

# Study on Metropolitan Planning Scenario Development: Costs and Benefits

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# Table of Contents

<b>Table of Contents</b> .....	<b>i</b>
<b>List of Figures and Tables</b> .....	<b>ii</b>
<b>Abbreviations</b> .....	<b>iii</b>
<b>Study Summary</b> .....	<b>1</b>
Purpose .....	1
Context and Research Approach .....	1
What is Scenario Planning? .....	1
Legislative Context.....	2
Study Definitions.....	3
Research Approach.....	4
Key Findings .....	5
Costs of Scenario Planning.....	6
Benefits of Scenario Planning .....	10
Technical and Financial Capacity: Challenges of Scenario Planning .....	11
Conclusion.....	11

# List of Figures and Tables

Figure 1: Money Spent to Conduct Scenario Planning as Part of MTP Development..... 8

Figure 2: Increase in Cost to Prepare MTP Due to Implementation of Scenario Planning ..... 8

Figure 3: Effect of Scenario Planning on MTP Preparation ..... 9

Table 1: Summary of Scenario Planning Costs Reported in CUTR Survey..... 6

Table 2: Staff Time Dedicated to Scenario Planning for Case Study MPOs..... 9

# Abbreviations

Abbreviation	Term
CFR	Code of Federal Regulations
CUTR	Center for Urban Transportation Research
DOT	U.S. Department of Transportation
FAST	Fixing America’s Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTE	Full-Time Employee
LRTP	Long-Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21 <sup>st</sup> Century Act
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
PBPP	Performance-Based Planning and Programming
RTP	Regional Transportation Plan
SDOT	State Department of Transportation
TMA	Transportation Management Area
UPWP	Unified Planning Work Program
U.S.C.	U.S. Code

# Study Summary

## Purpose

This study responds to requirements identified in Section 1201(b) of the Moving Ahead for Progress in the 21st Century Act (MAP-21), enacted in 2012. This provision requires the U.S. Department of Transportation (DOT), specifically the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), to prepare a study on metropolitan planning scenario development.<sup>1</sup>

This study:

- (1) Evaluates the costs and benefits associated with metropolitan planning organizations (MPOs) developing multiple scenarios for consideration as part of the development of their Metropolitan Transportation Plan (MTP).<sup>2</sup>
- (2) Includes an analysis of the technical and financial capacity MPOs need to develop the scenarios described in paragraph (1).

## Context and Research Approach

### *What is Scenario Planning?*

Scenario planning is a strategic planning approach used by transportation agencies, such as MPOs and State departments of transportation (SDOTs), to develop, compare, and test different scenarios or “stories” about what the future might look like. Scenario planning can help cities, regions, and States develop policies to address potential impacts of transportation projects. This approach can also help MPOs respond to stakeholder and public feedback obtained throughout the scenario planning process.

Scenario planning traditionally combines three main characteristics:

- Depicts an array of conditions that could logically co-exist;
- Presents a future that could evolve from current conditions, even if it is very different from the present; and
- Focuses on broad implications as opposed to detailed predictions.

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<sup>1</sup> Per MAP-21 Section 1201(b): Study on Metropolitan Planning Scenario Development.—

(1) In general.—The Secretary shall evaluate the costs and benefits associated with metropolitan planning organizations developing multiple scenarios for consideration as a part of the development of their metropolitan transportation plan.

(2) Inclusions.—The evaluation shall include an analysis of the technical and financial capacity of the metropolitan planning organization needed to develop scenarios described in paragraph (1).

<sup>2</sup> MPOs may use different terminologies when referring to their long-range plans. Common terms include the MTP, long-range transportation plan (LRTP), or Regional Transportation Plan (RTP). For the purposes of this study, the term “MTP” is used as the singular term throughout and represents both LRTPs and RTPs when referenced.

## Legislative Context

MAP-21 (2012) and the Fixing America's Surface Transportation (FAST) Act (2015) consider scenario planning as an optional approach with recommended components.<sup>3</sup> To follow this approach, MPOs electing to use scenario planning should consider developing a preferred scenario that improves baseline conditions for as many of the performance measures established under Title 23 Code of Federal Regulations (CFR) Part 490 and Title 49 United States Code (U.S.C.) 5326(c) and 5329(d) as possible.<sup>4</sup>

Furthermore, under 23 CFR 450.324(f)(4)(ii), in the system performance report required as part of the MTP, MPOs that voluntarily elect to conduct scenario planning should describe how their preferred scenario has improved conditions and performance of the transportation system.

For additional information on the optional scenario planning approach, see: 23 U.S.C. 134(i)(4) and 49 U.S.C. 5303(i)(4).<sup>5</sup>

MAP-21 also introduced performance-based planning (PBPP) for statewide and metropolitan planning agencies.<sup>6</sup> The purpose of PBPP is to establish a transparent, accountable decision-making framework, which can, among other things, identify multimodal capital investments and project priorities.

The FHWA and FTA published the final rule on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning (hereinafter referred to as the "planning regulations") on May 27, 2016, which addressed requirements in MAP-21 and the FAST Act.<sup>7</sup>

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<sup>3</sup> See 23 U.S.C. 134 and 49 U.S.C. 5303, 5304, and 5305

<sup>4</sup> 23 CFR 490.324(i)

<sup>5</sup> 23 U.S.C. 134(i)(4) and 49 U.S.C. 5303(i)(4) describe optional scenario planning as follows:

- (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).
- (B) RECOMMENDED COMPONENTS.--A metropolitan planning organization that chooses to develop multiple scenarios under subparagraph (A) shall be encouraged to consider:
  - (i) potential regional investment strategies for the planning horizon;
  - (ii) assumed distribution of population and employment;
  - (iii) a scenario that, to the maximum extent practicable, maintains baseline conditions for the performance measures identified in subsection (h)(2);
  - (iv) a scenario that improves the baseline conditions for as many of the performance measures identified in subsection (h)(2) as possible;
  - (v) revenue constraint scenarios based on the total revenues expected to be available over the forecast period of the plan; and
  - (vi) estimated costs and potential revenues available to support each scenario.
- (C) METRICS. -- In addition to the performance measures identified in section 150(c) of title 23, metropolitan planning organizations may evaluate scenarios developed under this paragraph using locally-developed measures.

<sup>6</sup> Section 134(h)(2) of Title 23, U.S.C., calls for the metropolitan transportation planning process to provide for the establishment and use of a performance-based approach to transportation decision-making, with targets for tracking progress towards attainment of critical outcomes for the region; coordination with the SDOT to ensure consistency to the maximum extent practicable; and coordination to the maximum extent practicable with providers of public transportation to ensure consistency with Title 49.

<sup>7</sup> 23 CFR Part 450; 49 CFR Part 613. See: 81 Fed. Reg. 34050 at:

<https://www.federalregister.gov/documents/2016/05/27/2016-11964/statewide-and-nonmetropolitan-transportation-planning-metropolitan-transportation-planning>.

Now, the planning regulations include a framework for the optional scenario planning approach and a significant focus on PBPP. Both the optional scenario planning framework and PBPP requirements are elements of MAP-21's transformation of the Federal-aid highway program and the Federal transit program to a performance-driven, outcome-based approach.

As there is a two-year phase-in period for PBPP requirements under the planning regulations, MPOs and SDOTs will not fully implement many of the PBPP requirements until at least 2019.<sup>8</sup> At the time of this study (2017), many MPOs have not yet incorporated the Federal performance measures into their planning processes or formally used the optional scenario planning framework established in the planning regulations. Currently, many MPOs use alternative approaches to scenario planning, depending on which method best meets their needs.

### **Study Definitions**

For the purposes of this study, FHWA and FTA used the following definitions for key terms:

- **Scenario planning:** A planning process that evaluates the effects of alternative policies, plans, and/or programs on the future of a community or region. This activity should provide information to decision-makers as they develop their MTPs.<sup>9</sup>

This study discusses scenario planning efforts in terms of two approaches:

- *Predictive/Normative:* The “traditional” transportation scenario planning approach, which often begins as an internal agency exercise focused on how predictable trends might affect future possible conditions. It involves stakeholders and the public in sharing themes, challenges, and visions for the future that are incorporated into scenarios, culminating in a preferred scenario.

This approach is closely tied to the optional scenario planning framework under MAP-21. A specific use of the predictive/normative approach focuses on developing investment/financial scenarios that address costs and potential revenues to identify and prioritize trade-offs for infrastructure investments.

- *Exploratory:* A higher-level scenario planning approach that explores uncertain or unknown factors, and imagines the range of potential alternative futures.

This is an emerging area for scenario planning in transportation that MPOs are increasingly considering. Exploratory scenario planning looks at uncertainties and external influences that are beyond the control of the MPO. Unlike predictive/normative scenario planning, the exploratory approach embraces the complexity of uncertainty, leading to opportunities to imagine what could happen in the future without the goal of having a single preferred scenario in place at the end of the process.

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<sup>8</sup> The two-year phase-in period for the PBPP requirements in the planning process begins two years after the publication date of the planning regulations, or two years after the effective date of each performance measure's final rule, whichever occurs later. See 23 CFR 450.226, 23 CFR 450.340, 23 USC 150(c), 49 USC 5326(c), and 49 USC 5329(d).

<sup>9</sup> See 23 CFR 450.104.

- **Costs:** The dollar amount an MPO spent on scenario planning efforts.
- **Benefits:** The value that scenario planning brings to the outcomes of an MPO’s metropolitan transportation planning process.
- **Technical Capacity:** The ability of an MPO to conduct scenario planning efforts, as related to its resources, staff experience, and access to necessary computing tools.
- **Financial Capacity:** The ability of an MPO to pay for a scenario planning effort.

### **Research Approach**

None of the agencies FHWA and FTA contacted for this study have formally used the MAP-21 scenario planning framework or are linking scenario planning with national performance measures. As such, the study focuses on the benefits, costs, and challenges for MPOs currently using scenario planning in the transportation planning process. The study does this through examples of agencies that have conducted scenario planning, taking into account the range of approaches used. It also indicates how scenario planning approaches may incorporate PBPP in the future.

The study uses results from a national survey conducted by the Center for Urban Transportation Research (CUTR) at the University of South Florida, as well as activities led by the FHWA-FTA study team, including case studies from discussions with MPOs.

### **The CUTR Survey**

Conducted in 2016, the CUTR survey updated the organization’s 2010 “Staffing and Administrative Capacity of MPOs” survey.<sup>10</sup> The survey primarily serves as a tool for FHWA and FTA to understand how MPOs are functioning, and helps MPOs meet their responsibilities under Federal law more effectively.

While most of the survey’s 92 questions relate to administration and staffing, CUTR included 5 questions on scenario planning to ascertain how MPOs nationwide are using this approach. The first question on scenario planning, which asked whether an agency used this approach, received comments from 259 respondents. Of these, 150 of them (58 percent) indicated they had used scenario planning in developing their MTPs, but not all of those who responded to this initial scenario planning question answered the later questions in the survey on scenario planning, resulting in the varied total response rates provided in this study. The CUTR survey was the primary source of information on scenario planning costs.

### **Case Studies**

The FHWA-FTA study team additionally held one-hour teleconferences with 13 MPOs. Of those, the team developed nine case studies to gain qualitative insights into the benefits and

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<sup>10</sup> The information from this survey that this study references was collected under an approved information collection under the Paperwork Reduction Act (OMB Control #: 2125-0039).

challenges of performing a scenario planning exercise, as well as additional details on the associated costs.<sup>11</sup>

The selected case study MPOs represent a diverse sampling of agency size, geographic location, and level of experience with scenario planning. All the case study MPOs have engaged in scenario planning to some extent. Their responses provide a narrative to supplement the information gathered from the CUTR survey.

The following list identifies the nine case study agencies:

1. Adams County Transportation Planning Organization (Adams County, PA)
2. Chicago Metropolitan Agency for Planning (Chicago, IL)
3. Chittenden County Regional Planning Commission (Burlington, VT)
4. Delaware Valley Regional Planning Commission (Philadelphia, PA)
5. Greater Buffalo-Niagara Regional Transportation Council (Buffalo, NY)
6. Metropolitan Transportation Commission (San Francisco, CA)
7. Mid-Region Council of Governments (Albuquerque, NM)
8. Nashville Area Metropolitan Planning Organization (Nashville, TN)
9. Pikes Peak Area Council of Governments (Colorado Springs, CO)

## Key Findings

Based on the team's research, this study finds the following regarding the costs, benefits, and challenges of scenario planning:

### Costs

- **Scenario planning can create additional costs for MPOs, but the cost burden is not necessarily large or undue.**
  - In most instances, scenario planning is integrated so closely into an MTP update that it can be difficult to distinguish its specific costs, separate from regular MTP update activities.
  - Some MPOs scale their approach and level of effort to scenario planning, from internal efforts to large public involvement initiatives, depending on the resources available.

### Benefits

- **Scenario planning benefits MPOs by providing additional data analysis and public input that can guide and inform MTPs and decision-making.**
  - MPOs use scenario planning to help select investment decisions that align with regional goals, connect regional transportation and local land use planning

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<sup>11</sup> The MPOs contacted for discussions but not highlighted in case studies were ones that were newer to scenario planning or considering the approach. They were as follows: Gulf Regional Planning Commission (Biloxi, MS); New York Metropolitan Transportation Council (New York, NY); Regional Planning Commission of Greater Birmingham (Birmingham, AL); and the Richmond Regional Transportation Planning Organization (Richmond, VA).

activities, strengthen public and stakeholder involvement, and expand understanding of potential future challenges and opportunities.

**Challenges**

- **Certain scenario planning approaches can be more time and resource intensive than others.**
  - MPOs may find it difficult to allocate adequate staff time and resources to conduct a predictive/normative approach. In response, MPOs are increasingly considering an exploratory approach to rely more on qualitative stakeholder feedback and less on modeling and forecasting tools.

The following sections detail specific findings on costs, benefits, and challenges.

**Costs of Scenario Planning**

This study reveals that scenario planning increases the funding and resources needed for developing an MTP to a certain extent, but the cost burden is not necessarily large or undue. In many cases, scenario planning is integrated so closely into an MTP update that it can be difficult to distinguish its specific costs, separate from regular MTP update activities.

Table 1 provides a summary of cost findings from the CUTR survey. For context, the survey shows that the average amount available to MPOs serving Transportation Management Areas (TMAs) in their Unified Planning Work Programs (UPWPs) is approximately \$5.9 million, and the average amount for MPOs serving non-TMAs is approximately \$510,000.<sup>12</sup> MPOs use UPWP funds to support their MTP development. In 2012, FHWA and FTA reviewed 24 UPWP’s to estimate the costs to update individual MTPs. The review showed costs ranging from \$15,000 for a minor update to \$1,095,000 for a major update, with an average cost of \$618,430 for the MTP updates for the 24 MPOs.

Table 1: Summary of Scenario Planning Costs Reported in CUTR Survey  
Source: CUTR

<b>CUTR Survey Question</b>	<b>All MPOs</b>	<b>TMA MPOs</b>	<b>Non-TMA MPOs</b>
<i>How much would you estimate your MPO spent or will be spending to conduct scenario planning?</i> <b>Average cost reported</b>	<b>\$53,073</b> (123 responses)	<b>\$53,170</b> (59 responses)	<b>\$52,984</b> (64 responses)
<i>What is the total dollar amount (\$), for all purposes, expressed in the MPO’s current UPWP?</i> <b>Average amount for one-year UPWP reported</b>	<b>\$2,884,875</b> (161 responses)	<b>\$5,895,345</b> (71 responses)	<b>\$509,949</b> (90 responses)
<i>By what percentage would you estimate that the implementation of scenario planning has increased the cost of developing the MTP/LRTP?</i> <b>Average percentage reported</b>	<b>18.6%</b> (58 responses)	<b>20.4%</b> (28 responses)	<b>17.0%</b> (30 responses)

<sup>12</sup> In general, TMAs are Urbanized Areas with U.S. census populations of 200,000 or greater. Non-TMAs are Urbanized Areas with populations less than 200,000.

<b>CUTR Survey Question</b>	<b>All MPOs</b>	<b>TMA MPOs</b>	<b>Non-TMA MPOs</b>
<i>How has the implementation of scenario planning affected the preparation of the MTP/LRTP? <b>Responses indicating increased cost and/or required reallocation of resources and prioritization of tasks reported</b></i>	<b>62.5%</b> (144 responses)	<b>68.6%</b> (70 responses)	<b>56.8%</b> (74 responses)
<i>Does a member(s) of your staff (excluding consultants) spend more than half of their time focusing on scenario planning? <b>Percent responses “Yes” reported</b></i>	<b>9.7%</b> (144 responses)	<b>12.7%</b> (71 responses)	<b>6.8%</b> (73 responses)

The CUTR survey finds the average costs of scenario planning are less than two percent of the overall funds provided for planning activities in the UPWP. The MPOs serving TMAs spent roughly the same amount of funds on scenario planning as those serving non-TMAs (approximately \$53,000 for both TMAs and non-TMAs). While these expenditures are similar across both TMAs and non-TMAs, the total amount of funding available to an MPO in its UPWP varies greatly. This difference demonstrates that scenario planning likely accounts for a larger portion of a non-TMA UPWP budget (around 10 percent) than a TMA budget (less than 1 percent). Based on this information, MPOs appear willing to dedicate resources to scenario planning, regardless of the size of their UPWP budgets.

For those using scenario planning, impacts to the MTP resulted in cost increases of approximately 20 percent for MPOs serving TMAs and 17 percent for those serving non-TMAs. Survey respondents indicated that using scenario planning had a significant impact on the preparation of their MTPs. Approximately two-thirds of all respondents (both MPOs serving TMAs and non-TMAs) found that applying a scenario planning approach had an impact on their staff and financial resources needed to prepare an MTP. The difference between costs and staff time is complicated slightly by the fact that many MPOs hire consultants, which is captured in cost, not staff time.

Lastly, only 10 percent of MPOs reported that a staff member dedicated more than half of his or her time to scenario planning. However, staffing levels for scenario planning varied between MPOs serving TMAs and non-TMAs. Approximately 13 percent of MPOs serving TMAs had a staff member dedicating more than one-half of his or her time to scenario planning, while about 7 percent of MPOs serving non-TMAs had such a position.

Scenario planning costs vary depending on the level of effort. Figure 1 illustrates the range of amounts that MPOs have spent on scenario planning. The majority of respondents (68 percent) spent less than \$50,000. To keep costs down, MPOs may conduct the activity at a smaller scale as an internal staff exercise. If more funding is allocated, they may pursue larger, regionwide initiatives involving multiple opportunities and methods for public involvement. Survey respondents did not provide specific examples of the types of scenario planning activities they had conducted for the cost identified.

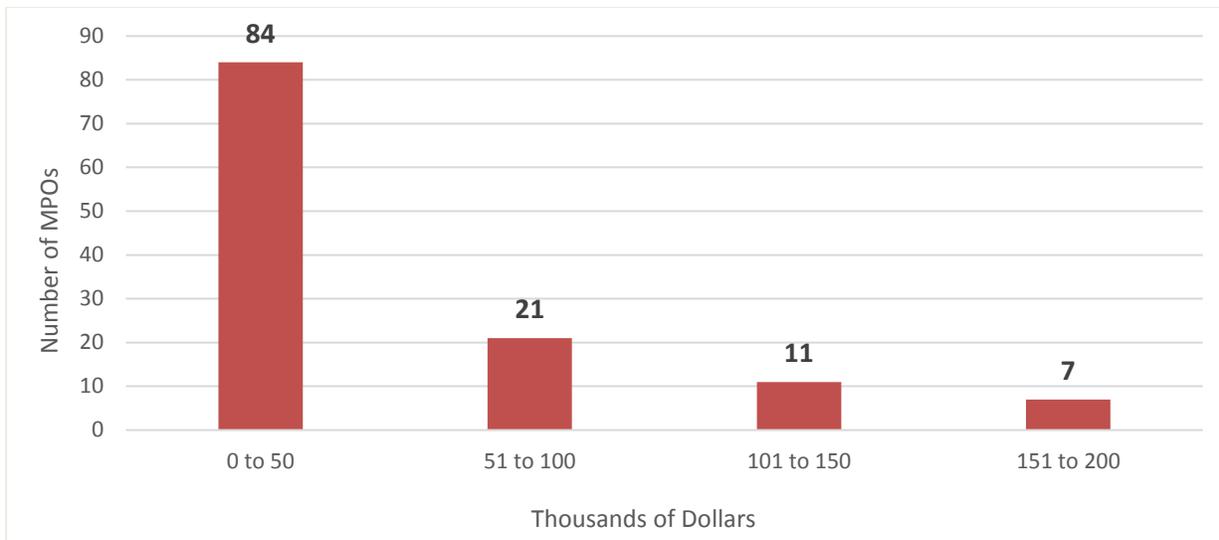


Figure 1: Money Spent to Conduct Scenario Planning as Part of MTP Development  
 Source: CUTR; Universe: 123 MPOs

In addition, MPOs often integrate scenario planning directly into their MTP updates. While the associated costs can sometimes be difficult to differentiate, survey respondents estimated what they believed to be the increase in cost to prepare an MTP due to using scenario planning (Figure 2). The majority of respondents (74 percent) found that preparing an MTP using scenario planning resulted in a cost increase of up to 20 percent.

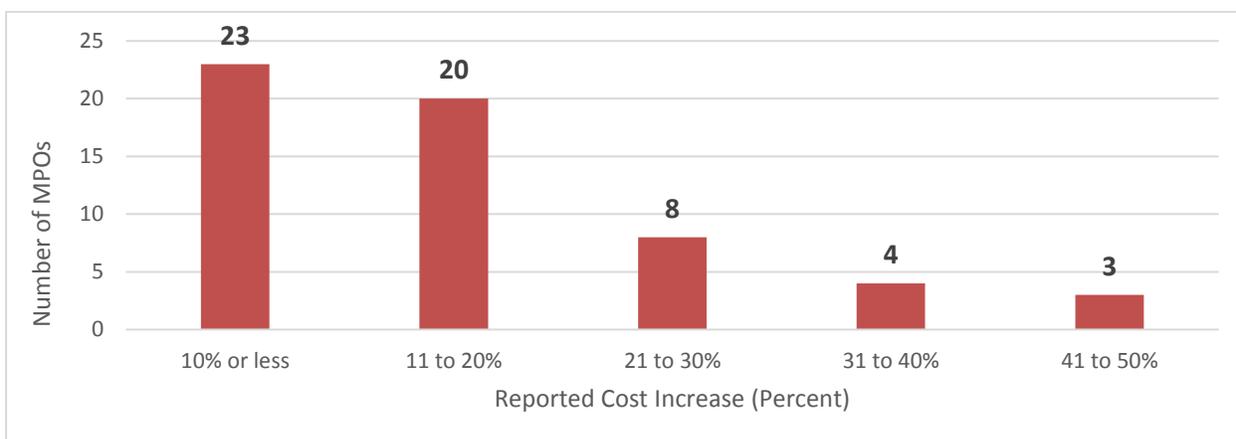


Figure 2: Increase in Cost to Prepare MTP Due to Implementation of Scenario Planning  
 Source: CUTR; Universe: 58 MPOs

For most MPOs, scenario planning impacts the staff and financial resources needed to prepare an MTP (Figure 3). Sixty-three percent of respondents reported that a scenario planning process increased their costs to prepare the MTP, requiring them to reallocate resources and prioritize tasks, or both. Eleven percent of the agencies provided an “other” explanation; for example, some indicated they had yet to begin a scenario planning process. The remaining 26 percent of respondents reported that scenario planning had no effect on the resources required.

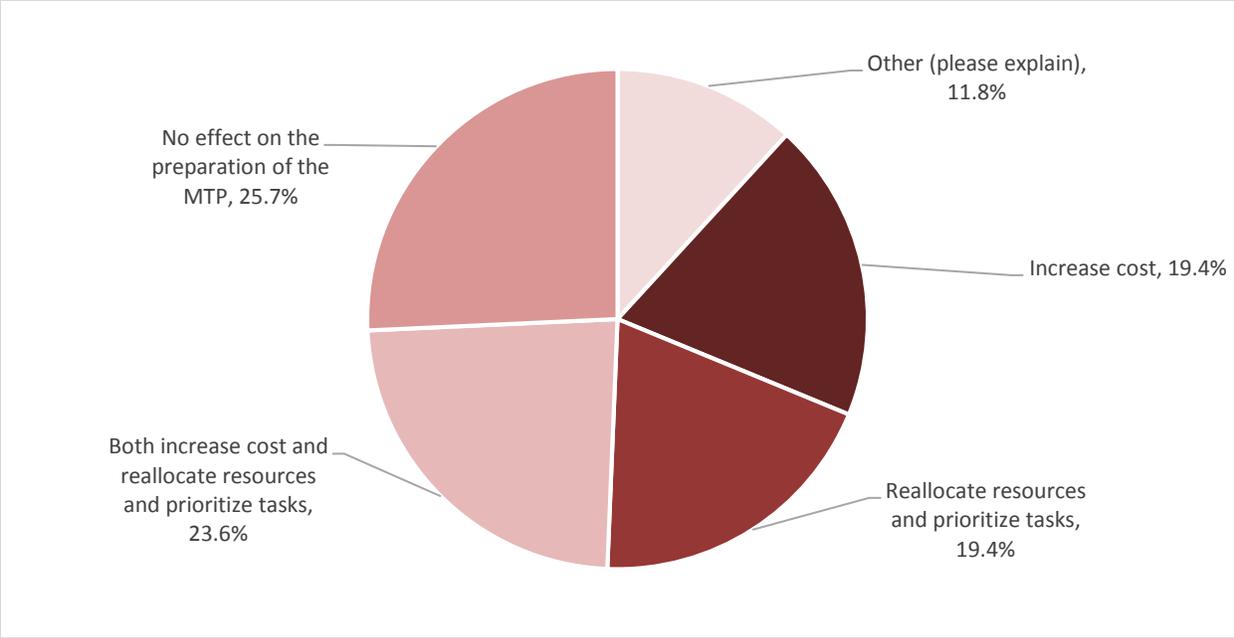


Figure 3: Effect of Scenario Planning on MTP Preparation  
 Source: CUTR; Universe: 144 MPOs

The case studies mostly corroborate the CUTR survey findings, as many of the case study MPOs indicated that scenario planning did not significantly increase the cost of developing their MTPs. Many of the MPOs could not provide specific costs for their scenario planning efforts because the process was integrated into their MTP development as a whole, particularly into their public involvement activities. The case study MPOs that provided dollar figures cited between \$75,000 and \$450,000<sup>13</sup> for consultant fees and software costs related to scenario planning.

However, the case study MPOs on average dedicated more time to scenario planning than the CUTR survey respondents and reported this as an important cost factor. All the case study MPOs used dedicated staff for their scenario planning. Most MPOs dedicated at least one Full-Time Employee (FTE) to scenario planning during the MTP update process, which occurs every four to five years (Table 2).

Table 2: Staff Time Dedicated to Scenario Planning for Case Study MPOs

Case Study MPO	Staff Time Dedicated to Scenario Planning
Adams County Transportation Planning Organization	1.5 FTEs
Chicago Metropolitan Agency for Planning	Unknown
Chittenden County Regional Planning Commission	½ FTE over 1-2 years
Delaware Valley Regional Planning Commission	1 FTE for 1.5 years

<sup>13</sup> This amount was exceptional and based on the amount of a grant award.

Case Study MPO	Staff Time Dedicated to Scenario Planning
Greater Buffalo-Niagara Regional Transportation Council	1 FTE for 1 year
Metropolitan Transportation Commission	1 FTE over 20 months, distributed across different tasks and number of staff
Mid-Region Council of Governments	2 FTEs over 1 year
Nashville Area MPO	Unknown, cited as significant
Pikes Peak Area Council of Governments	\$100,000-\$150,000 over 4 years

### ***Benefits of Scenario Planning***

Based on the case studies, MPOs use the outcomes of a scenario planning process to inform long-range planning and decision-making, and to provide opportunities for connecting regional efforts with more local land use planning. Eight of the nine case study MPOs used scenario planning to develop their MTPs.

The nine case studies revealed four of the specific ways in which scenario planning enhances a long-range planning process:

- **Leads to investment decisions that align with regional goals:** Eight of the nine MPOs featured in the case studies discussed how scenario planning provided information that helped decision-makers, including MPO boards and local governments, select investments that better aligned with regional goals and the outcomes of the planning process. This benefit illustrates the potential for MPOs to integrate scenario planning into a performance-based approach to planning.
- **Integrates regional transportation and local land use planning:** Five of the nine MPOs shared how scenario planning that focuses on land use patterns provides data for MPOs and local agencies to use when updating local land use plans. This results in improved ties between regional transportation and local land use planning. In the future, MPOs and local agencies can use this aspect of scenario planning to make progress on performance measures that are influenced by land use and development patterns.
- **Improves public and stakeholder involvement:** Eight of the nine MPOs found that using a scenario planning process to conduct outreach related to an MTP resulted in a higher level of public participation and an improvement in the quality of feedback gathered. These outcomes enable agencies to foster broad regional consensus on the goals and objectives included in the plan.
- **Broadens agency and public understanding of future challenges and opportunities:** This benefit is most often seen as a result of exploratory scenario planning. Three of the nine MPOs found that an exploratory approach to scenario planning increased agency and public understanding of future challenges. The approach allowed the MPOs to incorporate strategies into their MTPs that will help them navigate future uncertainties. While a preferred scenario is not the end goal of the exploratory approach, agencies could use the exploratory approach to identify potential performance measures. These measures can help when discussing the trade-offs, or when assessing gaps or risks that might occur in the future.

## ***Technical and Financial Capacity: Challenges of Scenario Planning***

The case studies and discussions with MPOs highlighted a variety of important challenges MPOs face when using scenario planning. The MPOs encountered different challenges depending on their approach to scenario planning, regional context, and resources.

This section summarizes the types of challenges the MPOs discussed that reflect both their technical and financial capacity to conduct scenario planning:

- **Allocating adequate resources:** A majority of case study MPOs found it difficult to allocate enough staff time and resources to conduct a predictive/normative approach to scenario planning. Currently, the MAP-21 requirements for MPOs electing to use scenario planning imply this type of method. Oftentimes, the MPOs' scenario planning efforts resulted in a trade-off of resources, in which they elected to use scenario planning in lieu of putting these resources toward other activities.
- **Incorporating possibilities beyond those forecasted:** The case study MPOs noted how a predictive/normative scenario planning approach was limiting because it relied on assumptions and did not account for the full realm of future possibilities. They expressed the view that the exploratory approach could help solve this dilemma because scenarios are based on qualitative stakeholder feedback rather than the outputs of modeling and forecasting tools. It therefore requires less staff time and resources.

## **Conclusion**

Many MPOs today are using different approaches to scenario planning to realize the benefits of incorporating the process into their MTP development. Some are using approaches that rely more heavily on modeling the effects of land use and development patterns, while others are focusing their efforts on gathering public feedback about needs and goals for their communities. Still other MPOs are applying an approach that analyzes emerging issues in transportation. Overall, the study finds that scenario planning is most beneficial when MPOs have the flexibility to use the approach that suits their needs.

As MPOs continue to develop their scenario planning processes and respond to Federal legislation and regulations, an opportunity exists for scenario planning to be more exploratory in nature and link directly with performance-based planning. Sharing costs and other resources between MPOs will increase the overall value that scenario planning brings to the MTP and project prioritization process.