

NEW TRENDS IN TRANSPORTATION AND LAND USE SCENARIO PLANNING

Five Case Studies of Regional and Local Scenario Planning Efforts

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Prepared by:
Transportation Policy, Planning and Organizational Excellence Division
John A. Volpe National Transportation Systems
Research and Innovative Technology Administration
U.S. Department of Transportation



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I. BACKGROUND

This report summarizes important findings from a literature review on scenario planning processes and a scan of stakeholders. It also presents case studies on innovative, 'next generation' scenario planning efforts. The project team defined next generation scenario planning efforts as those that seek to capture a broader range of issues and challenges than previously considered in transportation and land use scenario creation and analysis. The purpose of the report is to identify key issues and practices to provide direction for future scenario planning workshops.

The Federal Highway Administration (FHWA) Office of Planning sponsors scenario planning workshops for staff of metropolitan planning organizations (MPOs), state Departments of Transportation (DOTs), and other transportation agencies. The workshops have been offered around the country since 2004. FHWA now seeks to update the workshop agenda and workshop content to highlight new best practices and show how scenario planning can address emerging challenges facing state DOTs, MPOs, and other transportation agencies.

In support of this effort, the Volpe Center:

1. Conducted a brief literature review and scan of key stakeholders to identify recent trends in transportation planning (particularly long-range transportation planning) at transportation agencies, focusing on MPOs. Chapter 2 details the trends findings from this review and scan. The trends are grouped into three categories: 1) regional development, 2) risks, and 3) reporting.
2. Conducted a literature review and scan of key stakeholders to identify recent scenario planning processes at transportation agencies, focusing on MPOs, which address the recent planning trends.
3. Documented through case studies innovative scenario planning efforts at five transportation agencies (see [Appendix C](#)). Chapter 3 provides a brief summary of each case study and outlines the key findings. Chapter 4 outlines the key findings.

The scan of trends and review of scenario planning practices conducted were not intended to be an exhaustive review. Rather, the scan and review sought to identify key issues and practices to provide direction for future workshops.

II. SCENARIO PLANNING TRENDS

Most traditional land use/transportation scenario planning efforts have focused on a limited range of land use and transportation investment scenarios, with analysis and evaluation leading to a preferred scenario. Next generation scenario planning efforts seek to capture a broader range of issues and challenges than previously considered in scenario creation and analysis, such as alternative energy, technology advances, security, climate change, or economic shifts.

The wide-ranging topics that comprise next generation scenario planning are grouped into three categories (described in more detail in [Appendix A](#)):

- Regional development (e.g., a focus on trends specific to one region, such as demographic shifts or quality of life).
- Reporting (e.g., focus on developing better modeling tools or use of visualization tools to communicate with the public).
- External risks (e.g., climate change, security, or transportation funding—broad issues that affect multiple regions at once).

Climate change, livability, sustainability, and financial stability are some topics that are surfacing as particularly important issues that transportation agencies are incorporating into scenario planning efforts.

Climate Change

There are concerns in the transportation community regarding climate change and the appropriate strategies to mitigate, adapt to, or address climate change-related impacts. Climate change is becoming prevalent in transportation planning through several avenues, including state legislation (e.g., in California and New York) that requires MPOs to model projected greenhouse gas (GHG) emissions or consider emission reduction strategies in transportation planning.

FHWA has conducted research regarding how MPOs could integrate climate change considerations into transportation planning.¹ Several strategies, including scenario planning, have been proposed. Scenario planning could support integration of climate change into transportation planning by:

- Promoting different development types (e.g., transit-oriented development) that are conducive to GHG emission reductions and improved air quality.
- Helping the public and elected officials visualize and understand the impacts of future growth according to climate change-related criteria such as vehicle miles traveled (VMT), gallons of gas consumed, or GHG emissions.
- Allowing better decision-making on ways to address vulnerabilities, such as transportation infrastructure located in low-lying coastal areas.

Livability/Sustainability

Livability refers to policies that help preserve important elements of community life and identify and support sustainable development at the local level. Sustainability refers to efforts or policies that promote today's quality of life without endangering the quality of life for future generations. Sustainability is closely related to livability as livable principles can provide a framework for

¹ See especially *Integrating Climate Change in the Transportation Planning Process* (July 2008), available at <http://www.fhwa.dot.gov/hep/climatechange/climatechange.pdf>

sustainable development; however, sustainability is generally focused on long-term impacts while livability focuses on near- and mid-term impacts.

While transportation agencies have historically incorporated livability and sustainability elements, such as quality of life considerations, into transportation plans, there is no standardized practice for doing so. Transportation agencies face the ongoing challenge of making relationships between transportation, land use, and quality of life explicit.

The June 2009 initiation of the Interagency Partnership for Sustainable Communities between the U.S. Environmental Protection Agency, the U.S. Department of Housing and Urban Development, and the U.S. Department of Transportation reflected an increased recognition of livability principles at the Federal level and a growing commitment to integrate transportation, land use, and environmental planning.² The partnership explicitly identified scenario planning as a tool to support livability principles and integrated planning. Scenario planning can:

- Help the public and elected officials visualize and understand the impacts of future growth according to livability- or sustainability-related criteria (e.g., number of nonmotorized trips generated, air quality impacts, or percentage of land preserved).
- Identify community values and quality of life preferences (e.g., through public scenario planning workshops) and link these values to transportation and land use decisions (e.g., by developing scenarios that are sensitive to public preferences).
- Articulate a regional growth vision, which can help identify transportation investments that are consistent with and build support for the transportation plan and associated policies.
- Help transportation agencies understand and demonstrate the long-term impacts of current policies and development decisions on community quality of life.
- Identify long-term trade-offs involved with land use and growth, including the environmental, health, equity, economic, or safety impacts of regional growth.

Financial Stability

Financial stability measures the strength of financial systems and transportation funding sources. At the local level, transportation agencies recognize that assumptions about future growth must be grounded in realistic financial assessment. Growth projections need to consider the potential for private development and the financial impacts of various development types. Additionally, many transportation agencies are facing short-term funding shortages due to economic recession and are preparing for reduced long-term funding from declining gas tax revenues.

Scenario planning could help agencies, elected officials, and citizens understand the financial implications of transportation planning decisions and plan long-term investment strategies for a variety of future funding situations. For example, scenario planning could:

- Help stakeholders understand the transportation costs associated with different development types in order to help select preferred policies and investments under different possible funding levels.
- Show how travel demand could change under different possible economic outlooks.
- Use financial models of different development types to demonstrate the feasibility of development under different scenarios or the public finance impacts of different development and investment options.

² For more information on the partnership, see <http://www.epa.gov/smartgrowth/partnership/index.html>

- Help transportation agencies assess their ability to fund desired transportation investments under a variety of scenarios.

III. INVENTORY AND CASE STUDY DESCRIPTIONS

To identify specific next generation scenario planning efforts and practices, the project team conducted an internet scan, interviewed experts, and surveyed FHWA Division Office field planners.³ Based on this research, an inventory was developed of next generation practices (see [Appendix B](#)), which represents a snapshot of efforts rather than a comprehensive review.

Five agencies were selected from the inventory for which detailed case studies were developed (see [Appendix C](#) for complete case studies). The primary considerations in selecting the case studies were identifying efforts that appeared to be comprehensive. Other guidelines used to select case studies were:

- Inclusion of efforts from both urban and rural areas as well as coastal and inland areas.
- Inclusion of efforts for which information could be readily accessed online.
- Inclusion of efforts that had not been previously highlighted in FHWA HEPP-sponsored scenario planning workshops.

To conduct the case studies, five telephone interviews ranging from 60 to 90 minutes were held with agency representatives who self-identified as appropriate contacts. The project team tailored a flexible discussion guide for each interview to allow participants to talk about additional topics. The team then drafted case studies based on the discussions, relevant supplemental materials, and comments and suggestions that interviewees provided.

The selected case studies and associated key trends are listed in Table 1 below. Bolded 'Xs' signify the main trend that the effort addressed.

Table 1. Selected case studies and associated emerging trend.

<i>Lead Agency</i>	<i>Effort</i>	<i>Climate Change</i>	<i>Liability /Sustainability</i>	<i>Financial Stability</i>	<i>Reporting</i>	<i>Risks</i>
Southern California Association of Governments)	Sustainable Communities Strategy	X		X	X	
Cheyenne MPO	PlanCheyenne		X	X		
Metropolitan Washington Council of Governments	2050 Scenario Thinking Workshop	X				X
Chicago Metropolitan Agency for Planning	GOTO 2040	X	X	X	X	
Thomas Jefferson Planning District Council	Eastern Planning Initiative		X			

³ Scenario planning is not a consistently defined process. On its scenario planning website and in previous workshops, FHWA has promoted a six-step process to help guide agencies' scenario planning decision-making; however, in practice, implementation might not follow the six steps. For the purpose of this project, the Volpe Center project team included in the scan any effort by a transportation agency that evaluated multiple growth/land use scenarios to help define desired policies, strategies, and/or projects. The following were included in the scope of the scan: visioning efforts, long-range planning studies, agency business plans, and collaborative efforts between academic institutions and transportation agencies.

Each case study is briefly summarized below.

The Chicago Metropolitan Agency for Planning (CMAP) addressed economic and quality of life issues in its scenario planning process and used sophisticated real-time analysis and visualization tools for public involvement. Key components of CMAP's approach were:

- CMAP worked with a local community foundation to incorporate livability and quality of life considerations into the scenario planning process, as well as to leverage funding for the effort.
- CMAP developed 250 indicators related to the economy, environment, homes, communities, and the transportation system to assess three scenarios, called "reinvest," "preserve," and "innovate." A subset of indicators was used for public evaluation of the scenarios.
- CMAP used MetroQuest software and real-time analysis to display scenarios to the public. The software, which is available on CMAP's website and was available on kiosks at various public gathering places in the region, was used during 55 public workshops.

The PlanCheyenne effort, which was led by the Cheyenne MPO in coordination with the City of Cheyenne and Laramie County, used a scenario planning process in a rural region. The effort led to policies that shifted development away from a trend toward low-density growth. Key components of Cheyenne's approach were:

- PlanCheyenne was a joint effort with the City of Cheyenne Parks and Recreation Division and Laramie County to update the city's comprehensive plan, transportation plan, and parks and recreation plan. This partnering enabled a more comprehensive plan than would have been possible by using only transportation funds.
- PlanCheyenne involved comparing scenarios based on provisions of open space, park areas, multi-modal travel opportunities, community identity, and livability. The trade-offs highlighted the links between infrastructure costs and development density and open space. Analysis showed that higher-density development scenarios were less expensive than the trend (low-density) scenario.
- The City of Cheyenne is developing a new unified development code to implement the development envisioned through the preferred PlanCheyenne scenario. The code will allow for denser, more mixed-use development than was previously built in the region.

The Southern California Association of Governments (SCAG) is currently defining a scenario planning approach to reduce GHG emissions at the regional level. The process is being developed in response to California Senate Bill (SB) 375, which requires regional transportation plans to comply with GHG emission targets set by the California Air Resources Board. Key components of SCAG's approach are:

- SCAG will address climate change by modeling GHG emissions using a four-step travel model and a supplementary model of intrazonal travel.
- Extensive sub-regional workshops will be held to determine how best to reach the emission reduction target for the region.
- SCAG is using Envision Tomorrow software to define community types (e.g., mixed-use development) as scenario building blocks. This process will help stakeholders visualize the "look and feel" of development and support regional analyses of energy consumption, water use, open space, GHG emissions, and costs and revenues to local governments.

The Thomas Jefferson Planning District Commission (TJPDC) in Charlottesville, Virginia, used a scenario planning approach to address regional livability. Key components of TJPDC's approach are listed below:

- TJPDC undertook a two-year scenario planning study in the early 2000s to evaluate the interactions between land use and transportation and address regional quality of life and growth issues. FHWA funded the study
- Three land use scenarios were constructed with public input—dispersed growth, urban core, and town centers. TJPDC developed its own model, CorPlan, to analyze scenario trade-offs at the community level.
- Within CorPlan, TJPDC included quantitative indicators such as percentage of land preserved to assess scenarios' ability to address livability goals.
- The scenario planning process helped build a foundation for sustainable growth in the region. In addition, many of TJPDC's counties have since adopted plans that incorporate sustainability and livability concepts.

The Metropolitan Washington Council of Governments (MWCOC) developed a one-day scenario thinking exercise, demonstrating use of scenario planning in a low-cost, qualitative format to advance regional dialogue about key issues. Key components of MWCOC's approach are listed below:

- MWCOC's "outside-in" scenario development focused on global or national issues to consider impacts on regional or local systems. This discussion on regional growth was designed to help inform the Greater Washington 2050 initiative, which seeks to develop a regional growth vision.
- Scenarios were developed with the assistance of a consultant who conducted several interviews prior to the event with expert stakeholders and focus groups. MWCOC invited 100 regional leaders and representatives of the public and business sectors to participate in the workshop.
- The workshop resulted in strategies that participants believed would be applicable under a variety of potential futures. These strategies will ultimately frame the growth vision for the MPO's long-range plan.

IV. KEY FINDINGS

The case studies confirmed that MPOs consistently find scenario planning to be a valuable tool to engage stakeholders in transportation and land use planning and decision-making. Scenario planning also helps professional planners and public stakeholders understand and visualize complex sets of interactions and impacts. As transportation agencies face increasingly complex planning challenges or begin to address new issues not traditionally considered in transportation planning, scenario planning could become an essential tool.

This section summarizes innovative practices, success factors, and lessons learned identified in the case studies. These practices are categorized according to the six scenario planning process steps promoted by FHWA in previous workshops.⁴ These factors could inform a future workshop that helps agencies use scenario planning to incorporate new trends.

RESEARCH AND EVALUATE THE DRIVING FORCES OF CHANGE

A variety of factors influence an agency's decision to implement innovative scenario planning processes. When identifying the driving forces of change affecting communities, agencies tended to be influenced by:

- ***State laws or regulations*** that require MPOs to address certain issues in planning (e.g. California's SB 375, which spurred SCAG to use scenario planning to address climate change).
- ***Transportation projects***. For example, in Charlottesville, Virginia, some residents objected to a proposed four-lane bypass due to concerns about the potential traffic and sprawl it might generate. Partially as a response to these concerns, the TJPDC developed a livability-focused scenario planning approach to help articulate regional growth/land use alternatives.
- ***Timing/schedule of the long-range plan update***. For example, CMAP initiated its GOTO2040 scenario planning process to connect with the update of the region's long-range plan.
- ***Agency structures and missions***. For instance, CMAP was created in 2005 as a regional planning organization for the northeastern Illinois area. The GOTO2040 process was designed to be very comprehensive and inclusive of trends, in part as a result of the new agency's regional mission.
- ***Funding and/or other resources***. Access to and amount of available funding can be a major factor influencing the ability of agencies to include emerging issues in scenario planning. For example, CMAP reported that it would not have been able to address such a robust set of issues in its GOTO2040 scenario planning process without funding support that a community foundation provided. Other resources, such as availability of data and modeling tools, can also be influencing factors. TJPDC reported that obtaining water quality data was difficult; as a result, the agency solicited experts' opinions on water quality impacts rather than including impacts in the scenario modeling software.
- ***Risks and uncertainty***. Some transportation agencies perceived a high level of uncertainty around issues like climate change, technological advances, fuel prices, the economy and funding. Scenario planning was identified as a tool to help these agencies incorporate uncertainty into plans. For example, MWCOG used scenario planning to identify strategies that would be robust under uncertain conditions. Additionally, as a next

⁴⁴ The six steps are detailed on the FHWA scenario planning website at <http://www.fhwa.dot.gov/Planning/scenplan/about.htm>

step in its scenario planning process, CMAP expects to test its preferred scenario under several risk situations.

- ***Desire to promote a culture of innovation or presence of a champion.*** Some agencies might want to promote a culture of innovation by engaging in new types of scenario planning. The presence of agency champions might also motivate an agency to incorporate or consider new issues in scenario planning.

Agencies considering use of scenario planning—or expanding past efforts—could consider the above when identifying the specific issues to address in the effort.

Agencies using scenario planning for the first time could consider using other communities' processes as models. For example, the Cheyenne MPO looked to Envision Utah as a model for how to develop its own scenario planning effort.

Agencies with previous scenario planning experience can use or expand tools developed in the past. SCAG plans to use Envision Tomorrow software, which was initially developed for the 2004 Compass Blueprint exercise, in its upcoming scenario planning effort.

CREATE SCENARIOS

Engaging stakeholders in creating scenarios is a key component of next generation scenario planning. Involving the public in scenario creation has traditionally been a key part of land use scenario planning efforts. However, as scenario planning incorporates more issues and challenges not traditionally in the transportation realm, it will likely become necessary to use a broader suite of tools to better define scenario trade-offs and translate complicated issues into easily understood concepts.

Strategies could range from engaging local subject area experts and a selected advisory committee with limited public involvement (e.g., MWCOC) to organizing extensive public meetings through each step of the scenario planning process (e.g., SCAG). In addition, use of real-time visualization tools appeared to be increasingly important to support public involvement efforts (e.g., CMAP).

ANALYZE AND EVALUATE SCENARIOS

Use of an enhanced traditional travel model can help address climate change impacts. Agencies can supplement the traditional four-step travel model to achieve more comprehensive GHG and air quality analysis. For example, SCAG plans to project GHG emissions from alternative growth scenarios using the traditional travel model supplemented with a separate model for intrazonal trips. The traditional model projects GHG emissions based on VMT, speed, congestion, and assumed vehicle fleet emissions profiles. The model for intrazonal trips assumes mode splits and trip-making characteristics based on the community element(s) in that zone.

Development of meaningful indicators can help address livability. When analyzing scenario trade-offs, it is important to develop indicators that are meaningful to the community. For example, TJPDC quantified livability considerations by developing metrics related to agreed-upon community values identified through a series of public workshops, such as gallons of gas consumed and percentage of population living in clustered communities. These metrics could be developed from most transportation and land use models; however, the extra step TJPDC took to explicitly link the metrics to regional livability goals was unique and innovative. To project and model issues for which data were unavailable (such as water use), TJPDC used alternative means, such as bringing together a group of local water experts to provide feedback about the water impacts of each scenario.

Projection of financial impacts of development can help address financial stability. The Envision Tomorrow model developed for SCAG’s Blueprint effort projects the financial implications of development, both from a private development feasibility perspective and from a public finance impact perspective. This information is valuable for stakeholders and elected officials to evaluate alternatives and is also critical for developing a feasible plan. In addition, each of the scenarios modeled by PlanCheyenne was financially constrained. The effort found that there were high roadway costs associated with low-density, trend development patterns, and that denser, mixed-use development would help control future transportation costs. This ultimately led the community to choose higher density development in the preferred scenario.

Use of qualitative analysis. Use of qualitative analysis in scenario planning to address new trends can be a successful strategy, especially for agencies that want to spur dialogue about addressing emerging trends but have limited quantitative data and limited funding. For example, MWCOCG successfully used qualitative analysis to build consensus around appropriate future actions for the region and advance regional dialogue about plausible regional futures. The agency used a low-cost approach that required little data and instead relied on expert presentations and strategic thinking. While this effort did not necessarily lead to concrete policy solutions, it was viewed as a useful tool for beginning to address new issues including fiscal difficulties, climate change impacts to the region, and “green job” development.

MONITOR AND EVALUATE OUTCOMES

Collaboration is important to implementing policies that support growth preferences. Implementation and monitoring present ongoing challenges. Each of the agencies interviewed noted that—because some regional agencies have little control over land use and development—building regional consensus is valuable to help achieve implementation of recommendations. Nevertheless, regional agencies are working closely with local governments to encourage land use changes and providing technical assistance to locals as requested. One strategy for supporting collaboration could be the use of “demonstration” projects, as exemplified by SCAG. Through the Compass Blueprint program, SCAG provides funding and other resources to select member cities; the funding supports the development of plans that are consistent with regional sustainability and livability goals. To receive funding, demonstration projects must meet several criteria, including planning for alternative transportation modes to the automobile.

Agencies can consider use of performance measures. Two of the MPOs interviewed in this effort developed or planned to develop performance measures to monitor and evaluate implementation of the preferred scenario. This is noteworthy as the trend towards performance-based planning is becoming increasingly important. It is likely that development and use of performance measures will become an important part of future scenario planning efforts.

Preferred scenarios can be translated into development codes. The community typologies (e.g., “compact urban”) used in scenario planning efforts can provide a good framework for designating development codes. In a few cases, agencies provided direct assistance to local governments to update development codes using community typologies. In other cases, local governments independently used community elements in development code updates. For example, the City of Cheyenne rewrote its development codes, including land use, subdivision, street and sited design standards, to be consistent with PlanCheyenne recommendations.

OVERALL PROCESS

Agencies can use a range of scenario visualization tools. Use of visualization tools can be an important component of scenario planning efforts. Agencies interviewed for this effort developed visualization tools to communicate potential outcomes to the public, support more comprehensive analysis of scenarios, and obtain more focused feedback from stakeholders (e.g., TJPDC used maps created by the public to identify growth preferences, which were then translated into a scenario analysis model).

The visualization tools used ranged from high technology efforts, such as software programs that displayed scenario results in real-time, to lower technology efforts. Examples of the latter included “chips” exercises that allowed participants to visualize growth preferences, posters provided to workshop participants that illustrated various development types, and maps created by the public during workshops. CMAP worked with architecture and design firms to create hypothetical images of several communities; the images portrayed the community as it might look if various scenarios were implemented. It is important to note that high technology visualization tools that provide real-time results and are designed for use with multiple media could add significant cost to a scenario planning effort.

Many factors can influence agency’s decision-making process when developing or choosing an appropriate visualization tool. These factors might include cost, availability of consultants, resources available to hire consultants, purpose of tool (e.g., to display real-time results online, to facilitate communication with the public during workshops, to build overall support for the scenario planning effort), and timeframe for completing the scenario planning effort. Most of the interviewed agencies that developed visualization tools worked with consultants to do so. The software programs used included MetroQuest and Envision Tomorrow.

Partnerships can help agencies leverage resources. Agencies might face Federal or state restrictions on using certain funds to support next generation scenario planning efforts, which might focus on issues not traditionally considered in the transportation realm. Partnering with other stakeholders can help MPOs pursue more robust scenario planning efforts. For example, the Cheyenne MPO collaborated with the City of Cheyenne Parks and Recreation Division to develop PlanCheyenne. Some of the Parks and Recreation Division’s funds were allotted to PlanCheyenne and allowed the MPO to address a more robust set of land use issues.

Both low- and high-cost efforts to create scenarios can have powerful outcomes. Each of the cases the project team reviewed had different components and therefore had varying budgets. Costs of reviewed efforts ranged significantly—from \$50,000 to \$10 million. Factors affecting cost included the extent of public involvement, the sophistication of modeling tools used, the level of detail required in data used, and the length of the effort. However, even comparatively low-cost efforts led to regionally significant outcomes. For example, MWCOG’s relatively low-cost effort helped advance dialogue about regional quality of life and growth-related priorities. It is likely that costs will increase as agencies use scenario planning to address a more robust set of issues. Use of qualitative analysis to address new issues could help limit costs.

RECOMMENDATIONS FOR FHWA

Several agencies interviewed for this effort noted that FHWA should continue to support scenario planning efforts and that this support was crucial to help MPOs achieve success with these efforts. Some of the following were suggested as specific ways that FHWA could assist MPOs:

- Look for ways to continue strengthening working relationships between MPOs and FHWA.
- Provide specific guidance to MPOs regarding if and how Federal funds can be used to support comprehensive scenario planning efforts that address issues not traditionally considered in the transportation realm.
- Support development of more robust and accurate land use modeling tools. These tools would be a powerful complement to scenario planning efforts.
- Continue to support scenario planning workshops to assist MPOs in implementing scenario planning processes.

Appendix A. Key Issues in Transportation Planning

Issue	Examples and Comments
Regional Development	
Financial stability	Examples: development economics, public finance impacts of development, cost of system preservation. Many regions are interested in incorporating financial feasibility into transportation and land use strategies.
Livability	Examples: mobility, smart growth, quality of life, multimodal transportation, community preferences. Many transportation agencies have worked to integrate livability and quality of life issues into transportation plans, but it is an ongoing challenge.
Demographics	Examples: aging, immigration, health. It is likely that demographic shifts will impact transportation needs.
Local economy	Examples: impacts of technology, megaregions, sector outlooks.
Reporting	
Modeling tools, visualization techniques	Transportation agencies might be required to report greenhouse gas emissions and/or other sustainability metrics, which will require new modeling capabilities. New or enhanced visualization techniques might become more important as agencies seek to communicate more complex concepts to the public.
Risks	
Climate change	Examples: greenhouse gas emissions, vehicle miles traveled, water quality and quantity. Particularly in coastal areas, transportation agencies may need to evaluate climate change-related risks.
Fuel price/availability	Disruptions to the supply of oil might affect many regions and affect agencies' consideration of system vulnerability.
Transportation funding	The structure of transportation finance could change in the future. Agencies might need to evaluate their ability to build and maintain transportation systems under financial constraints.
Economic growth/decline	Economic shifts could pose dramatic changes to projected transportation and development conditions.
Security	Heightened security concerns could change people's willingness to ride public transit and/or overall travel behavior. It could also affect the feasibility of very high-density development.
Technology	While advances in vehicle and fuel technology are expected, gasoline-powered vehicles are expected to remain the primary technology for the foreseeable future.
Freight	Economic, environmental, and financial changes could change freight logistics.

Appendix B. Inventory of Next Generation Scenario Planning Practices

			EMERGING ISSUES														
			Regional Development				Risks						Reporting				
STATE	LEAD ENTITY(IES)	DATE of EFFORT	Financial Stability	Livability/ Sustainability	Demographics (i.e. aging, health)	Local Economy	Climate Change	Fuel Price & Availability	Transportation Funding	Economic Growth/Decline	Security	Freight	Technology	Modeling & Visualization	Agency Type	Agency Size (by pop. served)	Part of Mandated Long-Range Plan Development?
Arizona	Arizona's COGs, MPOs & the Governor's Office	2008		x	x	x	x								Statewide	Statewide	N/A
California	Association of Bay Area Governments (AMBAG)	1999-2002	x	x	x										Association of Gov'ments	Large	No
California	San Diego MPO (SANDAG)	2009	x	x	x		x								MPO	Large	Yes
California	San Luis Obispo COG (SLOCOG)	2007-2008												x	COG	Medium	Yes
California	Sacramento COG (SACOG)	2008		x											Council of Gov'ments	Large	Yes
California	Southern CA Association of Governments (SCAG)	2000		x			x								Association of Gov'ments	Large	Yes
California	UC- Davis	ongoing					x								Academic	N/A	N/A
Delaware	Delaware Valley Regional Planning Commission	2009	x			x	x								MPO	Large	Yes

			EMERGING ISSUES														
			Regional Development				Risks						Reporting				
STATE	LEAD ENTITY(IES)	DATE of EFFORT	Financial Stability	Livability/ Sustainability	Demographics (i.e. aging, health)	Local Economy	Climate Change	Fuel Price & Availability	Transportation Funding	Economic Growth/Decline	Security	Freight	Technology	Modeling & Visualization	Agency Type	Agency Size (by pop. served)	Part of Mandated Long-Range Plan Development?
	(DVRPC)																
D.C.	Metropolitan Washington COG (MWCOC) / Greater Washington Coalition	2008		x			x	x		x	x		x		MPO / COG	Large	No (Visioning)
Florida	Charlotte-County / Punta Gorda MPO / Florida State University	2007					x								MPO/Academic	N/A	N/A
Florida	North Central Florida Regional Planning Commission (NCFRPC)	2010					x								RPC	Medium	Yes
Florida	MetroPlan Orlando	ongoing		x					x						MPO	Large	Yes
Florida	Central Florida region	1999-2007		x			x								Regional	Large	No
Georgia	Atlanta Regional Council (ARC)	2007				x				x					MPO	Large	Yes
Illinois	Chicago Metropolitan Agency for Planning (CMAP)	2008		x	x	x	x					x	x	x	MPO	Large	Yes

			EMERGING ISSUES														
			Regional Development				Risks						Reporting				
STATE	LEAD ENTITY(IES)	DATE of EFFORT	Financial Stability	Livability/ Sustainability	Demographics (i.e. aging, health)	Local Economy	Climate Change	Fuel Price & Availability	Transportation Funding	Economic Growth/Decline	Security	Freight	Technology	Modeling & Visualization	Agency Type	Agency Size (by pop. served)	Part of Mandated Long-Range Plan Development?
Kansas	Mid-American Regional Council (MARC)	2008-2010				x	x			x					MPO	Large	Yes
Montana	Missoula County	2008	x	x											County	Small	Yes
New Jersey	North Jersey Transportation Planning Authority (NJTPA)	2009		x										x	TPA	Large	Yes
New York	Capital District Transportation Committee (CDTC)	2004, 2007			x		x								MPO	Large	Yes
New York	Binghamton Metropolitan Transportation Study (BMTS)	2004-2006		x	x	x									MPO	Medium	Yes
New York	Ithaca Tompkins County Transportation Council (ITCTC)	2009					x								MPO	Small	Yes
Oklahoma	City of Tulsa	Ongoing		x	x										City	Medium	No
Oregon	Portland Metro	2008		x		x									MPO	Medium	No (Visioning)
South Carolina	Berkeley-Charleston-	2006		x											COG	Medium	Yes

			EMERGING ISSUES														
			Regional Development				Risks						Reporting				
STATE	LEAD ENTITY(IES)	DATE of EFFORT	Financial Stability	Livability/ Sustainability	Demographics (i.e. aging, health)	Local Economy	Climate Change	Fuel Price & Availability	Transportation Funding	Economic Growth/Decline	Security	Freight	Technology	Modeling & Visualization	Agency Type	Agency Size (by pop. served)	Part of Mandated Long-Range Plan Development?
	Dorchester Council of Governments (BCDCOG)																
Texas	San Antonio-Bexar County MPO (SA-BC MPO)	2006-2009		x		x	x	x	x	x			x		MPO	Small	Yes
Utah	Multiple stakeholders statewide (public-private partnership)	2003, 2008													Statewide	Statewide	N/A
Utah	Dixie MPO	2007		x											MPO	Small	No
Vermont	Chittenden County MPO	2010		x			x								MPO	Small	Yes
Virginia	Center for Risk Management at Univ. of Virginia (sponsored by Virginia DOT)	2009	x	x	x	x					x				Academic	N/A	N/A
Virginia	Roanoke Valley Area MPO	Ongoing			x		x								MPO	Medium	Yes
Virginia	Thomas Jefferson Planning District Commission (TJPDC)	2000-2002		x											MPO	Medium	No

			EMERGING ISSUES														
			Regional Development				Risks						Reporting				
STATE	LEAD ENTITY(IES)	DATE of EFFORT	Financial Stability	Livability/ Sustainability	Demographics (i.e. aging, health)	Local Economy	Climate Change	Fuel Price & Availability	Transportation Funding	Economic Growth/Decline	Security	Freight	Technology	Modeling & Visualization	Agency Type	Agency Size (by pop. served)	Part of Mandated Long-Range Plan Development?
Washington	Puget Sound Regional Council	2008-2010					x								MPO	Large	Yes
Wyoming	City of Cheyenne and County of Laramie, led by the Cheyenne MPO	2007		x	x										City/County/MPO	Small	N/A

Appendix C. Case Studies

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Case Study 1: Cheyenne MPO, City of Cheyenne, and Laramie County, Wyoming (for PlanCheyenne)

Overview

PlanCheyenne⁵ is the Cheyenne Area Master Plan. The effort was undertaken by the Cheyenne, WY, Metropolitan Planning Organization (MPO), in coordination with the City of Cheyenne, City Parks and Recreation Division, and Laramie County. The PlanCheyenne effort involved an update of the city's comprehensive plan, transportation plan, and parks and recreation plan. The Cheyenne MPO's planning area is at the edge of the zone of influence of Denver and Colorado Springs (see Figure 1) and serves a population of 79,000.

Figure 1. Map of Cheyenne and surrounding area.



The Cheyenne MPO did not have previous experience with scenario planning, but chose this approach based on its observation of the success of the Envision Utah⁶ scenario planning effort. The agency noted that scenario planning was a useful educational tool for the public to see the effects of density.

Summary of Scenario Planning Effort

The PlanCheyenne team engaged stakeholders in developing and evaluating alternative growth scenarios during two workshops in the spring of 2005. The effort showed participants the linkages among development density, roadway costs, and open space. The total cost of the PlanCheyenne effort was approximately \$380,000; in addition, the agency dedicated one staff member to managing the project.

The scenarios developed included:

Current Comprehensive Plan. This scenario represented business-as-usual growth and transportation investment. New residential development was predominantly low-density single family. New rural ranchette development continued on five-acre or larger lots. New commercial development was low intensity and oriented to automobiles. The plan did not address open space or natural resources conservation in a significant way.

⁵ For more information on PlanCheyenne, see <http://www.plancheyenne.com/>

⁶ For more information on Envision Utah, see <http://www.envisionutah.org/>

Urban Service Areas/Rural Conservation. Development was most compact in this scenario, with most new development occurring in the urban service area. New residential development was predominantly single-family, but included a greater variety of other housing types than the current comprehensive plan. This scenario focused on clustering urban residential development to conserve large, contiguous ranch land and natural and cultural resources.

Neighborhoods and Activity Centers. Development in urban areas was focused in neighborhoods and districts around centers where activities such as shopping and offices were more intensive. The activity centers were pedestrian-oriented and include parks, plazas and other civic focuses.

Scenario Development

The MPO and consulting team held several public meetings at which six groups of participants were given a base map showing existing development and were then asked to assign forecast growth to the map using cardboard game pieces. Groups were given a set of game pieces that reflected either “business as usual” growth, growth focused in urban areas, or growth focused in neighborhoods and activity centers. Participants were free to exchange game pieces to achieve various density and open space preservation objectives.

Scenario Analysis

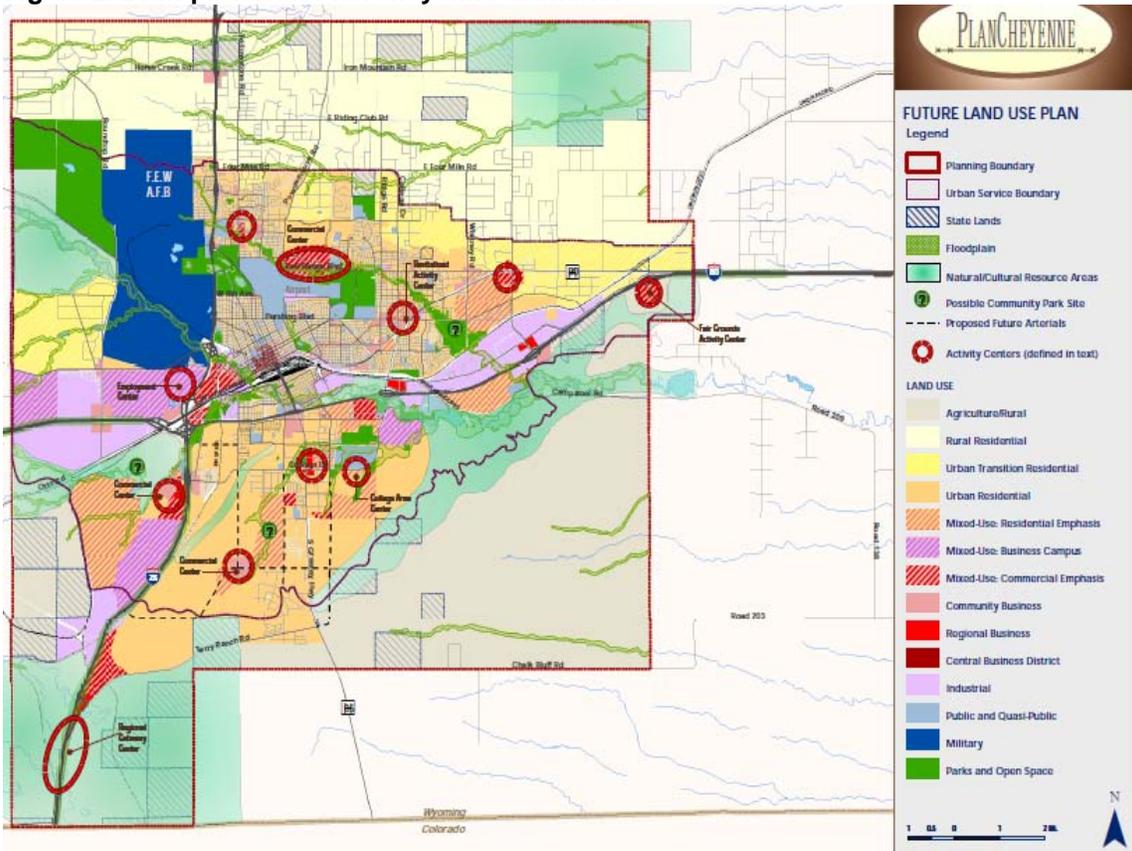
The PlanCheyenne team considered using CommunityViz for the scenario planning effort, but later decided that the software was too complex and cumbersome to be efficient for this effort.

The MPO provided the land use parameters for the business as usual, urban areas, and neighborhood/activity center scenarios to a transportation consultant who modeled each of these scenarios using the travel demand forecasting model. Because the transportation network for each scenario was financially constrained, the model included the existing system and programmed improvements.

The model results allowed public stakeholders to evaluate the congestion impacts of each scenario. In addition, scenarios were compared based on the provision of open space and parks areas, ranchland conserved, the potential for multimodal travel opportunities, and community identity and livability. The scenario evaluation highlighted the links between infrastructure costs and development density and open space.

A modified version of the Neighborhood/Activity Center scenario was selected as the preferred scenario (see Figure 2).

Figure 2. Draft preferred PlanCheyenne scenario.



Outcomes: Implementing the Preferred Scenario

PlanCheyenne was finalized in November 2006. The City of Cheyenne is currently re-writing its development code in a unified format that includes land use, subdivision, street and sited design standards. The development code will be consistent with the recommendations in PlanCheyenne.

City staff also reported that they are beginning to see new types of development that are consistent with the development envisioned in the preferred scenario.

Key Findings

Key findings from the PlanCheyenne effort included:

Public analysis of complex issues. PlanCheyenne used scenario planning to engage citizens in a discussion about the links between development patterns, open space, and transportation costs. It helped put a complicated, jargon-filled discussion into terms that everyone could understand. This was the first time that many citizens had engaged in these issues and scenario planning was a very valuable tool for letting citizens express preferences and make trade-offs. By making the issues accessible and facilitating open dialogue, the scenario planning built credibility for the plan and staff as well.

Development of financial constraint requirement. The financial constraint requirement for the transportation model was instrumental in the selection of a preferred scenario that involved higher density development. It was noted that the results of the transportation modeling—which showed that Cheyenne could not afford the pace of road-building required to sustain trendline development—was one of the main forces spurring selection of the neighborhood scenario.

Combining funding sources enabled a more comprehensive analysis. Combining funds for transportation, land use and parks and recreation planning helped the small MPO build a large enough budget to support more extensive consulting services, public involvement and modeling. The Parks and Recreation division expressed interest in being involved as it had not been able to conduct its own comprehensive plan. Combining transportation and land use planning with parks planning is helping the Cheyenne region develop a systematic, connected greenway system, and allowed for proactive park development.

The supplementary funding sources also gave the PlanCheyenne team the flexibility to include elements of the plan that could not be funded with federal transportation funds. For example, Federal transportation funds could not be used to fund the analysis of open space preservation, so Parks and Recreation funds were used to fund this element of the plan.

Challenges of Scenario Planning

Key challenges of scenario planning identified by PlanCheyenne team members:

- Scenario planning is complex. It was difficult to communicate the idea and purpose of scenario planning to city council, city staff, and the public.
- Defining the scope of the project was a challenge. It was difficult to provide enough guidance to limit the scenarios developed at public workshops without dictating what those scenarios should be.
- Evaluation of GHG emissions is not currently a community-level conversation due to the region's clean air. In addition, Cheyenne is an air quality attainment area, so air quality modeling is not required.

Key Documentation

Cheyenne Area Master Plan website with links to the final plan and information about the process and outcome: www.plancheyenne.com

Case Study 2: Chicago Metropolitan Agency for Planning (CMAP)

Background

CMAP is the regional planning organization for the northeastern Illinois area, including Chicago. CMAP's region includes six counties and the agency serves a total population of approximately eight million residents (see Figure 1). CMAP was established in 2005. The region is growing by about one percent per year. By 2040, nearly three million additional residents and 2 million additional jobs are expected.

Figure 1. Map of northeastern Illinois, including the CMAP region.



Overview of CMAP's Scenario Planning Effort

CMAP conducted an extensive scenario planning process as part of the *GO TO 2040* effort.⁷ *GO TO 2040* is the comprehensive regional plan to guide future development and growth. Scenario planning was used because CMAP viewed it as a best practice in developing complex L RTPs. In addition, CMAP reported that the scenario planning approach allowed it to conceptually test out various ideas before making actual recommendations on policies, strategies, or investments. Consultants, including Fregonese Associates and Envision Sustainability Tools, Inc., assisted with components of the CMAP scenario planning process.

Prior to the scenario planning portion of *GO TO 2040*, CMAP had developed a regional vision⁸ and collected extensive data on the region. With the assistance of a local community foundation

⁷ General information regarding *GO TO 2040* can be found at <http://www.goto2040.org/>

⁸ To build the vision, CMAP conducted a visioning workshop in the fall of 2007. About 150 participants attended the event; group brainstorming sessions and keypad devices were used to capture and prioritize key growth themes for 2040, such as sustainability and environmental health. A draft vision was then developed by CMAP and provided to internal committees for review and feedback. Ultimately, the preferred growth vision was approved by CMAP board in June 2008. Additional information on the visioning workshop is available at <http://www.goto2040.org/uploadedFiles/plan/appendix4.pdf>. The regional vision plan and additional information on the development process are available at <http://www.goto2040.org/ideazone/default.aspx?id=7718>

(as well as the Volpe Center), CMAP also developed snapshot reports⁹ and strategy papers¹⁰ that identified important issues in the region and potential strategies to address those issues.

Three scenarios were constructed in 2008. During the summer of 2009, the public provided feedback on the scenarios during a series of “Invent the Future” workshops and other public outreach events. A draft preferred scenario was chosen and is currently being reviewed by the CMAP board. The total cost of the *GO TO 2040* effort was approximately \$10 million (including staff time) over three years, of which about \$300,000 was spent on visualization tools.

Key Findings

The scenario planning process conducted by CMAP for *GO TO 2040* was an example of innovative scenario planning for several reasons:

- **Scenario analysis focused on factors not traditionally considered in transportation agencies’ long-range plans, such as energy and technological innovation.** CMAP used scenario planning to identify policies and strategies that the region can use to address growth- and quality of life-related trends. The effort considered a wide range of strategies and indicators of success, ranging from congestion, energy use, and impact on long-term economic growth. CMAP limited the scenario planning effort to strategies within the region’s control. The next step will be to test the robustness of these strategies to external forces beyond the region’s control. CMAP will begin this “external-in” analysis after plan adoption.
- **Use of visualization tools.** Extensive use of real-time visualization tools (both online and at workshops) helped educate the public on potential scenario outcomes.
- **Partnerships with external stakeholders.** CMAP partnered with the Chicago Community Trust, a local community foundation, to support the overall *GO TO 2040* effort and develop regional indicators to measure the area’s success in meeting quality of life goals.
- **Use of robustness testing.** CMAP plans to procure consultant assistance to develop a ‘robustness test’ after the *GO TO 2040* plan is completed. The test will explore how the preferred scenario would perform given future external drivers of change, such as increased fuel prices and climate change.

Scenario Construction

CMAP constructed three scenarios for *GO TO 2040* with the help of internal working committees that identified key, cross-cutting themes, then grouped themes into discrete scenarios. All scenarios used the same socioeconomic projections. Brief descriptions of each scenario and its associated recommended policies are listed below:

- Reinvest:** focused growth on existing infrastructure as well as support of transit-oriented development (TOD), walkable communities, and sustainable transportation options.
- Policy and investment choices associated with the reinvest scenario include removal of regulatory barriers to affordable housing in TOD areas, support for non-motorized transportation, and zoning changes to permit more TOD areas.¹¹

Preserve: focused on system preservation with moderate increases in density, aesthetic improvements to increase regional quality of life, upgrading of transportation system to serve a larger population, and small-scale improvements such as the addition of bike lanes.

⁹ More information on the snapshot reports is available at <http://www.goto2040.org/#3>

¹⁰ The strategy papers are available at http://www.goto2040.org/strategy_papers.aspx

¹¹ More details on the reinvest scenario can be found at <http://www.goto2040.org/scenario/default.aspx?id=15727>

- Policy and strategy options associated with the preserve scenario included increasing recycling and waste disposal programs, additional open space acquisition, bicycle and pedestrian improvements, implementation of car-sharing programs, and historic preservation programs.¹²

Innovate: focused on use and support of clean energy, alternative fuels, and energy-efficient technologies to reduce development impacts while still growing the region outward.

- Policies and strategies associated with the innovate scenario include support for ‘green’ jobs, investments in alternative fuels, adoption of congestion pricing, and support for context-sensitive transportation designs.¹³

CMAP did not intend the scenarios to be mutually exclusive. Ultimately, the preferred scenario combined the ‘best’ strategies from all three scenarios.

Scenario Assessment and Analysis

To assess the performance of the three scenarios, CMAP developed 250 regional indicators, including land consumption, open space, air quality, congestion, and environmental justice. Indicators were developed with feedback from internal CMAP committees as well as the public and CMAP ensured that good data were available for each one. CMAP will monitor future growth and development using these indicators.

Scenarios were analyzed using in-house models, including a four-step travel model. CMAP also worked with consultants to develop spreadsheet models to calculate scenario outcomes. Land use patterns and investments were varied to test which scenarios reduced congestion and other factors. The model did not fully consider existing development and constraints, as CMAP believed that land use patterns could change in the future. However, CMAP did restrict development on open spaces in line with open space preservation strategies.

Public Outreach

To solicit public feedback on the scenarios, CMAP conducted an extensive public outreach campaign that included a series of 55 “Invent the Future” workshops during the summer of 2009.¹⁴ Each workshop averaged 20-30 participants and lasted about one-and-a-half hours. The first half of each workshop focused on providing participants with an introduction to the *GO TO 2040* effort. Participants were then polled (using keypad devices) on their preference for each scenario and associated policy options. The second half of the workshop focused on discussion of results from the polling exercise.

CMAP also deliberately separated technical scenario analysis from public outreach to keep the workshops comprehensible and the public engaged.

MetroQuest software was used during the “Invent the Future” workshops as well as on CMAP’s website as a public involvement and educational tool to show participants how their policy choices might ‘play out’ in the future. MetroQuest was built by Envision Sustainability Tools, Inc., a Vancouver-based consultant.¹⁵ The software was designed to simplify complex scenarios for use in a general public forum.

During the workshops, participants used keypad polling devices to anonymously vote on preferred development patterns. The most popular responses were chosen and input to the MetroQuest tool. The tool then displayed the results of the chosen development pattern in real-

¹² More details on the preserve scenario can be found at <http://www.goto2040.org/scenarios/preserve/>

¹³ More information on the innovate scenario can be found at <http://www.goto2040.org/scenarios/innovatepolicies/>

¹⁴ As part of the campaign, kiosks were displayed in high-traffic public areas to solicit feedback on future development. CMAP received nearly 20,000 responses to the kiosks.

¹⁵ For more information on MetroQuest software, see <http://www.metroquest.com/>

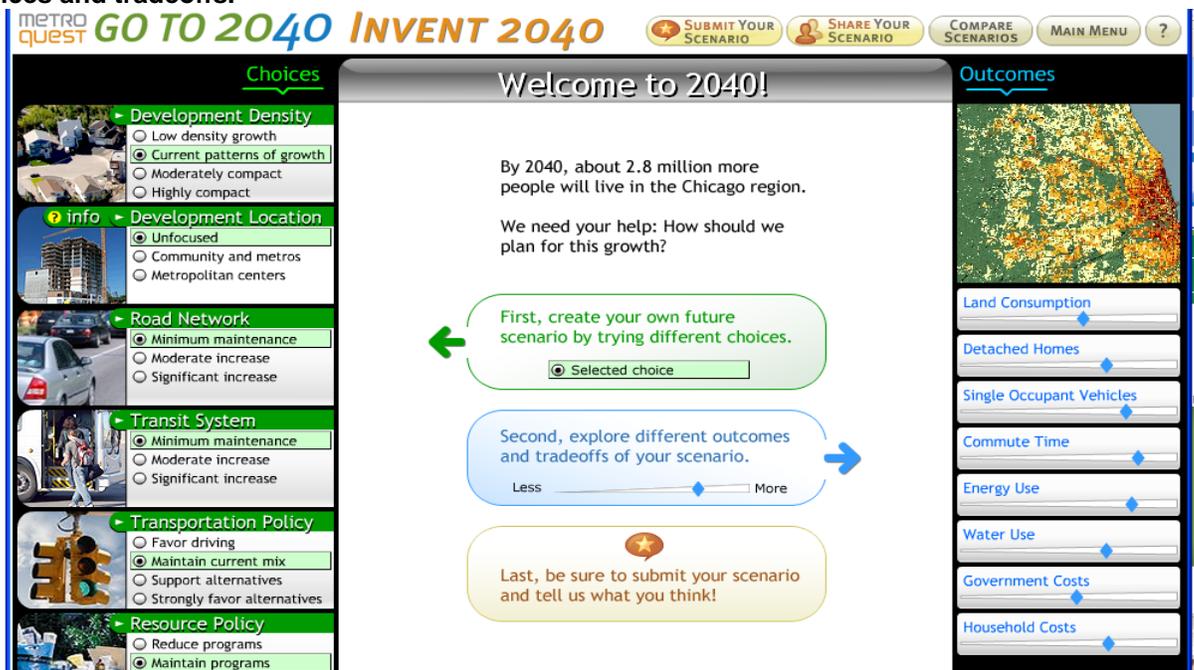
time. The displayed results were based on analyses that had been performed ahead of time and programmed into the MetroQuest tool.

Additional considerations regarding CMAP’s use of MetroQuest are listed below:

- CMAP believed that MetroQuest was an effective tool to help educate the public on scenario outcomes. CMAP reported that it chose to use MetroQuest because it was considered the most user-friendly tool available and had the most intuitive and usable interface.
- CMAP reported that the level of detail offered by MetroQuest was appropriate given how it was used for the effort. CMAP reported that a minority of participants wanted more detail than was provided by the software; these participants were able to view the 2040 website for additional information.
- Using the tool was not a labor-intensive process. The consultant did a large amount of work and CMAP had existing data to plug into the tool. The contract with Envision Tomorrow was signed in July 2008. Data transmissions began in September 2008 and the MetroQuest tool was working and utilized for workshops starting in May 2009.

The CMAP website also offered the public opportunities to construct their own scenario using MetroQuest software. Using the software, the public could also see the outcomes of each scenario as compared to indicators (while the specific indicators were built into MetroQuest, users could vary the priority level for each indicator) (see Figure 2).

Figure 2. Screenshot of “Invent 2040,” a MetroQuest-based online tool available on the CMAP website that allowed users to develop their own scenarios based on various policy choices and tradeoffs.¹⁶



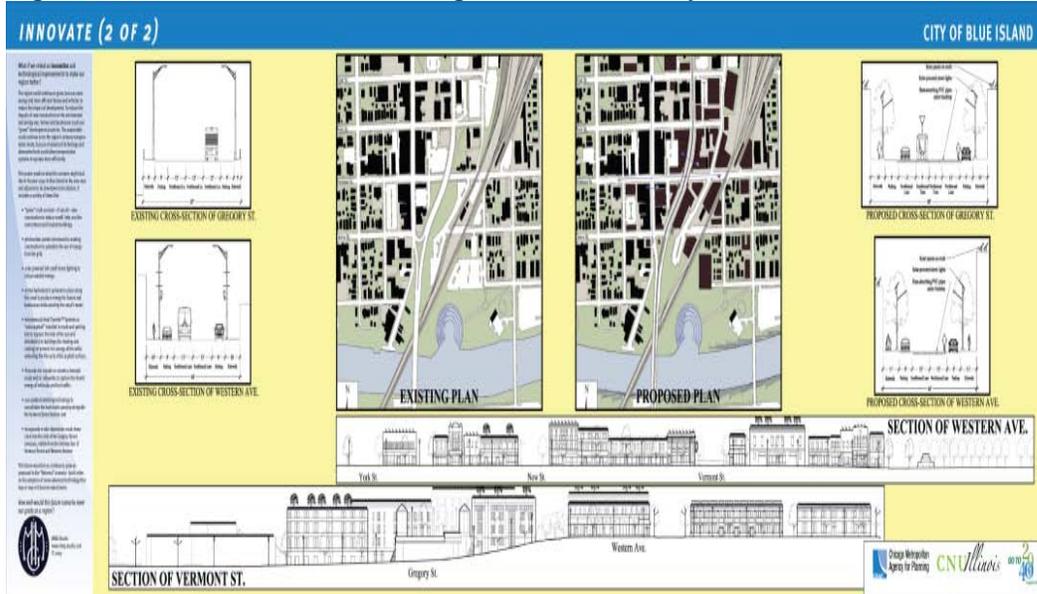
¹⁶ Graphic from the GO TO 2040 website at <http://www.goto2040.org/>

Use of Additional Visualization Tools

CMAP offered a variety of online visualization tools on its website, including general images that displayed each scenario as it might look like in the future. These images were used to help the public better understand the impacts of their choices.

In addition to these general images, CMAP worked with several architecture and urban design firms to create scenario outcome-based images specific to several communities. These images displayed the outcomes of the preserve, reinvest, and preserve scenarios as each might be overlaid on community-specific maps and plans (see Figure 3).

Figure 3. Innovate Scenario as it might look for the City of Blue Island, Illinois.¹⁷



Preferred Regional Scenario

The draft preferred regional scenario¹⁸ was selected by CMAP after extensive analysis and was consistent with public input provided during the “Invent the Future” workshops. The preferred scenario includes a focus on dense, mixed-use redevelopment, strengthening the region’s green infrastructure (i.e., interconnected open spaces and other green spaces), and other issues, such as development of innovative finance options and intergovernmental cooperation. The preferred regional scenario was endorsed by the CMAP Board in January 2010.

Outcomes

The CMAP board endorsed the preferred scenario in January 2010. Next, CMAP will focus on the details of implementing the preferred scenario components in winter and spring 2010. Next steps might include:

- Supporting innovative finance options (e.g., congestion pricing, public-private partnerships) for recommended transportation investments.
- Supporting local government land use decisions in line with the preferred scenario.
- Other actions, such as supporting open space preservation, resource conservation, public transit improvements, and others.

¹⁷ Graphic from the GOTO2040 website at <http://www.goto2040.org/>

¹⁸ More information on the draft preferred scenario is available at <http://www.goto2040.org/ideazone/default.aspx?id=17692>

To build support for the preferred scenario, CMAP's executive director has coordinated with area COGs and other stakeholders to explain the vision and its associated recommended policies, strategies, and actions.

Lessons Learned and Benefits

CMAP reported the following lessons learned in conducting the *GO TO 2040* scenario planning process:

- It is difficult to communicate technical details to the public. When presenting results or information to the public, it was important to keep the detailed and complex technical analysis portion, such as the results of travel modeling, separate from the communications portion of scenario planning to keep the public engaged.
- Scenario planning is a comprehensive approach that can help to create complex LRTPs.

CMAP already receives significant support from USDOT and believes that its priorities are well aligned with USDOT's planning priorities. However, it would always be helpful to look for additional opportunities to continue strengthening the relationship between CMAP, FHWA, and USDOT.

Challenges

CMAP reported the following challenges:

- The *GO TO 2040* process covered more than transportation, land use, and environment; as a result, traditional funding sources were difficult to use for this purpose. CMAP did have access to a private source of funds for *GO TO 2040*—the Chicago Community Trust—that provided CMAP with approximately \$1.3 million. Without this private funding source, CMAP believed it would have been very difficult to have sufficient resources to focus on in the full range of issues that a comprehensive plan should address.
- The *GO TO 2040* scenario planning processes have been very complicated and complex. Scenario planning has a lot of power but cannot be conducted quickly or simply. CMAP has expended significant time and staff resources to develop the plan; communication of the scenario planning effort to the public has always been a challenge.
- Generally, CMAP had access to good data (for land use, energy, water, etc.) to develop the three scenarios. However, CMAP did not have good freight data, which limited its ability to focus on freight issues when developing the preferred scenario. Freight issues are being addressed for *GO TO 2040* as part of an ongoing study.
- In addition, CMAP reported that the analytic tools it used to assess scenarios were adequate, but could be improved. It is difficult to find comprehensive models that can include data from non-built environment to help answer questions such as: what kind of impact will educational strategies have on the economy?

Key Documentation

Draft preferred regional scenario (2009):

<http://www.goto2040.org/ideazone/default.aspx?id=17692>:

GO TO 2040 strategy papers: http://www.goto2040.org/strategy_papers.aspx

Regional indicators for scenarios:

http://www.goto2040.org/uploadedFiles/RCP/New_Idea_Zone/Regional_Indicators/indicators_list_oct14.pdf

Case Study 3: Metropolitan Washington Council of Governments (MWCOCG)

Background

The MWCOCG is the regional organization of local governments in the District of Columbia (D.C.) area. MWCOCG is comprised of 21 local governments in Washington, D.C., Maryland, and Virginia (see Figure 1) and serves an approximate population of five million. MWCOCG was established in 1957 as a voluntary association of local governments. In 1965, MWCOCG was designated to provide staff to the National Capital Region Transportation Planning Board (TPB) when it was established as the region's metropolitan planning organization (MPO).

Figure 1. Map of the MWCOCG region.¹⁹



MWCOCG has used scenario planning several times in the past. The agency conducted a one-day scenario thinking exercise in November 2009 as part of a larger regional visioning initiative. This exercise, which comprises the focus of this case study, demonstrates an innovative example of scenario planning that differs from traditional scenario planning efforts.

Overview of MWCOCG Scenario Planning Effort

The purpose of the one-day workshop was to conduct a thought exercise to identify strategies that would serve the region well under several plausible alternative futures. Scenarios were chosen as a tool to help MWCOCG members think more creatively about the future of the region. The scenarios were also developed to encourage group discussion on long-term risks while building consensus among regional leaders on robust strategies related to growth and development.

¹⁹ Map from 2006 MWCOCG report available at <http://www.mwcog.org/uploads/pub-documents/9IdeXw20080205170003.pdf>

The workshop also served as a framework for the Greater Washington 2050 initiative.²⁰ This initiative seeks to develop a regional growth vision while fostering stronger regional leadership and policies that could implement components of the vision. The 2050 effort is led by a coalition that includes MWCOC and public, business, civic, and environmental stakeholders.^{21 22}

By design, the MWCOC one-day workshop differed from most traditional transportation planning uses of scenario planning:

- The effort was not designed to incorporate a sustained public participation element as in other types of scenario visioning projects (e.g., Envision Utah or Sacramento Blueprint).
- The workshop was designed to demonstrate an example of “outside-in” thinking: how scenarios focused on global or national issues could help consider impacts on regional or local systems.
- Scenarios were used primarily to build consensus around public policy directions that will serve the region well, regardless of how external forces of change might evolve and change.
- The exercise was not part of a mandated transportation planning process.
- The workshop was intended to be a qualitatively focused event that encouraged new thinking on “out of the box” futures. Quantitative data were not used to develop or analyze scenarios. Future, more quantitative work will be needed to set specific goals, policies, and/or performance measures to assess progress.

MWCOC noted that it has used more traditional data-driven, trend-line forecasting to help project future needs/conditions, but forecasting is based on the status quo while scenarios can be “wild cards” that promote innovative and creative thinking.

Scenario Development and Descriptions

Scenarios were developed prior to the workshop with the assistance of a consultant. To develop the scenarios, the consultant conducted interviews with local leaders and focus groups consisting of MWCOC staff and other professionals within the field. The stakeholders then provided input on the key forces of change in the region. Experts in climate change and economics reviewed the scenarios to ensure that they were valid. The scenarios were designed to represent plausible—though unlikely—futures.

Four scenarios were developed. A brief description of each is listed below.²³

- **High Tech Green** – a scenario in which green infrastructure investments help foster financial growth and create new “green” jobs. The focus is on clustered growth in transit-oriented activity centers with challenges such as declining exurban areas and lack of affordable housing in activity centers.

²⁰ The Greater Washington effort was modeled on the Urban Land Institute’s Reality Check exercise, which was a more traditional scenario planning visioning effort. Reality Check participants identified the need for a stronger regional vision and a compact between local jurisdictions in order to change trendline development patterns.

²¹ For more information on the Greater Washington 2050 effort, see <http://www.greaterwashington2050.org/home.html>

²² *Region Forward* is the plan documenting the 2050 regional growth vision. The plan also outlines broad regional growth goals related to land use, transportation, climate/energy, the environment, and others. The plan is currently being updated with public input. For additional information on Region Forward, see

http://www.greaterwashington2050.org/Reports/GW2050_LastUpdatedv2.pdf

²³ For additional details on scenarios, view the *Big Moves* report at http://www.mwcog.org/gw2050/Reports/GW2050_Big_Moves_Report.pdf

- **Federal Government Dispersal** – in this scenario, “Federal facilities slowly disperse outside the Washington region, driven by high rents...security concerns, and technological innovations.”
- **Hot and Gridlocked** – this scenario is characterized by recession and falling oil prices that derail strong climate policies. “Adapting to climate change is now as important as quickly reducing CO2 emissions.”
- **Cooperation in Hard Times** – this scenario focuses on aging population, a shrinking labor force, high health costs, and energy prices, as well as government debt. “The region and the nation focus on finding the most cost-effective ways to move forward. Regional cooperation expands to pool resources for common goals.”

Workshop Structure

MWCOG invited approximately 100 individuals to participate in the workshop, including local leaders and representatives of the public/business sectors. The stakeholders represented a cross-section of age, gender, race, and subject matter expertise. Other components of the workshop are detailed below:

- The workshop began with presentations from subject experts. These presentations helped provide context for the scenarios and gave all of the participants a common set of knowledge to use in their analysis.
- Participants then gathered into groups, and each group was assigned a scenario to consider. Visualization tools were not used during the exercise; scenarios were presented on paper, and participants were encouraged to voice their reactions (a scribe was assigned to each group to record the group’s thoughts). A consultant facilitated the group dialogue.
- Each group then reported the strategies that their group identified. A consultant facilitated a discussion to identify strategies that were effective for all of the scenarios presented. This set of strategies represents robust strategies for the region to pursue.

Key Findings

The following are key findings from MWCOG’s efforts:

- **Identification of broad strategies to address emerging trends.** MWCOG’s scenarios offer a model for thinking of issues and trends not traditionally considered in scenario planning as well as strategies that will be effective for several plausible futures. The exercise also generally helped to raise awareness about specific emerging issues, including climate change and the importance of setting greenhouse gas reduction targets.²⁴

While the specific forces of change might differ, other MPOs and transportation agencies could use MWCOG’s scenarios as a model to develop their own. Other MPOs could also consider a similar type of visioning event to “kick off” a larger scenario planning process or raise awareness among stakeholders about key regional issues.

- **Low-cost effort.** The effort relied on previous analysis and policy work, so that the workshop was a relatively low-cost effort. MWCOG estimated \$50,000 as a total cost for the one-day workshop, including \$16,000 estimated for consultant assistance and \$30,000 to \$40,000 estimated for staff costs to develop the workshop in the months leading up to the event. Volunteer facilitators were used to support MWCOG staff and

²⁴ The exercise did not intend to develop specific targets/performance measures to address these issues, such as the GHG reduction targets included in the 2050 Region Forward report.

consultants. MWCOG's use of expert discussion on regional futures helped frame the scenarios and prepared all of the workshop participants to feel comfortable analyzing them.

- **Qualitative analysis.** The qualitative analysis used in the one-day workshop was sufficient to create some consensus and provide direction for future strategies and policies. This could be a good model to follow for those MPOs or agencies that do not have the quantitative data (or financial) resources available for more "high-tech" scenario planning efforts.

Outcomes

The following were outcomes from the one-day scenario thinking workshop:

- **Identification of regional priorities.** The scenario thinking workshop helped the members of the Greater Washington 2050 committee identify regional priorities. These priorities, called the "Ten Big Moves," will guide the regional growth vision to be included in the Greater Washington 2050 effort.²⁵ The big moves address regional issues such as developing opportunities for transit-oriented development, a "green" economy, affordable housing, public education, and health.
- **Development of targets and performance measures.** The workshop helped provide a framework for the thought process used to develop performance measures to include in *Region Forward* Greater Washington 2050 effort report. These performance measures focus on short-, mid-, and long-term regional goals.²⁶ Reports will be developed every three to four years to measure the region's progress towards these goals. A survey will also be commissioned every three to four years to solicit public feedback on progress towards these goals.
- **Connection to regional long-range plan.** MWCOG solicited TPB's feedback when creating the four scenarios for the workshop. Now, MWCOG is working to develop language to include in the Greater Washington 2050 report based on TPB's comments. MWCOG is also using TPB's work as a foundation for the transportation piece within the 2050 plan.

MWCOG reported that it would use scenario planning in the future to assist with policy visioning. The agency reported that the workshop had "raised the bar" for more broad-based scenario thinking that could be used as a model for future efforts.

Benefits and Challenges:

MWCOG noted several benefits from the scenario thinking exercise:

- The exercise helped to build consensus among local leaders in the region with varied priorities and interests about how to respond to external challenges.
- The workshop encouraged innovative and creative thinking on solutions to complex issues and the qualitative approach kept the conversation high-level.

MWCOG noted several challenges in implementing the exercise:

- Data were not obtained to support each scenario; however, the exercise was not intended to be quantitatively based. MWCOG believed it would likely be difficult to know how to obtain specific data—and which data to obtain—to illustrate how each scenario might "play out" in a specific region or corridor.

²⁵ The Big Moves document is available at http://www.greaterwashington2050.org/Reports/GW2050_LastUpdatedv2.pdf

²⁶ For example, one goal related to accessibility was to develop transit-oriented mixed-use communities in regional activity centers that will capture new employment and household growth.

- MWCOG reported that there is a trade-off between developing “big thinking” scenarios and providing geographically specific data points. A discussion regarding how the exercise could be more quantitatively based in the future has not yet occurred at MWCOG.
- Some participants were not sure how the outcomes of the exercise would be used or how the exercise could be translated into policies/strategies.
- This effort took place outside of mandated or Federally funded transportation planning. It is not clear whether this type of effort could be accomplished using Federal transportation planning funds.
- It was difficult to know whether a sufficiently large group participated in the event. MWCOG attempted to invite a diverse range of stakeholders but suspected that some perspectives in the region were not represented.
- Results from the scenario thinking workshop were presented to the public but on a limited basis (via the MWCOG website). The agency reported that the effort would have benefitted from more extensive media coverage.

Key Documentation

The following documentation provides additional information on MWCOG’s scenario thinking workshop and related efforts:

- *Big Moves*, the report documenting the Scenario Thinking Workshop:
<http://www.mwcog.org/uploads/pub-documents/8FZeWg20090501130317.pdf>
- Draft *Region Forward* document, the report documenting the Greater Washington 2050 initiative and vision:
http://www.greaterwashington2050.org/Reports/GW2050_LastUpdatedv2.pdf

Case Study 4: Southern California Association of Governments (SCAG)

Background

SCAG is an MPO representing six counties that comprise half the population of California (see Figure 1). SCAG is the largest MPO in the United States, serving 19 million people in 6 counties and 189 cities. SCAG's size makes it unique in terms of resource availability and staff capacity. However, its size also presents significant challenges for coordinating local jurisdictions and creating regional consensus.

Figure 1. Map of SCAG region.²⁷



In 2004, SCAG used scenario planning in a very successful and well-documented process. The process was known as the Compass Blueprint effort.²⁸ Compass Blueprint is SCAG's largest and most successful outreach effort to date. It helped build support for new, regional integrated land use and transportation strategies, and helped SCAG build credibility with elected officials and other stakeholders.

Based on its positive experience with the Compass Blueprint effort, SCAG continues to use scenario planning to build support for progressive planning that considers the regional effects of local actions and policies. Because the Compass Blueprint effort has been well-documented, the focus of this case study is the upcoming Sustainable Communities Strategy (SCS) scenario planning process that SCAG will undertake, as required by California's Senate Bill (SB) 375.²⁹

²⁷ Map from SCAG site at <http://www.scag.ca.gov/eMap/MapGallery.htm>

²⁸ For additional information on SCAG's Compass Blueprint effort, see <http://www.compassblueprint.org/>

²⁹ Senate Bill 375: California enacted a state law in 2009 requiring the California Air Resources Board to set greenhouse gas emission reduction targets for regions in California, and requiring regional transportation plans to either demonstrate compliance with those targets, or requiring MPOs to develop a SCS that will be used to achieve compliance with the target.

Overview of SCAG's Scenario Planning Effort

SCAG is currently preparing for a scenario planning effort that will be used to develop the region's SCS and long-range transportation plan (LRTP) update. SCAG plans to use scenario planning for the SCS to facilitate a regional dialogue about environmental, financial, quality of life and travel-related impacts of development patterns and transportation investment decisions.

In preparation for the scenario planning effort, over the next several months, SCAG intends to:

- Work with stakeholders to provide a recommendation for the regional greenhouse gas (GHG) emission reduction target to the California Air Resources Board.
- Work with stakeholders to develop a regional vision based on adopted general plans.
- Model projected GHG emissions and transportation impacts associated with current adopted general plans and programmed transportation improvements.
- Determine the gap between the projected GHG emissions based on current plans and the regionally adopted GHG emission reduction target.
- Work with consultants to develop software tools to use in the effort.

SCAG will then lead a regional scenario planning effort to help determine how best to bridge the gap between the emission reduction target and projected emissions based on current plans. Scenario development and analysis for the SCS will be conducted through a series of sub-regional workshops.

SCAG intends to engage the workshop participants through a "chips" exercise in which participants will place development on a map of the sub-region using chips that represent different development types. During workshops, stakeholders will assign these types to the region using 5.5-acre grid cells. Different combinations of development types and geographic distributions represent alternative scenarios. Using these development types as the building blocks for scenarios will help stakeholders understand the "look and feel" and implications of their choices," while enabling a detailed analysis of a very large region.

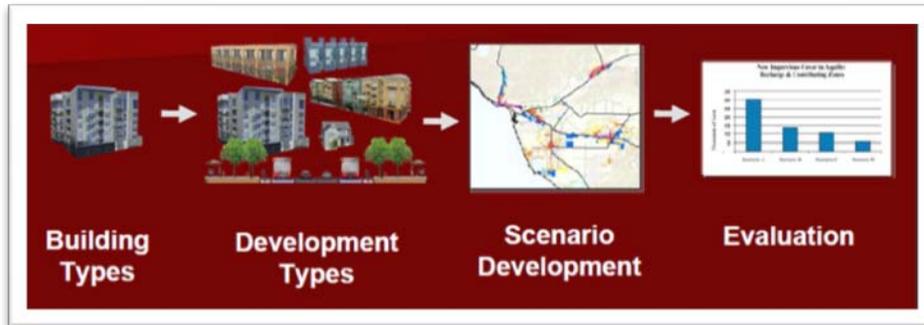
SCAG worked with a consultant to develop 17 customized development types as part of the Envision Tomorrow suite of planning tools for the Compass Blueprint effort.³⁰ SCAG staff believes that these typologies are a good representation of existing and potential development in the region. Each development type represents a mix and intensity of development and includes a high level of detail about building types, density, design, costs, rents, tax revenue, energy and water use. The development types represent human-scale elements such as building mix and design. They also provide a way to translate that level of detail to the regional scale for analysis.

SCAG staff will simultaneously model the development patterns using a customized version of Envision Tomorrow software. Workshop participants will then evaluate the pros and cons of several scenarios at each workshop and the scenarios will be refined through a series of three to four iterative workshops in each sub-region over an eight- to ten-month period. The process is documented in Figure 2.

Figure 2. Scenario Building Process.³¹

³⁰ Envision Tomorrow software was built by Fregonese Associates, an Oregon-based consulting firm. The tool allows users to quickly create and evaluate land use scenario using 'market-feasible' and prototype buildings. The tool works at both the neighborhood and regional scales and also offers an additional Scenario Builder extension for ArcGIS and a Return on Investment model. For more information on Envision Tomorrow and Fregonese Associates, see <http://frego.com/projects/envisiontomorrow.html>.

³¹ Graphics from Fregonese Associates.



Although GHG emissions will be a central focus of the SCS scenario planning effort, many other impacts related to growth and development, such as congestion and land consumption, will also be modeled so that a full picture of each scenario is offered to stakeholders for evaluation.

Ultimately, the sub-regional preferred scenarios will be combined to form a preferred scenario for the whole SCAG region. Policies and strategies for the preferred scenario will be included in the SCS plan and LRTP, as required by California’s SB 375.

SCAG’s ability to implement the preferred scenario is limited because local jurisdictions control land use decisions. However, certain tools and regulations will help yield land use decisions that are consistent with the SCAG’s plan. For example:

- The SB 375 statute requires that the distribution of housing included in SCAG’s SCS plan must be consistent with California’s Regional Housing Needs Assessment (RHNA) law and must be included in local general plans. The RHNA law, however, might be inconsistent with climate change legislation in requiring all jurisdictions to accommodate new housing growth. This requirement might limit the ability of transit-rich jurisdictions to take on additional residential growth to capture more transit trips and might also exacerbate growth in the outlying areas of the region.
- SCAG might require consistency with the SCS as a condition for Compass Blueprint Demonstration Project funding. Demonstration projects provide grants to local governments for planning that is consistent with regional goals. It expects to continue this approach and to include selection criteria that require consistency with the SCS for future demonstration project funding. SCA is also tracking how many demonstration projects are implemented in order to facilitate outcome monitoring.

Key Findings

The following are key findings from SCAG’s efforts:

- **Detailed development descriptions for a large region.** Using development types with a high level of detail can help provide direction to local jurisdictions for codifying the preferred development types. After the Compass Blueprint effort, SCAG received some requests for technical assistance from local jurisdictions interested in developing updated development codes.
- **Analysis of variety of impacts.** The Envision Tomorrow software tools will analyze many impacts of each scenario, providing a more complete picture of each scenario than analyses that are limited to land use and VMT outputs. SCAG is currently working with its consultant to add new analysis capabilities to Envision Tomorrow so that it can better meet the challenges of SB 375 and the SCS process. These improvements include GHG emissions modeling, “4D” analysis to model the transportation benefits of neighborhood-scale urban design strategies, and an estimation of the fiscal impacts of alternative scenarios to local governments.

The analysis tools for the SCS scenario planning effort will analyze:

- Density and mix of land uses;
 - Housing mix and affordability;
 - Costs and revenues to local governments;
 - Energy consumption;
 - Water use;
 - Open space;
 - GHG emissions;³²
 - Transportation mode split; and
 - Vehicle-miles traveled (VMT).
- **Stakeholder engagement and real-time analysis.** SCAG staff noted that many of the key benefits of the 2004 Compass Blueprint scenario planning effort were related to stakeholder engagement. SCAG plans to use a similar public involvement approach for the SCS scenario planning effort. In particular, SCAG scenario planning has helped to:
 - **Engage and educate stakeholders:** Scenario planning made complex planning issues accessible to stakeholders. It has helped bring planning issues into the vernacular of citizenship, which influences elected officials and leads to more progressive planning.
 - **Build credibility:** Extensive public involvement helped SCAG build a broad coalition of stakeholders and gave the Compass Blueprint plan credibility.
 - **Build consensus:** Buy-in from each jurisdiction is essential. Ultimately, SCAG cannot adopt a plan that conflicts with local jurisdictions' plans. Additionally, there are currently no sanctions for regions that do not comply with SB 375. This means that an MPO must build consensus for policy recommendations in order to adopt them. SCAG has assembled an advisory council of business representatives to help lead the process and build consensus.
 - **Encourage regional thinking:** The scenario planning effort built awareness about the regional impacts of local actions and policies and improved working relationships among local and regional partners and stakeholders.

The real-time analysis that SCAG plans to provide at the SCS workshops advances the process used in 2004, where analysis was not available in real-time. Real-time analysis will make the workshops more interactive and deepen the potential to explore alternative scenarios.

Challenges and Success Factors

SCAG identified the following challenges and success factors:

- Support from the Federal level for this type of broad transportation planning will help SCAG be successful.
- Individual actions and personal responsibility might be the most significant untapped solution to the issues facing the region. Encouraging people to take transit and/or walk/bicycle more often would be the most cost-effective way to meet or exceed GHG targets. A Federal campaign to build support for these planning strategies and create social consciousness around them might be helpful.

³² SCAG has developed a methodology for modeling GHG emissions. Rather than simply assuming a linear relationship with VMT, SCAG's method incorporates vehicle speed (through the 4-step travel model) and also models emissions from intra-zonal trips based on development type.

- Monitoring actual growth and development is an ongoing challenge.

Key Documentation

SCAG Growth Vision Report (2004), the Comprehensive report on Compass Blueprint efforts and associated growth vision: <http://www.compassblueprint.org/files/scag-growthvision2004.pdf>

SCAG State of the Region Report (2007), which details the performance of Southern California since 2000 as compared to several key indicators:
<http://www.compassblueprint.org/files/sotr2007.pdf>

Draft guidelines by SCAG for the development of the SCS:
<http://www.scag.ca.gov/pptac/pdfs/agendas/072109/pptac072109-5-1.pdf>

One-page overview of SCAG 's approach to address SB 375:
<http://www.scag.ca.gov/sb375/pdfs/FS/tech-SCAGsb375Approach.pdf>

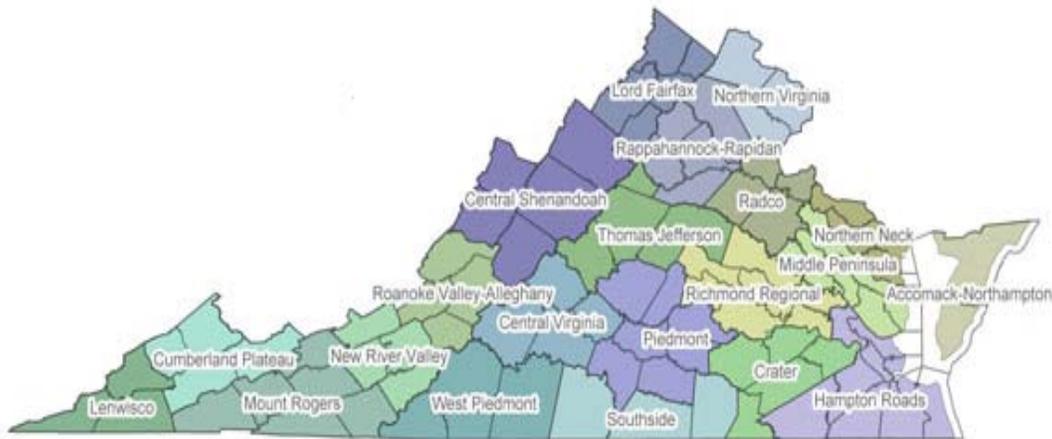
White Paper: Conceptual Land Use Scenario Methodology (developed by Fregonese Associates): http://www.scag.ca.gov/sb375/pdfs/CLUS_WhitePaper063009.pdf

Case Study 5: Thomas Jefferson Planning District Commission (TJPDC)

Overview

The TJPDC provides local and regional planning assistance to the City of Charlottesville and five surrounding counties in central Virginia, which have a collective population of approximately 225,000. Also known as the tenth (of 21) Planning District Commissions, the TJPDC also houses the Charlottesville-Abermarle Metropolitan Planning Organization (MPO)

Figure 1. Map of Virginia's planning districts. The TJPDC is located in the central area of the state.



The TJPDC undertook a two-year scenario planning study, the Jefferson Area Eastern Planning Initiative (EPI), in the early 2000s to better integrate land use and transportation planning in its rapidly growing northeastern suburbs. The study had three primary goals:

- Incorporate sustainability and livability principles into a 50-year regional vision.
- Advance the regional Sustainability Accords, a framework of 16 principles created during the 1990s by the TJPDC and public stakeholder groups.³³
- Develop a new modeling tool that would help regional and local planners test the travel demand impacts of alternative land use scenarios and address transportation needs by developing transit and non-motorized options as well as options related to single-occupant vehicles.

The study was primarily funded by a \$518,000 grant from the FHWA Transportation and Community and System Preservation (TCSP) Pilot Program. In-kind support and additional funding was provided by the TJPDC, the Charlottesville-Abermarle MPO, the Virginia Department of Transportation (VDOT), and the University of Virginia School of Architecture. The project team, which was led by TJPDC staff, included private consultants and University of Virginia design experts.

The EPI has been highlighted in three previous FHWA-sponsored scenario planning workshops³⁴ and the process has been well documented elsewhere.³⁵ To avoid duplication of efforts, this case

³³ More information on the Sustainability Accords is available at <http://www.tjpd.org/home/sustainability.asp>

³⁴ The TJPDC was a peer speaker at the Chico, California, workshop in 2006 and the Honolulu, Hawaii, workshop in 2004. In addition, the EPI was profiled as a case study in the FHWA scenario planning peer workshop for Burlington, VT (2007). For more

study primarily focuses on how TJPDC linked EPI to livability goals and quantified livability measures using a scenario planning approach. A brief background of the EPI process is provided below.

EPI Background

Throughout the 1980s and 1990s, the northeastern areas of the TJPDC region experienced rapid population growth accompanied by increasing congestion on the major state highways leading to Charlottesville. Some residents were concerned that the suburban development patterns threatened the region's quality of life. Residents were also debating a proposed four-lane highway bypass around Charlottesville. Opponents argued that the bypass would create more congestion and lead to urban sprawl. Alternative transportation options, such as transit, had been suggested, but it was unclear whether the region was dense enough to support a transit system.

At the same time, interest in sustainable development in the region was growing, due in part to a multi-year initiative led by the TJPDC to establish regional agreement on 16 sustainability policies, known as the Sustainability Accords.³⁶ The Sustainability Accords raised the expectations for the Charlottesville-Abermarle MPO and other regional agencies to update planning practices, tools, and documents to reflect these principles. Towards this end, the TJPDC implemented the EPI to address transportation and land use issues in its rapidly growing northeastern area while promoting a regional vision that supported sustainable growth and quality of life.

Workshops and Scenario Development

To involve the public in developing a regional growth vision, TJPDC hosted a series of four public workshops over the course of the two-year EPI effort.³⁷ The workshops focused public input on three major questions:

- 1) **How will we live?** The input from this workshop helped the EPI team develop a regional GIS-based map consisting of existing and potential future place types, or community elements. The 40-acre place types were distinguished by specific measurements, diagrams, and photos describing relative levels of density, diversity (mix of land uses), and design (e.g., organization of street grids and open spaces).
- 2) **Where will we live?** Participants in this workshop engaged in interactive mapping games that the EPI study team used to develop and evaluate several alternative future land use and transportation scenarios.
- 3) **How will we get there?** During this workshop, the EPI team led the participants to develop a regional map and an action agenda to advance the future vision for integrated land use and transportation.³⁸

During the workshops, TJPDC specifically asked the public to offer suggestions on how to improve the region's livability, with a particular focus on achieving the sustainability accords. At the neighborhood scale, community members identified several desired characteristics conducive to livable communities, including development of community focal points and mixed-used areas,

information, see www.fhwa.dot.gov/Planning/scenplan/chscenplanrpt.htm , www.fhwa.dot.gov/Planning/scenplan/hiscenplanrpt.htm , and www.fhwa.dot.gov/planning/scenplan/buscenplanrpt.htm

³⁵ See the key documentation section of this memo.

³⁶ The Sustainability Accords were later adopted by local governments, public agencies and private sector partners; the accords are available at: www.tjpd.org/home/sustainability.asp

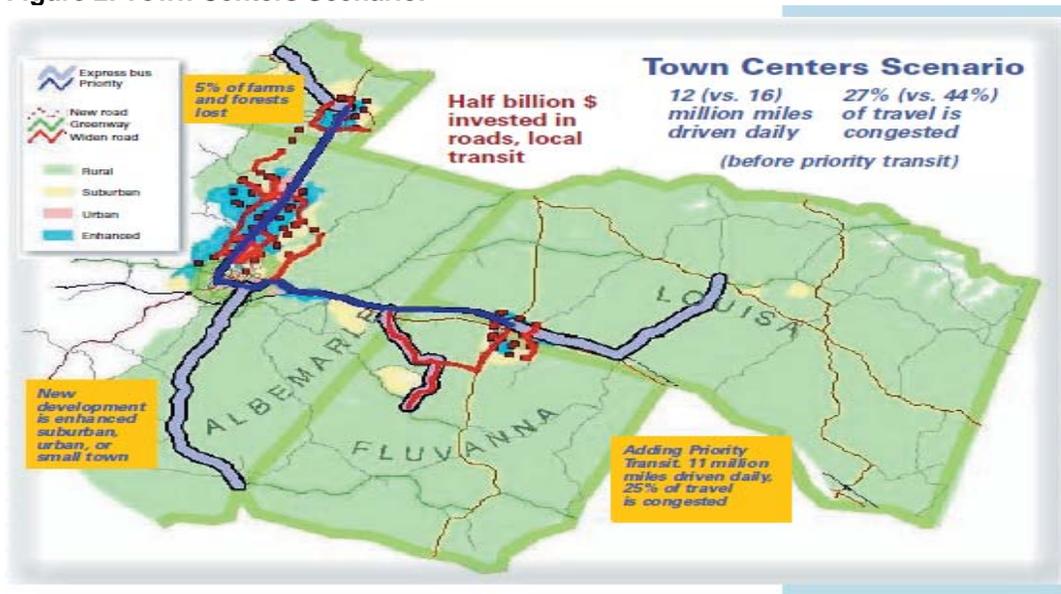
³⁷ To guide and facilitate the workshops, TJPDC created a 35-member advisory committee comprised of elected officials, business leaders, residents, a VDOT representative, and others. The committee met nine times over the study period. In addition, TJPDC was assisted by the University of Virginia School of Architecture.

³⁸ Questions are taken from TCSP case study on the EPI effort. The case study is available at www.fhwa.dot.gov/tcsp/cvadeflt.html

improvement of pedestrian access, and better use of open space.³⁹ At the regional scale, participants helped the study team to generate three distinctly different future development scenarios (described below) and evaluate their impacts relative to the sustainability principles,

- **Dispersed Scenario.** This scenario assumed that current growth trends continued in the future. An estimated \$1 billion was estimated for transportation network improvements, primarily new and/or wider roads. Due to dispersed density and automobile-oriented design, transit was not feasible outside the existing urban core.
- **Urban Core.** This scenario focused growth tightly in the urban center of Charlottesville, which allowed for increased transit, pedestrian and bicycling choices. Approximately \$500 million was estimated for transportation network improvements, primarily for local connector streets and transit-oriented projects.
- **Town Centers.** This scenario used primarily urban and suburban place types to focus growth on major crossroads and other transit-oriented nodal centers (see Figure 2). Under this scenario, transportation impacts could include the need to add or widen several roads and add transit options to serve Charlottesville and surrounding areas. The cost for these improvements was estimated at \$500 million.

Figure 2. Town Centers Scenario.⁴⁰



Scenario Analysis: Development and Use of CorPlan

Because the travel demand model used in the early 2000s by VDOT was not sensitive to alternative transportation or non-motorized modes, TJPDC identified the need to develop a new tool that could better assess the livability- and sustainability-related outcomes of different scenarios. This new tool, called Community-Oriented Regional Planning (CorPlan), was a GIS-based land use scenario development and analysis tool designed to provide alternative socio-economic data and trip tables for the travel demand model. It supplemented, but did not replace, the traditional travel model.

³⁹ The public was also asked to validate place types, such as 'urban mixed-use,' that the EPI project team had developed. To obtain public input, TJPDC printed different place types on large posters, which were accompanied by pictures that displayed examples of each place type from citizens' neighborhoods. Workshop participants used markers to draw on the posters and indicate growth and development preferences. After receiving public input, TJPDC refined and enhanced the types for use in the modeling process.

⁴⁰ Graphic from EPI brochure at http://www.tjpc.org/pdf/rep_comm_epiBrochure.pdf

CorPlan allows planners and community members to generate regional land use scenarios that are built upon existing or potential local development patterns and then to evaluate them based on criteria that reflect local values.⁴¹ The goal of developing CorPlan for the EPI was to produce results that would be understandable and technically acceptable to VDOT and the general public. CorPlan inputs can be viewed and adjusted in an accessible Excel-based spreadsheet format linked to a GIS application.⁴²

CorPlan data was initially developed by combining the somewhat small amounts of GIS data available at the time with an analysis of aerial maps and field research. Using maps created by the public during the workshops, TJPDC translated the public's growth preferences into the CorPlan model. CorPlan then generated outputs to analyze scenario trade-offs according to the chosen indicators (See Table 1). In Table 1, the italicized figures under the Dispersed scenario column indicate that this scenario scored lowest on every measure as compared to other scenarios. These low scores indicate the public's growth preferences in rejecting a dispersed, low-density pattern in favor of clustered enhanced communities along major corridors and key crossroads. The numbers under the 'Dispersed,' 'Town Centers,' 'CoreL,' and 'CoreM' scenarios show the comparison of each scenario's land use and transportation networks with each of the measures in the left-hand column. For example, only 55 percent of land cover in the Dispersed scenario was comprised of farms and forests, whereas this figure was 64 percent in the Town Centers scenario. In the Dispersed scenario, it was estimated that about 155 billion gallons of gas would be consumed on an annual basis, whereas that figure was 121 billion gallons in the Town Centers scenario. Outputs were also entered into VDOT's travel demand model for each scenario to assess land use and transportation impacts. The scenarios and trade-offs were then presented back to the public for feedback.

Table 1. Scenario Analysis.⁴³

How the Scenarios Compare
All scenarios assume @ 330,000 population and 220,000 employment

Measure / Sustainability Accord	Dispersed	Town Ctr	CoreL	CoreM
Pct. Farms and Forests Retain resources/habitat/farms/forests	<i>55</i>	64	65	65
Pct. Developed Retain resources/habitat/farms/forests	<i>45</i>	36	35	35
Pct. Living In Clustered Communities Optimize use/cluster/human scale	<i>13</i>	61	68	68
Pct. Non -auto Trips Transportation Alternatives	<i>4</i>	15	18	18
Annual Gallons Gas Consumed (billions) Conserve Energy	<i>155</i>	121	110	114
Pct. Travel Congested Employment / Education Access	<i>44</i>	27	20	21
Water Quality and Quantity Water Quality and Quantity	<i>Poor</i>	Good	Good	Good

Red/italics – Comparatively lowest

To develop indicators that measured scenario trade-offs, the TJPDC identified factors that could be easily measured using CorPlan and the travel demand model and could be expressed in ways that reflected the region's goals as enumerated in the Sustainability Accords. The TJPDC also considered indicators that would be understandable and meaningful to the public. For example, the travel demand model produced estimates of vehicle miles traveled (VMT) for each scenario. In order to make the technical, abstract concept of VMT more meaningful to the public, the

⁴¹ More information on CorPlan is available at <http://www.fhwa.dot.gov/tcsp/corplan.html>

⁴² CorPlan is available for download at <http://www.tjpc.org/community/epi.asp>

⁴³ Table available at <http://www.tjpc.org/community/epi.asp>

TJPDC developed estimates of indicators that were directly related to VMT, such as gallons of gas consumed and automobile emissions produced.

Ultimately, the preferred scenario incorporated the ‘best’ elements of each scenario, focusing development throughout the region in transit-oriented, walkable communities connected by logically designed networks of local streets and boulevards. Each locality received enough development to support its tax base, but the overall “footprint” of development was reduced to preserve open space and promote cleaner air and water. The possibility for more public-private development of roadway and transit networks was also increased.

The final vision document identified several key success factors that formed the basis for a regional agenda that furthered the preferred growth vision in concrete ways, such as preservation of rural areas and promotion of development in existing towns and city centers.⁴⁴

Next Steps

Since the completion of the EPI, the region has moved forward on many of the key success factors. All of the member localities have updated their comprehensive plans, regulatory tools, or special area plans to incorporate the concepts of sustainability and livability. For example, rural Nelson County used the community elements concepts and place type diagrams developed during the EPI as part of its comprehensive plan update. UnJAM 2035, the Charlottesville-Abermarle MPO’s updated long-range transportation plan, also established stronger policies to support compact, sustainable, urban, suburban, and rural development patterns.⁴⁵

The TJPDC and Renaissance Planning Group, a consulting firm, have updated and refined the CorPlan model through subsequent planning initiatives in Charlottesville and across the country. Currently, the model is being adjusted to increase its capacity to evaluate sustainability-related indicators such as energy efficiency and peak oil conditions.⁴⁶

The TJPDC has also collaborated with VDOT to update the regional travel demand model, including increasing its capacity to model the potential for nonmotorized modes, estimate travel demand in rural areas, and consider financial conditions such as reduced public funding availability. Ultimately, the TJPDC plans to use the updated travel demand model in tandem with CorPlan and other types of tools (e.g., GIS data) for better transportation and land use analysis.

Success Factors

The TJPDC reported the following success factors in using a scenario planning process to develop the EPI:

- ***Use of visualization tools and encouragement of public dialogue.*** The scenario planning workshops provided opportunities for TJPDC to explain terms such as “density” to the public. Defining terms helped avoid conflict and promoted concurrence prior to the modeling process. Visualization tools, such as posters and photographs, were successfully used during workshops to help the public understand what concepts might ‘look like’ if implemented.
- ***Use of CorPlan.*** By developing CorPlan to supplement the regional travel demand model, rather than modifying the accepted model, TJPDC was able to obtain greater VDOT buy-in to the EPI results. The team was able to explain clearly the assumptions and factors that went into building the alternative socio-economic data and trip tables, which gave VDOT greater confidence in the technical validity of the model results.

⁴⁴ Additional information on the success factors is available at <http://www.fhwa.dot.gov/tcsp/cvadeflt.htm>

⁴⁵ UnJAM 2035 is available at <http://www.unjam.org/mpoplan.asp>

⁴⁶ For more information about applications of CorPlan in other communities, see: www.citiesthatwork.com

- **Development of credible scenarios.** The transportation improvements for the urban core and town centers scenarios were estimated to be much less than the trend scenario, but all scenarios included a logical network of roadway improvements. The TJPDC reported that this increased the EPI's credibility with VDOT, since the scenarios led to increased livability while not depending on the assumptions that people would walk more often in compact communities or on large investments such as a new transit system.
- **External funding source.** TJPDC also reported that it was very useful to have an external source of funding (via the TCSP grants) to support the EPI. The grant funding allowed TJPDC more independence to shape and direct the EPI study to suit its particular needs, while VDOT was able to participate as an equal partner without the responsibility of overseeing the study as a grantor.
- **Use of long time horizon.** It was also important to have a long time horizon for the EPI (50 years) to encourage creativity and innovation. It was easy for the public and other stakeholders to understand that EPI was not an 'official' plan with legal standing; participants were able to focus on long-term values and goals rather than on current controversies.
- **Co-location of agencies.** The co-location of the TJPDC and the Charlottesville-Albemarle MPO created a synergy that was a significant success factor for the EPI study. The MPO staff was able to participate in developing the regional sustainability accords, while the environmental planners who led the sustainability initiative provided ongoing support to the transportation plans. The project also benefited from the participation of other TJPDC agency staff and committees working on topics such as affordable housing.

Challenges

The TJPDC reported the following challenges in using a scenario planning process to develop the EPI:

- **Obtaining water quality data.** Due to lack of water quality data at the time that the EPI was conducted, the TJPDC found it difficult to measure scenario impacts on water quality and quantity. To address this, TJPDC set up a review group of several water quality experts from around the region. The group reviewed each scenario from the water quality perspective and produced an analysis for TJPDC that was used to identify trade-offs.
- **Use of state-generated growth projections.** To estimate future growth for the scenarios, TJPDC used projections developed by a state agency. However, some residents questioned whether these growth assumptions were accurate, especially given the long time horizon of the project. In response, the TJPDC adjusted the future forecasts to generate scenarios with a lower assumed growth rate. The outcomes of this exercise showed that the overall scenario development patterns were essentially the same—what changed was the rate at which places would “fill up.” The exercise helped the community focus less on controversial questions (e.g., whether growth could be artificially capped at a certain number). Instead, local officials engaged in more useful debates about what types of overall development patterns they wanted to encourage.
- **Ensuring economic equity among all jurisdictions.** When allocating development across the three scenarios, some patterns, particularly the urban core scenario, made it difficult to ensure economic equity (e.g., a strong tax base) across rural and urban regions. The extreme urban development scenario also introduced questions such as whether it was desirable to increase the height of existing buildings (thus diminishing tree cover and changing the city's historic character) to accommodate growth. The scenario planning process highlighted the importance of considering trade-offs and identifying compromises that might need to be made to maintain overall regional quality of life.

- **Sharing technical analyses with the public.** The TJPDC reported that it was sometimes difficult to translate the technical analysis of scenarios into a vernacular that the public could understand. CorPlan was used to generate easily understandable results that addressed several values simultaneously.
- **Use of scenario planning to address fiscal futures.** Since the EPI was completed there have been dramatic fiscal changes in the region. VDOT and other agencies are experiencing unprecedented funding shortfalls that are likely to last for many years. The TJPDC does yet not have the right tools to develop growth scenarios that take this new funding situation into account. The agency suggested that important questions to pose in a future scenario planning effort could be: “what kind of future will the region have given funding shortfalls?” or “how would the region be affected if only \$100 million is available for transportation in the next 10 to 20 years?”

Key Documentation

Annotated Bibliography on Health and Physical Activity in Transportation Planning (April 2004), which includes a description of CorPlan development:

<http://www.planning.dot.gov/Documents/Health/Bibliography.htm>

Description of CorPlan from the TCSP: <http://www.fhwa.dot.gov/tcsp/corplan.html>

TCSP case study on the EPI (September 2001): <http://www.fhwa.dot.gov/tcsp/cvadeflt.htm>

FHWA scenario planning workshops featuring TJPDC as a peer speaker (August 2006 and June 2004): <http://www.fhwa.dot.gov/planning/scenplan/chscenplanrpt.htm>

<http://www.fhwa.dot.gov/planning/scenplan/hiscenplanrpt.pdf>

TJPDC EPI Building Livable Communities brochure, EPI Policy Report and EPI Technical Report:

http://www.tjpd.org/pdf/rep_comm_epiBrochure.pdf

<http://www.tjpd.org/pdf/transportation/EPIPolicyReport.pdf>

<http://www.tjpd.org/pdf/transportation/EPI TechReport.pdf>