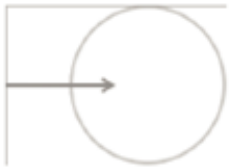
Think "STEEP" drivers

- **S**ocial
- **T**echnological
- **E**nvironmental
- **E**conomic
- **P**olitical

What STEEP drivers could influence the future of freight transportation in Arizona?

Translating STEEP Drivers into Scenarios, and Scenarios into Effects

How will scenarios impact freight flows?



Impact on sourcing patterns

Impact on flow destination

Impact on routing

Impact on flow volume

Impact on value density

Source: Chris Caplice, MIT

Crude, Conceptual Example of Alternative Scenarios

Source: Chris Caplice, MIT

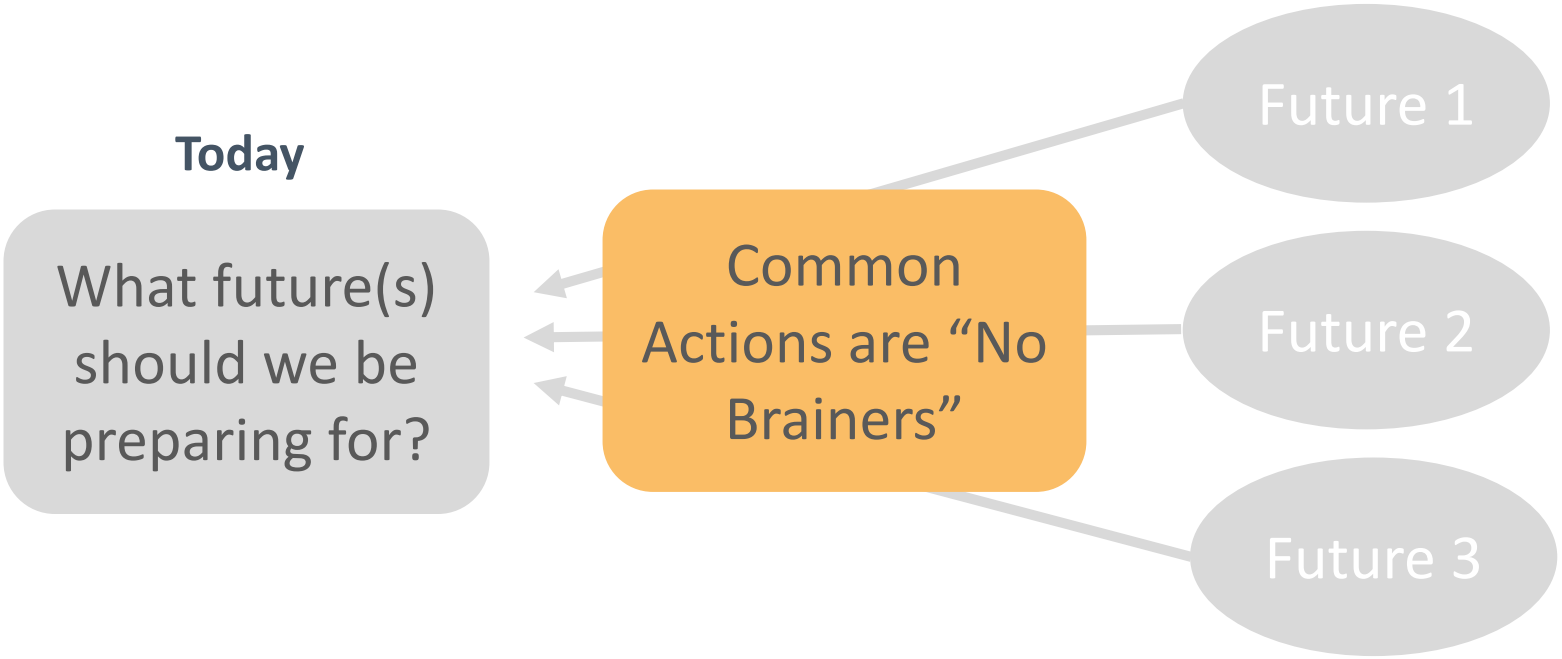
	Naftástique!	ONE WORLD ORDER	Global Marketplace	MILLIONS OF MARKETS
Global Trade	**Low**	**High**	**High**	**Low (physical)**
Resource Availability	**Low**	**Low**	**High**	**High**
Energy Cost Level	High	High	Low	Low
Energy Cost Variability	Low	High	High	Low
Level of Environmental Awareness	Same as Today	High	Low	High
Population Dispersion	Growth in SW	Growth in Biggest Cities	Growth in Biggest Cities	Rise in Mid Tiered Cities
Energy Sources	Majority NA	Mix Foreign & Domestic	Majority Foreign	Majority Domestic
Level of Migration	High w/in Bloc, Low between	High	High	Low
Migration Policy	High	High	Low	Low
Currency Fluctuations	Low w/in Bloc	High	Moderate	Low

Source: Chris Caplice, MIT

What can and can't be influenced?

Then What? How to Make Decisions?

Are there common actions for all scenarios?



Otherwise what are the preparedness "triggers" that should cause action as one future or another starts to materialize?

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Freight Advisory Committee to Help Define Arizona-Specific Future Scenarios

On November 5th, 2015, Dr. Chris Caplice of MIT will facilitate a workshop with the Freight Advisory Committee to develop three or four Arizona-specific 25-year outlook scenarios.

Dr. Chris Caplice
Executive Director
MIT Center for Transportation and Logistics

These scenarios will in turn be used to help position the Arizona State Freight Plan to *prepare* for the future.

Homework for Freight Advisory Committee

- What STEEP drivers could have the biggest impacts on the future of freight transportation in Arizona?
- How could different combinations of drivers manifest themselves in extreme, but plausible future scenarios for Arizona?
- What will be the likely effect of these drivers and related scenarios 25 years from now?

Reflect on these questions and come prepared to discuss them at the Scenario Planning workshop on November 5th.

Questions and Discussion

Marc-Andre Roy
Partner, Vice President (North America)
1050 Connecticut Ave. NW, 10th Floor, Washington, DC 20036
T: +1 202 772 3368 | C: +1 613 262 0451| mroy@cpcstrans.com | www.cpcstrans.com

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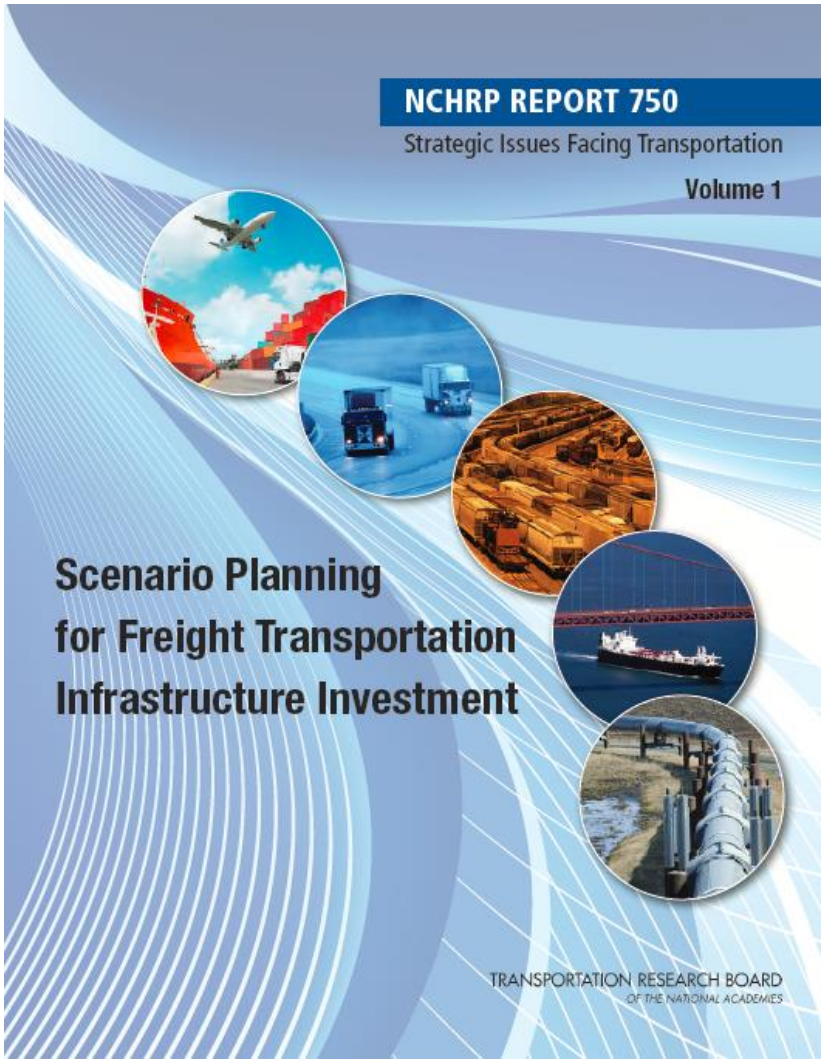
For More Information on Scenario Planning for Freight



http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_750v1.pdf

Arizona State Freight Plan:
Enabling Economic Competitiveness and Growth

Policies, Strategies and Performance Measures

Freight Advisory Committee Meeting
August 19, 2015
Phoenix, AZ

Presentation Overview

Key findings from policies and strategies working paper

FAC input on work currently underway

Immediate next steps

Key Findings – Policies and Strategies

Single broad policy: To increase the prominence of freight in ADOT planning and programming

Vision, goals, policies and strategies development process

Vision Statement, Goals and Objectives (Phase 1)

Policies and Strategies (Phase 4)

Decision Making Process and Prioritization Framework (Phase 9)

Freight Plan Vision: Arizona's freight transportation system enhances economic competitiveness and quality growth through effective system performance and management.

Economic Competitiveness

- Increase Economic Activity, Investment and High Paying Jobs
- Increase Trade

Increase System Performance

- Increase Mobility and Multimodal Accessibility
- Increase Safety and Security
- Increase System Efficiency and Reliability
- Minimize Negative Social and Environmental Impacts

Improve System Management

- Ensure System Preservation and Maintenance
- Ensure Good Fiscal Stewardship
- Link Transportation and Land-Use
- Work in Partnership
- Increase Effective Performance Monitoring
- Increase Smart Network Expansion

Policy

Increase Prominence of Freight in ADOT Planning and Programming
to better reflect the role of freight in enhancing the competitiveness and growth of Arizona's economy

Strategies

1. **Merit-Based Prioritization**
   Freight transportation system improvements to be prioritized on the basis of merit, in line with the goals and objectives of the Arizona State Freight Plan
2. **Preservation, Modernization, Expansion**
   Freight transportation system investments to prioritize asset preservation first, modernization to optimize the existing system second, and network expansion third
3. **Key Commerce Corridors**
   Freight transportation system improvements to bolster the performance of Key Commerce Corridors
4. **Improve Freight Information**
   Freight transportation system management to be informed on the basis of solid research, data and system performance monitoring
5. **Coordination, Partnerships, Communication**
   System planning and improvements to be coordinated with all stakeholders that have a role in enabling the goals and objectives of the Arizona State Freight Plan
6. **Sustainable Freight Funding**
   Priority freight projects to have access to a dedicated and sustainable source of funding and seek to leverage partner funding and private capital, where appropriate

Key Findings – Policies and Strategies

Six strategies: Developed from policy to achieve goals and objectives of the freight plan

Policy

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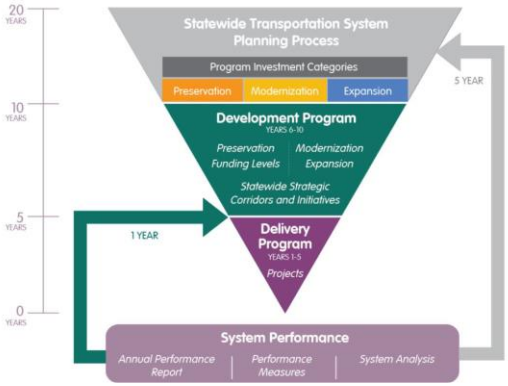
Key Findings – Policies and Strategies

- Next Step
  - Develop a decision making and project prioritization process
    - Built-on vision, goals, policies and strategies
- Central issue for consideration
  - How does the freight plan and projects fit into ongoing project evaluation and prioritization efforts within ADOT?



Presentation Overview

Key findings from policies and strategies working paper

FAC input on work currently underway

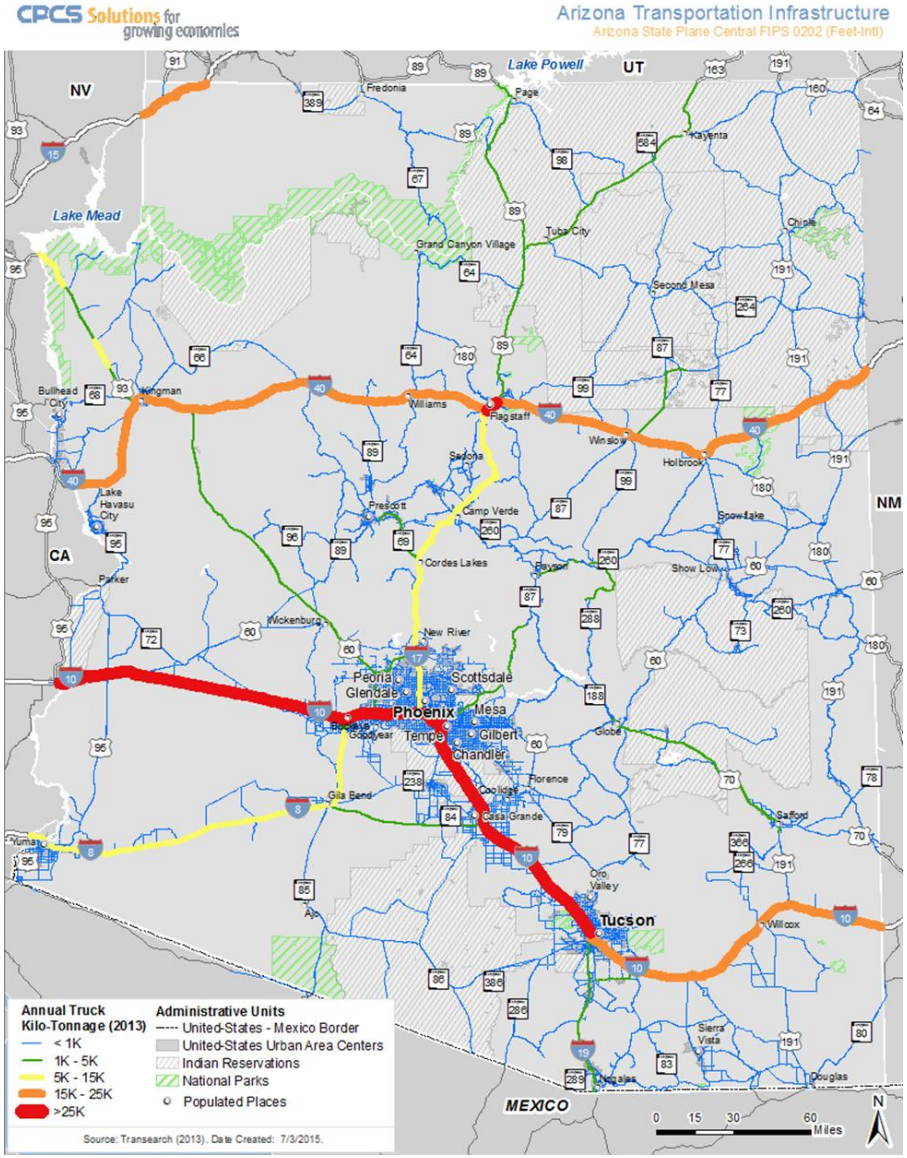
Immediate next steps

Designed to answer key questions

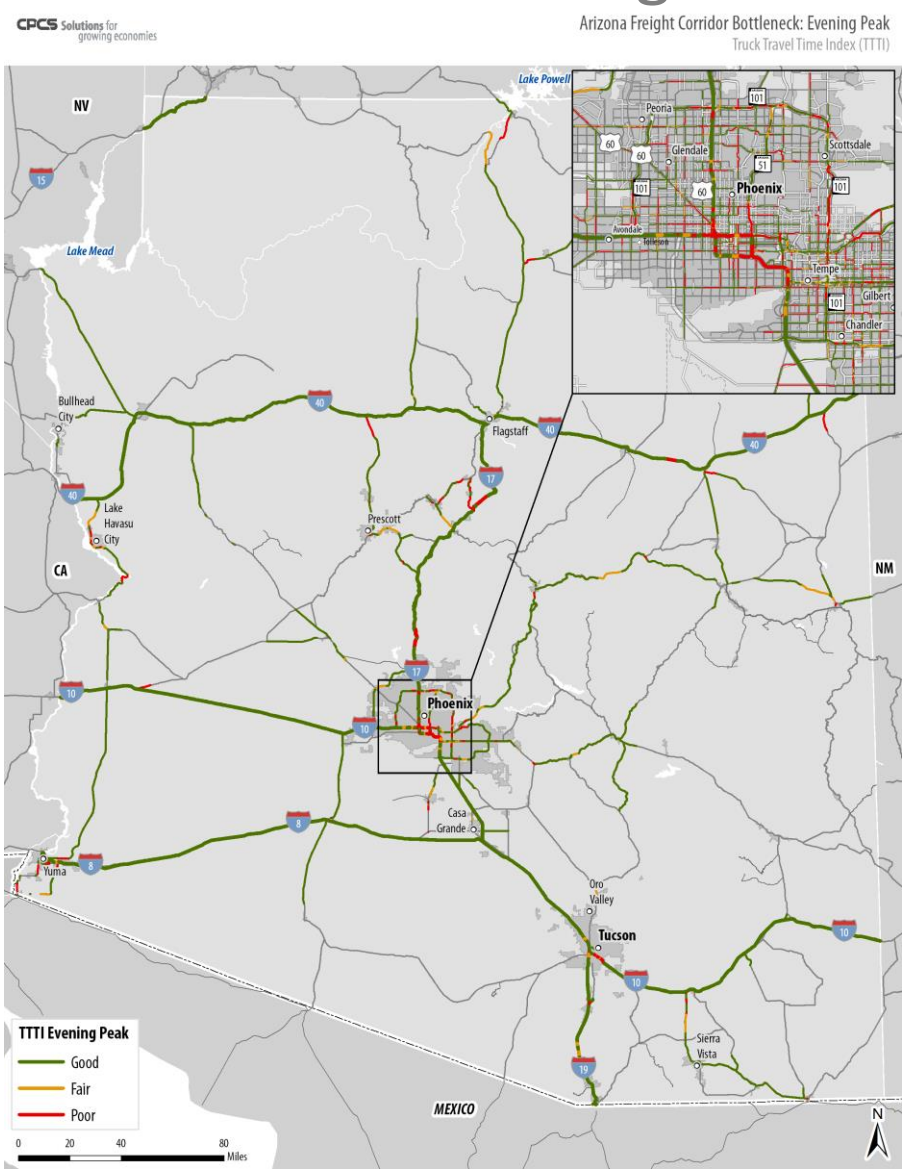
- How well is the transportation system **performing**?
- What are the **chief mobility constraints** affecting the transportation flow of Arizona supply chains?
- What is the nature and **role of border gateway facilities** and cross-border supply chains?
- What are the location and character of **major clusters** of warehousing, intermodal, and/or transload facilities?
- Which **multimodal corridors** connect major warehousing, terminal, and border freight activity clusters and how well do these facilities serve freight-dependent industries?

Key Findings – Highway

Concentrated traffic



Some localized congestion

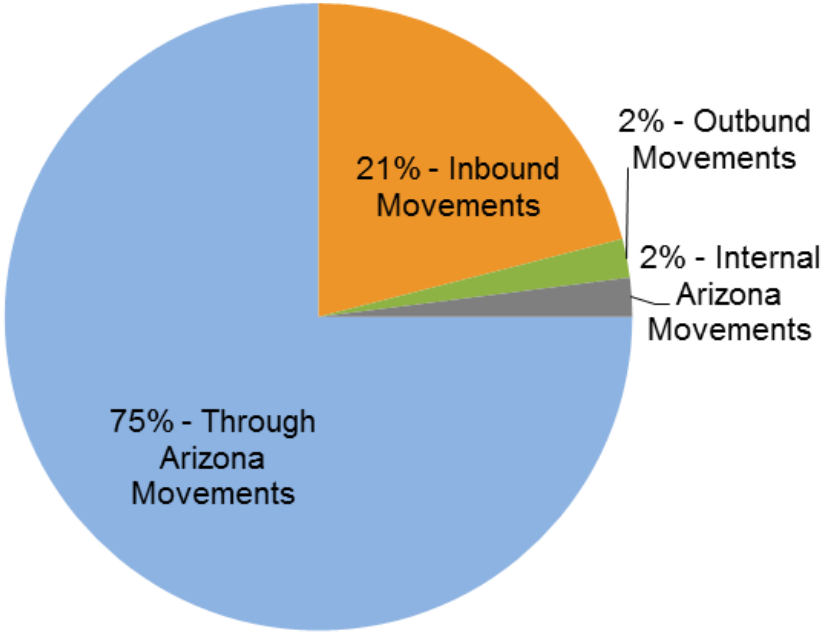


Key Findings – Rail

Current constraints

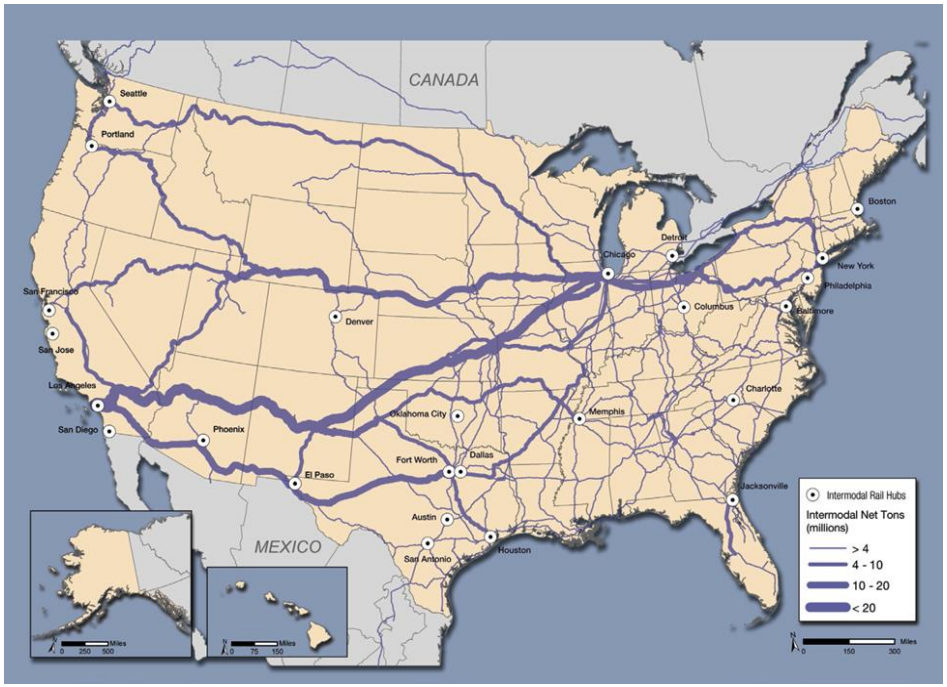
- At-grade crossings and the border crossing at Nogales were cited as other bottlenecks in the rail system.

Majority through traffic



Traffic profile

- Annual carloads for short line railroads are approximately 105,000 compared with the Class I railroads' total of 461,400 annual carloads



Key Findings – Air

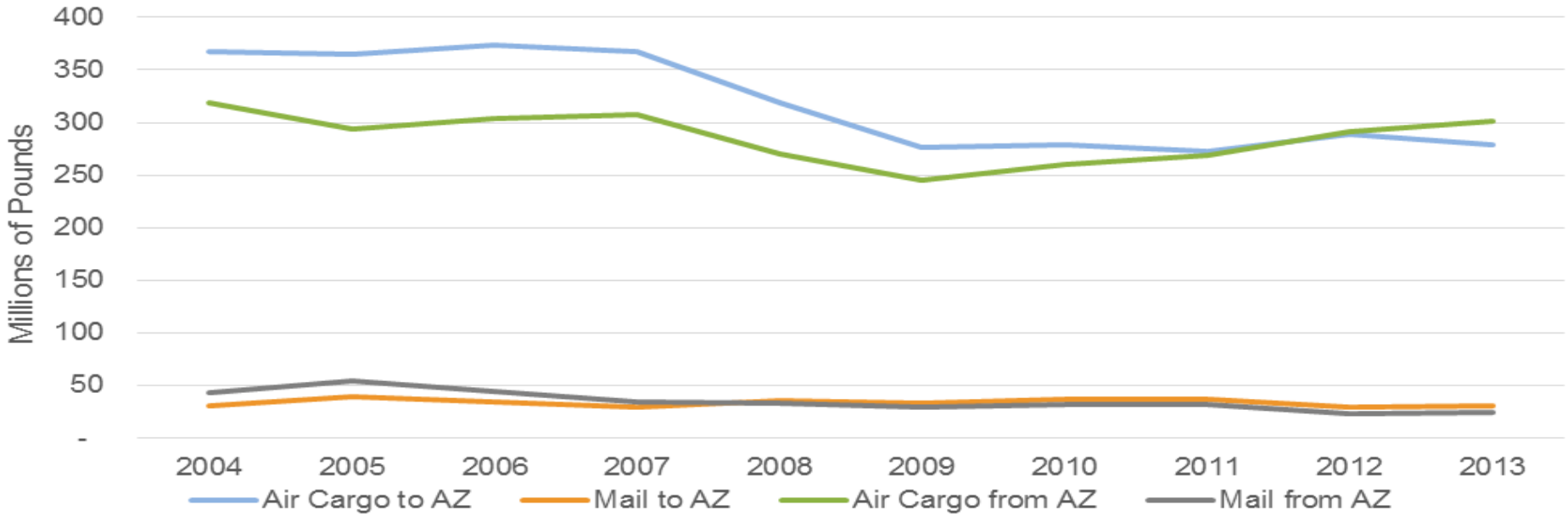
Key findings

- Phoenix Sky Harbor moves nearly 90 percent of all air cargo
- Tucson International Airport (TUS) handles nearly ten percent of the state's air cargo

Sufficient air capacity

- Estimates suggest no new on-airport cargo infrastructure will be needed until 2031
- Highway access to air cargo facilities at PHX will need to be addressed

Overall decline in air cargo



Key Findings – Border Crossings

Key Findings

- Over 85 percent of exports and 88 percent of imports use Nogales
- All rail traffic uses Nogales
- Congestion due to limited Port of Entry capacity

Declining trucking market share

- Increase in absolute number of trucks
- Decline in market share 1995-2014

Increasing rail market share

- Increase in absolute number of trains
- Increase in market share 1995-2014
- Nearly constant market share post-recession

Figure 43: Number of Northbound Trucks Crossing the U.S.-Mexico Border, by State

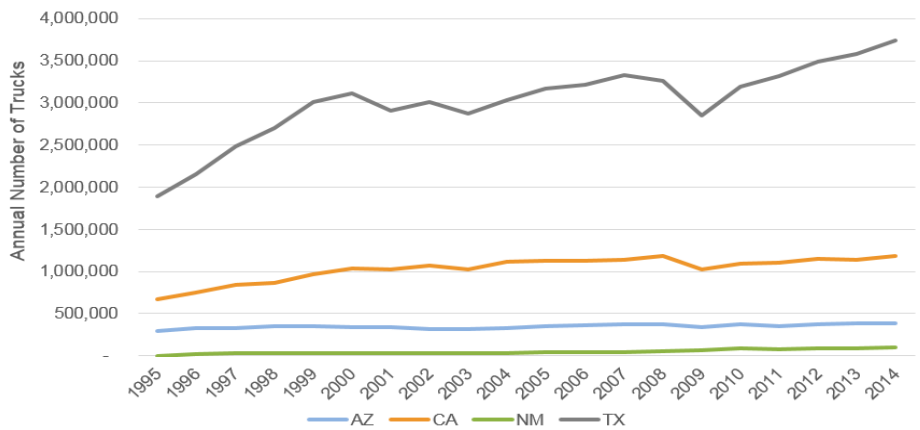
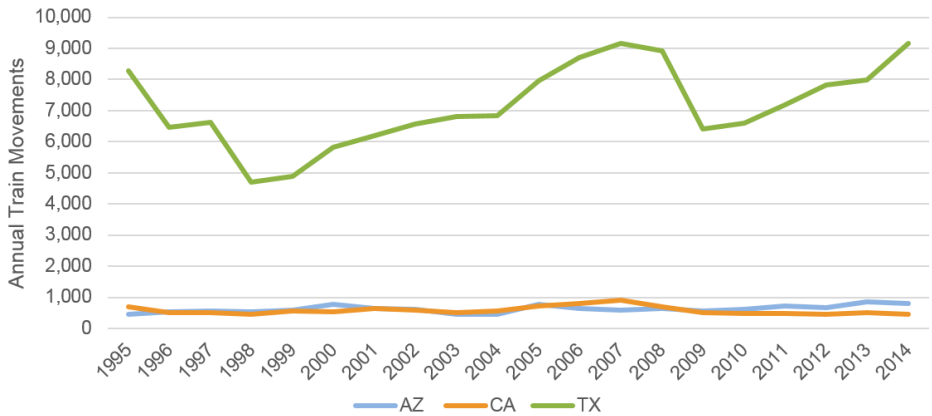
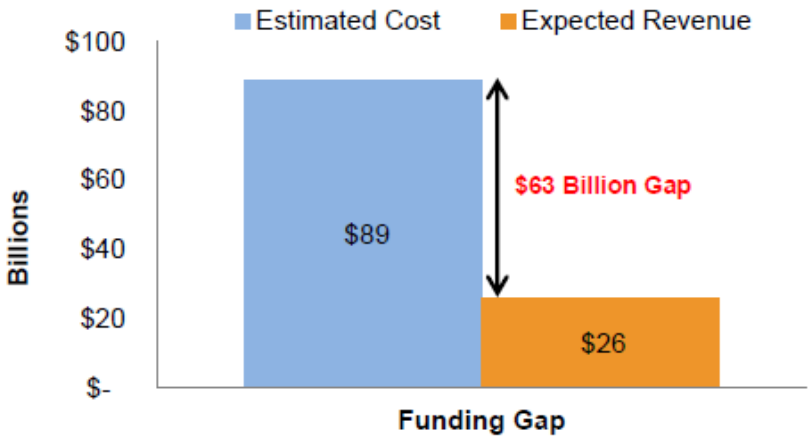


Figure 44: Number of Northbound Trains Crossing the U.S.-Mexico Border, by State



Transportation funding is the greatest challenge going forward

- Transportation performance is projected to degrade over the next 25 years
  - Population growth, limited alternate routes and network redundancy
- $89 billion needed over the next 25 years for transportation infrastructure



Work Currently Underway – Phase 3

- Phase 3: Freight characteristics and economic context
  - Under review
  - Focus on top 10 sectors
  - Transportation needs/trends/issues
  - Defines explicit link between economy and system performance

Figure 2-2: Value of Arizona Mining Output, 2012 (millions of dollars)

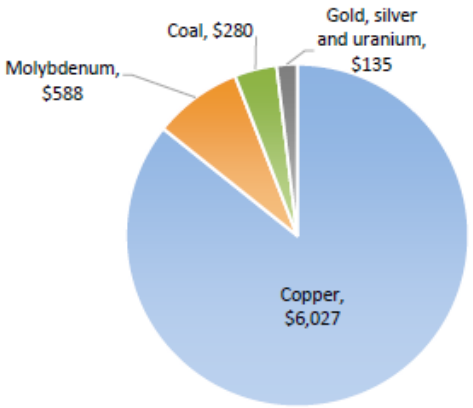
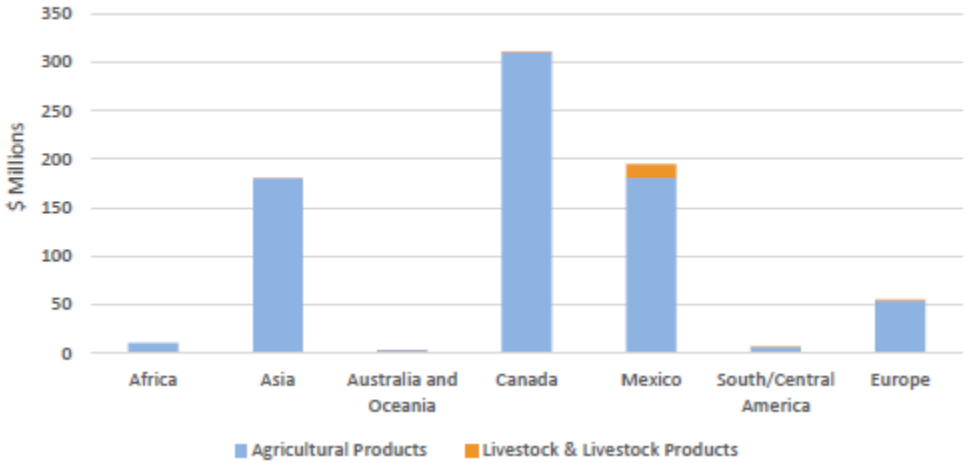


Figure 2-10: Destinations of Arizonan Agricultural Exports ($ millions, 2014)

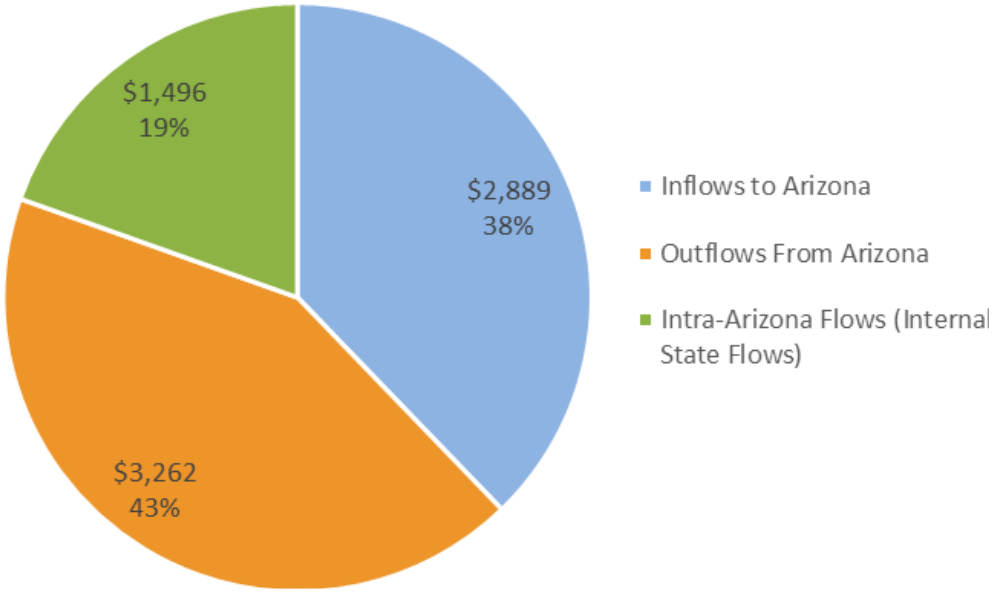


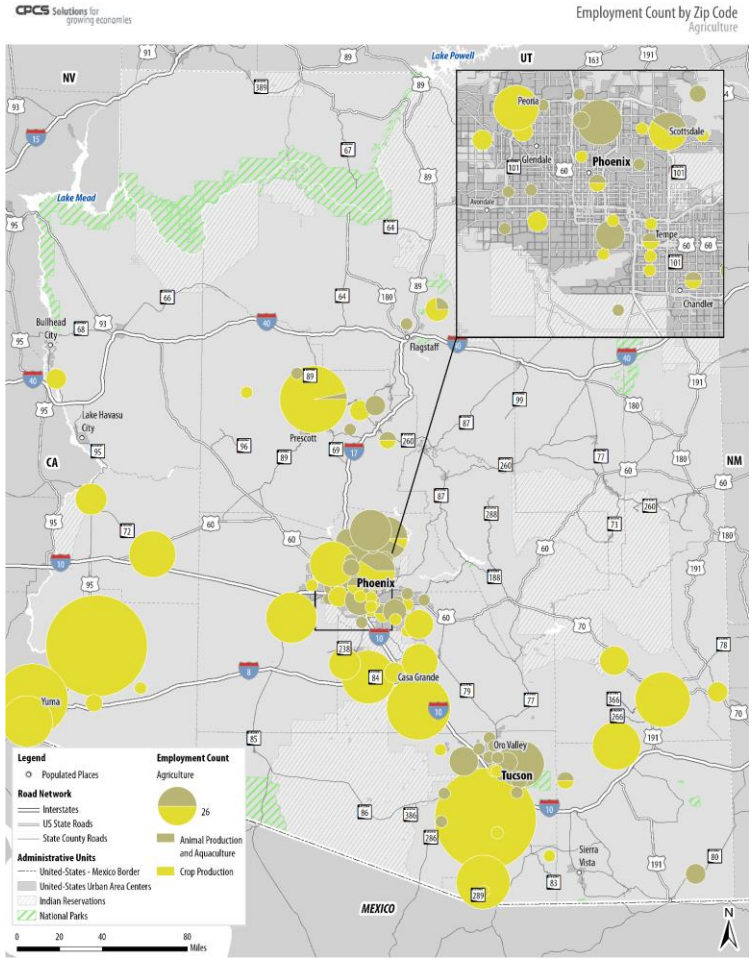
Top 10 Sectors for Focus
Wholesalers and Retailers
Food and Beverage
High-Tech Manufacturing
General Manufacturing
Transportation Equipment
Transportation and Logistics
Mining (except oil and gas)*
Energy (oil and gas)*
Agriculture*
Forestry*

CPCS Solutions for growing economies

Work Currently Underway – Phase 3

- Geographic concentration
  - Identifies transportation flows
- Sector and statewide
  - Trends and outlook will inform scenarios

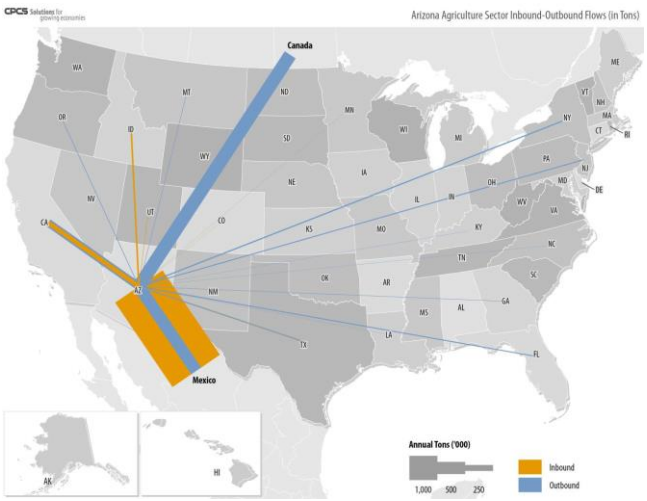


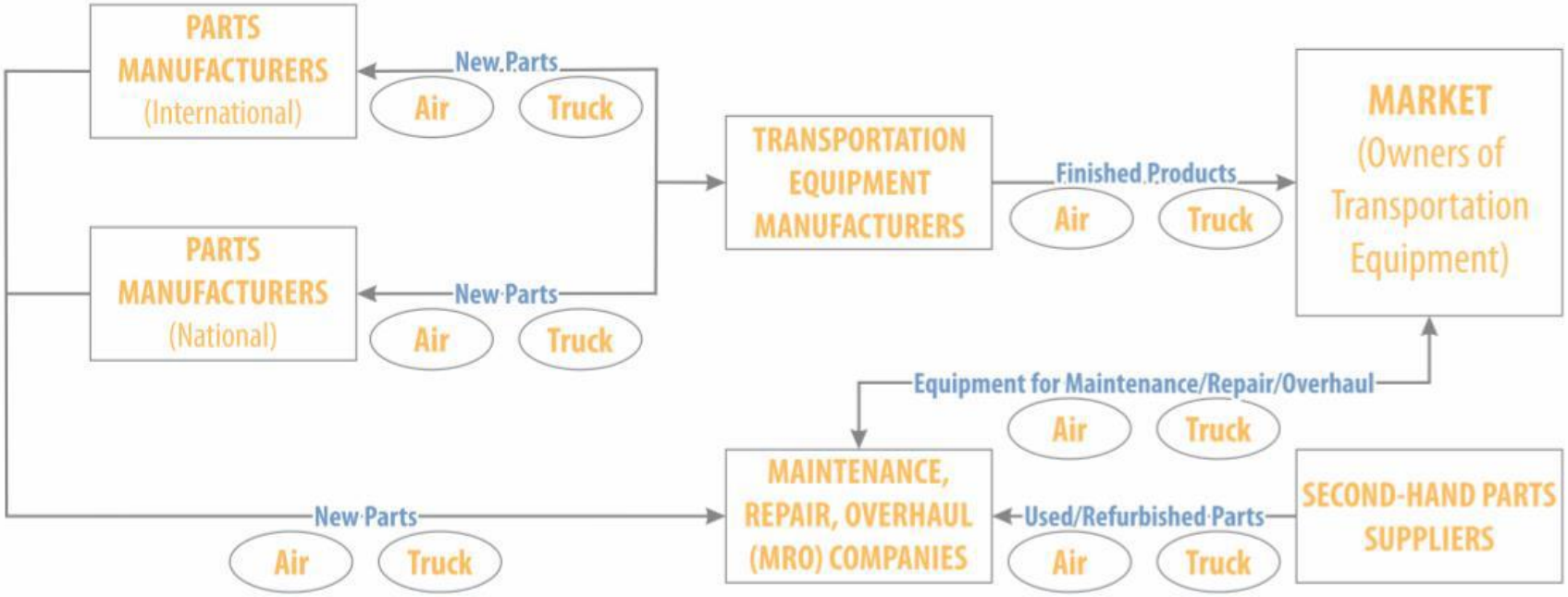


CPCS Solutions for growing economies

Work Currently Underway – Phase 3

- Supply chain and infrastructure based analysis
  - Identifies transportation by sector
  - Highlights needed improvements

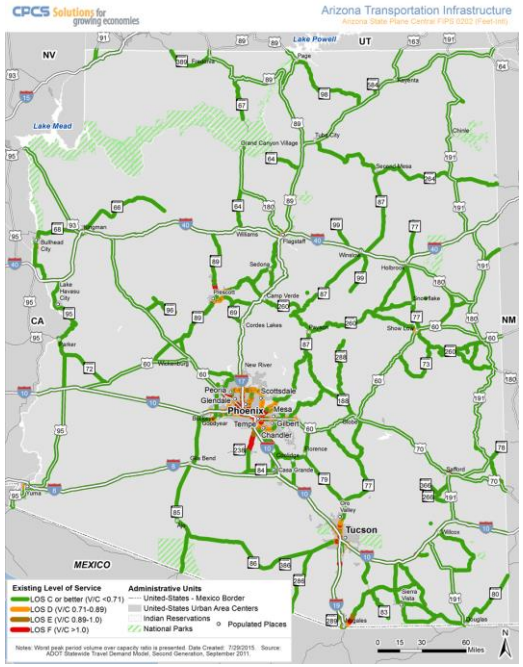




Phase 5: Condition and Performance Report

Phase Output: Set of performance measures, data and approaches to benchmark freight performance, inform improvement decisions and to measure progress

- Short-term focus
  - Identify actionable performance measures
  - Linked measures to freight plan goals
- Next steps
  - Develop baseline performance
  - Focus on strategic infrastructure



Phase 5: Industries use of Freight Performance Measures

- Which performance measures are used in your industry to assess supply chain performance?
- What are the most important performance measures for your supply chain (cost, speed, reliability, safety, environment)?
- Which infrastructure assets in Arizona increase the cost or variability in your supply chain?

Phase 5: Industries use of Freight Performance Measures

- Which private sources of data should ADOT use to assess system performance?
- How should ADOT communicate performance measures to industry?

Presentation Overview

Key findings from policies and strategies working paper

FAC input on work currently underway

Immediate next steps

Next FAC meeting

- Next FAC meeting November 5th
  - Focus on scenario planning development
- FAC input
  - What STEEP drivers could have the biggest impacts on the future of freight transportation in Arizona?
  - How could different combinations of drivers manifest themselves in extreme, but plausible future scenarios for Arizona?
  - What will be the likely effect of these drivers and related scenarios 25 years from now?

Working paper schedules

- Next working paper to be sent
  - Phase 2: Inventory on state freight transportation system assets, nodes and corridors
- Read through relevant sections and provide comments as needed about the validity of conclusions.

Questions and Discussion

Donald Ludlow, MCP, AICP
Managing Director
1050 Connecticut Ave. NW, 10th Floor, Washington, DC 20036
T: +1 202 772 3368 | C: +1 703 216 2872 | dludlow@cpcstrans.com | www.cpcstrans.com

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