Metro | Draft Discussion Guide

Choices

Transportation Investment Scenarios

The Portland metropolitan region is an extraordinary place to live. Our region has vibrant communities with inviting neighborhoods. We have a diverse economy and a world-class transit system. The region features an exciting nightlife and cultural activities as well as beautiful scenery, parks, trails and wild places close to home.

Over the years, the communities of the Portland metropolitan area have taken a collaborative approach to planning that has helped make our region one of the most livable in the country. We have set our region on a wise course – but times are changing. Climate change, rising energy costs, aging infrastructure, population growth and other economic challenges demand thoughtful deliberation and action.




MAKING THE GREATEST PLACE

November 2008

Choices for the future: understanding the possibilities and trade-offs

Urban Form
How and where do we grow?

Transportation
How do we travel?

Investments
How do we prioritize needed investments?

The following pages summarize the results of research conducted during the summer of 2008 to frame land use, transportation and public investment choices that lay before us.

Framing choices

Metro examined a set of "cause and effect" scenarios to explore the relative effectiveness of different policy tools and public investments toward implementing the region's long-range vision, the 2040 Growth Concept. The results are intended to help policy makers think and talk about what actions to take – locally and regionally – to achieve community and regional goals. Together, we must answer pivotal questions:

- How do we measure success?
- Which actions are local and regional leaders willing to take?
- What is the right mix of land use and transportation investments and strategies?
- What should be the region's investment priorities?

Our region has come a long way since 1995 when regional leaders adopted the 2040 Growth Concept as our long-range blueprint for managing growth. We have seen success around the region in accommodating job and housing growth within existing communities, rather than sprawling outward – the cornerstone of the 2040 Growth Concept. But we can do more to foster a healthy economy that generates jobs and business opportunities, protects farm and forest lands and builds vibrant downtowns and main streets that attract residents and businesses.

Making choices

We have several important and interdependent decisions to make before the end of 2009 that will set us on the path for how we grow, how we travel and what our communities will look like in the next 20 to 50 years. The region's elected officials will need to prioritize investments in the Regional Transportation Plan (RTP), establish areas for possible future urban expansion, identify areas reserved for rural and natural resource protection, and identify local and regional strategies to guide growth. In 2010 and 2011, local governments and the Metro Council will begin implementing those decisions.

Discussion guide purpose

This discussion guide summarizes the results of the transportation scenarios research, highlighting the effects of different transportation choices on finance, air quality, greenhouse gas emissions, household and job location, travel behavior, congestion and mobility. A second guide explores land use and investment choices and their effect on land supply, infrastructure needs and the location of housing and jobs.

The region will need to exercise leadership and good judgment in planning for our future in the face of:

- Rising energy and materials costs
- Infrastructure funding shortage
- Population growth and changing demographics
- Economic instability
- Global warming

The guides are intended to inform the discussion and decision-making process to develop and refine strategies to achieve the region's goals and local aspirations.

What makes a successful region?

To ensure that we are making the right choices, we need to have a clear sense of what success looks like. In the spring of 2008, the Metro Council, advised by its local partners, adopted "A Definition of a Successful Region" to guide policy and investment choices. This articulation of desired outcomes was intended to focus the region's attention on how to better implement the region's long-range plan.

Desired outcomes

1. People live and work in vibrant communities where they can choose to walk for pleasure and to meet their everyday needs.
2. Current and future residents benefit from the region's sustained economic competitiveness and prosperity.
3. People have safe and reliable transportation choices that enhance their quality of life.
4. The region is a leader in minimizing contributions to global warming.
5. Current and future generations enjoy clean air, clean water and healthy ecosystems.
6. The benefits and burdens of growth and change are distributed equitably.

How can scenarios help the region make the best choices?

What is a scenario?

A scenario is a hypothetical sequence of possible events or set of circumstances.

Research tools

A reference case and four transportation scenarios were evaluated using two computer simulation models – the regional travel model, and the regional MetroScope model – to illustrate the possible effects of RTP policies on identified trends and anticipated challenges.

Regional travel model

Given a set of assumptions about zoning, population and job forecasts, transportation investments and user costs, the regional travel model predicts:

- Where and how much people travel
- How trips are made
- How far people travel and how long it takes to get there
- Delay and congestion on the overall system and effect on goods movement
- Vehicle-source air pollutants and greenhouse gas emissions

Data reported from the regional travel model is for trips inside the urban growth boundary, unless otherwise noted.

Due to the macroscopic nature of the model, the model does not effectively analyze walking, biking or local street volumes in detail.

Fuel costs within the model are considered as part of auto operating cost, which consists of gasoline, oil, tire and general maintenance costs on a per mile basis. This cost is $0.13 per mile in 2008 dollars, as derived from AAA reporting.

Regional MetroScope model

Given a set of assumptions about the transportation system, zoning, population and job forecasts and market forces, the MetroScope model predicts:

- Where households and jobs might locate
- Development in urban growth boundary expansion areas
- Cost of housing and transportation per household
- Public costs of infrastructure
- Average commute distances
- Residential-source greenhouse gas emissions

What questions were explored with scenarios?

The analysis asked what would happen if we boldly changed some of the assumptions underlying our current path. Do any of the scenarios get us closer to achieving the long-range vision for growth in this region? What are the possibilities and consequences of different choices?

Broadly, the analysis looked at how travel patterns and conditions may change over time. Where does future growth go with increases in road and transit access? What effect do different types of investments have on reducing how much people drive and improving the region's air quality? Will certain types of investments help the region reduce greenhouse gas emissions? Will certain investments help reduce the amount individuals spend on housing or transportation as part of their household budget? How much do the scenarios cost?

Specific questions were explored through each scenario, as described below.

► **Reference scenario:** What if the region implements the mix of transportation, infrastructure and land use strategies that currently adopted plans and policies call for? What are the implications of continuing to invest in transportation as we have in the past?

► **Connectivity scenario:** Is it possible to meet RTP policies and help slow growth in congestion and delay by increasing street connectivity? Will people drive less or shorter distances with more connectivity?

► **High capacity transit (HCT) scenario:** Will people use transit more if we build new rail, bus rapid transit and streetcar lines that are supported by more frequent bus service throughout the region? Will households locate closer to transit?

► **Throughways scenario:** How much more will people drive with increased highway mobility? How much can we slow growth in congestion and delay with highway investments? Where might jobs and households choose to locate? What is the effect of pricing some of this new capacity?

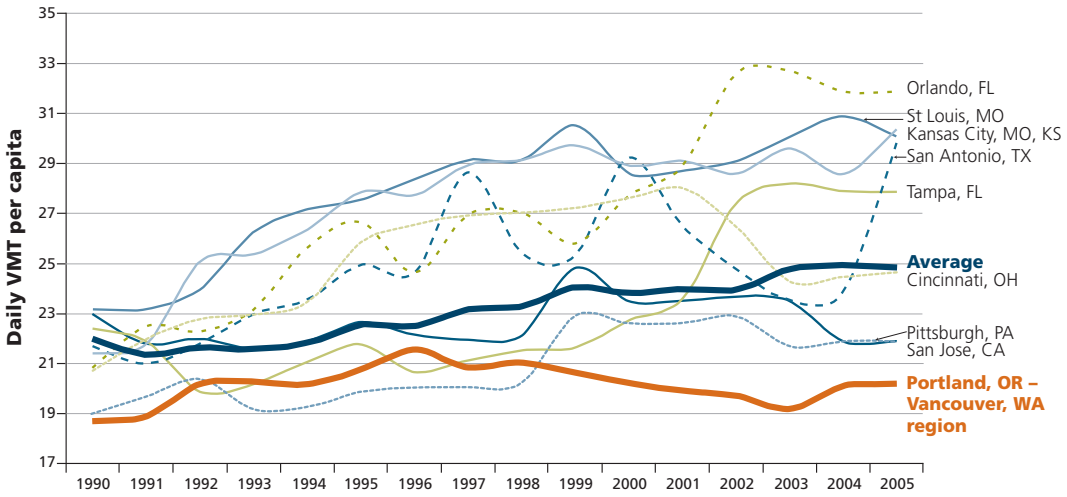
► **Management scenario:** How does increasing the direct costs of using the transportation system affect travel patterns, choices and overall system performance?


Where we are and where we are going: our region is growing and changing

Over the past 15 years growth has brought significant opportunity and prosperity to the Portland-Vancouver region, but it has also brought growing pains. Like many other metropolitan areas across the U.S., this region faces powerful trends that require new ways of thinking about the future.

Our region is growing and changing. We are expecting 550,000 new households and 825,000 new jobs in the seven-county area by the year 2035. Where people live and work, and how they travel will be shaped by the choices we make in 2009.

Portland region per capita daily vehicle miles traveled (VMT), compared to metropolitan areas with similar populations



All cities shown are within +/– 600,000 of Portland's 2005 population.
The average shown is for the 25 U.S. urban areas with the exception of Portland, that have 2005 populations of over one million and less than three million.
Source: U.S. Federal Highway Administration, Highway Statistics, Table IM-72, "Urban Areas – Selected Characteristics," 1990 – 2005.

The region has successfully implemented policies to expand transportation choices and reduce dependence on the automobile. Through a combination of land use planning and strong regional transit and bicycle networks, the Portland region is fighting long commutes and traffic congestion more successfully than comparable urban areas. In the Portland metro region, savings from shorter commutes may contribute as much as $2.6 billion of consumer purchasing power to the regional economy each year.

Regional transit ridership is growing. Ridership grew at twice the rate of population growth between 1990 and 2000. Between July 2007 and July 2008, the number of daily riders increased by more than 13 percent, likely in response to rising gasoline prices.

Some measures of air quality have improved dramatically, others indicate more work is needed. In the 1960s, the region averaged 180 days of air quality violations every year for ozone and carbon monoxide, but today we average zero. More work is needed, though. The I-5 corridor and the Pacific Northwest have unacceptable levels of benzene and other air toxics. Growth in travel is anticipated to elevate greenhouse gas emissions.

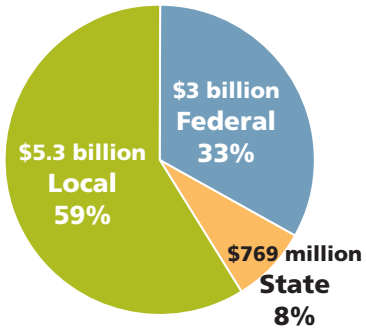
Congestion is growing. Freeway congestion increased 20 percent between 2000 and 2005, despite increased transit use and reductions in driving. Delays caused by freeway congestion pose significant economic challenges for freight transportation and commuters, affecting our region's economic competitiveness, environment and quality of life.

Where we are and where we are going: funding mechanisms are inadequate

Federal and state funding sources are at their lowest levels since the 1960s. Oregon relies heavily on weight-mile fees for heavy trucks and a gas tax (24 cents per gallon) that has not increased since 1993. That funding has lost more than 40 percent of its purchasing power because the state gas tax is not indexed to inf ation. Purchasing power is further eroded by rising material costs.

Very little of the land added to the metropolitan area through expansions of the urban growth boundary in the last decade has been developed, largely because of the lack of funding for transportation and other infrastructure necessary to serve these areas.

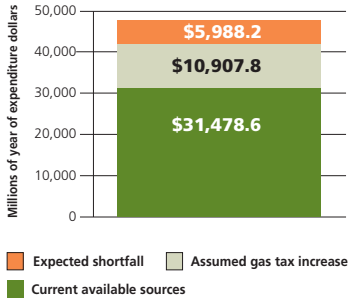
Cities and counties are funding an increasing share of the transportation infrastructure
(Capital revenue by source)



Source: 2035 Regional Transportation Plan

Over the next two decades, the gap is expected to grow between the revenues we have and the investments we need just to keep our bridges, roads and transit systems in their current condition, to say nothing of addressing new needs. Current sources of transit funding are not enough to support the system expansions needed to serve its rapidly growing ridership.

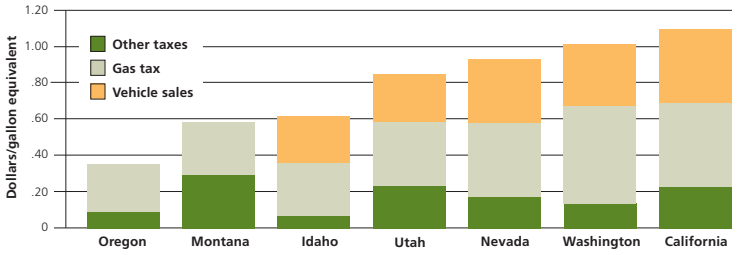
Growing road operations and maintenance funding gap



Source: 2035 Regional Transportation Plan

The region's aging infrastructure is deteriorating and requires more maintenance than ever before. Although maintenance consumes most funds, a backlog of projects is growing rapidly. The Oregon Department of Transportation (ODOT), cities, and counties devote nearly all existing state and federal gas tax revenues to operation and maintenance of the existing road system.

Oregon ranks last in total auto taxes and fees collected compared with other western states

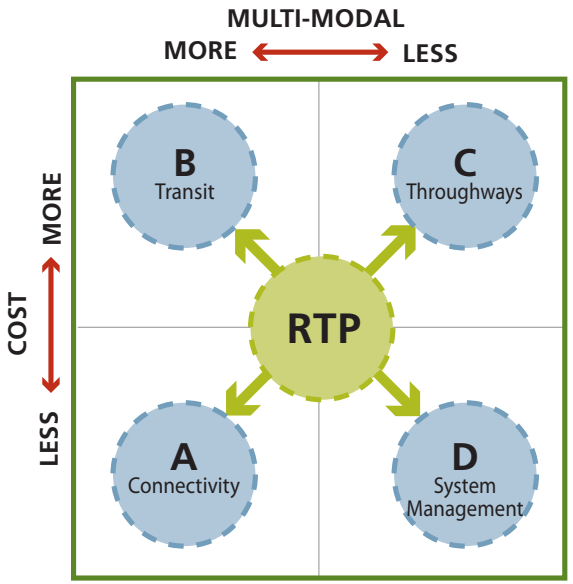


Source: Oregon Department of Transportation, 2006

Defining scenario terms

2040 Growth Concept
Adopted by the region in 1995, this long-range growth management strategy directs growth toward centers and major transportation corridors to encourage compact development that can be efficiently served by transit and other public infrastructure.

RTP cause and effect scenarios
The diagram illustrates the range of scenarios evaluated and the fiscal and modal choices and trade-offs underlying each scenario. The RTP must balance these and other considerations as the region defines the mix of strategies and investments that will best achieve the 2040 Growth Concept vision.



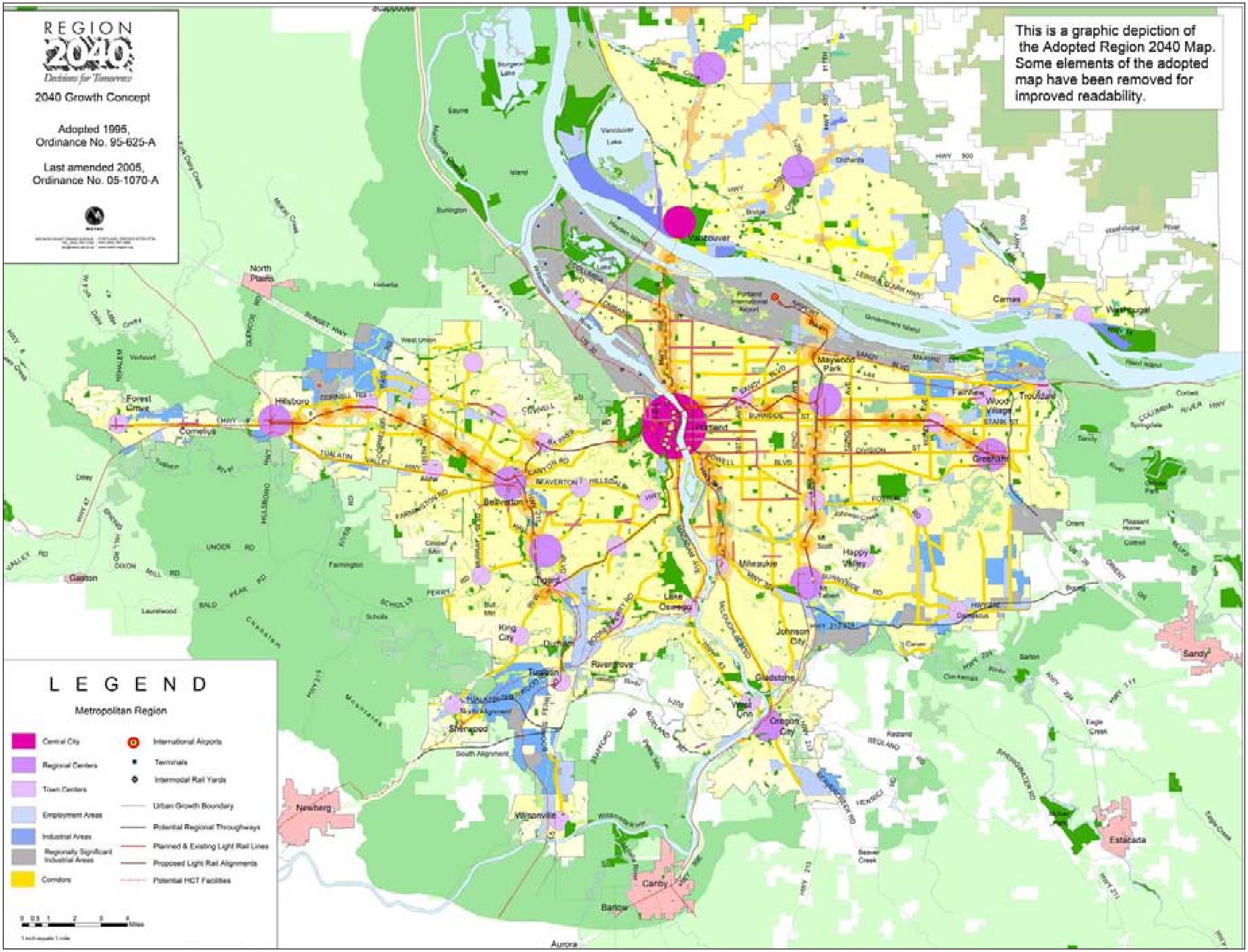
Seven-county area refers to the larger geography that the MetroScope models used. This geography extends beyond Metro's jurisdictional boundary and includes all of Washington, Multnomah, Clackamas, Columbia and Clark counties; most of Yamhill County; and a small portion of Marion County.

Centers and corridors are envisioned as higher density areas that combine housing, employment, retail, and cultural and recreational opportunities in a walkable environment that is well-served by transit.

Existing neighborhoods are primarily single-family neighborhoods within the Metro urban growth boundary. Most existing neighborhoods are planned to remain largely the same. As the region's population has increased, redevelopment and infill development have occurred in some existing neighborhoods, raising concerns about change to neighborhood character.

Neighbor cities are communities outside the Metro urban growth boundary such as Vancouver, Sandy, Canby, Newberg and North Plains, which have a significant number of residents who work or shop in the metropolitan area. Cooperation between the Metro region and these communities is crucial to address common transportation and land-use issues.

UGB expansion areas are the locations that are outside the current urban growth boundary, but that are added to the UGB in the scenarios for research purposes. These UGB additions follow the existing state hierarchy of lands for expansion and are not intended to represent future policy direction.


REGION
2040
Decisions for Tomorrow
2040 Growth Concept
Adopted 1995, Ordinance No. 95-625-A
Last amended 2005, Ordinance No. 05-1070-A
This is a graphic depiction of the Adopted Region 2040 Map. Some elements of the adopted map have been removed for improved readability.
LEGEND
Metropolitan Region
Central City
Regional Centers
Town Centers
Employment Areas
Industrial Areas
Regionally Significant Industrial Areas
Corridors
International Airports
Terminals
Intermodal Rail Yards
Urban Growth Boundary
Potential Regional Throughways
Planned & Existing Light Rail Lines
Proposed Light Rail Alignments
Potential HCT Facilities
Miles

▶Reference scenario

Given the uncertainties facing our region today, it is difficult to predict future trends and conditions. With that limitation in mind, the starting point for the scenarios analysis is the reference scenario. This scenario is a projection of how the region would grow if current local government transportation and land-use plans are followed through to 2035.

Model assumptions

Jobs and Households

- 550,000 new households in the seven-county area by the year 2035.
- 825,000 new jobs in the seven-county area by the year 2035.

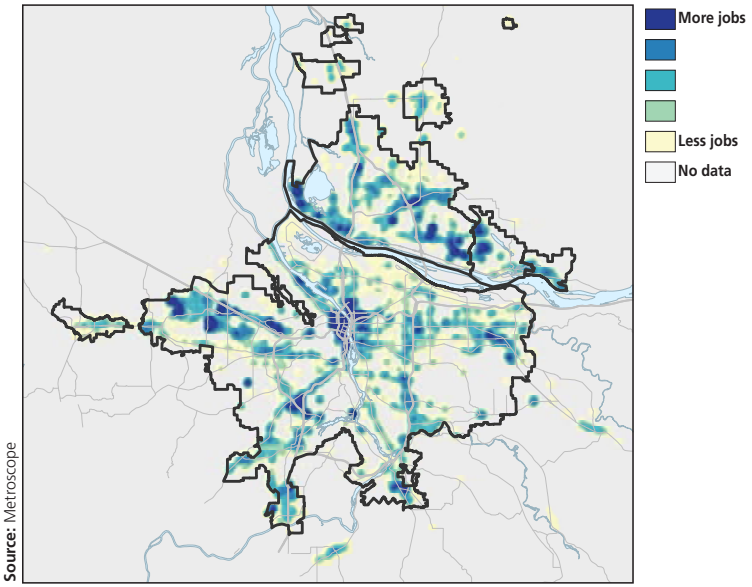
Land supply

- Current zoning is maintained. The region's central city, centers and corridors have capacity for about 355,000 new households (including vacant land, infill capacity, and redevelopment capacity).
- Future Metro UGB expansions through the year 2035 add about 35,000 acres, in keeping with the past rate of expansion.
- Nineteen square miles of urban expansion areas are available for development in Clark County, Washington, as designated by Clark County. (This decision was overturned in the courts, but is currently under appeal.)
- Neighboring cities grow at rates that are similar to historic rates.

Note: These maps are for research purposes only and do not necessarily ref ect current or future policy decisions of the Metro Council.

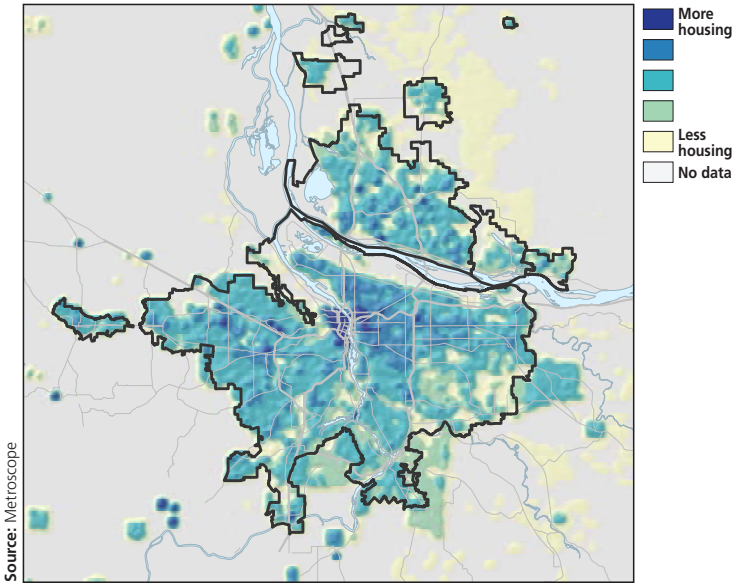
The maps show the location and amount of jobs and households per gross acre assumed for the reference scenario.

Reference scenario job assumptions



Source: Metroscope

Reference scenario housing assumptions



Source: Metroscope

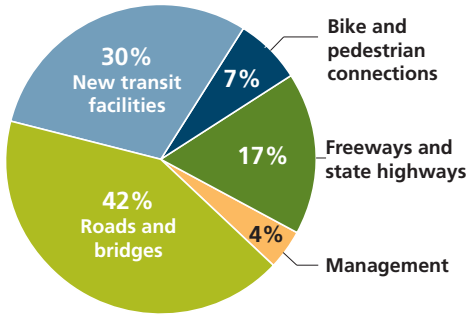
Investments and costs

- Flat system development charges (SDCs) are assessed at $25,000 per new residence.
- Public investments of $50,000 per dwelling unit in urban renewal areas, similar to those that exist today.
- Funding for public infrastructure (capital costs as well as costs of maintenance and upgrade) is available in all areas to accommodate new jobs and housing.
- Funding for infrastructure in recent (since 2002) UGB expansion areas, such as Damascus and North Bethany, becomes available in 2015.

Transportation system

- The transportation system and funding levels as defined in the 2035 RTP financially constrained system for the period 2008 to 2035. This includes:
  - an increase of one cent per gallon per year in the statewide gas tax for system operations and maintenance.
  - a $15 increase of the state vehicle registration fee every eight years to pay for system expansion.
  - continuation of past local and federal funding levels for system expansion.
  - $9.07 billion of investments that can be funded with resources the region expects.
- Interchanges in the OR 217 and US 26 corridors and at the junction of I-205/I-84 are improved.
- I-5 North and US 26 West are widened to six through lanes.
- The Sunrise project connection from I-205 to Southeast 122nd Avenue is built.
- New street connections and arterial street expansion are provided throughout system. Major streets are retrofitted for walking, biking and transit (wider sidewalks, safer street crossings, landscaped buffers, improved bus stops and bikeways).
- Milwaukie light-rail transit and McLoughlin Boulevard Bus Rapid Transit south of Milwaukie connecting to Oregon City are constructed.
- Lake Oswego streetcar, Portland Streetcar Loop, Portland streetcar extension to Lowell Street, and Burnside/Couch streetcar extension to Hollywood town center are constructed.
- Parking costs are increased in the Portland central city, regional centers and town centers.
- Westside commuter rail operations are expanded to all-day service.
- Projects for which there is no identified source of construction funding (for instance, a new bridge at the I-5 Columbia River Crossing) are not included.

Capital cost assumptions in 2035 RTP



Source: 2035 Regional Transportation Plan

What we tested

Connectivity scenario

This scenario tested the effectiveness of aggressively implementing RTP policies to increase the number of street connections throughout the region.

Model assumptions

- All arterial connections identified in local and regional plans are built and all existing arterials are widened to four lanes to meet one-mile arterial spacing where possible.
- New arterial river crossings are built at 12 locations, including Columbia River crossings connecting Camas to Troutdale, and the Port of Vancouver to Rivergate.
- The I-5/99W connector is included as an arterial connection.
- Grade separation of railroad and arterial street network is completed.
- Arterial overcrossings of the throughway system are added every two miles.
- Intersection density is increased in some town centers and neighborhoods to assume higher levels of street connectivity in developing areas.
- All other assumptions are the same as the reference scenario.

High capacity transit scenario

This scenario tested the effectiveness of bold expansion and improvement of the HCT system beyond current RTP policies.

Model assumptions

- New HCT extensions are built to connect all regional centers to the Portland central city, and new lines connect Clark County to the Expo Center and Gateway, Oregon City to Washington Square, Hillsboro to Forest Grove, and downtown Gresham to Mount Hood Community College, for example.
- All HCT connections are assumed to operate as light-rail transit. New connections to downtown require a transfer to another HCT line. A subway through downtown Portland and other improvements are made to the existing system to increase efficiency and speed.
- Commuter rail is developed to serve Columbia, Marion, Hood River and Yamhill counties.
- There is 15-minute or better bus service on all major arterials.
- Portland Streetcar system is expanded on key major arterials, as defined by the streetcar system plan.
- All other assumptions are the same as the reference scenario.

Throughways scenario

This scenario tests the effectiveness of bold expansion of the region's highway and freeway system to address growing congestion and delay. A second transportation model run was conducted to test high-occupancy toll (HOT) lanes on capacity added to I-5, I-205, I-405, I-84, OR 217 and US 26. Pricing is varied by time of day.

Model assumptions

- The existing highway system is widened up to 10 lanes to address congestion and freight bottlenecks identified in the reference scenario.
- New throughways are built – the Sunrise Corridor, I-5/99W connector, and the I-84 to US 26 connection.
- Two new Columbia River bridges are added, connecting Camas to Troutdale, and the Port of Vancouver to Rivergate.
- A new North Willamette River crossing that connects Rivergate to US 30 is built.
- All other assumptions are the same as the reference scenario.

Management scenario

This scenario tests the effectiveness of aggressive system management to optimize capital investments in the reference scenario and address growing congestion and delay.

Model assumptions

- Signal timing and access management on major arterials are enhanced.
- Increased parking costs and reduced transit fares in downtowns, station communities, main streets and major employment areas are implemented.
- Interchange accesses at 26 locations are closed to general purpose travel to meet Oregon Highway Plan spacing standards and reduce entry/exit merge conf icts.
- Tolling on all lanes of I-5, I-205, I-405, I-84, OR 217 and US 26 is implemented to address congestion and freight bottlenecks identified in the reference scenario. Pricing is varied by time of day.
- All other assumptions are the same as the reference scenario.

What we learned about **costs**

The analysis looked at what different investment choices might cost, both at the regional and household level, to illustrate the private and public cost of different investment choices and begin to frame the financial tradeoffs of different choices. The summary and graphs on this page highlight overall findings. More detailed summaries are provided at the end of the guide.

Outcomes

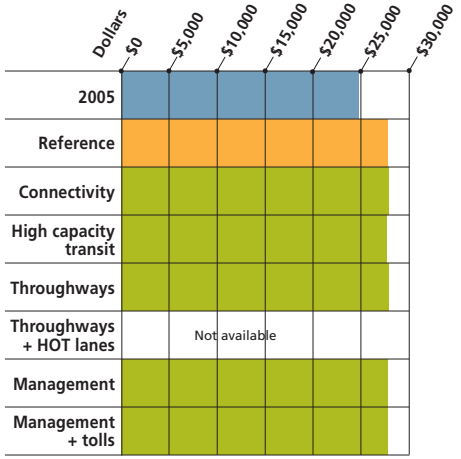
- The total costs for each scenario range from $1,100 per household per year for the reference scenario to $2,800 per household per year for the HCT scenario.
- Current funding levels for maintenance and expansion of the transportation system are inadequate. The gap is largest for expanding the throughway and high capacity transit systems.
- The gap in road maintenance funding identified for the reference scenario, grows even larger with all the scenarios. The connectivity and throughway scenarios would cost an additional $29 million and $27 million per year, respectively, to operate and maintain the expanded road and bridge systems, compared with the reference scenario.
- Transit operating and maintenance costs of the HCT scenario would require $100 million more than transit operating and maintenance costs of the reference scenario.
- The combined annual cost of housing and transportation per household increases from today's levels in all scenarios, costing on average $2,500 more per household per year. This household cost is in addition to the estimated cost per household to build and maintain the level of investment assumed in each scenario.

System costs

Scenario	Total system cost (billions)	Annual cost per household
Reference	**$26.9**	**$1,100**
Connectivity	**$35.8**	**$1,500**
High Capacity Transit	**$66.7**	**$2,800**
Throughways	**$50.3**	**$2,100**
Throughways + Tolls	**$50.3**	**NA**
Management	**$28.2**	**$1,200**
Management + Tolls	**$28.2**	**NA**

Costs are in 2007 dollars and are not adjusted for inf ation. Costs include capital construction and operations, maintenance and preservation. HCT cost estimates were more rigorously developed than throughway estimates, and assume light-rail transit for all connections.

Annual cost of housing and transportation per household



Source: MetroScope

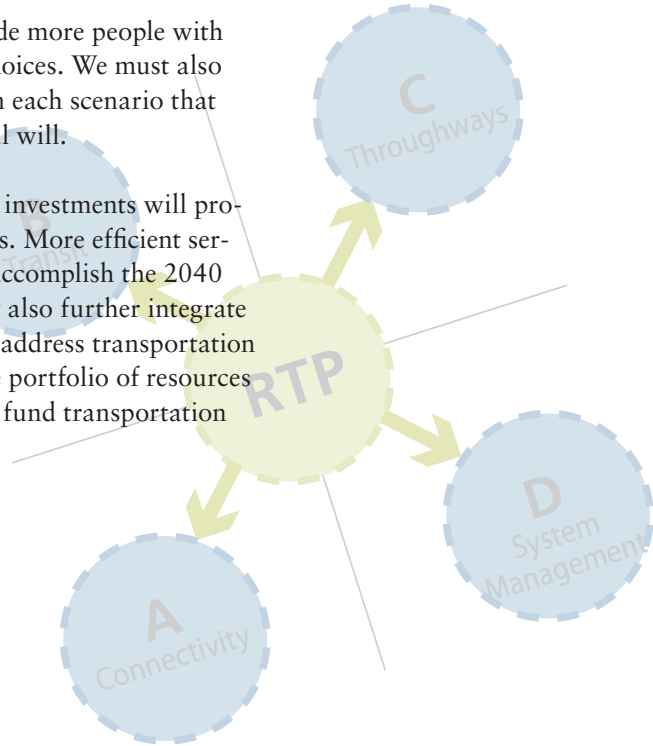
Policy implications

These findings have important implications for future land use and transportation decisions – particularly when considered in the context of the benefits each scenario provides. All scenarios require significant commitment and action from local, regional, state and federal agencies – politcally and financially.

In addition, each scenario has different public agency implementation "leads." For example, expanding the arterial street system and increasing parking costs in centers would be primarily a local government responsibility and could largely be funded through current revenue streams, such as system development charges, traffic impact fees or local ordinances. Highway expansion and tolling strategies would be primarily a state responsibility. Expansion of the transit system would be primarily a TriMet and SMART responsibility.

The region should consider how to provide more people with affordable housing and transportation choices. We must also consider the feasibility of elements within each scenario that depend on public acceptance and political will.

The region must also decide what mix of investments will provide the best return on public investments. More efficient service delivery by itself is not sufficient to accomplish the 2040 Growth Concept vision. The region must also further integrate land use and transportation strategies to address transportation issues and needs. We need a more diverse portfolio of resources and strategies to reliably and sustainably fund transportation needs in the long-term.



What we learned about **housing distribution**

This analysis looked at where households might choose to locate over time to illustrate the effect of different investment choices on meeting regional goals to protect existing neighborhoods and direct household growth to centers and corridors. The analysis begins to frame the land-use trade-offs of different investment strategies. The summary and maps on the next two pages highlight overall findings. More detailed summaries are provided at the end of the guide.

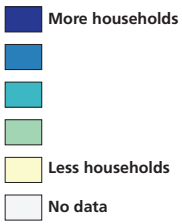
Outcomes

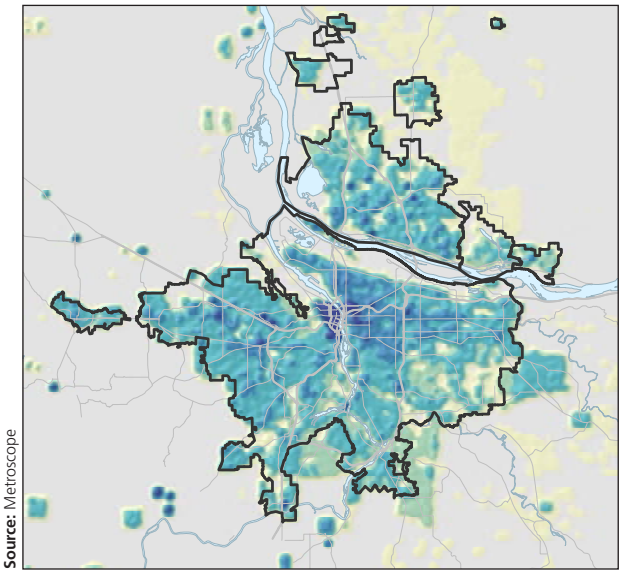
- Household assumptions in the reference scenario influence outcomes of other scenarios.
- The connectivity scenario supports development in UGB expansion areas and some neighbor cities.
- The Portland central city, regional centers and some town centers show more housing growth in the HCT scenario than the other scenarios.
- The throughway scenario supports more housing growth in Clark County and UGB expansion areas than the other scenarios. This scenario draws housing away from centers in the UGB.
- Scenarios with less congestion and delay inside the UGB show more growth in households outside the UGB.
- The HCT scenario concentrates the most housing growth in centers and corridors, and shows the least amount of housing growth outside the UGB compared to the other scenarios.
- The management scenario shows less housing demand in Clark County and focuses more growth in UGB expansion areas and neighbor cities compared with the other scenarios.

Reference scenario – households

This map shows the location and concentration of households assumed in the reference scenario.

Note: These maps are for research purposes only and do not necessarily ref ect current or future policy decisions of the Metro Council.





Source: Metroscope

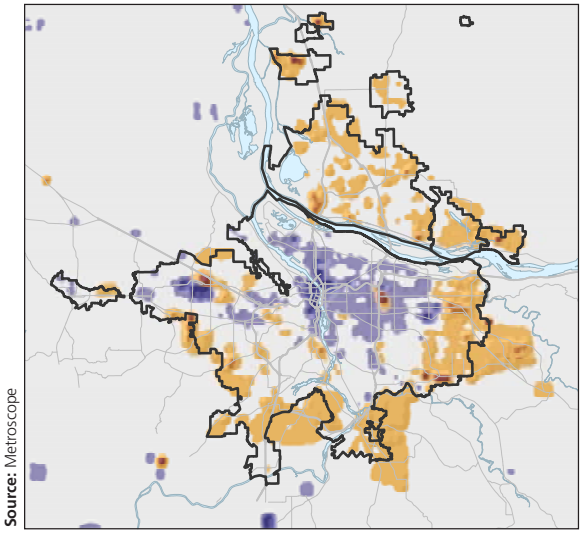
Policy implications

These findings have important implications for future land use and transportation decisions. Changes in transportation access (as measured by travel time) and travel behavior (as measured by mode share) affect the relative attractiveness of different locations for housing.

For example, while significant expansion of the road or highway systems shows significant reductions in congestion and delay, the land use effect is to increase the demand for housing outside of the UGB and in existing neighborhoods and centers. Households in neighboring communities will often have longer car commutes back to the Metro region. It will be important to more fully integrate land use and transportation decisions to limit the unintended consequences of different investment choices.

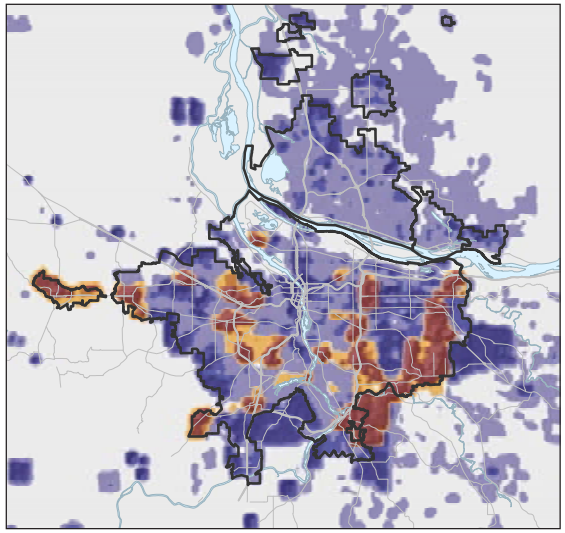
Placemaking is an important consideration that analytical tools are not able to account for at this time.

Connectivity scenario



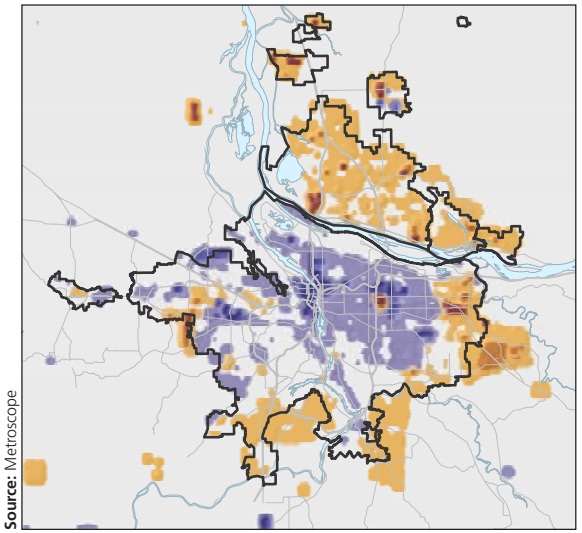
Source: Metroscope

High capacity transit scenario



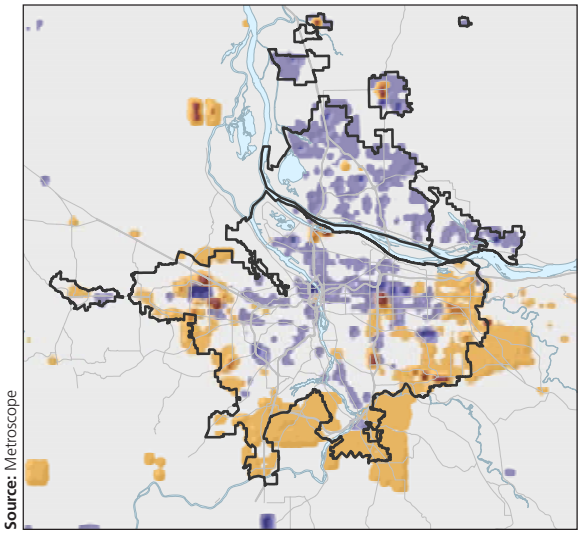
Source: Metroscope

Throughways scenario



Source: Metroscope

Management + tolls scenario



Source: Metroscope

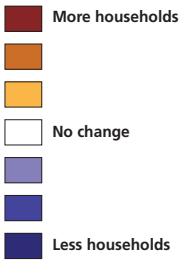
What the maps show – Change in household density and location (compared with the reference scenario)

The maps show the change in the location and amount of households per gross acre for each scenario when compared with the reference scenario.

MetroScope considers both demand and supply when allocating household growth. Vacant land, urban growth boundary expansion areas, and redevelopment and infill in centers, corridors and neighborhoods contribute housing capacity. The interplay of these factors and changes in transportation access (as measured by travel time) contribute to the household growth patterns shown in the maps.

When more households are shown in a map, it means more housing is being added through redevelopment, infill and the development of centers and corridors, compared with the reference scenario. In general, when more housing is shown in previously undeveloped areas, it means that vacant land is being converted to urban uses. In areas that show fewer households, it means that fewer households may choose to locate in that area when compared with the reference scenario.

Legend



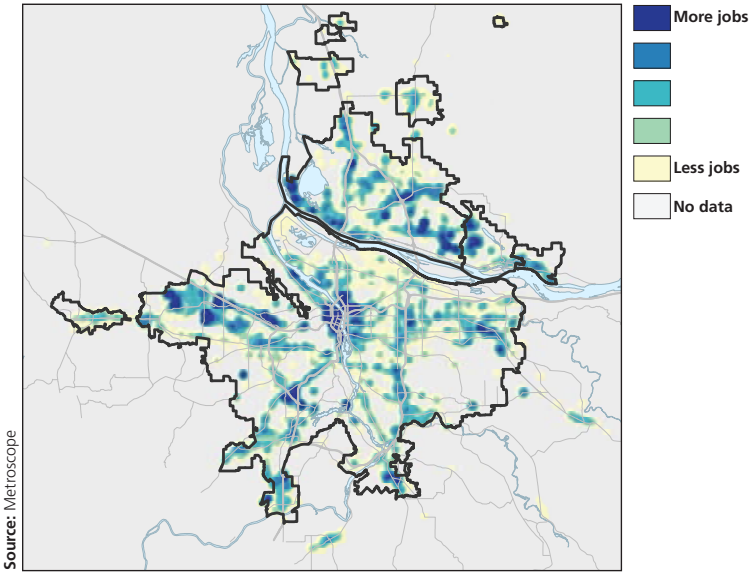
What we learned about **job distribution**

The analysis looked at where jobs might choose to locate over time to illustrate the effect of different investment choices on meeting regional goals for protecting existing employment and industrial locations and directing future job growth to designated employment and industrial areas, centers and corridors. The analysis begins to frame the land-use trade-offs of different investment strategies. The summary and maps on this page highlight forecasted changes. More detailed summaries are provided at the end of the guide.

Outcomes

- Job assumptions in reference scenario inf uence outcomes of other scenarios.
- All scenarios show fewer jobs in Clark County compared to the reference scenario as more jobs choose to locate in centers, corridors and employment areas in the UGB.
- The connectivity scenario shows the most new jobs in the Rivergate industrial area and Washington Square compared to the other scenarios.
- The Clackamas industrial area and Oregon City show fewer jobs than the reference scenario in all scenarios except for the connectivity scenario, which shows more jobs in that area.
- The Tualatin-Sherwood industrial area shows more jobs than the reference scenario in all scenarios except for the HCT scenario, which shows fewer jobs in that area.
- The HCT scenario shows the largest increase in jobs in the Sunset industrial area in western Washington County.
- The throughway scenario shows fewer jobs in the Sunset industrial area in western Washington County, and greatest increase in jobs in Tualatin, Sherwood, and Sandy industrial areas.

Reference scenario – jobs



Source: Metroscope

This map shows the location and concentration of jobs assumed in the reference scenario.

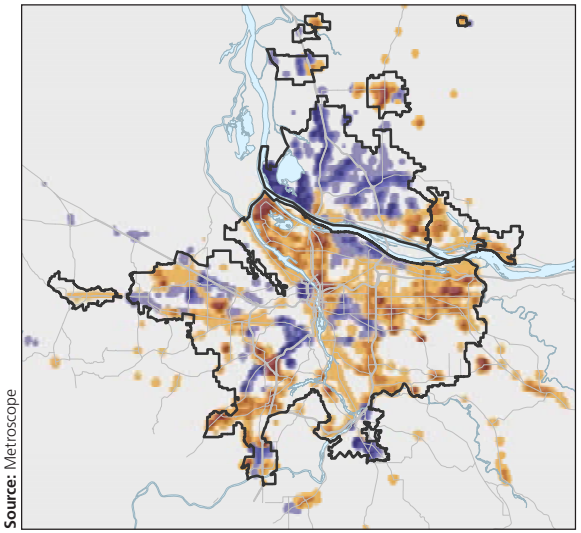
Note: These maps are for research purposes only and do not necessarily ref ect current or future policy decisions of the Metro Council.

Policy implications

These findings have important implications for future land use and transportation decisions given that the scenarios show jobs and housing react differently to congestion and access. Changes in transportation access (as measured by travel time) and travel behavior (as measured by mode share) affect the relative attractiveness of different locations for jobs. For example, significant expansion of the road or highway systems shows significant reductions in congestion and delay region-wide. This change in access has the effect of increasing the attractiveness of locating jobs in centers, corridors and employment areas inside the Metro UGB.

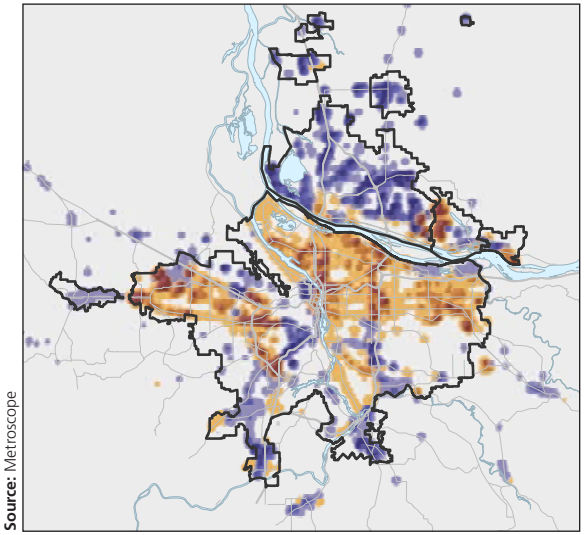
Previous analysis explained that scenarios with less congestion and delay show more households in neighboring communities, including Clark County. These outcomes may increase the amount people drive further increasing commute trip lengths and vehicle miles traveled.

Connectivity scenario



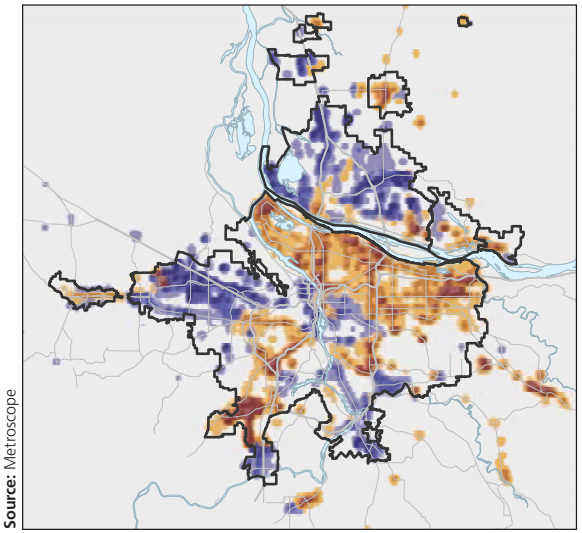
Source: Metroscope

High capacity transit scenario



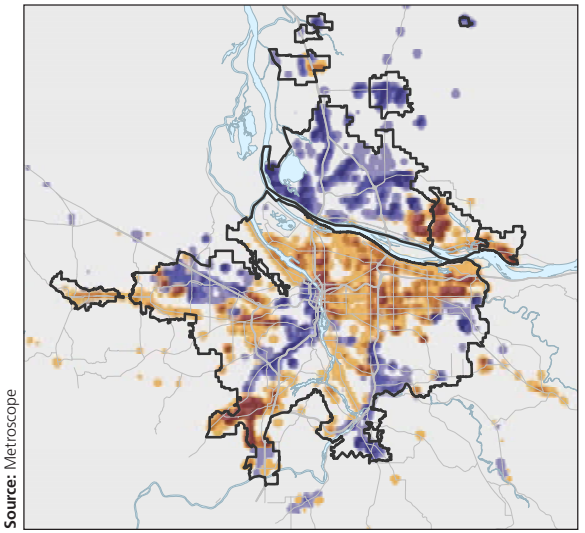
Source: Metroscope

Throughways scenario



Source: Metroscope

Management + tolls scenario



Source: Metroscope

What the maps show – Change in job density and location (compared with the reference scenario)

The maps show the change in the location and amount of jobs per gross acre for each scenario when compared with the reference scenario.

MetroScope considers both demand and supply when allocating job growth. Vacant land, urban growth boundary expansion areas, and redevelopment and infill in centers, corridors and employment areas contribute job capacity. The interplay of these factors and changes in transportation access (as measured by travel time) contribute to the job growth patterns shown in the maps.

When more jobs are shown in a map, it means more jobs are being added through redevelopment, infill and the development of areas with job capacity, compared to the reference scenario. In general, when more jobs are shown in previously undeveloped areas, it means that vacant land is being converted to urban uses. In areas that show less jobs, it means that fewer jobs may choose to locate in that area when compared with the reference scenario.

Legend

What we learned about
air quality and greenhouse gas emissions

The analysis looked at how vehicle emissions might change over time with different investment choices to illustrate the region's ability to continue to meet current state and federal air quality requirements and state targets to reduce greenhouse gas emissions. The summaries and graphs on this page highlight overall findings. More detailed summaries are provided at the end of this guide.

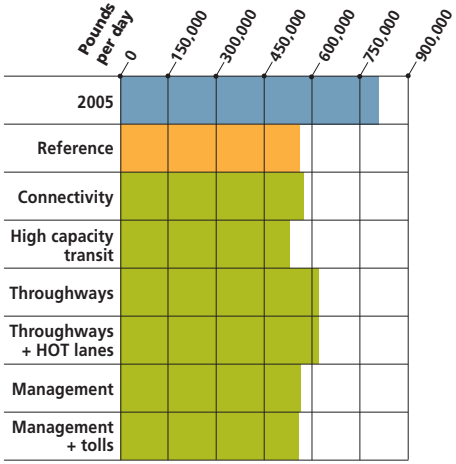
Outcomes

- All scenarios show that air quality continues to improve and meet state and federal air quality requirements as measured by carbon monoxide emissions compared with today.
- All scenarios show an increase in transportation- and residential-source greenhouse gas emissions.
- Scenarios with additional road and highway capacity show greater increases in all emissions than scenarios focused on transit and management strategies.
- The throughways scenario showed the greatest increase in all emissions levels compared with today and the reference scenario.
- Compared with the reference scenario, the HCT scenario showed the only reduction in transportation-source greenhouse gases and the greatest reduction in carbon monoxide and nitrogen oxide.

Policy implications

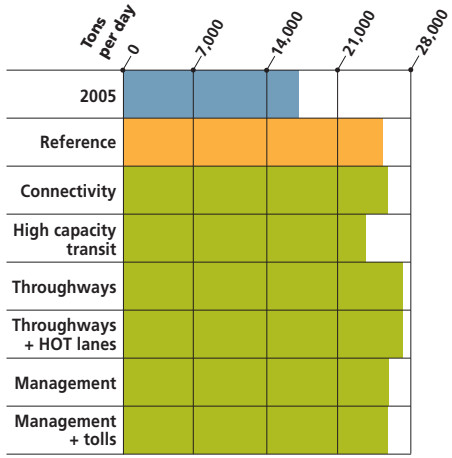
These findings have important implications for the region's ability to meet state greenhouse gas reduction targets, which commit the state to reducing greenhouse gas emissions to 10 percent below 1990 levels by 2020 and to 75 percent below 1990 levels by 2050. None of the scenarios, including the reference scenario, achieve these targets by 2035. The region must identify the land use and transportation strategies needed to meet them. The region's growing population will make it difficult to achieve the targets without other strategies. As a result, the region will also need to support new technology and conservation measures.

Carbon monoxide emissions



Source: Metro travel model.

Greenhouse gas emissions



Source: Metro travel model.

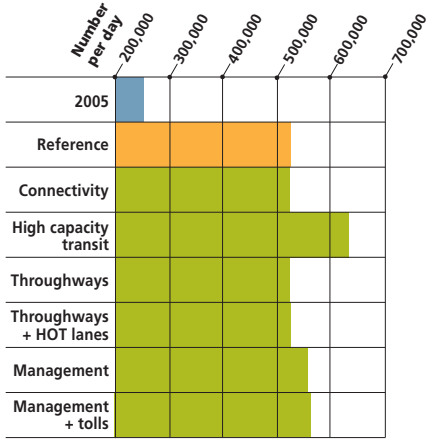
What we learned about **travel behavior**

The analysis looked at how travel behavior might change over time to illustrate the effects of different investment choices on meeting regional goals for people to drive less and walk, bike and use transit more. The analysis begins to frame the trade-offs of different investment choices. The summary and graphs on this page highlight forecasted changes. More detailed summaries are provided at the end of the guide.

Outcomes

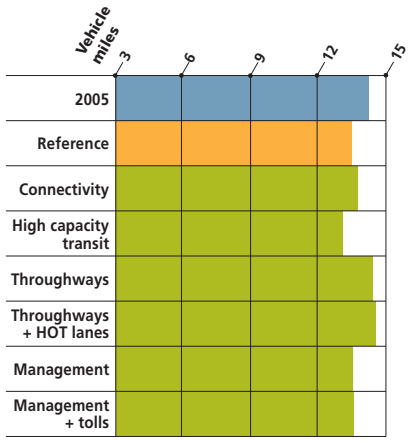
- All the scenarios show the Portland central city and all regional centers meeting RTP targets for increased walking, biking and use of transit.
- Vehicle miles traveled per person continues to decline from today in all scenarios except the throughways scenario. The connectivity and throughways scenario show an increase in VMT per person compared with the reference scenario.
- While vehicle miles traveled per person declines from today, the total number of miles driven continues to increase in all scenarios.
- Extensive investment in transit in the HCT scenario and higher parking costs in the management scenario increase transit use, walking and biking the most compared to the other scenarios.
- All scenarios show transit trips more than doubling compared with today, with the HCT scenario showing the greatest increase compared with today and the reference scenario.
- The number of daily bike and walk trips increase the most in the management scenario - nearly double the number of people who walk and bike today.
- Extensive highway investment in the throughways scenario results in more driving, longer trips, and less walking, biking and use of transit than the other scenarios.

Transit trips within UGB



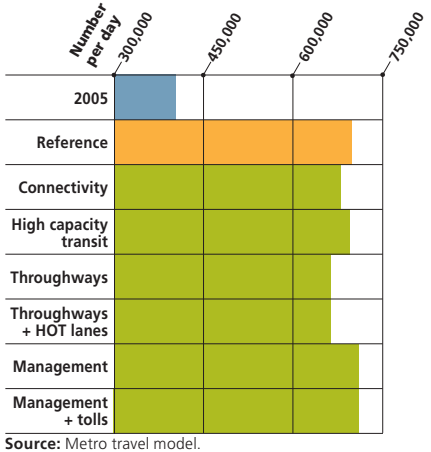
Source: Metro travel model.

Vehicle miles traveled per person



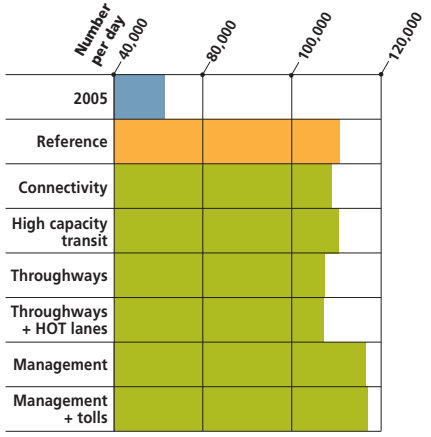
Source: Metro travel model.

Walk trips within UGB



Source: Metro travel model.

Bike trips within UGB



Source: Metro travel model.

What we learned about **mobility**

This analysis looked at how much traffic volumes, travel times and the amount of delay users experience might change over time to illustrate the effect of different investment choices on the region's ability to provide a reliable system for commuters and the movement of goods. The analysis begins to frame the trade-offs of different investment choices on mobility. The summary and graphs on the next two pages highlight overall findings. More detailed summaries are provided at the end of the guide.

Outcomes

- All scenarios show significantly more congestion and traffic delay than today during both the mid-day and rush-hour travel periods.
- The majority of vehicle hours of delay occurs on arterials rather than freeways in all scenarios except for the connectivity scenario.

Selected auto travel times in the 2-hour PM peak period

	Portland City Center to Vancouver		Sunset Industrial Area to Portland Airport		Washington Square to Oregon City	
	Travel time (minutes)	Change from 2005	Travel time (minutes)	Change from 2005	Travel time (minutes)	Change from 2005
2005	25	——	47	——	33	——
Reference	33	+ 31%	57	+ 21%	50	+ 49%
Connectivity	27	+ 9%	55	+ 15%	45	+ 36%
High capacity transit	33	+ 35%	58	+ 22%	50	+ 48%
Throughways No HOT lanes	22	– 11%	54	+ 15%	46	+ 38%
Throughways + HOT lanes — Main lanes	20	– 18%	54	+ 15%	44	+ 31%
Throughways + HOT lanes — Hot lanes	18	– 26%	49	+ 3%	40	+ 19%
Management No tolls	31	+ 25%	57s	+ 21%	50	+ 50%
Management + tolls	27	+ 8%	53	+ 12%	45	+ 35%

Source: Metro travel model.

- Scenarios with extensive arterial connectivity or new highway capacity reduce congestion and traffic delay the most, particularly truck delay on the regional freight system.
- Generally, the throughway scenario best improved auto travel times and significantly reduced system delay compared with the reference scenario.
- The connectivity and HCT scenarios best improved transit travel times compared with the reference scenario.
- The connectivity scenario shows the greatest reduction in arterial system delay during the rush-hour travel period compared with the reference scenario helping reduce transit travel times on these facilities.
- The management scenario with tolls shows increased arterial system delay compared with the management scenario without tolls.
- The cost of increased congestion on the regional freight system decreased in the scenarios compared with the reference scenario. The analysis estimated potential economic losses in the region between $6.3 and $13.7 million annually from increased freight costs due to increases in travel time.
- Scenarios with more highway capacity and management show larger increases in daily traffic volumes on state highways at the edge of the Metro UGB.

Policy implications

These findings have important implications for future land-use and transportation decisions. The transportation system plays a crucial role in sustaining economic health of the region and the

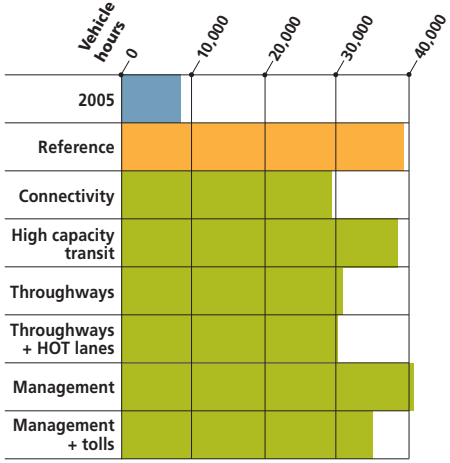
state of Oregon. Unmitigated congestion and delay will compromise the economy in the future. As a global trade gateway and domestic hub for commerce and tourism, the region must expand current efforts to address growing congestion, particularly on the region's mobility corridors.

Business and consumer needs are expected to double the amount of goods moved on the region's waterways, runways, railways, and roadways over the next 30 years. The continued economic health of our region and state depends on effectively serving growing transportation needs of business by providing reliable highway and arterial access to gateway and hub facilities as well as on preserving the beauty and livability of the region that attracts industry and a high-quality labor pool.

The results of the analysis support a growing body of research that suggest adding road capacity alone is not a sustainable solution to congestion. Rather, a coordinated strategy that links land use and transportation decisions, provides targeted road and highway improvements along with high quality transit service, better transportation options, and system management shows greater promise in mitigating congestion and delay into the future.

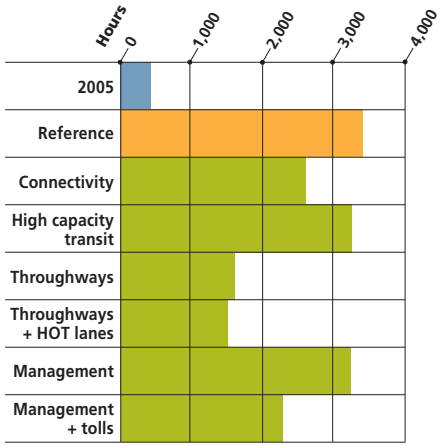
The region must pinpoint the most critical locations to mitigate roadway congestion and delay to enhance freight mobility and access to industrial areas and intermodal facilities. These strategic investments must allow us to move goods and people in ways that support our livability, economy, and environment. The region must also expand current system and demand management efforts to help preserve highway capacity for longer distance goods movement and person trips. Potential new strategies include congestion pricing, high-occupancy vehicle lanes, managed travel lanes and freight-only lanes. More evaluation of these strategies is needed to better understand their effect on the region's parallel arterials, low-income households and land use patterns to ensure any unintended consequences are identified and addressed in design and implementation.

Rush hour system delay



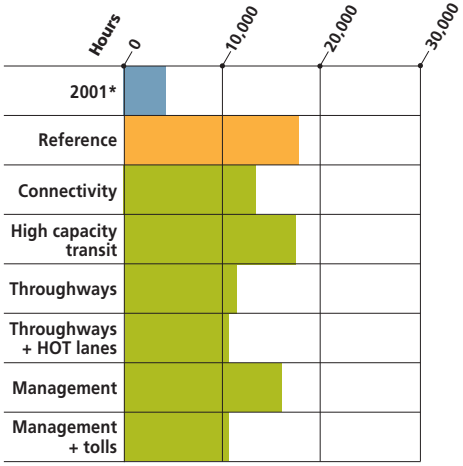
Source: Metro travel model.

Mid-day delay on freight system



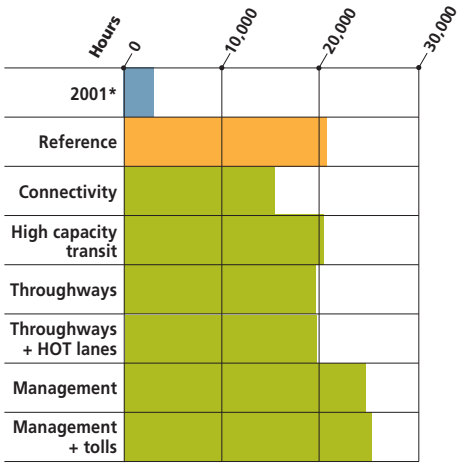
Source: Metro travel model.

Rush hour delay on freeways



Source: Metro travel model.

Rush hour delay on arterials



Source: Metro travel model.

Finally, land-use planning and environmental considerations must be integrated into transportation decisions to ensure that needed highway projects solve existing problems rather than inducing demand from outside the region and generating a new set of problems.

How do the transportation investment scenarios compare?
By the numbers

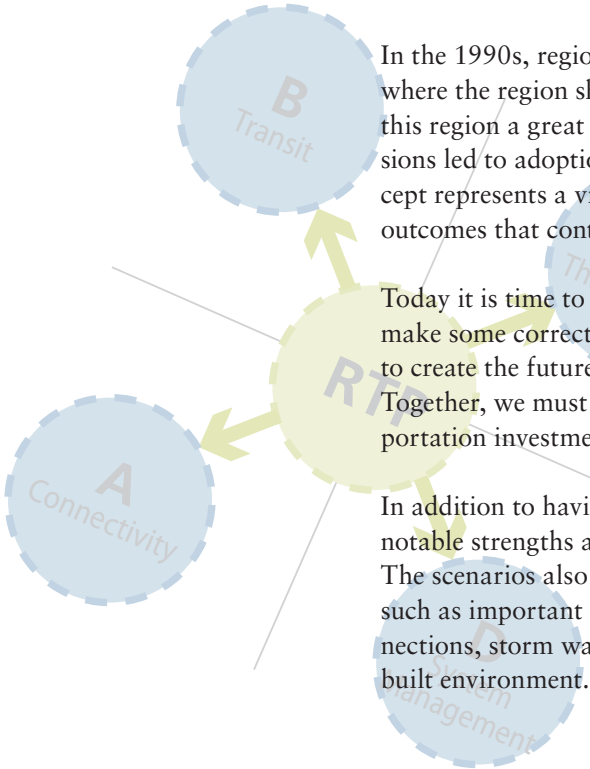
Scenario	1 New households in centers and corridors	2 Land developed in future UGB expansion areas (acres)	3 Future UGB expansion undeveloped by 2035	4 Average one-way commute distance (miles)	5 New households total daily commute length (miles)	6 Total infrastructure cost for new households + jobs in UGB	7 Total infrastructure cost for new households + jobs in 7-county area	8 Average cost of infrastructure cost per new household in UGB	9 Average annual new household cost of housing and transportation	10 Average portion of household income spent on housing and transportation	11 Residential source greenhouse gas emissions (lbs per year)
2005	15% (estimated)	NA	NA	11.4	NA	NA	NA	$71,100	$24,900	43.9%	21.25 billion
Reference scenario	24.4%	11,000	68.5%	12.3	13,495,901	$36.8 billion	$56.1 billion	$69,968	$27,400	47.5%	32.73 billion
Connectivity	24.2%	11,200	68.2%	12.3	13,513,067	$36.9 billion	$56.2 billion	$69,993	$27,400	47.5%	32.74 billion
High capacity transit	26.2%	10,400	70.3%	12.1	13,303,549	$37.3 billion	$55.4 billion	$69,087	$27,400	47.3%	32.52 billion
Throughways	24.1%	11,100	68.3%	12.4	13,681,621	$37.0 billion	$56.5 billion	$70,333	$27,500	47.5%	32.74 billion
Throughways + HOT lanes	Not available										
Management	24.3%	11,100	68.2%	12.3	13,543,453	$36.9 billion	$56.2 billion	$70,082	$27,400	47.5%	32.74 billion
Management + tolls	24.4%	11,200	68.2%	12.4	13,596,950	$37.0 billion	$56.4 billion	$70,183	$27,400	47.5%	32.74 billion

Note: Costs show in 2005 dollars and not adjusted for inf ation. Data is derived from MetroScope.

Scenario	12 Transportation ystem capital cost	13 System cost for capital and operations + maintenance ($/year/ household)	14 Carbon monoxide (pounds)	15 Transportation greenhouse gas emissions (tons)	16 Daily transit ridership	17 Daily walk and bike trips	18 Daily vehicle miles traveled (VMT)	19 VMT per person	20 System delay during evening 2-hour peak period (hours)	21 Delay on regional freight system during mid-day period (hours)	22 Annual cost of mid-day delay on regional freight system
2005	NA	NA	807,055	16,696	243,216	458,533	20,044,778	14.23	7,865	434	$1,724,000
Reference scenario	$9.06 billion	$1,100	566,661	24,710	519,756	799,347	27,446,722	13.46	38,868	3,380	$14,387,000
Connectivity	$17.11 billion	$1,500	577,275	25,268	520,996	786,474	27,975,073	13.71	29,217	2,617	$11,169,000
High capacity transit	$45.91 billion	$2,800	538,924	23,504	631,332	798,824	26,759,312	13.12	37,616	3,201	$13,670,000
Throughways	$31.65 billion	$2,100	619,965	26,856	519,594	771,997	29,180,173	14.31	31,335	1,608	$6,475,000
Throughways + HOT lanes	$31.65 billion	NA	616,737	26,748	521,445	772,133	29,358,504	14.39	30,260	1,569	$6,316,000
Management	$10.26 billion	$1,200	566,947	24,645	560,812	818,852	27,208,681	13.34	41,390	3,211	$13,575,000
Management + tolls	$10.26 billion	NA	560,426	24,345	564,295	821,544	27,165,135	13.32	35,890	2,281	$9,606,000

Note: Costs show in 2007 dollars and not adjusted for inf ation. Data is derived from the Metro travel demand model.

Moving forward: what are our choices?



In the 1990s, regional policy discussions centered on how and where the region should grow to protect to the things that make this region a great place to live, work and play. Those discussions led to adoption of the 2040 Growth Concept. This concept represents a vision of shared community values and desired outcomes that continue to resonate today.

Today it is time to revisit how we are implementing the vision, make some corrections and find new strategies and resources to create the future we want for ourselves and our children. Together, we must answer important questions about our transportation investment strategy in 2009.

In addition to having significant price tags, each scenario has notable strengths and in some cases unintended consequences. The scenarios also do not represent all the choices to consider, such as important freight rail, trails, bike and pedestrian connections, storm water run-off and impacts to the natural and built environment.

Here are the questions, choices and trade-offs to consider as we move forward:

- What transportation investment strategy is best to achieve our long-term goals for the economy, environment and implementation of the 2040 Growth Concept?
- What investment strategy is best in the short-term given current funding constraints?
- What is the appropriate balance of investment strategies across all modes?
- What land use strategies are needed to help address transportation issues and needs? What transportation strategies are needed to help address land use issues and needs?
- Should a higher priority be placed on maintaining existing transit, roads, bridges, bikeways and sidewalks than on expanding these facilities and services?
- How should the region provide adequate mobility to support current and future travel and also respond to the critical need to reduce greenhouse gas emissions?
- Should we expand our use of management strategies, such as parking pricing, tolls and reduced transit fares, to optimize the transportation system?
- Who should be responsible for which parts of the transportation system?
- What funding sources should the region pursue to fund needed investments? Should users of the transportation system be asked to pay more than they do today?

Next steps:
an outcomes-based approach

These scenarios are a first step in a regional conversation about how best to achieve the region's desired outcomes and long-range vision for managing growth.

By the end of 2009, the region's leaders will need to weigh the trade-offs and define the combination of local and regional actions they can support to achieve the region's desired outcomes.

Regional and local decisions made in 2009 and 2010 will shape the region's ability to implement the region's blueprint for growth during the next 20 to 50 years. As we refine choices and make decisions in 2009, we will need to consider the effect of combinations of transportation, land use and investment choices as well as the possible effects of different choices at the local and regional level.

- How do we measure success?
- Which actions are local and regional leaders willing to take?
- What is the right mix of land use and transportation investments and strategies?
- What should be the region's investment priorities?

The next step is to refine our choices through additional analysis and working together to identify local aspirations in early 2009. We will continue to build from what is learned through these analyses and subsequent policy discussions by the Metro Council, Metro Policy Advisory Committee (MPAC) and Joint Policy Advisory Committee on Transportation (JPACT) through 2010 – and beyond.

PHASE 1
Frame choices
July to December 2008

Analyze population, land use and transportation trends

PHASE 2
Refine choices
January to June 2009

Develop and refine strategies to achieve the region's goals and local aspirations

PHASE 3
Make choices
July to December 2009

Coordinate and prioritize state, regional and local land use, transportation and investment strategies

PHASE 4
Implement choices
2010 to 2011

Implement state, regional and local land use, transportation and investment strategies

Metro | *People places. Open spaces.*

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy and good transportation choices for people and businesses in our region. Voters have asked Metro to help with the challenges that cross those lines and affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to protecting open space, caring for parks, planning for the best use of land, managing garbage disposal and increasing recycling. Metro oversees world-class facilities such as the Oregon Zoo, which contributes to conservation and education, and the Oregon Convention Center, which benefits the region's economy.

www.oregon**metro.gov**

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