Summary of the Federal Highway Administration's Scenario Planning Program Webinar – Central New Mexico Climate Change Scenario Planning Project

August 12, 2015
1:00 - 2:30 PM (ET)

These notes provide a summary of the webinar's presentations and the question-and-answer session that followed the presentations. Copies of the speakers' presentations are available for download in the webinar recording or from the contacts listed below.

A complete audio recording of the webinar is available at:
https://connectdot.connectsolutions.com/p8g6bcnwsxi/

Presenters

Name	Organization	Contact Information
Rae Keasler	Federal Highway Administration (FHWA) Office of Planning	(202) 366-0329 rae.keasler@dot.gov
James Garland	FHWA Office of Planning	(202) 366-6221 james.garland@dot.gov
Ben Rasmussen	USDOT / Volpe National Transportation Systems Center	(617) 494-2768 benjamin.rasmussen@dot.gov
Aaron Sussman	Mid-Region Council of Governments of New Mexico	(505) 724-3631 asussman@mrcog-nm.gov

Participants

Approximately 52 participants attended the webinar.

Introduction to Webinar and the FHWA-FTA Scenario Planning Program

Rae Keasler
Transportation Specialist, FHWA Office of Planning

James Garland
Team Lead, Planning Capacity Building Team, FHWA Office of Planning

Ms. Keasler welcomed participants to the webinar, the seventh in a series supported by the Scenario Planning Program offered by FHWA and the Federal Transit Administration (FTA). The FHWA Office of Planning organized this webinar. Ms. Keasler, along with her colleague James Garland, moderated the webinar and provided opening remarks.

The purpose of the webinar was to share information about applications of scenario planning for climate change. Using insights from two agency presenters, the webinar focused on a specific scenario planning project in central New Mexico.

Overview of Scenario Planning and FHWA/FTA Scenario Planning Program

While the webinar focused specifically on climate change scenario planning, Ms. Keasler briefly described a more common scenario planning approach that agencies often use. This approach includes public involvement activities and discussions on a variety of topics such as trends in the region and the intersections between transportation and land use. In addition, Ms. Keasler provided information on the FHWA/FTA Scenario Planning Program.

Scenario planning can be a useful resource for transportation agencies as part of their transportation planning processes. It brings many benefits, including helping agencies evaluate transportation choices and alternatives, engaging stakeholders in discussions about the futures of their communities, and encouraging an informed and collaborative decisionmaking process. The Moving Ahead for Progress in the 21st Century Act (MAP-21) also addresses scenario planning. MAP-21 encourages and provides an option for metropolitan planning organizations (MPOs) to use scenario planning.

The FHWA/FTA Scenario Planning Program offers a variety of resources for agencies interested in using scenario planning. Resources include technical assistance such as on-call technical assistance, peer-to-peer sharing, and customized webinars and workshops. In addition, FHWA and FTA developed a *Scenario Planning Guidebook*, which provides a six-phase framework for using a scenario planning approach. To learn more about the FHWA/FTA Scenario Planning Program and its resources, please visit: http://www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning/.

Interagency Transportation, Land Use, and Climate Change Initiative: Central New Mexico Climate Change Scenario Planning Project

Ben Rasmussen
Community Planner, USDOT Volpe National Transportation Systems Center (Volpe Center)

Mr. Rasmussen discussed the Volpe Center's support of the Interagency Transportation, Land Use, and Climate Change Initiative, including the Central New Mexico Climate Change Scenario Planning Project in partnership with the Mid-Region Council of Governments (MRCOG). The purpose of the project was fourfold: 1) to focus equally on climate change adaptation and climate change mitigation; 2) to use scenario planning as a framework; 3) to integrate the results and findings of the project into a regional long-range transportation planning process; and 4) to involve multiple agencies outside of the transportation field.

The Initiative included two locations—one in Cape Cod in 2010, and the recent effort in New Mexico. In 2010, FHWA, the Volpe Center, and their partners led a climate change scenario planning pilot project on Cape Cod. In 2013, FHWA decided to test the climate change scenario planning approach in a non-coastal location and selected MRCOG, the MPO for Albuquerque and Central New Mexico. One of the primary differences between the two projects is that MRCOG used its existing modeling environment and software, while Cape Cod used a scenario planning software tool known as CommunityViz. In addition, Mr. Rasmussen noted that the state of the practice for climate change planning has advanced considerably since the Cape Cod pilot; MRCOG and the Volpe Center were able to leverage these advancements into the New Mexico project.

The Central New Mexico project included partnerships at all levels. Federal funding sponsors included FHWA, the Bureau of Land Management, the National Park Service, and the U.S. Fish and Wildlife Service. Other supporting Federal agencies included the U.S. Department of Interior's Bureau of Reclamation, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Federal Emergency Management Agency (FEMA), Sandia National Laboratories, National Oceanic and Atmospheric Administration, and the U.S. Forest Service. The regional and local agencies involved in the project included MRCOG and the Mid-Region MPO, and the Albuquerque/Bernalillo County Water Utility Authority. The consultant team for the project was Ecosystem Management, Inc. with key support from the University of New Mexico.

After identifying the project partners, Mr. Rasmussen introduced the scope of the project, which focused on the four-county region surrounding the City of Albuquerque in Central New Mexico. The region is already starting to experience impacts relating to climate change, including increased flooding.

The project used a climate change adaptation process to first identify regional climate change impacts; study the effect of these impacts on transportation, land use, and natural resources; and evaluate the effects of transportation and land use policy choices on climate change impacts. Example adaptation strategies included mixed-use/density, urban footprint, and buffers around sensitive areas.

For its climate change mitigation process, the project evaluated over two dozen strategies to determine their potential for reducing greenhouse gas (GHG) emissions and their capacity for modeling. Project partners were able to model the strategies as part of the scenario planning process and using MRCOG's existing modeling software. For each development scenario, the project team estimated vehicle miles traveled (VMT) and GHG emissions. Example mitigation strategies included mixed use/density, alternative fuels, transit, and nonmotorized investments.

Several resources were used throughout this process, including the FHWA Scenario Planning Guidebook[1], the Cape Cod pilot guidebook[2], the National Park Service's scenario handbook[3], and the Bureau of Reclamation's climate change report for the region, which the team used when evaluating water availability[4]. Mr. Rasmussen described the MRCOG project as demonstrating the nexus between climate change mitigation, adaptation, and scenario planning research.

In closing, Mr. Rasmussen reviewed the successful methodologies used for the MRCOG initiative. These methodologies included: integrating land use and travel demand models in an existing modeling environment, conducting off-model GHG emissions analyses, analyzing the effectiveness of different land use patterns on water consumption using data from the local water utility, integrating climate analysis into the long-range transportation plan (LRTP), and leveraging partnerships and existing studies in the region.

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[1] Information about the *FHWA Scenario Planning Guidebook* is accessible here:
http://www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning/scenario_planning_guidebook/
[2] Information about *A Framework for Considering Climate Change in Transportation and Land Use Scenario Planning: Lessons Learned from an Interagency Pilot Project on Cape Cod* is accessible here: http://www.volpe.dot.gov/transportation-planning/public-lands/cape-cod-climate-change-scenario-planning-project
[3] Information about *Using Scenarios to Explore Climate Change: A Handbook for Practitioners* is accessible here: http://www.nps.gov/subjects/climatechange/upload/CCScenariosHandbookJuly2013.pdf
[4] Information about *West-Wide Climate Risk Assessment: Upper Rio Grande Impact Assessment* is accessible here: http://www.usbr.gov/watersmart/wcra/docs/urgia/URGIAMainReport.pdf

For future research, Mr. Rasmussen offered several recommendations:

- *Plan for climate change beyond traditional planning time frames.* Most LRTPs look 20 to 30 years in the future. Climate change has impacts far into the future, as does the infrastructure built over that period of the LRTP.

- *Infrastructure is a long-term investment that should be considered when planning for climate change.* As climate change impacts extend far into the future, it may be helpful to also evaluate the potential impacts to infrastructure in a 50- to 100-year period.

- *Conduct early exploratory analysis well before formal plans need to be developed.* MRCOG was able to tie the climate change scenario planning project into its Metropolitan Transportation Plan (MTP) timeline and structure, which allowed time for research in the early planning stages.

- *Develop a complete picture of climate change impacts specific to the region before developing conceptual land use and transportation scenarios.* Understanding the context for potential climate change impacts can help strengthen the scenarios and their inputs.

Integrating Climate Change Analysis into the Metropolitan Transportation Planning Process

Aaron Sussman, AICP
Senior Planner, Mid-Region Council of Governments of New Mexico (MRCOG)

Mr. Sussman focused his presentation on how MRCOG integrated the climate change analysis into its metropolitan transportation planning process.

Mr. Sussman began with an overview of Albuquerque and Central New Mexico. Although Albuquerque is home to about 550,000 people, the metropolitan area has about 900,000 people and is expected to reach 3 million or more by 2040. Most of this growth stretches across 8,400 square miles, bordered by mountains to the east and Tribal lands to the north, south, and west. It also borders the northern edge of the Chihuahuan Desert. The area receives about 9 inches of rainfall per year, but the mile-high elevation helps the arid region maintain a temperate climate; temperatures rarely surpass 100 degrees. However, over the past couple of decades, the area has experienced prolonged drought periods and, with that, higher incidences of wildfire. Summer monsoons also often result in severe flooding.

The Central New Mexico Climate Change Scenario Planning Project was an opportunity for MRCOG to partner with various agencies across the metropolitan area and collaboratively think about climate change in different ways, such as whether development patterns make the region more or less resilient to the impacts. Through its understanding of climate trends related to temperature and precipitation, MRCOG determined that droughts, wildfires, flooding, and water availability were the most pressing impacts on the region.

The timing of the project also coincided with initial efforts around MRCOG's MTP, which was adopted in April 2015. MRCOG expanded its measurements and analysis to consider transportation conditions as well as other mitigation considerations like water consumption needs. MRCOG focused on two key elements in its effort—mitigation and adaptation. From a mitigation standpoint, MRCOG assessed ways to grow and invest that reduce GHG emissions

such as investing in mixed-use development and transit and improving road efficiency and speed. MRCOG's adaptation strategies focused on how development choices affect the region's resiliency to climate change, such as minimizing growth in vulnerable areas or evaluating how growth patterns and land use types relate to water availability and water consumption.

Looking at temperature trends for Central New Mexico, the average temperature has increased 0.7 degrees Fahrenheit per decade—twice the global average. There is a growing willingness in the region to consider climate change impacts and the need for adaptation strategies. One of the existing resources that MRCOG leveraged was the "Upper Rio Grande Impact Assessment," a study that evaluated the impacts of climate change on the hydrology and water operations of the Upper Rio Grande Basin in Colorado and New Mexico. The basin ultimately filters into the Rio Grande, whose waters pass through the Albuquerque metropolitan area.

The study produced 112 different emission scenarios, all of which indicated increases in temperatures. Precipitation results were highly variable, meaning a higher probability of more intense droughts followed by more extreme rainfall events. The scenarios also showed the variability of whether precipitation falls as snow or rain, when snowmelt occurs, and how runoff and river flows will be impacted, which then affects water availability in the region. According to the study, by 2100, the Rio Grande flows are expected to decrease by one-third. Flows for the San Juan-Chama water system, from which water is diverted into the Rio Grande to support the Albuquerque metropolitan area, are anticipated to decrease by one-fourth. When looking at the status of these flows by 2040, the next few decades will likely see quantifiable decreases in the river flow along the river systems that provide drinking and potable water to the region.

In addition to declining water resources, there are population pressures in the metropolitan area where 50 percent growth is expected by 2040. While New Mexico is still recovering from the economic recession, MRCOG estimates a fair amount of economic growth in the long term. As many as 185,000 new jobs are expected by 2040. When looking at the distribution of these population and employment growth trends, the population tends to gravitate toward the edges of the urban core, while employment opportunities are much more evenly distributed but with more growth in the core, creating an increasing distance gap between residential locations and employment sites. Understanding these trends helped MRCOG arrive at the decision to use scenario planning.

MRCOG's scenario planning process took about 18 months and involved a range of stakeholder engagement activities, from questionnaires to workshops with State agencies and stakeholders to help identify challenges facing the region. Across all stakeholder groups, water was identified as the biggest issue. MRCOG then took the list of challenges and translated these into scenarios that could be tested, modeled, and refined. During two workshops held in summer 2014, MRCOG led an iterative process to create initial scenarios, present them to stakeholders for review, discuss potential policy changes, and refine each of the scenarios until a preferred scenario resulted. The preferred scenario addressed linking land use and transportation decisionmaking; concentrating development in activity centers and transit nodes; mixing uses in activity centers to promote alternative modes and shorten trip lengths; creating a wider range of housing and transportation choices, including transit service expansion; and maximizing the utility of existing infrastructure. MRCOG used several modeling tools as part of the scenario planning effort, including UrbanSim[5], Cube[6], and several integrated models with feedback

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[5] To learn more about UrbanSim, please access: http://www.urbansim.org/Main/WebHome
[6] To learn more about Cube, please access: http://www.citilabs.com/software/cube/

loops. In addition, MRCOG applied a series of "shifters" to represent development incentives as a way to test if policy choices could impact growth in different locations.

Mr. Sussman then reviewed MRCOG's transportation performance measures as part of the MTP. These measures addressed the difference in traffic volumes and congestion for the trend scenario versus the preferred scenario; development footprint and the number of acres consumed; wildfire risk areas; FEMA-designated 100- year floodplains; crucial habitats; water consumption; and GHG emissions. The differences between the preferred scenario and the trend scenario demonstrated a variety of reductions, including in flood and fire risk areas, GHG emissions, and water consumption.

In closing, Mr. Sussman highlighted the project's benefits and lessons learned. He shared that MRCOG's experiences in tying scenario planning to the metropolitan transportation planning process had pros, cons, and several lessons learned:

Pros
- The structure of the MTP using built-in forecasting ensured that the scenario planning effort linked to policy decisions.
- Market-based modeling tools generated realistic scenarios that were immediately respected.

Cons
- The MTP development process is constrained by member agency policies and investment decisions.
- Market-based modeling was not used to diagnose necessary changes in the region.

Lessons Learned
- Land use and transportation scenarios lend themselves to creative spatial analysis. This analysis requires an understanding of the changing conditions and impacts to natural features, like floodplains and fire risk areas.
- Creating an inventory of vulnerable infrastructure and at-risk locations is a challenging but critical first step. Few agencies are linking climate change impacts with development policies and transportation decisionmaking, so the MPO has a role to play.
- How a transportation agency frames climate change impact discussions is important. In some cases, it may be appropriate to address the topic directly or it may be more valuable to discuss the co-benefits that resiliency planning can bring.

Downscaled Climate Data Processing Tool

Ben Rasmussen
Community Planner, Volpe National Transportation Systems Center

Mr. Rasmussen returned to discuss the five-climate features tool developed with the National Park Service as part of the Central New Mexico Climate Change Scenario Planning Project. The project team used the same data from the 112-model runs and divided it into five climate quadrants: warm wet, hot wet, hot dry, warm dry, and central (a hybrid of all quadrants). The results indicated the average increase or decrease in precipitation and temperature.

The team also looked at daily time step data to determine the number of additional days when the temperature would be greater than 100 degrees or when precipitation would be heavy over

a 24-hour period, both of which have implications for pavement and railways. The team then identified six grid cells of interest that varied in elevation to help determine variations across the region as a whole. When the team ran different scenarios for each of the grid cells, the results differed with elevation, especially when thresholds were modified.

The Central New Mexico Climate Change Scenario Planning Project also included a mitigation component that evaluated GHG reduction strategies. In collaboration with the University of New Mexico's Department of Civil Engineering, the team grouped strategies into three categories: 1) analysis completed during the scenario planning workshop phase; 2) strategies that were evaluated post-workshop; and 3) strategies that would be discussed in the final report. As part of this exercise, the team prioritized the strategies to identify the ones they would model as part of the modeling process or off-model and those that did not have enough potential or were too difficult to model at the time. During the workshops, the team then used the models to evaluate zoning changes, infill development, transit-oriented development, and improvements to public transportation, and how these changes impacted VMT and GHG emissions. Outside of the workshops, the team identified a range of other strategies, including urban growth boundaries, VMT tax, bicycle infrastructure, incident management, traffic signal enhancement, and roadway connectivity. The results demonstrated that urban growth boundaries had the greatest potential impact as a politically feasible strategy.

In closing his presentation, Mr. Rasmussen discussed the resources developed as part of the Central New Mexico Climate Change Scenario Planning Project, including those available on MRCOG and the Volpe Center's websites:
- http://www.mrcog-nm.gov/transportation/metro-planning/long-range-mtp
- www.volpe.dot.gov/nmscenariooplanning

Summary of Questions and Discussion

Following the presentations, Ms. Keasler moderated a question-and-answer period to address questions received during the webinar. Key questions and insights from the presenters are outlined below. To facilitate readability, the answers presented here are summaries and are not direct transcriptions of what occurred during the actual webinar proceedings.

- **Did you consider how automated vehicles may disrupt land use and transportation over the life of the plan?**

   Aaron Sussman: The short answer is no. Automated vehicles seem to have come on the scene within the last year or two, and though they were on the radar before that, they were not considered as part of this project.

Closing Information

Ms. Keasler thanked webinar participants, presenters, and hosts for participating in the webinar.

Ms. Keasler also provided information for the FHWA-FTA Scenario Planning Program website and program contacts.

- FHWA/FTA Scenario Planning Program contacts:
    - *FHWA Headquarters*

- - Rae Keasler: 202-366-0329 or Rae.Keasler@dot.gov
    - Dave Harris: 202-366-2825 or Dave.Harris@dot.gov
  - o *FTA Headquarters*
    - Tonya Holland: 202-493-0283 or Tonya.Holland@dot.gov
  - o *FHWA Resource Center*
    - Brian Betlyon: 410-962-0086 or Brian.Betlyon@dot.gov
    - Jim Thorne: 708-283-3538 or Jim.Thorne@dot.gov

Participant Polling

Pre-Presentation Poll Questions

Question 1: What type or organization do you represent?

	Number Responding	Percent Responding
Federal Government	17	43.5
State Government	6	15.3
Local Government	1	2.56
Regional Government	8	20.5
Tribal Government	0	0
Transit Provider	0	0
Non-Profit	0	0
MPO	6	15.3
Private Sector	0	0
Academic	1	2.56

Question 2: How did you find out about this webinar?

	Number Responding	Percent Responding
FHWA/FTA Transportation Planning Capacity Building Program Email	30	75
FHWA/FTA Transportation Planning Capacity Building Program Website	1	2.5
FHWA Division or FTA Regional Contact	7	17.5
Stakeholder Association (i.e., AASHTO, AMPO, APA, APTA, NADO, NARC, etc.)	1	2.5
Non-Profit	0	0
Other	1	2.5

Question 3: Has your agency been involved in climate change adaptation planning?

	Number Responding	Percent Responding
Yes, as part of a metropolitan transportation planning process	9	36
Yes, through other efforts	13	52
No, my agency has not been involved in adaptation planning	3	12

Question 4: Has your agency been involved in climate change mitigation planning?

	Number Responding	Percent Responding
Yes, as part of a metropolitan transportation planning process	4	19
Yes, through other efforts	12	57.1
No, my agency has not been involved in mitigation planning	5	23.8

Question 5: Do you feel that there is interest / willingness to address climate change-related issues in your region?

	Number Responding	Percent Responding
No, focusing on that issue is not likely to result in policy actions	1	4
Yes, climate change is a critical issue in my region and there is support for necessary actions	8	32
Yes, but only if we focus on co-benefits or other policy issues without discussing climate change specifically	16	64