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USP 570 | Transportation and Land Use
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Modeling Exercise Report
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Multnomah County Growth Plan for 2035
Portland, Oregon

Overview

The Portland Metropolitan area is known for its forward-thinking approach to long-range planning. In developing the Multnomah County Growth Plan for 2035, the County recognizes the importance of planning ahead for the health, sustainability, and success of our communities. The policies in this long-range plan commit to:

1. Growth in the employment sector and equitable job accessibility
2. Having a robust, multi-modal transportation network with less reliance on the private automobile and safer neighborhood streets
3. Combat climate change and promote holistic sustainability

First, a healthy economy is dependent upon seeing growth in total employment and strong working- and middle-classes. The County firmly believes that this growth in employment must be met with equitable access to jobs for people of all income levels. While Portland's tech and creative industries are growing, this growth should not overshadow the need for low-barrier jobs for residents. This is especially important, as affordability increasingly becomes an issue.

Second, Multnomah County is committed to building a robust, multi-modal transportation network that will serve to efficiently move people and goods. The County will look to expand its well-connected networks for transit, biking, and walking, which will help to reduce dependence on the private automobile. Additional policies addressing traffic safety in neighborhoods will also seek to reduce crash rates and improve safety for all road users. Further, policies to improve safety in regards to traffic law enforcement will be subject to review and comment by local community members to ensure that heightened police presence on unsafe arterials and highways does not create undue burden on communities of color.

Lastly, the County will look to adopt policies to combat climate change and promote environmental sustainability by reducing greenhouse gas (GHG) emissions. In doing so, the County will continue to maintain compliance with air quality standards as mandated by federal law, if not improve upon these benchmarks.

The County will measure progress towards these long-range goals by monitoring specific objectives using the Smart Growth Area Planning (SmartGAP) model, a land-use transportation interaction (LUTI) model. For each long-range goal, the County has determined a metric and objective in the SmartGAP model that will be used for evaluation of that specific goal (Table 1). The Multnomah County Growth Plan for 2035 will then

determine what changes in land use and transportation planning are needed in order to reach these goals.

Table 1. Long-Range Planning Goals for Multnomah County and SmartGAP Metrics

Long-Range Goal	SmartGAP Metric	Objective
1. Equitable Job Accessibility	Job Accessibility by Income Group	+1%
2. Reducing Auto Dependency	Daily Vehicle Miles Traveled (DVMT)	-15%
3. Increasing Walkability	Walking Percentage Increase	+10%
4. Increasing Traffic Safety	Crash Rates	-10%
5. Robust Multi-Modal Network	Daily Transit Trips	+10%
6. Combat Climate Change	Greenhouse Gas Emissions	-20%

Source: Author's analysis, 2016

Growth Scenarios

Scenario 1 - Land Use Policies

The first scenario focuses on using land use planning policies to manage growth and develop specific desirable outcomes. In this scenario, population and employment growth in mixed use and transit-oriented development (TOD) zones is encouraged within the urban core (UC), close in communities (CIC), and suburban (Sub) areas. These policies limit growth in residential areas in suburban and close in communities, where less dense, single-family housing encourages auto-dependency. This scenario does assume that slight growth will occur in rural areas (Rur).

Because this scenario increases the amount of mixed use and TOD zones, it is assumed that daily vehicle miles traveled (VMT) for light vehicles will decrease because of the reduced need for residents to travel by private automobile. In the model, daily VMT is reduced from 27,000 trips to 25,000 trips. The proportion of freeway/arterial trips also is assumed to decrease from 77% to 50%.

Table 2. Population and Employment Growth, Multnomah County, 2005-2035

Place Type	Population Growth	Employment Growth
Rur	0.05	0.05
Sub R	0.05	0
Sub E	0	0
Sub MU	0.05	0.05
Sub TOD	0.1	0.1
CIC R	0.05	0.05
CIC E	0	0.05
CIC MU	0.1	0.1
CIC T	0.1	0.1
UC R	0.1	0.1
UC E	0	0.2
UC MU	0.3	0.1
UC T	0.1	0.1

Source: Author's Analysis using SmartGAP, 2016

Scenario 2 - Transportation Investments

Alternatively, rather than focusing on land use, Multnomah County proposes the adoption of a second scenario where key transportation investments are made to reach the determined policy objectives. In this scenario, auto dependency is reduced while investments are made to expand active transportation and public transit infrastructure.

As a result of these investments, auto trips per capita may be reduced from 1.5 to 1. Similar to Scenario 1, the daily VMT is reduced from 27,000 trips to 22,000 trips and the proportion of freeway/arterial trips is assumed to fall from 77% to 50%. These assumptions are made because it is assumed that the increased quality and availability of active transportation and public transit infrastructure will shift residents' mode choice away from private vehicle use. Growth rates for investment in bus and rail revenue miles per capita are matched to the growth rates for freeway and arterials at 1.0. Coupled with this change is a policy to decrease the supply of arterial road lane miles (900 to 500 miles) and increase bus and rail revenue miles (19 to 100 miles and 4 to 6 miles, respectively).

Findings

The results for job accessibility by income group found that Scenario 1 provided substantial growth for all income groups, which exceeded the goal set for 2035 across the board (Table 3). In contrast, Scenario 2 failed impact any change (positive or negative) in job accessibility in comparison to the base year. This demonstrates that transportation investments alone are not sufficient at affecting job accessibility. Thus, accompanying land use policies would be needed to complement transportation investments to reach the desirable equity outcomes.

Table 3. Job Accessibility Percent Change by Income Group

Income	Base	Scenario 1	Scenario 2
0-20k	3%	6%	3%
20-40k	3	6	3
40-60k	2	5	2
60-80k	1	5	1
80-100k	0	4	0
100k+	-1	3	-1

Job Accessibility Goal: 1% Increase for each income group by 2035
Source: Author's Analysis using SmartGAP, 2016

In terms of reducing auto dependency, both scenarios resulted in decreases in total daily VMT (Table 4). However, Scenario 2 was more successful at reaching the 15% reduction in daily VMT than Scenario 1. In this case, the results show that transportation investments were more effective than land use policies at meeting this long-range goal overall. Still, in Scenario 1 because population and employment growth was shifted towards urban centers and suburban mixed use or TOD, the daily VMT values in these regions increased substantially. Suburban residential areas (i.e., mostly single family households) demonstrated the most significant reduction in overall daily VMT for either of the two scenarios at close to 5 million trips. Given that the Scenario 1 modeled no growth in this region, this is an important finding. Further, the increases in daily VMT for areas within the urban core is concerning for increased congestion, parking management and storage, and air quality.

Table 4. Daily Vehicle Miles Traveled by Place Type

Place Type	Base	Scenario 1	Scenario 2
Rur	1,179,315	1,132,570	1,010,922
Sub R	6,389,950	1,048,887	5,458,132
Sub E	-	-	-
Sub M	2,103,395	1,051,282	1,795,140
Sub T	-	2,031,885	-
CIC R	2,630,698	864,282	2,237,303
CIC E	-	-	-
CIC M	1,737,201	1,779,717	1,479,604
CIC T	-	1,748,513	-
UC R	1,802,637	1,835,093	1,553,673
UC E	-	-	-
UC MU	1,674,027	5,483,564	1,444,311
UC T	1,719,469	1,780,869	1,482,528
Total	19,236,692	18,756,662	16,461,613

DVMT Goal: 15% Reduction to 16,351,188 miles by 2035
Source: Author's Analysis using SmartGAP, 2016

The results for increasing walkability find that Scenario 1's land use policies are incredibly effective at increasing walking (Table 5). In this scenario, an increase in the walking rate of 17% makes a strong case for mixed use developments and TOD. Again, by increasing the diversity, density, and intensity of uses allows for better accessibility and mobility for pedestrians. In comparison, Scenario 2's policies focused on transportation investments while they did support walking to transit, these investments did not impact the percentage of walking growth or reach the long-range goal of a 10% increase by 2035. While the model allows for a target goal of 30% of all trips be by bicycle in 2035, it does not indicate separate spending priorities for active transportation in the growth rates or supply of infrastructure components of the model.

Table 5. Walking Percentage Increase

Base	Scenario 1	Scenario 2
6%	17%	6%

Walking Goal: 10% Increase to 7% by 2035
Source: Author's Analysis using SmartGAP

In terms of improving traffic safety, the crash rates decreased in both scenarios, but only Scenario 2 met the 10% reduction goal (Table 6). It is likely that because Scenario 2 underwent a larger decrease in daily VMT that it was able to meet this long-range goal.

Table 6. Crash Rates

Type	Base	Scenario 1	Scenario 2
Fatal	80	78	68
Injury	3,605	3,516	3,085
Property	9,405	9,170	8,048
Total	13,090	12,764	11,201

Crash Rates Goal: 10% Reduction to 11,781 by 2035
Source: Author's Analysis using SmartGAP, 2016

Additionally, for Multnomah to realize its long-rang goal for having a robust multi-modal network, only Scenario 2 was able to successfully reach a 10% increase in daily transit trips by 2035 (Table 7). As could be expected, the transportation investments made in Scenario 2 more than doubled the amount of daily transit trips in the region. The most significant increases could be found in the rural and suburban areas that are typically less served by transit. In comparison, the changes in land uses in Scenario 1 did increase daily transit trips, and came just short of reaching the goal of a 10% increase.

Table 7. Daily Transit Trips

Place Type	Base	Scenario 1	Scenario 2
Rur	7,225	4,805	18,061
Sub R	16,261	2,678	40,653
Sub E	10,290	-	25,724
Sub M	11,294	6,065	28,235
Sub T	-	16,509	-
CIC R	10,543	9,883	26,357
CIC E	4,425	2,603	11,064
CIC M	11,594	11,099	28,984
CIC T	-	14,119	-
UC R	8,226	12,145	20,565
UC E	7,600	7,474	18,999
UC MU	19,889	30,531	49,723
UC T	14,976	15,686	37,440
Total	122,322	133,596	305,806

Daily Transit Trips Goal: 10% Increase to 134,555 by 2035
Source: Author's Analysis using SmartGAP, 2016

Lastly, in terms of combatting climate change, both scenarios were able to benefit from reductions in greenhouse gas (GHG) emissions (Table 8). The results from the models found that Scenario 2 was able to meet the 20% reduction goal. Again, it is likely that the decrease in daily VMT in this scenario was a strong influence on this outcome. In comparison, the results from Scenario 1 again show that no growth in the suburban residential areas and significant increased growth in the urban core areas also affect the distribution of GHG emissions amongst the different place types. The increased emissions in the urban core may lead to air quality issues.

Table 8. Greenhouse Gas Emissions

Place Type	Base	Scenario 1	Scenario 2
Rur	261	230	199
Sub R	1,591	230	1,205
Sub E	-	-	-
Sub M	524	231	397
Sub T	-	456	-
CIC R	688	206	519
CIC E	-	-	-
CIC M	459	414	346
CIC T	-	411	-
UC R	488	444	372
UC E	-	-	-
UC MU	479	1,322	367
UC T	481	439	366
Total	4,971	4,383	3,771

GHG Emissions Goal: 20% Reduction to 4,225 by 2035
Source: Author's Analysis using SmartGAP, 2016

Conclusions

The varying results from Scenarios 1 and 2 demonstrate the need to integrate land use and transportation policies into a comprehensive long-range plan in order to effectively address all of Multnomah County's goals (Table 9).

Multnomah County recognizes that the metrics used in this analysis are limited what they are able to quantify, and do not take into account all of the social, economic, and racial components of planning that are necessary to adequately assess these long-range goals. However, these models will serve to better inform this discussion as one part of a more comprehensive or holistic planning process. For the metrics for which the models do provide forecasts, SmartGAP is useful in determining the efficacy of the policies. Additionally, the quality of each forecast provided by the models is only as good as the data being put into it. While these data are gathered from various reputable sources (e.g., National Household Travel Survey, U.S. Department of Commerce Bureau of Economic Analysis, National Transit Database, Federal Highway Administr-

ation Highway Statistics data, etc.), the data do not come without errors in accuracy and reliability. For this reason, transparency in collection and evaluation of these data sources is also integral in the quality of the SmartGap model forecasts, and calls for further study.

Table 9. Summary of Long-Range Goals and Scenario Results

Long-Range Goal	SmartGAP Metric	Objective	Scen. 1	Scen. 2
1. Equitable Job Accessibility	Job Accessibility by Income	+1%	✓	
2. Reducing Auto Dependency	Daily Vehicle Miles Traveled	-15%		✓
3. Increasing Walkability	Walking Percent Increase	+10%	✓	
4. Increasing Traffic Safety	Crash Rates	-10%		✓
5. Robust Multi-Modal Network	Daily Transit Trips	+10%		✓
6. Combat Climate Change	Greenhouse Gas Emissions	-20%		✓

Source: Author's analysis, 2016