Descending the Oil Peak:
Navigating the Transition from Oil and Natural Gas

Report of the City of Portland
Peak Oil Task Force

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Affiliations are provided for identification purposes and are not intended to represent the formal participation of any agency or organization.

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Introduction: Preparing for Peak Oil

Every day, businesses, government agencies and households around the world plan and make decisions based on the assumption that oil and natural gas will remain plentiful and affordable. In the past few years, powerful evidence has emerged that casts doubt on that assumption and suggests that global production of both oil and natural gas is likely to reach its historic peak soon. This phenomenon is referred to as "peak oil." Given both the continuous rise in global demand for these products and the fundamental role they play in all levels of social, economic and geopolitical activities, the consequences of such an event are enormous. This report assesses Portland's vulnerabilities in the face of wide-ranging changes in global energy markets and provides an initial set of recommendations for addressing that challenge thoughtfully and prudently.

Task Force Created by City Council

In May 2006 Portland City Council adopted Resolution 36407 establishing the Peak Oil Task Force consisting of 12 citizens from a wide variety of backgrounds. The resolution charged the Task Force with examining the potential economic and social consequences of peak oil in Portland and developing recommendations to mitigate the impacts of rising energy costs and declining supplies. Over the past six months, the Task Force held more than 40 meetings and involved more than 80 stakeholders and interested citizens in gathering information.

Impacts and Vulnerabilities: High Fuel Prices Will Change Portland

Fifty years from now, the peak of global oil production will be a distant memory. Predictions for the year oil production will peak range from present day until 2040, with the most common estimates between 2010 and 2020. Despite the apparent breadth of current projections, even the most optimistic forecasts offer little time to adapt given the very long lead times required to change such things as transportation and building infrastructure.

Of all the impacts from rising oil prices, the clearest are those on transportation, which will experience profound pressure to shift toward more efficient modes of travel. For personal travel, this means transit, carpooling, walking, bicycling and highly efficient vehicles. Transportation of freight will become more costly and either decline or shift modes from air and truck to rail and boat. Population may shift to city centers, and density and mixed-use buildings will increase.

Food is a critical resource, and the American food system has become highly dependent on fossil fuels. Food production and distribution accounts for 17 percent of U.S. energy consumption. Because of this, higher oil and natural gas prices are expected to lead to a decline in the amount and variety of food produced and available locally, even with Portland's proximity to the agricultural production of the Willamette Valley. Food prices will rise, further straining the ability of low-income households to put food on the table.

Like agriculture, the economy as a whole is expected to experience significant disruption and volatility. Impacts will vary widely by industry and firm, and Portland has strengths in high technology and a relatively diversified transportation system. Portland also enjoys a strong and growing clean energy sector, which is likely to see increased demand. Nevertheless, many of Portland's industries are dependent on national and global markets, and business start-ups and failures are likely to increase.

Unemployment could be a major economic and social issue. This is of particular concern, since social services are already stretched to their limits. Vulnerable and marginalized populations are likely to grow and will be the first and hardest hit by rising oil prices. Increasing costs and decreasing incomes will reduce health coverage and further stress the health care system, which is already in crisis. Heating, maintenance, and monthly housing costs will consume a larger share of household budgets and push people toward lower-quality housing choices at the same time that auto transportation costs increase dramatically. First responders, especially police, are likely to be further taxed as social service agencies struggle to meet demand.

Recommendations: Act Big, Act Now

The Task Force findings illustrate the profound economic and social vulnerabilities that could result as fuel supplies cease to be abundant and inexpensive. The magnitude of this issue led the Task Force to explore bold and far-reaching solutions. The Task Force is unified in urging strong and immediate action.

The Task Force recommends preparedness on two different levels. Most of the recommendations seek to reduce Portland's exposure to rising fuel prices, anticipating the economic and lifestyle adjustments that will be needed in the future. Other recommendations prepare Portland to maintain community stability as volatile energy markets trigger conditions ranging from emergency shortages to longer-term economic and social disruption.

Reduce Portland's exposure*:* The Task Force proposes cutting oil and natural gas consumption in half, transforming how energy is used in transportation, food supply, buildings and manufacturing. It proposes strategies to maintain business viability and employment in an energy-constrained marketplace.

Strengthen community cohesion**:** However well Portland succeeds in its energy transition, it will not be able to isolate itself from global energy crises or the resulting economic implications. The Task Force sees the potential for profound economic hardship and high levels of unemployment, and it recommends having plans in place to adapt social and economic support systems accordingly. Similarly, contingency plans are needed for fuel shortages that may last for months or years, well beyond the time considered in existing emergency plans.

The Task Force recommends a comprehensive package of actions, proposing strategies to initiate institutional change and to motivate action by households and businesses. The recommendations propose major changes for Portland, but the Task Force believes their implementation can have a positive social and economic impact as local residents and businesses spend less on imported fuels and redirect dollars into the local economy. This presents a significant economic development opportunity for Portland.

While all the recommendations are important, ***achieving a significant reduction in oil and natural gas use*** is a necessity for easing the transition to an energy-constrained future.

1. Reduce total oil and natural gas consumption by 50 percent over the next 25 years.

Leadership builds the public will, community spirit and institutional capacity needed to implement the ambitious changes. Leadership is needed to build partnerships to address these issues at a regional and statewide level.

2. Inform citizens about peak oil and foster community and community-based solutions.
3. Engage business, government and community leaders to initiate planning and policy change.

Urban design addresses the challenge at a community scale.

4. Support land use patterns that reduce transportation needs, promote walkability and provide easy access to services and transportation options.
5. Design infrastructure to promote transportation options and facilitate efficient movement of freight, and prevent infrastructure investments that would not be prudent given fuel shortages and higher prices.

Expanded efficiency and conservation programs shape the many energy choices made by individual households and businesses.

6. Encourage energy-efficient and renewable transportation choices.
7. Expand building energy-efficiency programs and incentives for all new and existing structures.

Sustainable economic development fosters the growth of businesses that can supply energy-efficient solutions and provide employment and wealth creation in a new economic context.

8. Preserve farmland and expand local food production and processing.
9. Identify and promote sustainable business opportunities.

Social and economic support systems will be needed to help Portlanders dislocated by the effects of fuel price increases.

10. Redesign the safety net and protect vulnerable and marginalized populations.

Emergency plans should be in place to respond to sudden price increases or supply interruptions.

11. Prepare emergency plans for sudden and severe shortages.

Each of these 11 major recommendations is accompanied by a series of action items detailing how it can be implemented.

Next steps

A number of the recommendations imply the need for a central program to coordinate goal setting, tracking and communications. Other recommendations are policies, programs or projects to be implemented by specific bureaus or groups of bureaus. The Task Force proposes that a team of city staff be appointed to translate these recommendations into a funded, operational course of action.

Acting on this report, however, does not need to await further study or analysis. City bureaus can immediately look for ways to incorporate these energy concerns and impacts into ongoing planning activities and educational programs around sustainable development. City Council can challenge bureaus to align their investments and activities with the recommendations outlined in this report.

Finally, the Task Force members would like to express their willingness to continue assisting the City of Portland as it engages City staff and the public about peak oil and Portland's energy future.

Introduction: Preparing for Peak Oil

Every day, businesses, government agencies and households around the world plan and make decisions based on the assumption that oil and natural gas will remain plentiful and affordable. In the past few years, powerful evidence has emerged that casts doubt on that assumption and suggests that both oil and natural gas production are likely to begin to decline significantly. This phenomenon is known as "peak oil."[1] Given the fundamental role of oil and natural gas in all levels of social, economic, and geopolitical activities, the consequences of such a change are enormous. Portland City Council created the Peak Oil Task Force by resolution to investigate the implications for Portland of a future in which oil and natural gas production is declining, prices are rising, and supply is subject to periodic volatility. The resolution charged the Task Force with addressing these issues and presenting findings and recommendations to the City Council.

The starting point for the Task Force is well summarized in the introduction to the February 2005 United States Department of Energy (U.S. D.O.E.) report, *Peaking of World Oil Production: Impacts, Mitigation, & Risk Management*:

> The Earth's endowment of oil is finite and demand for oil continues to increase with time. Accordingly, geologists know that at some future date, conventional oil supply will no longer be capable of satisfying world demand. At that point world conventional oil production will have peaked and begin to decline.[2]

While there is a wide range of opinions on when the peak will occur, many experts predict global oil production will peak within five years, and few anticipate a peak later than 2020. For purposes of the Task Force these debates about when the peak will occur are largely irrelevant. Fossil fuel consumption patterns cannot be substantially altered without changing the transportation and building infrastructure. Since these change slowly, action is required now even if peak production is 10 or more years away. Again, the U.S. D.O.E. report is instructive:

> Mitigation will require an intense effort over decades. This inescapable conclusion is based on the time required to replace vast numbers of liquid fuel consuming vehicles and the time required to build a substantial number of substitute fuel production facilities. . . . There will be no quick fixes. Even crash programs will require more than a decade to yield substantial relief.

Development of alternative liquid fuels will help, but no credible authority believes that a significant portion of petroleum transportation fuels can be replaced by alternatives in the short term or that they can make up the whole gap, even in the long term.

To avoid unnecessary confusion and debate in the reading of this report, a crucial point of understanding is that peak oil does not imply that the world is physically running out of oil or natural gas in the immediate future. Generally, the peak of production is expected to occur at the point at which about half the resource has been used, meaning that half still remains. The crucial concern is that, while production is approaching its peak, demand for oil is rising rapidly. The

[1] In keeping with standard usage, the term "peak oil" is used throughout this report to refer to both oil and natural gas.
[2] Commonly referred to as the "Hirsch Report."

inevitable collision between escalating demand and a plateau and decline in production will bring sweeping economic consequences.

The oil and natural gas we have already used were relatively cheap to obtain. Many of the existing oil fields are known to be in decline, and the remaining supplies are deeper, under water, in more extreme climatic locations and/or in politically unstable regions. All these conditions place upward pressure on production costs. Following from this, even current production levels cannot be maintained without massive, risky investments in new production that will directly increase costs. Even in a static situation, therefore, either production will fall or costs—and then prices—will rise. Unfortunately, the situation is not static. Greatly exacerbating the increasing cost of production is rapidly increasing global demand resulting from accelerating industrialization, particularly in China and India, both of which have extremely large populations. Current production capacity exceeds demand by only a few percent, and that margin is steadily shrinking. As in any market where production costs are rising, demand is rising, and supply and demand are closely matched, basic economic theory holds that:

1) Long-term prices will rise;
2) Short-term prices will be more volatile, with spikes and drops occurring at an increasing rate; and
3) Supplies will become less reliable because even small disturbances at any point in the production or delivery chains will lead to immediate shortages for consumers.

The scenario that the Task Force addressed assumed all of these outcomes would occur. The Task Force focused its efforts, however, on the impacts of gradually increasing long-term prices because the longer timeframe allows for the development and implementation of meaningful long-term policy recommendations. While the Task Force fully believes oil and natural gas supplies will likely be punctuated by sudden disruptions and price hikes that will trigger periodic emergencies, it also recognizes that it has less to add in this arena, as the consequences will be similar to other types of emergencies which are already addressed by agencies such as the Portland Office of Emergency Management.

The Task Force acknowledges the possibility of a scenario in which the impacts are so severe that society will deteriorate severely, leading to rampant unemployment, hunger, crime and violence. While such a collapse is not out of the realm of possibility, the Task Force felt it would not be constructive to focus on it because, by its very definition, such a situation implies that government is able to respond in an extremely limited way. The transition the Task Force chose to focus on is meant to mitigate the likelihood of such a collapse and to provide some ability to respond to a collapse, should one occur.

During six months of careful study, consultation and dialogue, the Task Force investigated the types of impacts that Portland may experience as a result of changes in the global supply and demand for oil and natural gas. This document briefly reviews the process the Task Force followed in developing this report, explores in detail the impacts peak oil is anticipated to lead to, and makes recommendations to City Council for responding to those impacts. This report is intended to assess Portland's vulnerabilities in the face of wide-ranging changes in global energy markets and to provide an initial set of recommendations for addressing that challenge thoughtfully and prudently.

Task Force Process

In May 2006 Portland City Council adopted Resolution 36407 establishing the Peak Oil Task Force. In the resolution, City Council charged the Task Force with four key tasks:

1) Review information on the issues of peak oil and natural gas production and the related economic and social consequences;
2) Seek community and business input on the impacts and proposed solutions;
3) Develop recommendations to City Council on strategies the City of Portland can take to mitigate the impacts of declining energy supplies in areas including, but not limited to: transportation, business and home energy use, water, food security, health care, communications, land use planning, and wastewater treatment; and
4) Propose methods of educating the public about peak oil in order to create positive behavior change among businesses and residents that reduces dependence on fossil fuels.

The resolution also instructed the Offices of Sustainable Development, Transportation, and Emergency Management and the Bureau of Planning to provide staff support to the Task Force. In addition, the Oregon Department of Energy agreed to provide technical assistance on energy and policy issues.

Commissioner Dan Saltzman appointed 12 members to the Peak Oil Task Force in July 2006. At its first meeting, the Task Force established four subcommittees to examine peak oil from several perspectives, which, while overlapping, were also intended to produce distinct insights. The four subcommittees were:

1) Land Use and Transportation
2) Food and Agriculture
3) Public and Social Services (including education, health, social services, utilities and public safety)
4) Economic Change

Each Task Force member participated in at least one subcommittee, and about 10 members of the public also participated regularly in subcommittee meetings. Each subcommittee identified a set of relevant issue areas and stakeholders, experts and other resources to consult. After the initial organizational meetings, subcommittee meetings typically involved a discussion with one or more stakeholders or experts, including local and state agencies, major regional employers, health care providers, developers, food retailers, human service agencies and economists, among many others. From July through December 2006, the full Task Force met every two weeks, with each subcommittee convening at least once between meetings of the Task Force. Collectively, the Task Force held more than 40 subcommittee meetings and involved 80 stakeholders. An additional 40 citizens participated in at least one Task Force or subcommittee meeting, with most taking part in multiple meetings.

Task Force subcommittees generally directed their efforts first toward gathering relevant background information and context; second, toward exploring likely impacts of peak oil on their focus areas; and third, toward developing recommendations to address the anticipated impacts. Subcommittees reported their preliminary findings and proposals to the full Task Force, where they were reviewed and discussed. After the four subcommittees produced their preliminary impacts and

recommendations, a fifth subcommittee was formed to develop recommendations for how best to inform and engage the public and encourage behavior change. In addition, Task Force members identified several umbrella issues and recommendations that were added to those developed by subcommittees.

A draft report was released on January 18, 2007 with comments accepted through February 12. Feedback was received in the following forms:

- 44 individuals provided comments using an online comment form
- 7 organizations submitted letters:
  - Cascade Policy Institute
  - Multnomah County Health Department
  - Northwest Natural Gas
  - Oregon Department of Transportation
  - Oregon Electric Vehicle Association
  - Western States Petroleum Association
  - Portland Office of Emergency Management
- 30-40 people attended one of two public forums
- Briefings were conducted for several groups:
  - Staff from City Commissioners' offices
  - Food Policy Council
  - Metro
  - Planning Commission
  - Sustainable Development Commission

After the close of the comment period, the Task Force met to review input received and determined changes for its final report.

Impacts and Vulnerabilities

Global Context – When will production peak?

Oil and gas are finite resources, and their production will indisputably peak. Fifty years from now, the actual peak of global oil production will be a distant memory. Despite the apparent breadth of current projections of the peak year of oil production—predictions range from now until 2040, with the most common estimates between 2010 and 2020—even the most optimistic projections offer little time to adapt, given the vast public and private infrastructure built in anticipation of inexpensive fossil fuels for decades to come. The Task Force concluded that the peak is likely to occur sooner rather than later, but the actual timing has only a modest effect on the magnitude and urgency of the overall issue. (Appendix 1 summarizes issues relating to the timing of the peak.)

Several events occurred during the Task Force's work, however, that could be interpreted to suggest that peak oil is well off in the future and that any action can be delayed. In fact, a close examination of these developments confirms the need to take urgent action and helps make clear why the range of predictions is a relatively minor issue.

First, in September 2006 media reports announced a "new" oil field in the Gulf of Mexico. While large by today's standards, it is small by historical standards, and its existence has been known for years. If the early estimates are confirmed by further drilling, the field represents only one to six months worth of oil at current levels of world consumption and would have no noticeable effect in delaying the peak. In addition, the field is located in a hurricane-prone area under 7,000 feet of water and another 20,000 feet below the ground, which will adversely affect costs and production.

Second, Cambridge Energy Research Associates, a major economic consulting firm, released a report in November 2006 with the most optimistic forecast yet of ultimately recoverable reserves, proposing that world oil production will not peak before 2030. The estimate has come under heavy criticism, and the Task Force sees no reason to reverse its opinion of the seriousness of the problem or its recommendations. Even if this forecast does turn out to be accurate, it does not eliminate the problem, but only postpones it briefly, providing much-needed time to take preventive and mitigating actions. Taking no action in the near term increases the likelihood of an emergency situation in the future. The impacts of delaying action and being wrong are far more damaging than the impacts of preparing now and being wrong. In fact, the impacts of waiting until 2030 to respond will make the inevitable adjustment even more difficult, since the economy will have become still more dependent on fossil fuels in the meantime. It is only prudent to begin to plan and prepare now; if indeed the optimistic estimate proves correct, Portland would be unwise to squander the good fortune of a grace period.

Third, oil prices declined from a high of $79 per barrel in July and August to $58 per barrel in October; correspondingly, gasoline prices dropped from about $3.00 per gallon to $2.25, and predictions circulated on the internet and elsewhere that gasoline could drop to as low as $1.15 per gallon. Short-term fluctuations can be misleading, however, and it is the long-term trends that are key. Crude oil prices averaged about $15 per barrel from 1986 to 1999, with an annual average value of $20 per barrel in 1990 leading up to the first Gulf War and an annual average low of $10 per barrel in 1998 as a result of the East Asian financial crisis. Prices averaged about $25 per barrel from 2000 to 2003 and climbed to almost $37 per barrel in 2004, $51 per barrel in 2005, and $62

per barrel through November 2006. From 2000 to 2005, crude oil prices rose an average of 14 percent annually.

Several other forces may also create conditions that look and act much like peak oil and provide further grounds for action:

- Geopolitical events affect production of fossil fuels. Most of the remaining oil and natural gas is in nations that are either unstable or hostile to the U.S., and both voluntary production cuts and war-related disruptions have and will continue to limit productive capacity or output.
- The production and use of fossil fuels may have to decline rapidly to reduce carbon emissions in response to global warming.
- Economic pressure to reduce U.S. use of fossil fuels may arise if the value of the dollar declines significantly. The U.S. currently uses a disproportionate share of the world's oil and natural gas, but as the dollar declines in value the effective rise in oil prices will put pressure on the U.S. economy to reduce oil purchases. This could happen if U.S. debt is called in or nations begin to conduct more oil transactions in currencies other than U.S. dollars.[3]

Summary of Impacts

A key charge of the Task Force was to assess the local impacts of peak oil and natural gas. Recommendations can then be developed to respond to the anticipated impacts. In turn, the severity of the impacts depends on how well the community prepares.

Carrying Capacity

The human carrying capacity of the planet has been dramatically increased by the use of fossil fuels. Fossil fuels meant humans no longer had to rely on animal power or "current" solar energy in the form of wind, hydro and biomass energy. Instead, humans harnessed the stored solar energy captured by plants and converted to fossil fuels by geologic pressures over millions of years. Fossil fuels allowed a dramatic increase in humans' ability to provide shelter and produce and transport food and other products to spur a growing economy and population.

What will happen to that carrying capacity when its underlying driver is no longer available? Fossil fuels are the most productive resources known, and any combination of alternatives will be less productive. All known alternatives have a lower "energy return on energy invested" than oil and natural gas—i.e., producing alternatives requires more energy than producing oil and natural gas, leaving less net energy gain with which to do other work. As a result, it is unlikely that alternatives will fully replace oil and natural gas in the quantities they are currently used. This will have wide-ranging impacts and force broad changes in Portland's future.

Historical Experience

The energy crises of the 1970s offer insight into the kind of effects that may occur when production of oil and natural gas peak. The Arab oil embargo of 1973 cut world oil production by 6 to 7 percent. Prices rose 50 percent in October 1973 and doubled in January 1974. As a result, annual U.S. gross national product growth fell from 4 percent in 1960-73 to 1.8 percent in 1973-82; productivity growth dropped from 2.5 percent in 1966 to less than 1 percent in 1979; unemployment rose from 4.8 percent in 1972 to 8.3 percent by 1975; inflation was 8.8 percent for the 1970s; and

[3] See, for example, "Oil producers shun the dollar," *Financial Times*, December 11, 2006, page 1.

inflation-adjusted take-home pay declined 6 percent from 1973 to 1979. The impacts defied conventional economic theories which assumed an inverse relationship between inflation and unemployment. In the 1970s the two rose in tandem, giving rise to the term "stagflation."

Cuba experienced an event similar to peak oil when it lost half its oil imports after the collapse of the Soviet Union in 1990. Imports and exports both fell by about 80 percent, and gross domestic product dropped by more than one third. Transportation, industry and electricity production experienced major disruptions. Agricultural production dropped drastically, and because of the U.S. embargo and reduced production and trade, Cuba was unable to import enough food. As a result, the average daily caloric intake in Cuba dropped by one-third. In response, Cubans strengthened community networks to find alternative ways of growing food and providing essential services. While instructive of the potential impacts that withdrawal of a critical resource like oil can have on a society, Cuba's level of energy use was much lower to begin with and its mix of business and industry was very different from Portland's, as is their political structure.

Direct and Indirect Effects

The three main functions that will be directly affected by peak oil and natural gas are transportation, heating of buildings and industrial activities that use oil or natural gas. These direct effects produce indirect or ripple effects throughout the economy. For example, the availability and cost of food could be significantly affected because of increased costs for transportation, processing and fertilizer, all of which depend on oil or natural gas. As production and transportation of industrial goods become more costly, employment, wages and purchasing power may all be adversely impacted; this, in turn, will have feedback effects on what goods and services are provided, as well as the number of people needing public assistance of some type. In many cases these indirect impacts can be more significant than direct impacts. Understanding the impacts on Portland requires an examination of these interdependencies.

Structure of Impact Analysis

As noted above, the Task Force identified four broad areas that would capture the majority of impacts: Economic Change, Transportation and Land Use, Food and Agriculture, and Public and Social Services. Housing was also identified as a major area, but it had individual components that could be addressed within several of the other categories.

For each of the four categories, the Task Force first identified how direct provision of products and services would be affected. To capture the indirect impacts as well, the Task Force explored how demand for the product or service would be affected and how upstream suppliers of materials or other services would be affected. In many cases a business may not use much energy directly and may therefore appear to be relatively insulated against even dramatic energy cost increases. However, getting material from suppliers who do depend more on oil or natural gas to produce or transport their product could be problematic. Moreover, consumer demand for most products and services will weaken if and purchasing power erodes due to rising unemployment rises or declining income.

The Task Force identified three possible scenarios associated with peak oil and natural gas.

> **Scenario 1—Long-Term Transition:** The impacts of peak oil are potentially severe, but the decline in supplies and the rise in prices will occur at a fairly gradual pace, allowing time to plan for and potentially mitigate some impacts of peak oil. To provide a sense of scale, this scenario contemplates that the U.S. reduces its fossil fuel use by 50 percent over the 20

years following the peak, even as population continues to increase. While other fuel sources will be developed, they will not be sufficient to meet current levels of demand, particularly for transportation fuels.

Oil and natural gas prices would trend upward, though with significant price rises and dips. Price drops may last for as much as a year or more at a time and may give the impression that there is no problem or that the problem has been addressed. However, dips are to be expected, in part because previous price increases dampened consumption, whether by energy users conserving, substituting other inputs, going out of business, or moving their facilities. However, supply will continue to fall and consumption may increase because of temporarily lower prices, forcing prices to climb again. Each time prices drop they will not drop as low as the previous cycle, and when they rise they typically will rise higher than the previous cycle, producing a gradual upwards ratchet on prices.

Scenario 2—Oil Shocks: The long-term decline of world oil and natural gas supplies is punctuated by sudden disruptions and price hikes, triggering periodic sustained emergencies. Long-term impacts would be similar to the Long-Term Transition described above, but would require additional preparations to deal with the sudden dislocations that could persist for months or years.

Scenario 3—Disintegration: Whether sudden or gradual, the impacts become so severe that the social fabric begins to disintegrate. Unemployment, hunger, crime and violence are rampant, with socially catastrophic competition for scarce resources, including food, shelter and energy. A Disintegration Scenario could arise from failure of multiple global systems—financial, currency or trade, for example—and would force governments to dedicate an overwhelming share of their resources to basic human needs.

The scenarios are not mutually exclusive but are distinguished by the speed and the severity of the impacts. The Task Force focused its efforts on the Long-Term Transition scenario with the intent that its recommendations would reduce the likelihood of the severe disruption of the Disintegration scenario.

Impacts may manifest as economic problems

Impacts stemming from peak oil and natural gas may be difficult to recognize. The impacts will strongly resemble current economic and social problems, though they will be deeper and more persistent, and the tendency will be to treat them similarly to more traditional economic problems. However, since the source of the problem is rooted not just in economic policies but in physical constraints on a fundamental input into economic productivity, the problems will be more systemic and less susceptible to conventional economic analysis and remedies.

		SEVERITY OF IMPACTS	
		LESS SEVERE	MORE SEVERE
SPEED OF IMPACTS	GRADUAL SLIDE (STEADY OR BUMPY)	**Long-Term Transition** (focus of Task Force efforts) Long-term planning, policies, programs	**Disintegration** Limited ability to respond. Task Force recommendations are meant to help avoid this scenario.
	RAPID DECLINE PUNCTUATED BY SUDDEN SHOCKS	**Oil Shocks** Emergency Management Plan	

Impacts on Transportation and Land Use (T)

Of all the impacts of peak oil, the clearest are those on transportation, particularly use of the automobile. Transportation accounts for almost 40 percent of the energy used in Oregon, and 95 percent of the energy used for transportation is oil. With rare exceptions, cars, trucks, buses, planes, boats and trains all use petroleum-based fuels, and about 85 percent of all petroleum is used for transportation.

Peak oil has direct, major implications for movement of freight, movement of people and migration of populations into or out of an area. These, in turn, will have secondary but major impacts on land use patterns. Cheap transportation fuel after World War II strongly influenced land use patterns and roads, and buildings and roads are durable features of the landscape that are difficult and slow to change.

T1. Automobile use will decline and people will seek alternative transportation for their needs.
Rising prices for gasoline and its alternatives will force consumers to choices other than conventional single-occupancy automobile travel. Increases are expected in the use of gasoline-electric hybrids and other efficient vehicles, car pooling, combined multiple trips into one, and park-and-rides. Car trips will be fewer and shorter, and car sharing will become more common. While biofuels offer a partial replacement of petroleum-based liquid fuels, their scale is limited by agricultural capacity and the need to maintain food production.

Rising fuel prices will increase the demand for added capacity in non-auto modes. Use of public transit, bicycling, and walking will increase over time as fuel prices continue to rise. Likewise, demand for compressed work weeks and teleworking will increase. The cost of providing alternative transportation infrastructure and equipment, such as light rail, buses and bike paths, will rise as oil and natural gas prices rise. The longer action is delayed, the more expensive it will be. In addition, the operating costs of transit systems will rise.

If the number of car trips declines, traffic congestion and demand for parking will decrease. This would lead to a reduced demand for road capacity, improved freight movement, and improved safety for bicycles, pedestrians and motorists. Land could potentially become available for other uses. However, improvements in congestion and parking availability will encourage some to get back in their cars, at least in the short run.

Land use planning, high quality public transportation, and relatively good walking and bicycling infrastructure have kept the percent of household expenditures on transportation in Portland relatively low compared to other major U.S. cities (see Table 1). Vehicle miles traveled in the Portland area have been flat or declining in recent years (see Figure 1). Even with gasoline sales flat, however, expenditures on gasoline in Multnomah County have increased dramatically (see Figure 2).

Table 1. 2003 Household Expenditures on Transportation by Metropolitan Area

Rank	Metropolitan Statistical Area	% of Household Expenditures on Transportation
1	Houston	20.9%
2	Cleveland	20.5%
3	Detroit	20.5%
4	Tampa	20.4%
5	Kansas City	20.2%
6	Cincinnati	20.0%
7	Anchorage	19.9%
8	Dallas-Forth Worth	19.7%
9	Phoenix	19.6%
10	Miami	19.6%
11	Denver	19.2%
12	Seattle	19.0%
13	St. Louis	18.7%
14	Atlanta	18.7%
15	Los Angeles	18.4%
16	San Diego	18.4%
17	Honolulu	18.0%
18	Boston	17.2%
19	Minneapolis-St. Paul	17.2%
20	Chicago	16.9%
21	Milwaukee	16.6%
22	San Francisco	16.6%
23	Pittsburgh	16.6%
24	Philadelphia	15.9%
25	Washington, D.C.	15.4%
26	New York	15.4%
27	**Portland**	**15.1%**
28	Baltimore	14.0%
	United States	19.1%

Source: Center for Neighborhood Technology and Surface Transportation Policy Project, "Driven to Spend: Pumping Dollars out of Our Households and Communities," June 2005. Based on average annual expenditures and characteristics, Consumer Expenditure Survey, 2002-2003, for selected metropolitan statistical areas

T2. People and businesses will relocate to be closer to each other and to transportation options; population will likely shift to city centers, and density and mixed-use development will increase.

Land use patterns are strongly interrelated with transportation options. Inexpensive gasoline over the past half-century allowed for dispersed land use patterns, resulting in relatively lower population densities and longer distances between residential and commercial areas. This has made alternatives such as walking and public transit less attractive and viable.

In the long term, one of the responses to increasing costs and difficulties in transportation will be a spatial realignment of people and businesses. The question is whether it will happen quickly enough to minimize disruptions from peak oil. In addition, without public guidance or intervention, some of these realignments may leave vulnerable and marginalized populations worse off.

As automobile travel becomes more expensive, demand for housing closer to jobs, retail stores, services, schools, parks and other frequent destinations will increase, as will demand for housing that is more accessible to transportation options, such as public transit. These needs will likely spur two other changes.

Figure 1. Vehicles Miles Traveled

Portland metro (excluding Clark Co.) and United States

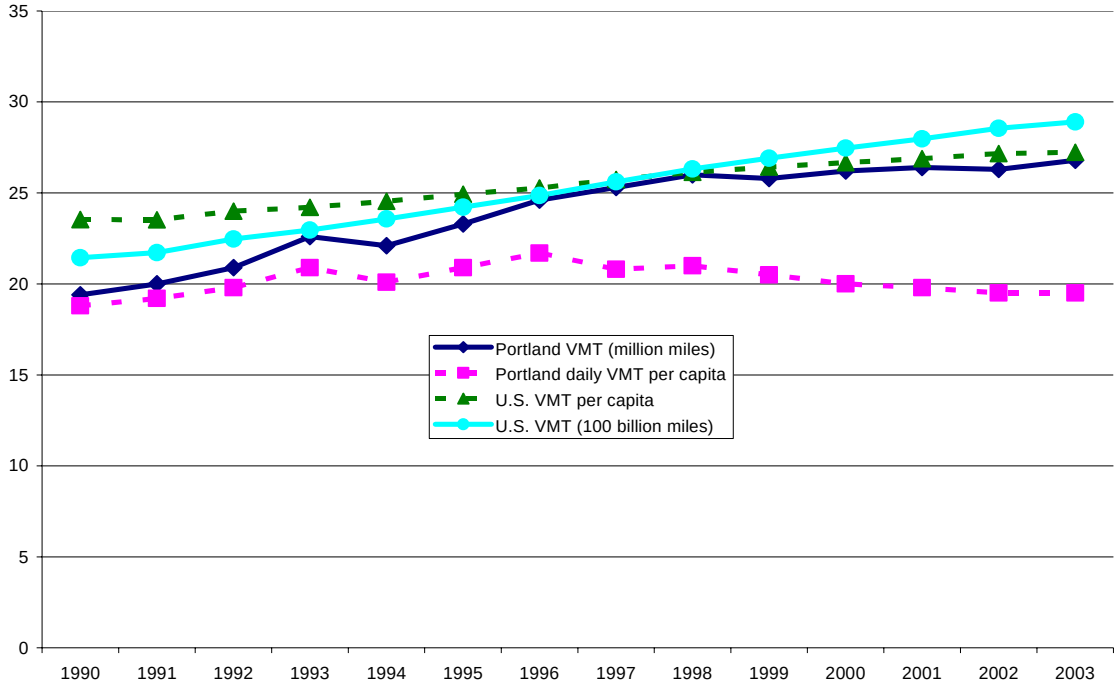
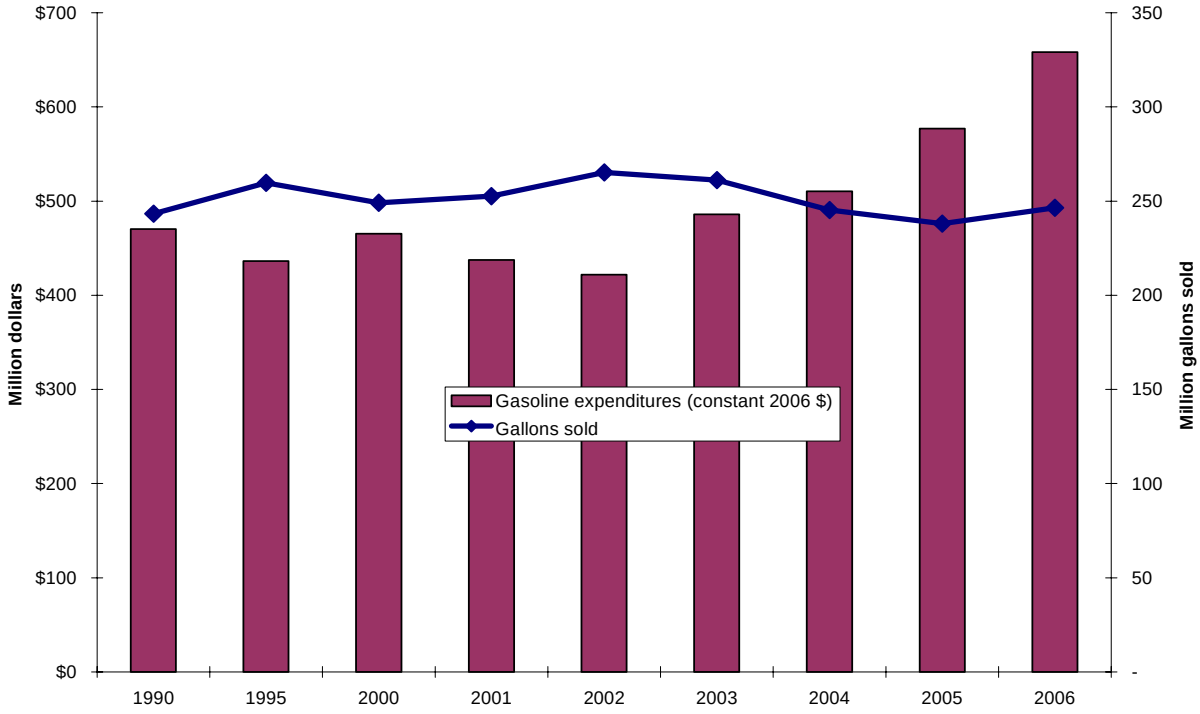


Figure 2. Gasoline sales and expenditures (Multnomah County)



First, there could be increased movement to city centers and reduced demand for suburban and exurban housing. As a result, homes will lose value in some areas and gain value in others,

depending on the convenience of shopping, schools, work and other services. Low-income and vulnerable populations will be displaced, with residents likely relocating to "edge" areas with poor access to these services. Low-income households already spend a much higher percentage of income on transportation, and the added transportation costs associated with living farther from city centers will make life increasingly difficult, causing these populations to be further marginalized. At the same time, the relocation of businesses, housing and services as a result of higher oil prices may create new neighborhood and town centers throughout Portland, including areas that currently have poor access to essential services.

Second, the attempt to move closer to jobs and services will increase pressure to allow mixed-use and high density development, which may conflict with current land use regulations. Densities may increase even without new development, because average household size could grow once again. Demand for and stress on public spaces will also increase.

Not only will people want to be closer to jobs and services, but the location of workplaces will shift as well. Businesses may want to be closer to customers, employees or intermodal transportation. Transportation system constraints are likely to drive changes in location and extent of supply-chain facilities and retail outlets.

T3. Transportation of freight will become more costly, likely leading to mode shifts from air and truck to rail and boat.

Freight is critical to the economy, both locally and globally. Portland is a trade-heavy economy, strongly influenced by the intersection of two interstate highways, two railroads, two navigable rivers and major port facilities, including an international airport. Raw materials, semi-processed goods and finished products must be brought into the region, and products produced locally must make their way to market. In addition, many products travel through Portland en route elsewhere. Two-thirds of energy used for freight transportation in the U.S. is for trucking and 23 percent for air. Trucks carry 75 to 80 percent of the weight and freight value shipped in Oregon; air freight accounts for about 1 percent of the weight and 7 percent of the value of goods transported nationally. Increases in oil prices could diminish the movement of freight through the region and harm the export sector.

Peak oil could reduce freight moved by long-haul truck and air. As a result, fewer goods would travel long distances, and the array of goods moved may be narrower. This will be particularly evident for products and materials that have relatively low value for their weight. Although air is the most fuel-intensive freight mode, the products transported by air are high value and therefore may be less affected.

Rising fuel prices will shift the comparative costs of shipping by truck, air, boat and rail, with the greater fuel efficiency of rail and boat providing a stronger competitive advantage than it does today. As a result, demand for shipping by rail and boat will increase. However, railroads are operating close to capacity now, and adding railroad capacity will be difficult, expensive and slow.

The shift to rail and boat will increase demand for intermodal connections, with implications for land use. Transportation by rail and boat is also slower than truck or air freight and will influence warehousing strategies and other business practices, which could also affect land use. The most dramatic change will be in time-sensitive goods and the widely used inventory-control strategy of "just-in-time" delivery.

Sudden changes in the price or availability of oil for transportation will have significant effects on freight transportation, with ripple effect on jobs and the economy.

T4. Air travel may decline significantly.
Personal air travel will be one of the first activities to be affected. Fuel accounts for half of airlines' costs, and this will rise post-peak. Air travel will be less affordable for discretionary trips. As with freight, some passenger travel could shift to more fuel-efficient intercity passenger transportation, most likely rail and bus.

T5. Maintenance of road infrastructure will be increasingly difficult because of loss of revenue and reliance on asphalt.
Gas tax revenues will decline as fuel conservation increases, reducing current funding sources for maintenance and construction of infrastructure. Alternatives such as tolls or weight-mile taxes will also be sensitive to reduced travel. Roads and bridges may handle less traffic and experience less wear-and-tear, but the present maintenance backlog is large and growing.

In addition to revenue constraints, road maintenance and repair will be made more difficult and costly because asphalt is a petroleum-based product. In 2005 road maintenance was hampered in some U.S. localities because of the high cost of asphalt. Concrete, which is currently more expensive than asphalt, is also energy-intensive and will increase in cost as fuel prices climb.

Impacts on Food and Agriculture (F)

Food is a critical resource, and the American food system has become highly dependent on fossil fuels in recent decades. Energy flow into agriculture has increased several-fold since World War II, and productivity of American agriculture has increased 82 percent since 1960. The "Green Revolution," fueled by fossil-fuel-based fertilizers, has increased calories available per person almost 20 percent worldwide. The food system now accounts for about 17 percent of the energy used in the U.S., the equivalent of about 400 gallons of oil per person annually. This includes the energy used to produce (e.g., fertilizers, irrigation, tractors and other farm equipment), transport, process and distribute the food. The production of nitrogen fertilizer, for example, requires natural gas, and there is no practical substitute currently available. As natural gas prices rise, use of nitrogen fertilizers will likely decrease, resulting in a reduction in world food production of as much as 60 percent. Moreover, food routinely travels thousands of miles to reach our tables. An estimated 5 to 10 calories of energy are typically used to produce one calorie of processed food.[4] In a very real sense, we are eating fossil fuels.

Oregon possesses some of the most productive agricultural land in the world. Oregon farmers produce over 225 different crops, fewer than only California and Florida, and agriculture accounts for 10 percent of the state's economic activity. Eighty percent of Oregon's agricultural production leaves the state, and one-half of that goes overseas, including 90 percent of Oregon's wheat production. The Port of Portland is the largest wheat exporter in the U.S., shipping wheat primarily from Oregon, Idaho and Washington overseas. About 60 percent of agricultural goods in the U.S. move by long-haul truck, including most processed foods.

[4] The term "processed foods" includes food items that are processed in any way. For example, meat is not generally considered a processed food, but in order to make bacon, the meat needs to be cut, cured, packaged and refrigerated before reaching the store. Even apparently "raw" foods such as produce are routinely washed, bagged, cut and/or boxed.

Oregon produces more than enough dairy products, wheat, potatoes, green peas, green beans, sweet corn, onions, pears, cherries and hazelnuts to be self-sufficient, and is close in a number of other products including various fruits, vegetables, nuts and seafood. Nonetheless, an estimated 65 to 75 percent of the food consumed in Oregon is grown out of state. Sixty-two percent of Oregon's harvested cropland relies on irrigation, and irrigated farms produce 77 percent of the total value of harvested crops.

Much of this bounty is within reach of Portland. The Willamette Valley accounts for more than 60 percent of the value of all crop production in the state, and almost 30 percent of the value of animal production. More than 40 percent of the crops produced are specialty products, such as nursery crops, turf, bulbs, seed stock and Christmas trees.

Food security today is affected more by access to food than production of food. While Oregon is a major agricultural producer, Oregon ranks among the worst in the nation in outright hunger and sixth for food insecurity. More than 650,000 people received emergency food assistance from the Oregon Food Bank network in 2000. In terms of food consumption, about 46 percent of American food dollars are spent in restaurants. About a quarter of our food is wasted, of which about half is edible.

In examining food production, transportation, processing, distribution and preparation, the Task Force identified the following major impacts.

F1. The amount and variety of food produced will decrease.
The globalized food industry relies heavily on inexpensive fossil fuels. Modern farm production is highly dependent on diesel-powered equipment; fertilizers are produced from natural gas and pesticides from oil. As the costs of these critical inputs rise, their use will decline, which will lower crop yields over time. (The increasing cost of North American natural gas has already caused almost half of U.S. fertilizer production to move offshore.) Corn and wheat, two staple crops, are particularly dependent on fertilizer and could experience significant declines. Impacts on diet and nutrition will be determined by the severity of the decline and which crops are most affected.

Some farmers will choose to leave farming as they struggle to maintain profitability. Reduced profitability also may increase pressures on farmers to sell their land for development. The result could be a combination of farm consolidation and reduction in acreage farmed.

Complicating factors such as drought years or fuel price spikes could lead to short- or medium-term food shortages. Long-term water availability may decline, in part due to the impacts of climate change. In extreme cases, farm acreage will go out of production due to a lack of water.

As transportation fuel costs rise, some farmers may choose to grow crops as feedstock for biofuel processing, leading to a reduction in acreage farmed for food. Like food crops, however, biofuel feedstock growers will face similar constraints on the cost and availability of inputs. As prices rise for both fuel and food, farmers will adjust crops accordingly.

F2. Food will cost more.
Peak oil will increase the cost of growing, transporting, processing and distributing food, and the costs of food to the consumer will rise. Foods that are highly dependent on fertilizer inputs, transported over long distances, require time-sensitive refrigerated transport, or are highly processed (e.g., ready-to-eat meals, many boxed foods, frozen foods and vegetables out of local growing

season) will experience the most significant cost increases. Many fresh fruits and vegetables, meats and dairy products are also vulnerable.

Rising fuel prices will increase pressure to transport food that is currently shipped by truck or air to rail or ship/barge. Some foods that are extremely time sensitive in shipping or that do not have enough value per unit weight or volume may not be shipped at all. Given that much of the food grown in Oregon is processed out of state, rising transportation costs may make more local processing attractive and financially viable.

F3. Low-income households are most vulnerable to higher prices and could see a decline in diet and nutrition.

Low-income households already spend a larger fraction of their household budgets on food than do families with higher incomes. As food prices rise, low-income households will be the hardest hit and may experience a decline in nutrition.

Rising food prices will put added demand on food assistance programs. At the same time the costs of food assistance will rise and donations and government funding may falter as a result of a broader economic downturn. The effectiveness and adequacy of the food assistance and emergency food distribution system will suffer without targeted efforts to bolster its resources and, perhaps more importantly, targeted efforts to prevent families from needing such assistance in the first place.

F4. The kinds of foods produced and processed will shift, introducing business pressures and opportunities for food producers and processors.

The relative costs associated with the production, processing and shipping of different kinds of food crops will cause some crops to be favored over others in the post-peak energy environment. Some will become relatively unprofitable and others relatively more so. As farmers and processors react to these realities, processors and consumers will see changes in the foods available to them.

The most energy-intensive foods, which today tend to be meats such as beef and pork, will see the most serious market declines. Processes that produce frozen or refrigerated foods, thereby requiring constant energy inputs for preservation, may be replaced by canning, drying or other kinds of preservation that allows storage in ambient conditions. More generally, fewer foods are expected to be affordable out of season.

Crops processed and grown locally, processed less, and shipped over shorter distances, without refrigeration, will be the most available and least expensive. New investments will likely be needed in processing capacity for these crops, with scale changes as indicated by the new cost structures. Some existing infrastructure investments may be stranded. Energy prices will be a much larger factor in determining where and how many plants are operated.

As pesticides, herbicides and fungicides grow more expensive and are used less, the visual quality and yields of many crops may diminish. Consumers may learn to become more concerned about the nutritional value of their food and less concerned with its appearance.

F5. Households will experience increased pressure to grow, process and handle their own food.

As the price of purchased food rises, many households could turn to growing and processing more of their own food. Local organic agriculture and residential gardens are least vulnerable to rising

fossil fuel costs and will likely contribute a growing share of the food consumed by Portlanders. Since many households do not have adequate or appropriate space for gardening, demand for community gardening space will increase.

Since few households now grow and process a significant amount of their own food, there will be a need for educational programs to teach these skills. Likewise, demand will increase for equipment and supplies used for home processing and storage of food. Many people will not have the cooking skills required to make the best use of food that is not significantly processed.

F6. Food retailing options will shift.

Large grocery chains currently source their products from a wide geographic area, and many foods travel a long distance to arrive on shelves in Portland. Time-sensitive and frozen and refrigerated foods are especially energy intensive to transport. Locally grown and produced food should be less energy intensive to the extent that much less transportation is needed. The closer to Portland the foods are grown and processed, the more likely it is that there will be direct relationships between producers and sellers, and possibly between producers and consumers. Large chain stores would benefit by becoming more local and less dependent on high-cost shipping methods. Consumers may start to migrate toward smaller-scale local retailers, including farmers' markets and community-supported agriculture, especially for fresh foods such as produce, meat and dairy.

Convenience will be less of a decision factor in shopping decisions, and cost will become more important to more households (this is already the most important concern in low-income households). Many highly processed or imported foods, such as processed meats and frozen foods, will see a decline in sales as they become optional in household food budgets.

Full-service restaurants are typically one of the first businesses affected in times of economic difficulty.[5] Alternatively, there may be an increase in patronage at fast-food restaurants, which provide the most calories at the lowest cost. However, fast-food chains are heavily dependent on the long-haul trucking and refrigeration of foods purchased and processed at regional plants, and the cost advantage may narrow over time.

F7. There will be less food waste and changes in packaging.

Food production and consumption generates large amounts of waste. Recent estimates suggest that only 50 to 60 percent of food is actually consumed, with nearly half lost through on-farm, retail and in-home wastage. Most of this food waste is landfilled today, with little composted. Metro and the City have been aggressively trying to divert edible food to food banks and have begun a program of commercial food waste composting. Metro also provides support for home composters. Plans call for moving to residential food waste collection in Portland when the current commercial composter locates a facility in the region.

As food costs rise, it is likely that food waste will decline. Similarly, current food packaging is largely derived from fossil fuels, and as prices rise, the use of such packaging will likely decline. The bio-based packaging that replaces today's materials will likely be more expensive as well, suggesting a trend toward more efficient packaging.

[5] For example, the restaurant chain Applebees reported that it "lost 5 percent to 6 percent of its customers in June and July [2006], when gasoline prices were at their peak." "Dip in Gas Prices Helps Consumers, Hurts Investors," *Morning Edition*, September 27, 2006.

Impacts on Business, Economy and Jobs (E)

Portland's history is rooted in its location at the confluence of two major rivers and ready access to the ocean and a great agricultural valley. Because of its location, Portland also became the hub of significant rail service. This network allowed Portland to develop as a production and shipping center for heavy and bulk products that can be transported by boat or rail. Portland also enjoys a head start on many other urban areas in terms of energy efficiency, renewable energy, alternative fuels, sustainable design and green building, all of which promise to be growth industries post-peak oil.

The economy serves to produce and distribute goods and services and to provide people with the income to afford these products and services. Portland's economy faces two big questions with respect to peak oil:

1) How will businesses remain viable in the face of constricted oil supplies?
2) How can Portland citizens remain employed in high quality jobs?

It is important to emphasize that Portland will not experience peak oil in a vacuum, and local changes will be felt relative to those taking place regionally, nationally and globally. Portland differs in important ways from other cities and regions and holds certain competitive strengths and weaknesses. In examining vulnerabilities in the local economy, Portland's economy must be considered together with the regional economy, which includes the greater Portland-Vancouver Metropolitan Statistical Area. Major export-oriented sectors of the economy include high technology, nursery stock, metals manufacturing and fabrication, transportation equipment and sports apparel. Other important sectors include construction and real estate, health care, retail and government.

Peak oil will affect the economy both directly and indirectly. Direct impacts are experienced in the actual operations of a business or industry. This includes fossil fuels used in building energy use, the transportation of goods, and in manufacturing, such as for process heat or as a raw material for chemical or plastic products. Indirect impacts, by contrast, occur upstream with suppliers of raw materials or semi-processed goods, or downstream in consumer demand for products and services. These impacts are more difficult to measure and forecast. While transportation and energy represent only a small portion of many businesses' costs, indirect impacts stemming from upstream supply problems or consumer demand may often be more significant.

The Task Force considered four key questions for various industry clusters:

1) How will peak oil affect production costs?
2) How will demand for the product or service be affected?
3) How will upstream suppliers of raw materials or semi-processed goods be affected?
4) What reasonable substitutes or alternatives are available to mitigate these effects?

The Task Force also considered the possibility that large shifts in international financial and currency markets could undermine the U.S. economy as a whole, including serious impacts in Portland. The recent decline in the value of the dollar, the possible shift away from the dollar in international oil transactions, and the complex interrelationships among these and related macro-economic issues merit close attention and further study, which is beyond the scope of the current report.

Below are potential major impacts the Portland economy may experience.

E1. Prices will rise, and the number of business start-ups and failures will increase.
Improvements in energy efficiency will enable businesses partially to buffer themselves from the impacts of peak oil, but the direct and indirect effects of rising energy prices will result in economic disruptions and dislocations, adversely affecting businesses and employment.

To the extent that energy prices rise while the aggregate size of the population (i.e., the supply of labor) increases, the cost of labor relative to the cost of energy will fall. This shift will provide new opportunities for skilled and manual labor as well as for efficient alternatives to existing technologies, materials, processes and services.

In general, rising production costs will lead to higher prices for goods and services, and both consumer purchasing power and consumption are likely to decline, as they did in the 1970s. In many industries, production may also take place on a smaller scale in decentralized locations, thereby sacrificing current efficiencies of scale that are largely the result of access to inexpensive fossil fuels.

The combination of increased production costs and decreased consumer purchasing power likely will increase the number of businesses that fail each year. To the extent that increased unemployment accompanies business closures, more people may try to create their own businesses. On a larger scale, this increase in the number of business start-ups and failures per year will increase the risks and uncertainties about economic downturns and what goods and services are provided, how and by whom.

E2. Some businesses will experience significantly higher production and distribution costs; others may be more impacted by changes in demand for their products and services.
Businesses will be affected by increases in the direct costs of producing and transporting their products or inputs. Businesses will also be affected indirectly, however, by significant changes in demand for some products. Every economic sector is likely to produce both winners and losers.

Manufacturers of products that are energy-intensive to produce will likely be among the first businesses to experience the adverse impacts of peak oil. In particular, suppliers of inexpensive raw materials that require high amounts of energy to extract or harvest and imported semi-processed components that are energy-intensive to manufacture may be some of the first to face increasing costs.

In addition to changes in the way that inputs are shipped, distribution of finished goods to consumers may change as well. Fewer non-essential or low-value products may be distributed to retail outlets and consumers by air and long-haul truck. Proximity to transportation hubs may also become a more important factor in the location of production facilities in order to limit exposure to rising freight costs. Similarly, proximity to employees and customers will become a more important factor in business decisions about where to locate.

Businesses that are located farther from population centers or that depend on the willingness of consumers to drive significant distances to shop may experience a sharper decline in sales than centrally located businesses. Neighborhood retail and other consumer services may gain customers as larger, more distant stores become less economic. At the same time, however, while local businesses may experience increased sales, they also may experience a disproportionate increase in

the transportation cost of supplying such retailers as a result of the inability to carry large inventories.

Businesses that depend heavily on discretionary consumer spending are at risk, especially those goods and services for which there are readily available substitutes, that are considered luxuries, or whose purchase can be put off. Industries that may experience a particularly strong decline in sales include restaurants, tourism, personal services, recreation, home furnishings and consumer electronics. Additionally, there may also be disproportionately less demand for consumer products that require oil or natural gas to operate.

Overall, the effects are difficult to predict. Policy makers should be aware that the challenges faced by businesses will be large and that the risk of business failure is great.

E3. Unemployment will likely increase in the short term.
Unemployment is likely to increase, at least initially, as businesses struggle to adjust to higher energy prices by changing business models or closing their doors. The middle class may shrink as people fall into lower income brackets and purchasing power is reduced. Increased numbers of unemployed workers will add stress to social services systems, including the Oregon Food Bank, the Oregon Health Plan, Low-Income Home Energy Assistance Program, Section 8 Housing and others.

It is unclear how severe or permanent this impact will be. If the decline in oil and natural gas production is rapid or unsteady, the unemployment problem will be more serious. Over time opportunities in renewable energy, goods and services that increase energy efficiency and other fields that may experience growth in the post-peak environment could offset job losses in other sectors, although the extent of this is uncertain.

E4. Impacts will vary in intensity by industry and business division.
Portland has a significant high-technology sector, and energy comprises a relatively small proportion of delivered high-tech product costs, despite using commercial aviation as the primary delivery mode. Although chip production is energy-intensive, electricity still accounts for a small proportion of producers' overall cost structure. Even as the cost of air freight increases, customers in the high-tech sector likely will be willing to pay more for the chips because chips are a high-value commodity. Peak oil's greater impact on the high-tech sector will be through the possibility of declining demand for some of its products as peak oil negatively impacts its customers and decreases demand. These negative impacts may be partially offset or even balanced by increasing demand for high-tech components in devices that increase energy efficiency. In general, the high-tech sector is probably less vulnerable than many to increased oil prices and has many opportunities to benefit.

Portland is home to several major transportation equipment manufacturers. Any shift from long-haul trucking and aviation shipping modes to rail and ocean shipping clearly will have significant impacts on these industries. The effect on individual firms is unclear but would likely represent a significant departure from current business plans, and some manufacturers would fare better than others.

Similarly, the Portland region includes several major employers in the highly globalized apparel industry that will likely experience the impact of peak oil in a variety of ways. The first is a decline in retail sales as consumer discretionary spending shifts away from luxury items to essential goods.

Second, distribution costs may increase dramatically because these companies rely heavily on trucking for national distribution of their products. Third, because petroleum products are used in the manufacture of many synthetic fibers, current raw materials will become more expensive. Business models are likely to undergo significant change, with uncertain impact on the various design, marketing, financial and other functions that provide employment in the Portland area.

The metals industry in Portland focuses mostly on steel manufacture and the fabrication of special products. Production costs of metal fabrication may not be hit hard, although electricity prices may increase as natural gas prices rise. However, to the extent that consumer demand shifts as a result of higher fuel prices, sales may be impacted depending on the type of products in which these manufacturers' goods are used.

Much of Oregon's nursery product is currently shipped long distances. As transportation costs rise, demand for low-value nursery products such as spruce trees likely will decrease. However, high-value products such as hazelnuts can withstand a rise in transportation costs. To the extent that nursery production declines, production and employment likely will shift from growing nursery stock to food crops.

The construction industry will be significantly impacted. Demand for new homes may decline as incomes are stretched to provide food, heat, transportation and clothing. In addition, production, processing, and transportation of construction materials will increase costs. The decline in the housing market will have ripple effects on the mortgage finance industry and real estate.

For many employees in the service sector, such as health care and retail, it will no longer be economical to commute long distances by car to reach low-paying jobs. Unemployment in these sectors could rise.

The public and non-profit sectors may also experience job cuts, as revenues from conventional sources will likely decline. The arts and creative sectors may be especially hard hit, as their products and services may be perceived as non-essential.

E5. Portland's population may grow faster than forecast as a result of in-migration.

The Portland metropolitan area may experience significant population growth as a result of peak oil. Oregon has long been heralded for its environmental ethic and livability, and Portland is a national leader in sustainable development. In addition, Portland offers a temperate climate with ample fresh water in the midst of some of the most productive and diverse agricultural land in the world. As a result, Portland is seen as better prepared than most areas to adapt to the impacts of peak oil and could attract people from other areas.[6] Population may also shift within the metro area, with greater concentrations of people in areas with better transportation options.

However, population growth will put added pressure on the very systems that make Portland attractive. For example, population growth could lead to increased conflict between urban development and agricultural land, which will be increasingly valuable post-peak as rising fertilizer costs reduce agricultural yields throughout the U.S. food system.

[6] For example, SustainLane released a ranking of the "peak oil preparedness" of 50 U.S. cities that placed Portland sixth based on commute mode trends, transit use, sprawl, local food and availability of wireless connectivity (www.sustainlane.us/peak-oil.jsp).

Impacts on Public and Social Services (S)

The Public and Social Services subcommittee examined a wide range of impact areas including health care and public health, education, social services, housing, energy utilities, police, fire, water, sewer and solid waste. In exploring the impacts of peak oil and natural gas on these essential services, the Task Force made several cross-cutting observations that are important to set the context:

- Public, health and social services are already stretched to their limits and are feeling the effects of trying to serve more people than funding allows. Additional stressors on these systems from peak oil would only worsen a situation in which serving those in need is already difficult.
- Because these systems are so focused on providing services for today and the impacts of peak oil and natural gas are mostly indirect, public and social service agencies are largely unaware of or unable to consider the long-term, potentially severe effects of peak oil.
- In providing social services, there is a complex network of City, County, Metro, and State governments. The City provides relatively few public health and social services on its own and depends heavily on these other entities for services. However, when systems fail, the City is forced to attend to the needs of its citizens in other ways (e.g., an inadequacy in mental health care, which is provided by the County or State, may result in Portland Police being forced to intervene on an emergency basis).

S1. Vulnerable and marginalized populations will grow and will be the first and hardest hit by peak oil.

The impacts of increasing oil and natural gas costs are felt first and deepest among vulnerable and marginalized populations. Rising oil and natural gas prices increase the cost of transportation, housing, food, and other goods and services. The sharp rise in gasoline prices in 2005 provided direct evidence of the effects of increasing fuel costs as people shifted their budgets from food to fuel. As a consequence of this, demands on food banks increased dramatically. In addition, the disabled, elderly, and people with the least economic resources are more likely to depend on public transportation. Increasing fuel costs and decreased social program funding may price even public transportation out of reach, or decrease special public transportation options. This can dramatically impact mobility and may lead to loss of jobs for some and further isolation for others.

Vulnerable and marginalized populations are already among the most at-risk members of society. They are least likely to have information or understanding about peak oil or to see it as a pressing issue. This population has the fewest resources to meet increased costs stemming from peak oil. Their housing and vehicles are often the least efficient, and they have little control over housing improvements or access to programs that would help.

In addition, these populations are the least likely to have the resources needed to protect their rights. Many are already vulnerable to being displaced by growth and development. Lack of integration or isolation of people and populations within Portland places them on the outside of both communication and information networks, as well as having fewer resources to adapt to changing circumstances. These are groups who are also frequently not represented in policy and planning discussions.

The economic impacts of peak oil will spread beyond those who are on fixed or marginal incomes. People who are currently better off will have less disposable income to spend on things other than energy and goods and services affected directly by peak oil. This is critically important, because public and social services are already highly dependent on private organizations to meet the demand for community programs such as food banks, cultural integration, services for the homeless and outreach to elders. Traditional citizen and business contributions to these private organizations will likely decline, as will foundation resources.

It is essential to recognize that marginalized communities have strengths, knowledge and skills that can benefit the broader community. The elderly have the experience of surviving in a much less energy dependent world, along with critical human skills that automation and mass production have replaced. Different cultural communities have social, health and other knowledge which has largely been lost in mainstream society. Poor people have skills for getting by with less and creatively stretching resources that the more advantaged population may lack. Most of all, different communities offer different perspectives and broaden the range of strategies and solutions brought to the table.

S2. Increasing costs and decreasing incomes will reduce health coverage and further stress the health care system, a system already in crisis.

About 16 percent of the population is presently uninsured, and another large proportion is underinsured Health care expenses have been rising at about 15 percent per year, four times the rate of inflation. In addition, an aging population is utilizing higher levels of health care. The medical/health care system functions on tight profit margins, and affordable health treatment for illnesses is becoming inaccessible for many. The effects of peak oil will exacerbate the trends of rising costs and decreased medical coverage.

Peak oil will cause several direct impacts on the medical/health care system. Peak oil will increase costs of medical services, from the cost of transportation and maintaining expensive facilities to the cost of medical equipment, supplies and pharmaceuticals. These increasing costs will accelerate current cost trends and could possibly result in reduced operating hours for clinics and/or closure of some facilities. As economic stresses stemming from peak oil take their toll, needs for mental health care and substance abuse treatment may increase.

The biggest impact, however, is the indirect impact of peak oil on health coverage. As the overall economy is stressed due to peak oil, businesses will continue to shift the costs of health coverage to employees and the number of uninsured and underinsured will increase. As a result, there will be less preventive treatment for a growing segment of the population. People will let health problems fester until they need emergency treatment in clinics and hospitals, at which point the advanced illness will be more difficult and expensive to treat. In combination with current cost trends, the conventional health care model may become unworkable.

S3. Protection of public health will be at increased risk.

Public health services (immunizations and control of contagious disease, sanitation, vector control, environmental health, etc.) are interrelated, and problems in one area may exacerbate problems in others. Increasing costs will challenge the budgets of governments, businesses and individuals.

To the extent that provision of public health services declines, associated public health risks will increase. This will put additional stress on the health care system, family budgets and absenteeism. The probability of these public health impacts occurring is uncertain, but impacts are serious if they

occur. Putting resources into public health toward preventive care ultimately saves money for both society and individuals as later costs for medical health services decrease.

Contagious disease in particular may pose a specific risk to populations. These risks may occur for two reasons. First, the rate of immunizations may decline due to lower family incomes and loss of health coverage. The uninsured, low income, elderly and immigrant communities are likely to be most impacted. Second, people may be more susceptible to contagious diseases because of weakened immune systems due to physical and emotional stress.

S4. Demand for social services will increase, but the ability to provide service will decline.
Social services are most likely to be accessed by vulnerable and marginalized populations. This includes such services as child protective services, unemployment, food stamps, intimate partner violence, and private non-profit social services agencies like the Food Bank and Meals on Wheels. These services will also likely be utilized by low- to middle-income households that may not previously have needed them.

Many private and publicly funded social service organizations are already overstretched and cannot meet the needs that exist. Under a peak oil scenario, both the number of people needing services and the amount of services will increase. However, the ability to serve the increased needs will decrease as tax revenues and charitable contributions decline. In addition, current laws, statutes, administrative rules and standards may not apply well in a society struggling to serve those suffering the economic effects of peak oil.

S5. Heating, maintenance and monthly housing costs will consume a larger share of household budgets and push people toward lower-quality housing choices.
The housing options available to people form a hierarchy: 1) homeownership; 2) rental; 3) assisted housing (including public, subsidized and transitional housing); and 4) homeless shelters. It is in the community's best interest to keep people as high on this hierarchy as possible. In Portland, it is becoming steadily more difficult to keep people adequately housed. This situation has been aggravated by the recent rise in home prices in the Portland metro market. Increasingly risky mortgage instruments (e.g., interest-only, 50-year, minimal down payment) have been used to make housing "affordable." These mortgages pose potential financial concerns to homeowners in a severe economic decline, threatening to push people lower on the housing hierarchy.

Housing costs will continue to consume a larger share of household budgets due to higher heating cost and general economic pressures such as unemployment, wage loss and inflation. This would exacerbate an already over-leveraged housing market and increase foreclosures. There will be downward pressure on the hierarchy of housing options as more people slide toward shared housing, assisted housing or homelessness. Eventually, lower incomes may force housing prices and rents down, but not soon enough to avoid crisis situations for many households. As incomes are stretched, home and facility maintenance may suffer, causing the city's housing stock to deteriorate. This would affect people's comfort, and eventually safety or sanitation. The price of housing located near jobs, services, and accessible transportation may increase, forcing low-income and vulnerable populations to move to areas without these attributes, making it more difficult and expensive for them to get to services and jobs.

As the cost of heating a home increases, existing federal and utility bill-reduction programs will struggle to meet the increasing demand for their services. While Portland's relatively mild climate

may not place people living in unheated homes at direct risk of dying from the cold, both the frequency and severity of illness are likely to increase substantially.

S6. Demand for public school services may increase at the same time that costs of maintaining public school facilities increase.

Schools in the Portland metro area are exposed to a limited number of impacts due to peak oil, but they are critical issues, as the education system is a core societal activity. The cost of heating and lighting schools, especially older buildings, will rise. This could result in budget reductions in other areas, such as routine and capital maintenance expenditures, which are already squeezed. In addition, the cost of transporting students will increase, and some parents who currently drive their children to school may stop doing so, placing a greater transportation burden on the school system. As school budgets are squeezed by higher prices, the current trends of teacher, curriculum, school year and program cuts could get worse, and the quality of education could decline.

Public school enrollment may increase as private school tuitions rise and population moves back into Portland, although this could be partially offset by an increase in home schooling. Marginalized populations will be affected if there is a reduction in federal funding for food programs in the schools. Finally, there may be increased pressure for schools to become more of a multi-function community resource, putting more pressure on the schools' maintenance and capital upgrade budgets.

S7. It is unclear whether demand for electricity will increase or decrease; electric loads served by natural gas-fired generation will have to be reduced or replaced by renewable energy.

Portland's electricity is provided by Portland General Electric (PGE) and Pacific Power; natural gas is provided by Northwest Natural. To meet the demand for electricity, electric utilities must either produce power from their own generating plants or purchase electricity from other producers under contract or on the spot market.

As demand for electricity grows, utilities must expand capacity to meet the load. The Oregon Public Utility Commission requires utilities to develop Integrated Resource Plans (IRP) identifying the least-cost ways to meet load growth, including energy efficiency and renewable energy. Since the early 1990s the least-cost way to meet load growth has routinely appeared to be natural gas generation. Natural gas currently is used to generate between 7 and 25 percent of the electricity distributed in Oregon, depending on weather conditions and utility company. Utility IRPs use or modify forecasts of natural gas prices from one of several national economic consulting firms. These forecasts show natural gas prices dropping for the next several years, then increasing back to current prices and holding steady for the foreseeable future. These price assumptions do not appear to take into account any impacts from peak oil on energy prices.

Though utilities serving Portland do not rely on oil as an energy source, they do use large quantities of natural gas. World natural gas production will eventually peak like oil; natural gas production in North America has already peaked, and it is questionable whether imported liquefied natural gas (LNG) will be sufficient to maintain current levels of natural gas use, much less allow an increase. In addition, since oil and natural gas are substitutes in many uses, higher oil prices are likely to drive up natural gas prices as well.

The biggest impact of peak oil on both electric and natural gas utilities will be the effect that rising prices and limited supplies of natural gas will have on their costs and rates charged to consumers. The more dependent electric utilities are on natural gas generation, the more electric rates will rise

along with natural gas prices. In the long run, current natural gas generation will have to be replaced with non-fossil alternatives. Any utility commitments to more reliance on natural gas generation in the short run will increase long-term exposure to increased costs. Even if utilities generate electricity from alternative resources, these currently cost more than power from natural gas plants, so rates could increase in any event. Over the long term, however, less dependence on natural gas generation should reduce electricity prices.

The effect of peak oil and natural gas on demand for electricity is uncertain. As oil and natural gas prices rise, some businesses may scale back or shut down operations, which would cause demand for electricity to drop. In addition, business and residential electric customers will conserve electricity as rates increase and budgets and incomes are stretched. Significant demand destruction could cause rates to increase as utilities try to recover fixed capital investments. Over the long run, there may be an increased demand for electricity as consumers convert to electric heating, plug-in hybrid or electric cars and other substitutes for oil and natural gas.

S8. First responders, especially police, may become primary service providers as social services struggle to meet demand.

Police and fire services are critical and are expected to be given priority access to fuel (whether gasoline, diesel or biofuels) at all times. Police are expected to be affected more than fire services.

In a scenario of gradual energy decline, peak oil will cause dislocations in employment. As neighborhoods, families and individuals become more stressed, there may be an increase in drug and alcohol use, domestic disputes and violence, loitering and property crimes (shoplifting, burglary, larceny, robbery, etc.). As social services are reduced, police may become the primary social service provider. Demand for fire protection services may increase because of unsafe heating methods and weather-related medical emergencies.

If peak oil is punctuated by sudden price spikes or supply cutoffs, impacts will be more severe and may include sudden and severe dislocations in transportation, employment and the price and distribution of goods. Tempers will flare and panic could set in. Police and fire personnel will be first responders in such situations.

S9. Water, sewer and solid waste services are not expected to be affected significantly.

These services are critical to the health of Portland's citizens. However, the impacts of peak oil on these services would be minimal. Portland's water system is primarily gravity fed, and most of the energy used in the water and sewer systems is electricity. To the extent that water and sewer services require energy to continue operation, they are anticipated to be given priority. Rates may rise slightly as a result of higher energy prices, but probably not dramatically.

Solid waste pickup depends primarily on diesel for its trucks, so would be more at risk than water and sewer. However, as with water and sewer, solid waste pickup is assumed to be a priority if resources become limited. It is also possible that solid waste may be reduced post-peak as packaging is reduced and people use less, make more efficient use of scarce resources, and recycle or compost more.

S10. Competitive, individualistic responses could erode community spirit and cohesion.
The worst-case scenario associated with peak oil and natural gas is the unraveling of the social fabric. The Task Force does not predict this will happen, and its recommendations are intended to help guard against it. However, the potential impacts are so large that social unraveling deserves mention.

Society will not collapse simply because of a sudden or extreme reduction of oil and natural gas supplies. Severe social disruption could occur, however, if the collective response breaks down. Without community cohesion, self-organization and teamwork, individuals may feel isolated and focus only on their own survival. This outcome would severely magnify the impacts of economic dislocations, mental health problems and crime described elsewhere in this report.

A strong community is therefore critical to finding and implementing solutions to overcome the impacts of peak oil. Equally importantly, a major part of the response to peak oil will come from the citizens themselves, not just government programs. These solutions will be fostered if there is a sense of community and stymied if there is not.

Recommendations: Act Big, Act Now

The Task Force findings illustrate the central role that oil and natural gas play in our daily lives. They depict the profound economic and social vulnerabilities that could result as fuel supplies cease to be abundant and inexpensive. The magnitude of this issue led the Task Force to explore bold and far-reaching solutions. The Task Force is unified in urging strong and immediate action.

Goals

The Task Force recommends preparedness on two different levels. Most of the recommendations seek to reduce Portland's exposure to rising fuel prices, anticipating the economic and lifestyle adjustments that will be needed in the future. Other recommendations prepare Portland to maintain community stability as volatile energy markets trigger conditions ranging from emergency shortages to longer-term economic disruption.

***Reduce Portland's exposure**:* The Task Force proposes a dramatic reduction in fuel use, far beyond the level of change achieved by current or past efficiency and conservation initiatives. It envisions cutting oil and natural gas consumption in half, transforming how energy is used in transportation, food supply, buildings and manufacturing. It proposes strategies to maintain business viability and employment in an energy-constrained marketplace.

***Strengthen community cohesion*:** However well Portland succeeds in its energy transition, it will not be able to isolate itself from global energy crises or the resulting economic impacts. A strong, dynamic community is essential to responding to the social and economic stress of such a major transition, and Portland must accelerate its efforts to foster a resilient, interconnected community. The Task Force sees the potential for profound economic hardship and high levels of unemployment, and it recommends having plans in place to adapt social and economic support systems accordingly. Similarly, contingency plans are needed for emergency fuel shortages.

Principles

As the Task Force developed its recommendations, several guiding principles emerged. These themes apply across the identified strategies and should be consulted as points of reference as the community refines and implements the recommendations.

City leadership: Change on the scale suggested requires broad participation from all sectors of society. Neither the City of Portland nor any other government can accomplish such change alone. The City can, however, play a catalytic role by informing and mobilizing the community, setting a positive example and convening partners to develop solutions.

Immediate action: A "wait and see" approach to this issue will diminish opportunities Portland now has to reduce its exposure in a meaningful way. The recommended changes will take years to implement and will be easier to afford while the economy is still relatively strong. Uncertainty concerning oil and natural gas supplies, rather than being an excuse for delay, is in fact an argument for urgency. The tightening of energy supplies could well occur quite soon and suddenly. Even if it occurs later, buildings and infrastructure being planned and built today will last for many decades and should be designed for a more constrained energy future.

Economic and social benefits: The recommendations propose major changes for Portland, but the Task Force believes their implementation will have an overall positive social and economic impact. Local residents and businesses will enjoy the health benefits and financial savings of cleaner air and walkable communities. They will also benefit economically as dollars spent on imported fuels are redirected into the local economy. This presents a significant economic development opportunity for Portland businesses and residents.

Demand reduction: While the recommendations include development of biofuels and other renewable sources, these sources can replace only a fraction of the oil and natural gas used today. The solution is a multi-faceted approach, with greatest emphasis on reducing energy demand through energy efficiency, frugality and reorganizing lifestyles and the urban landscape.

Vulnerable and marginalized populations: The impacts of increasing oil and natural gas costs are felt first and deepest among vulnerable and marginalized populations. Portland's energy strategies must pay particular attention to the needs of these populations, recognizing that many people lack the resources to adapt (e.g., by buying a hybrid car or installing a solar water heater) and tend to be under-represented in planning or policy decisions.

Global warming: Global warming is a defining issue of our time, and it will grow as a focus of international policy and action. The recommendations presented in this report align closely with those in the Portland-Multnomah *Local Action Plan on Global Warming*. The urgency and level of action required are similar. The City should continue to connect these issues as it communicates with the public and implements the recommended strategies. It should also be cautious that efforts to reduce reliance on oil and natural gas do not lead to increased use of coal (for production of liquid fuels or electricity), which would greatly increase greenhouse gas emissions.

In applying these principles, the Task Force outlined a comprehensive package of recommendations, proposing strategies to initiate institutional change and to motivate action by households and businesses. Of these recommendations, the first and most fundamental is to reduce oil and natural gas use by 50 percent over the next 25 years. While all the recommendations are important, without meaningful implementation of this first one—actually achieving a significant reduction in oil and natural gas use—Portland will experience a more economically and socially damaging transition to an energy-constrained future.

Collectively, the recommendations address the need for:

Achieving a significant reduction in oil and natural gas use, to ease the transition to an energy-constrained future.

Leadership, *to* build the public will, community spirit and institutional capacity needed to implement the ambitious changes.

Urban design, *to* address the challenge at a community scale.

Expanded efficiency and conservation programs, to shape the many energy choices made by individual households and businesses.

Sustainable economic development, to foster the growth of businesses that can supply energy-efficient solutions and provide employment and wealth creation in a new economic context.

Social and economic support systems, to keep the impacts of fuel price increases from evolving into broader disruption for Portlanders, particularly for lower-income households.

Emergency preparedness, to improve Portland's ability to respond in the event of sudden price increases or supply interruptions.

The Task Force recommendations and proposed action steps are detailed below.

1. Reduce total oil and natural gas consumption by 50 percent over the next 25 years.

With the *Local Action Plan on Global Warming*, the City of Portland has already adopted goals for reducing consumption of fossil fuels both in its own operations and in the community as a whole. However, the potentially imminent vulnerabilities posed by peak oil, paired with the increasing urgency of global warming, call for more aggressive and far-reaching goals.

A dramatic reduction in fuel use will help buffer Portland from the vulnerabilities of a volatile global energy market. This inevitable transition away from oil and natural gas will be made much easier if Portland takes action immediately rather than waiting until the marketplace forces a response.

A 50 percent reduction over 25 years (an absolute, not per capita reduction) is a meaningful goal from the perspectives of both peak oil and global warming.

- The Oil Depletion Protocol is a proposed international agreement under which nations would reduce their consumption at the rate at which known oil reserves are being depleted. This rate is estimated to be 2.6 percent reduction annually, or approximately 50 percent over the next 25 years.
- A recent global policy analysis from the United Kingdom calls for steep reductions in carbon dioxide emissions, which are primarily attributable to fossil fuel use. Reducing oil dependence helps Portland stay ahead of policy changes that may result as international will to address climate change grows.

> The risks of the worst impacts of climate change can be substantially reduced if greenhouse gas levels in the atmosphere can be stabilised between 450 and 550ppm CO2 equivalent (CO2e) … Stabilisation in this range would require emissions to be at least 25% below current levels by 2050, and perhaps much more … Ultimately, stabilisation—at whatever level—requires that annual emissions be brought down to more than 80% below current levels.
>
> —Stern Review on the Economics of Climate Change, 30 October 2006

- As the City seeks to reduce reliance on oil and natural gas, it should be cautious that its efforts do not lead to increased use of coal (for production of liquid fuels or electricity), which would greatly increase greenhouse gas emissions. [7]

The Task Force proposes the 50% reduction recognizing that it is a challenging target considering Portland's continued population growth. While Portland is known for its successful transportation and building-efficiency programs, reductions in per capita energy consumption have been offset by growth of the population. Cutting total consumption in half will require a two-thirds reduction on a per capita basis. While daunting, a number of factors suggest this target is achievable.

[7] Because of its high carbon content, conventional coal use releases large amounts of carbon dioxide, the primary cause of global warming.

- Over 25 years, the fleet of vehicles in the region will turn over twice, offering opportunity to switch to more efficient options. Similarly, older, less-efficient appliances and furnaces will require replacement.
- Because of the state energy code, new construction is much more efficient than the existing building stock; even more promising is that green building projects are dramatically surpassing the energy code. For example, Oregon Health Science University's new building exceeded energy code requirements by over 50 percent, while actually reducing construction costs. Residents of the most efficient new housing projects enjoy utility bills less than one-third the amount they would have to pay in older, comparably-sized buildings.
- The American Institute of Architects Board of Directors and U.S. Conference of Majors adopted The 2030 Challenge, a program that calls for all new buildings to reduce fossil fuel use by 50 percent with a goal of gradually reaching carbon neutrality for all new and existing buildings by 2030. Building operations currently consume 40 percent of all energy used in the U.S.
- Just 50 years ago, the average American home was half the size it is today. Even a partial reversal of this growth trend would yield significant reductions in home energy use.
- In other wealthy countries such as Denmark and the United Kingdom, per capita energy consumption is already half the level in the United States.

Action items:

a) Adopt a resolution declaring an **overall reduction goal.** Portland City Council can play a key leadership role by articulating a vision for our energy future.

b) Develop specific reduction targets necessary for achieving the overall reduction goal. These include **targets** for specific residential and business sectors. Annual and five-year targets should also be established.

c) Require **City bureaus** to set reduction targets for their operations. Bureau sustainability plans may be a vehicle for establishing and tracking these targets.

d) Initiate a **data gathering and analysis system** to assess progress toward meeting goals. This system would track progress on an aggregate and per capita basis, quantify reductions in specific residential and business sectors, and monitor implementation of action plans. This effort would augment the carbon emissions tracking that currently takes place.

e) Develop mechanisms to keep community decision-makers informed of **trends in energy markets**, including the global fuel supply situation and local impacts such as how residents are being affected by higher fuel prices.

2. Inform citizens about peak oil and foster community and community-based solutions.

The transition from oil and natural gas will be a time of tremendous change, both in the way we live and in the shape of the economy. The communities that make the smoothest transitions are those whose residents, businesses, and public and non-profit agencies know how to work together to adapt, to create solutions, and to support one another as they face economic and social disruption. Community is therefore the glue underlying the Task Force recommendations.

The Task Force recommends a community campaign to raise awareness and unite Portlanders around a vision of sustainable energy. In a more general sense, the Task Force sees a need for ongoing programs and systems that build community. Without strong community cohesion, the economic impacts of rising energy prices could readily devolve into broader social problems with people feeling isolated and with little or no hope for help or for the future.

Peak oil is part of a broader context in which escalation of oil and gas prices provides one powerful reason to move even faster in the direction of sustainability. Portland's community visioning project, visionPDX, shows the promise of demonstrating once again that Portlanders have a vision of a community that is connected, accessible, independent and sustainable. The changes that Portlanders have already made in development patterns, transportation choices, green building and clean energy have slowed the upward trend in consumption at the same time that the local economy has generated jobs for a growing population.

The Task Force believes that integrated community-wide efforts, led by a City Council that provides unwavering support for further progress, can achieve dramatic reductions in energy consumption while at the same time improving quality of life. The Task Force believes strongly that success is possible, but only if Portlanders mobilize their creativity and desire to change and plan for the future. While it is necessary for the City Council to align its services, investments and regulations with our recommendations, that alone is not sufficient. The greater task is to foster a can-do spirit in support of a truly sustainable community.

Action items:

a) **Research public understanding** of Portland's energy future, including peak oil, and develop effective ways to communicate regarding energy issues.

b) Leverage **existing programs** to communicate with the public about Portland's energy future, including global warming, peak oil, and potential for oil supplies to be interrupted by geopolitical events. Messages can be integrated into programs that promote transportation options, reduce waste, encourage recycling, encourage energy efficiency and promote local food.

c) Design and implement a highly visible **information campaign** which would integrate peak oil issues into a broader context of energy and sustainability. Provide resources that connect households and businesses to assistance programs and information they need to take action. **City Council** members play an important role focusing community attention on its energy goals and helping people see how their actions contribute.

d) Work with **community-based organizations** to provide information about options and resources to help citizens prepare to mitigate the impacts of oil and natural gas price increases on their lives. Strengthen community networks.

e) Design **competitions or incentives** for neighborhoods or businesses to meet reduction targets.

f) Work with **schools** to educate students about peak oil and related issues.

g) Integrate peak oil into **visionPDX** and other **strategic planning** projects**.** Peak oil should be discussed wherever Portlanders envision and plan for the future.

h) Plan for public schools to be used as **distribution points for public services** and community support. Design mechanisms to cover the full costs to the schools of providing these services.

i) Facilitate development of **local business networks or barter systems** that build community and broaden economic opportunity.

3. Engage business, government and community leaders to initiate planning and policy change.

Beyond the initial community-wide assessment conducted by the Task Force, more detailed work needs to continue, with public and private institutions weighing the impacts of peak oil and developing plans to address the specific vulnerabilities and opportunities they face. Civic and business leaders need to be encouraged to:

- Identify ways to reduce energy use in their facilities, activities and transportation systems;
- Assess how suppliers will be affected and develop alternatives for products and materials that are dependent on petroleum and natural gas (for example, the health care industry uses many petroleum-based products, and agriculture uses fertilizers made from natural gas);
- Consider how customer purchasing patterns or client demand will change;
- Prevent over-expansion of facilities that may see a reduced demand in the future;
- Develop strategies to protect vulnerable and marginalized populations who will be particularly impacted by peak oil; and
- Develop new business opportunities and circumstances that will result from peak oil.

The City has an important leadership role to play in encouraging preparedness planning and determining what types of incentives are needed to assist in the transition. Because Portland is part of a regional economy and transportation system, it will need to build partnerships with other jurisdictions in order to address issues at the regional and state level.

Action items:

a) Directly involve civic and business leaders in **issue briefings.** Task Force members can support this outreach. Important audiences include:
   - **City of Portland**: City Council, bureau heads, citizen advisory groups
   - **Infrastructure providers**: Port of Portland, Oregon Department of Transportation, Portland Office of Transportation, Metro, and railroads
   - **Business leaders**
   - **Freight and logistics industry**: Individual airline, trucking, rail, and marine companies
   - **Building industry:** Architects, builders, developers, and owners
   - **Food industry**: Farmers, processors, grocery stores, restaurants, food relief agencies
   - **Health care providers**
   - **Public agencies**: Schools, social service agencies, partners in local, regional and state government
   - **Major non-profit organizations**
   - **Utilities and Oregon Public Utility Commission**
   - **Faith communities**

b) Educate key **City employees.** Share the Task Force report, emphasizing that all bureaus should incorporate the report's recommendations into their plans. Bureau sustainability plans are also a potential vehicle for tracking bureau progress.

c) Provide **regional and national leadership** by collaborating with leaders in other jurisdictions within the metropolitan region, and working with organizations such as the U.S. Conference of Mayors.

d) Seek partnerships with businesses, universities and other governments to develop **economic analysis** that will investigate the implications of rising energy prices and inform planning by businesses and economic development agencies.

4. Support land use patterns that reduce transportation needs, promote walkability, and provide easy access to services and transportation options.

When people decide to reduce the number and length of their auto trips and turn to walking, biking and transit, they need development patterns that put stores, services and employment opportunities within easy reach. The City has already committed to a walkable development pattern by designating the "Central City" and a series of "Regional Centers" and "Town Centers" as places linked by high-capacity transit and offering a full range of retail and civic services. To complement this pattern and bring retail services within walking distance of people who live outside these Centers, the City should designate and encourage smaller-scale "Neighborhood Centers," many of which remain from pre-WWII streetcar days. Neighborhood Centers should put every Portlander within walking or easy biking distance of a full-service grocery store and other essential stores and services.

Action steps:

a) Designate a series of Neighborhood Centers throughout the city and apply flexible **mixed-use zoning** designations to allow neighborhood-scale retail, professional and civic services in those neighborhoods that do not have these services within walking distance.

b) **Change zoning and other regulations** to encourage the types and number of housing units that would make neighborhood-scale retail, professional and civic services more feasible financially.

c) Develop a **rating system** to evaluate each Portland neighborhood on its degree of accessibility to transportation options and services. Use this rating system to encourage the development of more walkable neighborhoods.

d) Ensure zoning allows the types and amount of housing near **transit stops** that will support the use of transit and generate fares to make transit more sustainable.

e) Resist expansion of the **urban growth boundary** in order to allow all types of Centers to thrive and to relieve pressure on agricultural land (see also the discussion of food production in Recommendation 8).

f) Fund programs to ensure a **mixture of income levels**, affordable housing, mixed-income housing and workforce housing.

g) Build and maintain a **street network** that supports pedestrian and bicycle trips. Achieve a high degree of street connectivity.

h) Provide **pedestrian-friendly public spaces** and other amenities near Centers and other areas of compact development.

i) Commit to urban growth patterns that follow **sustainable development guidelines** and **green building strategies**.

5. Design infrastructure to promote transportation options and facilitate efficient movement of freight, and prevent infrastructure investments that would not be prudent given fuel shortages and higher prices.

Transportation infrastructure is a long-term investment that needs to consider long-term community needs and costs. Rising petroleum prices influence infrastructure planning at several levels. Transportation modes and patterns will shift at the same time that transportation agencies face inflated construction costs with rising prices for fuel, asphalt and other materials. Gas tax revenue will also be affected. Combined, these factors call for transportation agencies to adapt infrastructure plans to meet mobility and access needs in a post-peak environment.

Action items:

a) Facilitate fuel-efficient **freight movement.** Portland's competitiveness is largely dependent on the region's role as a gateway and distribution center for domestic inland and international markets**.** Efficient movement of freight is critical to maintaining business viability and jobs.
   - Protect existing inter-modal freight facilities to ensure options in response to fuel price increases.
   - Continue to protect industrial and manufacturing land, particularly areas that already have rail access or are close to inter-modal transport to allow for economic diversification if the global economy falters.
   - Encourage rail to serve industrial clusters.
   - Work with freight vendors such as individual airline, trucking, rail and marine shipping companies to encourage efficient and sustainable transportation technologies and fuels and to identify incentives needed to promote transition.
   - Reduce delay for high value trips, like freight or bus, through congestion pricing for one or more lanes on highly congested corridors.

b) **Prevent infrastructure investments** that would not be prudent given fuel shortages and higher prices. Air, long-distance truck and car travel are likely to be reduced in response to peak oil, and land use patterns are likely to become more compact. Thus, investments in expanding road and air capacity may not be prudent. The Port of Portland, the Oregon Department of Transportation and other agencies need to consider the impacts of peak oil when developing capital construction plans for major facilities.

- Encourage the **Port of Portland** to examine the timing and impacts of a peak oil scenario on air traffic when developing plans to expand the airport.
- Recognizing that the majority of transportation investment funding comes from non-city sources and that the uses of these funds are not flexible, direct the **Portland Office of Transportation** to consider the impacts of rising oil prices when deciding where to invest those scarce transportation funds under its control.
- Invest in infrastructure that meets **access and mobility** needs with less fuel.

c) Continue to identify and promote the use of **recycled paving materials and other methods** that require less petroleum.

d) Support the work of the Oregon Department of Transportation to develop a sustainable funding structure for transportation that will eventually replace **declining gas tax revenues.** As people shift to more efficient vehicles and transportation options, gas tax revenue will not keep pace with needs to maintain roads and improve transportation infrastructure. This impacts all modes, since pedestrians and bicyclists as well as auto and truck users need permanent smooth surfaces. The City should explore new revenue options for transportation, including a carbon tax, congestion pricing, and a vehicle-miles-traveled fee, and should also encourage the state and federal government to investigate revenue options that do not rely on declining gas taxes. The new funding structures should be flexible to enable significant investment in services and infrastructure for fuel-efficient modes of transportation.

e) Work with regional agencies to accelerate development of **inter-urban transit options**, including **commuter rail**. Continue to expand the **light rail, street car and bus systems**.

f) Advocate for **state and federal funding** for transportation options, such as in ConnectOregon 2 and in the next Federal Surface Transportation Act.

6. Encourage energy-efficient and renewable transportation choices.

Land use and infrastructure set the context, but in the end, transportation fuel use is driven by individual choices. Portland has proven strategies that can be expanded to promote a variety of transportation options. It also needs to develop new strategies to promote both energy-efficient vehicles and energy-efficient transportation modes.

Alternative fuels cannot replace the amount of transportation fuels used today, but they can play an important role in decreasing Portland's vulnerability to energy markets. The City should determine how to encourage production and use of alternative fuels that give a good return on energy used.

Action items:

a) Encourage "**paid parking environments**" wherever possible, since there is a direct connection between free parking and automobile dependency. Parking costs and supply are the most effective tools for encouraging transportation options. The City should extend metering for curbside parking to congested retail commercial districts throughout the city. Metering will reduce cruising for a parking space because it reduces the number of cars and promotes turnover of parking spaces. The City should earmark a portion of parking revenues for pedestrian, bicycle

and transit accessibility improvements, and for other improvements to the vitality of the commercial districts.

b) Expand programs and policies that promote specific efficient **transportation options** including walking, bicycling, transit use, car- and vanpooling, car-sharing and flexible work hours.

c) Expand **individualized marketing programs** which use personal contacts to identify and support the transportation options people want to use. These programs have consistently reduced single occupancy vehicle trips by 8 to 10 percent in the four Portland neighborhoods in which they have been implemented. Still, they have reached only 20 to 25 percent of residents and few businesses, and then only for one year.

d) Encourage businesses to take advantage of **ride-sharing** and **car-sharing**.

e) Work with Oregon Department of Transportation and other responsible agencies to provide incentives and remove barriers to the purchase and use of **hybrid vehicles, electric vehicles, small vehicles and alternative vehicles** that currently are restricted in use.

f) Investigate **incentives** to reduce single occupancy trips or congestion:
- Taxes based on vehicle miles traveled in single-occupancy vehicles
- Road user fees based on transponder technology
- High occupancy vehicle lanes

g) Encourage **production and distribution of biofuels.** Identify strategies, incentives and taxes to promote existing and new technologies.
- Attract alternative **fuel manufacturers and distributors**.
- Foster **neighborhood co-op** fueling stations.
- Pair **Oregon farmers** making biofuels with neighborhoods that purchase fuel from their own co-ops.

Table 2. City of Portland transportation fuel use by agency, FY 05-06 (gallons)

Bureau	Diesel	Gasoline
Development Services	-	41,634
Environmental Services	15,465	40,582
Fire	97,306	53,192
General Services		
Printing & Distribution	-	4,666
Communication	-	293
Facilities	-	4,458
Fleet	7,482	50,209
Government Relations	-	467
Parks & Recreation	45,910	104,793
Police	14,256	643,183
Transportation		
Traffic Management		36,553
Maintenance	365,306	100,409
Water	96,199	111,571
Total	**641,924**	**1,192,010**

h) Adopt policies and programs to **prioritize biodiesel (and diesel) supplies for heavy uses** including freight, buses, and heavy equipment. These require the concentrated power that diesel and biodiesel provide. More alternative fuel options are available for personal transportation than for heavy-duty uses.

i) Use the most fuel-efficient flex-fuel vehicles available for the **City fleet** (see Table 2 for recent fuel usage by bureau).

7. Expand building energy-efficiency programs and incentives for all new and existing structures.

Buildings account for 40% of energy use in the United States. Portland and Oregon have long-standing energy-efficiency programs that address the residential, commercial and industrial markets. Expanding these initiatives will become increasingly important as natural gas supplies become more constrained. Not only is natural gas used directly in building systems, it accounts for a growing percentage of electrical generation in the Northwest. Strategies should include retrofitting existing buildings and influencing the design of new ones to maximize energy efficiency.

Action items:

a) Increase funding and availability for programs and demonstration projects to increase **energy efficiency** and the use of **renewable energy**. All buildings in Portland should have energy-efficiency upgrades over a 20-year period.

b) Adopt **The 2030 Challenge** put forward by the American Institute of Architects and implement policies and programs to achieve the reductions in fossil fuel use for all new and renovated structures.

c) Use City leverage in **building permitting processes** to promote efficiency of both new and existing buildings.

d) Actively participate in the State of Oregon **energy code** adoption process to push for changes that align with the City's sustainability goals.

e) Provide incentives to encourage energy-efficiency improvements at the time of **real estate transfer**.

f) Work with **utilities** and the **Oregon Public Utility Commission** to ensure that peak natural gas considerations are incorporated into utility Integrated Resource Plans and into utility rates, policies and programs. Conventional coal-fired generation is not an acceptable alternative fuel, given its high emissions of carbon dioxide, the primary cause of global warming.

g) Ensure weatherization programs are available for **renters**.

h) Assist businesses and residents in installing **solar energy** systems.

i) Continue the City's green building program, offering technical assistance, resources, and financial incentives to residents, developers, and the **design and construction industry**. Accelerate outreach and services to the mainstream building community.

j) Promote efficiency and renewable energy for **Police, Fire, Water, Sewer, and Solid Waste** services. Demand and provision of these services are not expected to be greatly affected by peak

oil and natural gas, but they are critical services that should be made as energy efficient as possible and transitioned to renewable fuels.

8. Preserve farmland and expand local food production and processing.

The global food industry depends heavily on inexpensive fossil fuels. Fertilizers are produced from natural gas, pesticides from oil, and energy is required to grow, process, transport and store food. A constrained energy future calls for a less energy-intensive food supply, with crops grown locally, processed less, processed locally and shipped over shorter distances. In this regard, Portland is relatively well positioned with its location in the Willamette Valley, which has fertile soils and ample water. By preserving this farmland and expanding food production and processing, the region can create the flexibility needed to adapt to a changing agricultural economy. Portland can expand its options further by developing the land and know-how for small-scale food production by residents within the city itself.

Action items:

a) Take an active role in preserving the productive capacity of Portland's foodshed.
   - Encourage appropriate agencies to preserve existing farmland and protect productive soils for agricultural use. This could include the creation of **agricultural sanctuaries and conservancies** as well as resisting the expansion of the **urban growth boundary** onto productive farmlands.
   - Maintain and strengthen current **farmland protections** through the "New Look" at Metro and the "Big Look" at the state level.
   - Where there is no natural "hard edge" or natural feature available to protect farmland, establish **compatible land uses** adjacent to farmland.
   - Hold on to and preserve **City land** that could be suitable for urban agricultural uses. Such lands have been identified by the Diggable City project.
   - Direct additional resources toward the **Diggable City** project, the community garden program and other urban agriculture possibilities.
   - Explore options to **open public and private land** for food growing such as financial incentives for leasing private land to the City for community gardens.

b) Work to reduce the harm from **Measure 37** to agriculture in the greater Portland region.

c) Examine current policies to increase **sales directly from farmers to** consumers, such as making it easier for farmers' markets and farmstands to operate and establishing a public market.

d) Continue assistance and incentives for the **food processing industry** as one of Portland Development Commission's priority development clusters

e) Accelerate planning for a large-scale local **commercial composting** site.

f) Provide **education** about growing, processing, preserving and preparing foods.
   - Work with Multnomah County to reinstate the **Oregon State University Extension Service**. Their programs educate residents about food growing, processing, preserving, composting and cooking.

- Work with the State and Multnomah County to increase **nutrition knowledge.**
- Encourage **schools** to teach more about nutrition, where food comes from, how to grow, harvest, process, preserve and prepare foods, and how to compost food waste.

9. Identify and promote sustainable business opportunities.

Rising energy prices pose substantial challenges to the economy and community, but they also introduce new opportunities. Some businesses will gain a competitive edge through efficient practices. Others will profit directly by providing the goods and services that will be in demand as energy becomes more expensive. To maintain business viability and employment, Portland must equip its business community with the information and tools to adapt.

Action items:

a) Identify and promote **sustainable business sectors** that will create local jobs in an energy-constrained future. Promising areas include:
   - sustainable building design services;
   - renewable energy and conservation services and products;
   - sustainable industrial design;
   - repair and re-use services, including remodeling of existing buildings, that extend the lifetime of products; and
   - substitution of locally produced products for those now mainly imported.

b) Expand **workforce training** to support sustainable industries and increase job opportunities for workers dislocated from conventional industries.

c) Conduct a comprehensive review of existing **City business assistance programs** to see if they are adequate to help businesses adapt to changes required by peak oil, including providing assistance to existing businesses to survive, and new ones to get started. This includes regulations, incentives, infrastructure, business assistance and job retraining programs.

d) Provide **case studies, personal impact calculators and business evaluations** as tools to help businesses assess impacts on their business sector. Extend Office of Sustainable Development education efforts, coordinating with Portland Development Commission and business associations.

e) (See Recommendation 2i, page 35, to facilitate the development of local business networks and barter systems.)

10. Redesign the safety net and protect vulnerable and marginalized populations.

Because peak oil and natural gas presents a serious threat to the economy as a whole, Portland's preparedness needs to encompass more than energy efficiency. Economic downturn creates more demand for public services, while public revenue declines. Energy and food price increases are especially burdensome for lower-income households, pushing more people into need of assistance. Resources for public health, social services and housing are already stretched thin and may have to

be reprioritized and reallocated. People living in poverty will be the most vulnerable to peak oil impacts.

A wide variety of organizations and programs comprise the safety net protecting vulnerable and marginalized populations. Although Portland is just one of many partners, it can participate with County and State partners working to improve coordination and service delivery across agencies. The City can advocate for maintaining funding and support.

A preventive approach is needed to minimize the impacts. Reducing poverty now will mean fewer people who will require assistance in the future. By ensuring reasonable employment, housing, nutritional and educational opportunities for low-income and marginalized populations, more expensive mental health- and health-related problems will be averted.

Action items:

a) Support state and national efforts and explore City options to encourage or mandate health care providers and insurers to emphasize **preventive care**. Prevention is by far the lowest-cost societal approach to health care.

b) Facilitate a discussion among health care providers to expand **health care** and **health care access** (e.g., prescription drugs, immunizations, universal care, reproductive and perinatal health services). Increasing health care costs and numbers of uninsured will lead to more contagious diseases and more severe health issues before treatment is sought, and generally inefficient use of resources (e.g., indigent patients going to emergency rooms for treatment of non-emergency problems). Similar facilitation served a key role in bringing parties together on the Healthy Communities Initiative several years ago.

c) Support **prioritization models** like an expanded Oregon Health Plan. Health care needs are rising independent of peak oil as the baby boom generation ages, and peak oil threatens to aggravate the problem by limiting resources to meet the increased need.

d) Work with the **Oregon Public Utility Commission** to provide financial assistance so that marginalized populations can maintain utility service, thereby preventing health or infrastructure problems. Expand **energy assistance programs** to keep utility services affordable. (See also Recommendation 7f and 7g for discussion of efficiency and weatherization programs.)

e) Police and other service providers should plan for a gradual increase in drug and alcohol abuse, domestic violence, and other problems associated with an increase in unemployment, homelessness and marginalized populations. For example, this may require an increase in staffing or a reallocation of resources, such as reinforcing the emphasis on **community policing**.

f) Strengthen current **hunger relief** systems. Work with the Oregon Food Bank to develop plans to prepare for increased food demand from a higher percentage of the population. The Oregon Food Bank has systems in place to provide food to low-income citizens, but this system is already stressed.

g) Plan for City subsidization of **school breakfast and lunch** programs in the event of lower levels of federal support.

h) Review rules such as **program eligibility requirements** to see whether they should be adjusted as a broader segment of the population is in need.

i) Develop strategies for coping with **widespread unemployment** (as severe as during the Great Depression), including working with the state to examine how the current unemployment

system will require modification. [See also recommendations on sustainable job creation and retraining included with Recommendation 9.]

j) Expand efforts to move Portland households out of **poverty**, building on coordinated initiatives such as the Ten-year Plan to End Homelessness and the Multnomah County Poverty Advisory Committee.

11. Prepare emergency plans for sudden and severe shortages.

As fuel supplies become more constrained, they will become more susceptible to disruption from natural or political events. Sudden price spikes or supply cut-offs can lead to severe dislocations in transportation, employment and the price and distribution of goods. Portland should have contingency plans in place to address these logistical challenges and also the public unrest or panic that takes place during shortages. Plans should address sudden shortage situations that persist months or years, well beyond the shorter-term events for which emergency agencies typically prepare.

Action items:

a) Use the structures already in place in the **City's Emergency Management System** for immediate disasters and add items necessary to address a "long emergency" brought about by oil supply constraints and lasting months or years. Ensure that Portland collaborates with all levels of government and non-governmental organizations.

b) Have strategies in place for **rapid reduction of fuel use**. An assessment of options was recently conducted in the Puget Sound area.

c) Develop **fuel allocation systems**. Ensure that fuel is available for police, fire, waste collection, medical response and supporting transportation responders. Also consider transportation needs of food, medicine and other essential freight, as well as agricultural fuel needs.

d) Develop a **comprehensive food plan** to ensure that food supplies are adequate in a short-term or mid-term emergency. Portland Office of Emergency Management should develop this working with the Oregon Food Bank, Multnomah County and Oregon Voluntary Organizations Assisting in Disasters (ORVOAD).

e) Establish a major **food warehousing system** capable of meeting food needs beyond the 72-hour supplies recommended for home emergency preparedness.

f) At the **neighborhood level**, provide training and planning help for emergency response.

Next Steps

A number of the recommendations imply the need for a central program to coordinate goal setting, tracking and communications. Other recommendations are policies, programs or projects to be implemented by specific bureaus or groups of bureaus. The Task Force proposes that a team of city staff be appointed to translate these recommendations into a funded, operational course of action.

Acting on this report, however, does not need to await further study or analysis. City bureaus can immediately look for ways to respond to these energy concerns and impacts into ongoing planning activities and educational programs around sustainable development. City Council can challenge bureaus to align their investment and activities with the recommendations outlined in this report.

Finally, the Task Force members would like to express their willingness to continue assisting the City of Portland as it informs City staff and the public about peak oil.

Appendix 1: Resolution Establishing the Peak Oil Task Force

RESOLUTION No. 36407

Establish a Peak Oil Task Force to assess Portland's exposure to diminishing supplies of oil and natural gas and make recommendations to address vulnerabilities (Resolution)

WHEREAS, U.S. oil and natural gas production have peaked and are now in decline, ensuring our nation's continued and growing dependence on oil and natural gas imported from politically unstable regions; and

WHEREAS, a growing body of energy industry experts believe that the world has already arrived at, or will soon arrive at, the peak of global oil production, which will be followed by an inevitable decline in available supply thereafter; and

WHEREAS, global demand for oil and natural gas continue to increase; and

WHEREAS, following the global peaks of oil and natural gas production, the interaction of decreasing supply and increased demand will cause the price of oil and natural gas to become more volatile; and

WHEREAS, the United States Department of Energy's National Energy Technology Laboratory has stated that, "The problems associated with world oil production peaking will not be temporary, and past 'energy crisis' experience will provide relatively little guidance. The challenge of oil peaking deserves immediate, serious attention, if risks are to be fully understood and mitigation begun on a timely basis"; and

WHEREAS, the City of Portland and its citizens and businesses depend on oil and natural gas for their economic welfare and their most critical activities, including transportation and food supply; and

WHEREAS, a large majority of money spent on fossil fuels leaves Oregon and provides no local economic benefit, while many of the solutions to lessening dependence on fossil fuels result in local jobs and substantial economic benefits;

WHEREAS, Portland residents and businesses are not currently aware of the full implications of an impending decline and will greatly benefit from an objective source of information on this topic; and

WHEREAS, the City of Portland has adopted the *Local Action Plan On Global Warming*, the success of which depends upon reducing carbon dioxide emissions from burning fossil fuels; and

NOW, THEREFORE, BE IT RESOLVED, a Peak Oil Task Force will be established to assess Portland's exposure to diminishing supplies of oil and natural gas and make recommendations to address vulnerabilities. The Task Force will be lead and staffed by the Offices of Sustainable Development and will coordinate with the Office of Transportation, the Bureau of Planning and other applicable bureaus. It will include up to 11 members representing a broad range of community and business interests.

BE IT FURTHER RESOLVED, the Task Force's charge is:

a. To acquire and study current and credible data and information on the issues of peak oil and natural gas production and the related economic and other societal consequences;

b. To seek community and business input on the impacts and proposed solutions;

c. To develop recommendations to City Council in this calendar year on strategies the City and its bureaus can take to mitigate the impacts of declining energy supplies in areas including, but not limited to: transportation, business and home energy use, water, food security, health care, communications, land use planning, and wastewater treatment. These recommendations will be considered as amendments to the Local Action Plan on Global Warming when it is revised in 2007 and integrated into citywide long term strategic planning; and

d. To propose methods of educating the public about this issue in order to create positive behavior change among businesses and residents that reduce dependence on fossil fuels.

Adopted by the Council, May 10, 2006
Commissioner Sam Adams
Commissioner Randy Leonard
Commissioner Dan Saltzman
Commissioner Erik Sten
Mayor Tom Potter
Prepared by: Brendan Finn
May 10, 2006

GARY BLACKMER
Auditor of the City of Portland
By: /S/ Susan Parsons
Deputy

BACKING SHEET INFORMATION

AGENDA NO. 601-2006

ORDINANCE/RESOLUTION/COUNCIL DOCUMENT NO. 36407

COMMISSIONERS VOTED AS FOLLOWS:		
	YEAS	NAYS
ADAMS	X	
LEONARD	X	
SALTZMAN	X	
STEN	X	
POTTER	X	

Appendix 2: Peak Oil — An Overview

This document was prepared by John Kaufmann of the Oregon Department of Energy and provided to Task Force members as part of the initial Peak Oil Task Force Briefing Book.

PEAK OIL – AN OVERVIEW

Much has been written about the concept of "peak oil" in recent years. Peak oil does not mean that no more oil exists. It means is humans have used about half the Earth's endowment of oil. Once the peak is reached, global oil production can no longer be maintained or increased. Annual oil production will level out and begin a long-term decline. Production will no longer be able to meet growing demand as it has in the past.

Peak oil typically encompasses the idea of peak natural gas as well. Natural gas follows a production curve similar to oil. World natural gas is expected to peak perhaps a decade or two later than oil. However, the U.S. is expected to experience the effects of declining natural gas production sooner than that. North American gas production appears to have peaked in the past few years. It is more expensive to import natural gas than oil. It has to be liquefied for transport and storage and then re-gasified for distribution.

Oil accounts for about 40 percent of the energy we use, and natural gas accounts for another 25 percent. Oil provides virtually all our transportation energy, and natural gas heats nearly half our building space and generates 7-15 percent of Oregon's electricity. In addition, oil and natural gas are used for numerous industrial processes, including use as a feedstock for thousands of products such as asphalt, fertilizers, pesticides, plastics, chemicals, paints, medical products, vinyl, and shoes and apparel.

Peak oil could have a major impact on the U.S. and world economies. All the major recessions of the past 35 years were preceded by sharp increases in the price of oil. The energy crises of the 1970s provide a preview of the impact of peak oil. U.S. oil production peaked in 1970 and started a decline, which continues to this day. We turned to imports to make up the shortfall. OPEC used this growing dependency for political purposes, cutting production 6-7% in 1973 and tripling prices. As a result:

- GNP growth fell from 4% in 1960-73 to 1.8% in 1973-82;
- productivity growth dropped from 2.5% in 1966 to less than 1% in 1979;
- unemployment rose from 4.8% in 1972 to 8.3% by 1975;
- inflation was 8.8% for the decade; and
- take home pay dropped 6% from 1973 to 1979.

High prices stimulated energy conservation and development of more expensive, harder-to-get supplies from places like Alaska and the North Sea, and eventually OPEC was forced to reduce prices. However, this time there's no major new resource areas to develop. The impacts could be deeper and last longer than they did after U.S. oil production peaked.

Opinions differ as to when production will peak. Some experts believe the peak is imminent or has already happened. Many believe it will occur in the next 10 to 15 years. The most optimistic opinions place the peak around 2030 to 2040. The primary difference revolves around estimates of earth's ultimately recoverable reserves and the effect of prices in stimulating advanced recovery and development of unconventional resources. Generally speaking, the lower estimates tend to come from petroleum geologists and physicists, the higher estimates from economists.

A review of the data leads us to conclude the peak likely will occur sooner rather than later. Among our observations are the following:

1) Trends of both discoveries and production point to a global resource base of about 2.2 trillion barrels of oil. The world has already used more than one trillion barrels, and is currently using more than 30 million barrels per year.

2) Optimistic estimates that the earth holds 3 trillion barrels of recoverable oil would require a reversal of historic discovery trends and a doubling of estimates of remaining reserves.

3) In the long run, production cannot exceed discoveries. Experience in many oil-producing nations indicates that production lags discovery by 25 to 40 years. For example, in the U.S., discoveries peaked in the early 1930s, and production peaked in 1971. World discoveries of oil peaked in the mid-1960s, and have declined ever since.

4) Discoveries fell below production in the mid-1980s and have continued to fall. The world currently finds one barrel for every four or more that it uses.

5) Higher oil prices and increased drilling have not resulted in increased discoveries. New discoveries have tended to be fewer, smaller, deeper, more remote, and more costly. The largest, most easy-to-find deposits are likely to already have been found. For example, a much-heralded discovery in the Gulf of Mexico recently is located in a hurricane-prone area under 7,000 feet of water and another 20,000 feet below the ground, and contains 1 to 6 months worth of oil at current rates of consumption – the costs of producing this would be high, and it would not noticeable delay the peak.

6) About two-thirds of oil-producing nations have already peaked and are in decline, including the U.S., Mexico, and the North Sea (U.K. and Norway). At least two of the world's five largest fields ever found – Burgan in Kuwait and Cantarell in Mexico – have peaked and begun to decline, and there is concern that Saudi Arabia is having difficulties maintaining production from the world's largest field, Ghawar.

7) Knowledge of where oil may or may not be located is more extensive than ever. Geologists have identified what kind of geological formations are likely to produce and hold oil, and the earth's geology has been extensively mapped. In addition, millions of wells have been drilled looking for oil and other resources. The likelihood of finding new fields comparable to those in Middle East, Texas, Russia, Mexico, or the North Sea, is very low.

8) Estimates of existing reserves are unreliable. Reserve estimates of OPEC member nations jumped 60 percent in the late 1980s. This was likely due to a link between proved reserves and production quotas. In the past two years, Shell Oil and Kuwait downgraded their estimates of proved reserves by 20 and 50 percent, respectively.

Several other forces could also create conditions that would also require reductions in U.S. oil consumption like peak oil.

- Geopolitical events affect production of fossil fuels. Most of the remaining oil and natural gas is in nations that are either unstable or hostile to the U.S., and both voluntary production cuts and war-related disruptions have and will continue limit productive capacity or output.
- The production and use of fossil fuels may have to decline rapidly to reduce carbon emissions in response to global warming concerns.
- A decline in the value of the dollar relative to other currencies could reduce our purchasing power and force the U.S. to reduce its share of oil use to levels commensurate with its share of the world population. The U.S. currently has about 5 percent of the world's population, but uses about 25 percent of the world's oil production.

Many believe higher prices will stimulate either new discoveries or the development of alternatives. For example, Cambridge Energy Research Associates, a major economic consulting firm, released a report in November 2006 claiming that world oil production will not peak before 2030. This is based on the highest estimate of developable resources to date, and has come under criticism from many. In particular, CERA's projects that the market will stimulate more production from advanced recovery techniques, Canadian oil sands, and oil shale than others forecast. Our review of the literature suggests these resources will cost more and be developed more slowly than CERA assumes.

Below is an assessment of some of the major supply alternatives. While alternatives will be used in some measure, they are unlikely to fully replace oil and natural gas. All have a lower energy return on energy invested (EROEI) than oil or natural gas – that is, they take more energy to produce and yield a smaller net energy gain. For example, most of the alternatives yield 2 to 5 units of energy for every unit needed to produce them. This compares to oil and gas which historically have had net energy ratios of 20:1 and greater. As a result, the alternatives are less productive and more expensive.

In addition, the alternatives produce electricity rather than liquid transportation fuels, have significant environmental problems, or will have their own supply constraints, particularly if production is increased to offset declining oil and gas resources. All would take decades to replace a significant amount of declining oil and natural gas reserves.

1) *Coal* is abundant in the U.S., with 240 years worth of reserves at current use rates. It can be used to generate electricity or can be made into gaseous or liquid fuels. However, increased use of coal would seriously aggravate global warming. Much of the CO2 could be sequestered, but it would require about one-fourth of the energy in the coal to do so. In addition, coal use would have to quadruple or more to displace oil and natural gas. But if U.S. coal use increased just 2 percent per year, the lifetime of our coal reserves would drop to 85 years and lead to a "peak coal" problem in the not-too-distant future.
2) *Nuclear power* produces only electricity, which means it is not well suited to replace oil as a transportation fuel. Even if nuclear power could meet all U.S. energy needs, the 10-fold increase in nuclear power plant capacity would require massive infrastructure costs. With

that many plants in operation, known reserves of uranium would be depleted in about 20 years. Breeder reactors could extend the life of uranium reserves, but safe, affordable breeder reactors are not currently available. Nuclear power also poses the problems of nuclear waste disposal and nuclear weapons proliferation. Oregon has had strong opposition to nuclear power, and Oregon's only nuclear plant was closed early because of leaking steam tubes.

3) *Oil sands* in Canada and Venezuela are abundant. However, the oil is not in liquid form, but rather more like sand-impregnated asphalt. This makes oil sands extraction land- and water-intensive, polluting, and high in carbon emissions. In addition, it has an EROEI of about 3-to-1, meaning it takes about one-third of the energy in the oil sands to produce it.

4) *Oil shale* has many of the same environmental problems as oil sands. In addition, oil has never been produced commercially from shale. Shale oil has an estimated EROEI of about 1.5-to-1, meaning two-thirds of the energy it yields must be used to produce it. This would increase the amount of CO2 emitted. Capturing the CO2 would further reduce net energy.

5) *Enhanced oil recovery* involves advanced methods to extract more oil from a field, such as in-fill drilling, horizontal drilling, hydraulic fracturing, and injection of solvents like CO_2, nitrogen or steam to make the oil move more easily. Because of costs, enhanced recovery is unlikely to affect an oil field's peak since it is not typically applied until after production has peaked. Recent studies also suggest these methods simply allow the oil to be extracted a little faster, with the total amount of oil produced from a field remaining about the same.

6) *Biofuels (biodiesel and ethanol)* are highly touted to replace oil for transportation. Biofuels are carbon neutral, meaning the CO_2 they emit is balanced by the CO_2 they need to grow. However, biofuels would compete with other uses of the land, such as food, forest, erosion control, and habitat. In addition, most ethanol in the U.S. is now made from corn, which is oil- and natural gas-intensive to grow and, as a result, has a low energy return – best-case analysis estimates the EROEI at about 1.67-to-1. There are hopes that ethanol will be able to be made from cellulosic plants such as switchgrass, which are less energy intensive and can be grown on marginal lands. However, this is still in the research stage. Biodiesel has a better EROEI (3-to-1 or slightly greater) than ethanol, but will probably require dedicated crops and cropland, thereby limiting the amount that can be produced. While biofuels hold some promise, they are unlikely to replace more than a small share of the petroleum-based liquid fuels currently used.

7) *Hydrogen* is often touted by many as the clean, renewable fuel of the future. However, hydrogen is an energy carrier, not an energy source. It is not found in its most useful state–H_2–but must be separated from other atoms to which it is attached, such as carbon or oxygen. Most hydrogen today is produced from natural gas. This is not sustainable when natural gas is in decline. In the long run, if hydrogen is to be used as a transportation fuel, it will have to be electrolyzed from water using renewable power. But because of thermodynamic losses in producing and transporting the hydrogen, it may be more efficient to use the renewable power directly. In addition, because of its volume and because it leaks so easily, hydrogen is difficult to store and distribute. The current storage and distribution infrastructures for natural gas and gasoline would have to be replaced, at huge costs, to accommodate hydrogen.

8) *Clathrates* are ice crystals containing methane (i.e., natural gas) found at the bottom of oceans. The potential resource is immense. However, methane is a more potent greenhouse gas than CO_2, and release of even part of this methane could trigger runaway global warming. At this time it is not technically feasible to capture the methane for commercial use without a large portion escaping.

9) *Renewables (wind, solar, biomass, wave power)* will need to be developed to the fullest extent possible, and fortunately Oregon is well-endowed with them. However, aside from biofuels, most renewables produce electricity or thermal power (heat). Their applications rarely include transportation. While abundant, it is not clear how much of our total energy needs renewables will be able to meet. The immediate need for renewables is to meet electric load growth, then to begin displacing coal and natural gas in electrical generation to reduce CO_2 emissions. In addition, fossil fuels are required to build renewable power plants. We need to begin building the infrastructure now while cheap oil and natural gas are still available. They will be more expensive and difficult to build once oil and natural gas supplies are declining.

In addition to alternative supplies, it will be necessary to reduce how much energy we use. While we cannot conserve our way to zero, we will need to use less energy in the future than we use today. With the peak of world oil production approaching, we need major improvements in energy efficiency – we need to improve the efficiency of our cars, our homes and buildings, our lights and appliances, our industrial processes. In addition to technology improvements, we will need to restructure various institutions and systems. For example, we should reinvigorate our rail system, develop mass transit, and change land use patterns to reduce the need to travel. We will also need to change behaviors. We should ride share, walk and bicycle more often, and vacation closer to home.

Regardless when the peak occurs, the implications are potentially profound. It would be prudent to begin act now. Robert Hirsch, co-author of the highly regarded SAIC report completed for the U.S. government entitled "Peaking of World Oil Production: Impacts, Mitigation, and Risk Management," concludes that peak oil is going to happen, although the timing is uncertain, and that it could cost the U.S. economy dearly. The report further concludes that to have substantial impact, mitigation options must be initiated more than a decade in advance of peaking and will cost in the range of $1 trillion. The costs of acting too late will exceed the costs of acting too early.

The solution will require a massive effort. It took decades to develop coal, oil, and natural gas into significant energy sources. It will take decades to transition to a new way of doing things, and will require large amounts of capital and energy. If we wait until the peak occurs, we will be trying to build the new infrastructure at the same time that energy supplies are declining, prices are rising, and we're struggling to maintain other services. Energy efficiency and renewable energy technologies will provide a strong base for jobs and profits in the post-peak oil-and-gas economy, and can serve as an economic development tool for Oregon. We must begin now.

Appendix 3: Peak Oil Scenario

The following scenario was developed by the Peak Oil Task Force for use in summarizing the issue to stakeholders who participated in interviews and discussions through the task force process.

PEAK OIL SCENARIO

Our society is dependent on massive quantities of energy. In particular, oil accounts for about 40 percent of the energy we use, and provides virtually all the fuel to transport people and freight. Natural gas accounts for another 25 percent of the energy we use, meaning oil and natural gas combined account for about two-thirds of the energy we use.

However, recent evidence strongly suggests that the world is near the maximum, or "peak," of oil production, after which supply will begin a long-term decline. World natural gas production will peak a few years after oil, but evidence indicates that natural gas production in North America (U.S., Canada, Mexico) has already peaked. As a result, supply will have trouble meeting demand – prices will rise, productivity will decline, and shortfalls may occur. In addition, it is unlikely that energy efficiency or alternate energy forms will allow us to maintain our prodigious energy use anywhere near current levels.

This will have profound impacts on society. In many cases we will have to prepare for the impacts and learn to do things differently. Some of the mitigation measures may require capital investment or lead times to develop.

To begin to prepare, we must anticipate what the impacts will be. The City of Portland has established a Peak Oil Task Force to identify potential impacts so preventive steps can be taken. Examples of some likely or potential impacts include:

- Air travel, which is very energy intensive and sensitive to fuel prices, will be one of the first industries to be affected.
- Fertilizer is made from natural gas, pesticides are made from oil. As oil and natural gas become scarcer and prices rise, agricultural production may decline. Food will become more expensive, and there may be an increase in hunger.
- Trucking will be one of the first industries to feel the pinch. However, this could have a ripple effect throughout the economy. Prices of all goods may rise, and some goods may remain undelivered. Some industries are critical and will survive the squeeze, others may not. This will have ripple effects on employment, which could affect homelessness.
- Individual travel will be affected. Long vacations and other recreational or discretionary trips likely will decline, with economic impacts on those businesses which depend on it.
- Heating costs will increase. Combined with employment impacts, many people will be squeezed economically. This could affect some people's ability to maintain or own a

home, and put strain on individuals, families, and communities requiring additional services.

We ask you to think about the effects that rising oil and natural gas prices or declining supplies could have on the business or service your organization provides. Some specific questions are:

- How will demand for your product or service be affected?
- How will costs or the ability to produce your product or provide your service be affected?
- Looking up the supply chain, how will your suppliers of raw or finished materials be affected?
- How would these impacts affect your revenues and/or profit margins? Your employment base?
- What steps do you think your organization will take to respond to continual increases in energy prices or scarcity of supply? What are some changes or alternatives you could implement?

Appendix 4: Land Use & Transportation Subcommittee Materials

POTF Land Use & Transportation – Materials and Contacts

Individuals Consulted

Eileen Argentina	Portland Office of Transportation
Constance Beaumont	Department of Land Conservation and Development
Rob Bertini	Portland State University
Dan Bower	Portland Office of Transportation
Rex Burkholder	Metro
Roland Chlapowski	Commissioner Adams' Office
Stuart Cowan	Autopoiesis
Michael Dennis	Willamette Pedestrian Coalition
Steve Dotterrer	Portland Bureau of Planning
Damon Fordham	Oregon Department of Transportation
Roger Geller	Portland Office of Transportation
Lavinia Gordon	Portland Office of Transportation
Bob Hillier	Portland Office of Transportation
Peter Hurley	Portland Office of Transportation
Jim Karlock	Citizen
John Kaufmann	Oregon Department of Energy
Susie Lahsene	Port of Portland
Beth Meredith	Living Spaces Design
Jim Newcomer	Confluence Point Consulting
Pam Peck	Metro
Deena Platman	Metro
Bob Robison	Pedestrian Advisory Commission
Julie Rodwell	Oregon Department of Transportation
Peter Schoonmaker	Illahee
Phil Selinger	TriMet
Eric Storm	Living Spaces Design
Bridget Wieghart	Metro

Materials Reviewed

architecture2030.org – online documents from
www.architecture2030.org/current_situation/current5.html
"U.S. Energy Consumption" data and "2030 Challenge Targets"

Berkowitz, Edward. Something Happened: A Political and Cultural Overview of the Seventies. Columbia U. Press, NY: 2006.

Sightline Institute – Cascadia Scorecard 2006 Focus on Sprawl & Health

City of Portland Bureau of Planning – online documents from
http://www.portlandonline.com/planning/index.cfm?c=42773
"Comp Plan Context: 1980 to Today", Chapters 1-8

"Maslow's Hierarchy of Needs"

"Funding Peak Oil and Climate Change Preparedness and Schools" by Eli Lamb – source unknown

American Trucking Associations – FHWA Talking Freight Seminar Series: Energy Issues and the Impacts on Freight Transportation by Richard Moskowitz, May 17, 2006 (copy of a presentation)

Owner-Operator Independent Drivers Association, Inc. – Effect of Fuel Prices on Professional Truckers by Todd Spender, OOIDA Exec. VP, August 23, 2006 (copy of a presentation)

Global Insight – Global Economic Trends and Trade Patterns by Paul Bingham, October 12, 2005 (copy of presentation)

Jim Karlock – "A Comparison of Energy Consumption of Cars, Transit Buses, Rail, and Air" based on data found in The Transportation Energy Data Book: Edition 25-2006

Metro – New Look at Regional Choices February 2006

Cambridge Systematics, Inc. – Oregon Transportation Plan Policy Analysis 3.0 Sensitivity Scenarios

Oregon Transportation Plan (in particular, Pages C-50 – C-52)
http://www.oregon.gov/ODOT/TD/TP/docs/ortransplanupdate/05otpVol1jul.pdf

ODOT – Transportation Key Facts 2006.
http://www.oregon.gov/ODOT/COMM/docs/key_facts/04KeyFacts_final.pdf

Pew Research Center – History Repeats Itself: As the Price of Gas Goes Up, The Nation's Odometer Slows Down

"The Cost of Congestion to the Economy of the Portland Region."
http://www.portlandalliance.com/pdf/Congestion_Report.pdf

Portland Office of Transportation – one page outline on bicycles and walking statistics

Portland Office of Transportation – summary of Transportations Options program

Metro – Regional Transportation Options 2004-05 Program Evaluation, Final Report, July 12, 2006

TriMet – "Notes on Transit Responsiveness to a Peak Oil Shift" by Phil Selinger, August 28, 2006

Land Use and Transportation Subcommittee
October 16, 2006

Proposed Recommendations on Accessible Development Patterns

Overarching Recommendations:

I. Foster a land use pattern and transportation system that will make it easier for people to shift trips to walking, biking and transit when oil prices stimulate changes in travel behavior.

II. Prioritize investments in improvements to the city's network of pedestrian and bicycle facilities, especially in areas of low accessibility.

Specific Recommendations

The city should:

1. Rate each Portland neighborhood on its degree of "accessibility": the degree to which retail, profession and civic services (such as grocery stores, schools, doctors' offices, libraries, transit stops, day-care centers, cafes and restaurants, dry cleaners, hardware stores, parks, banks) lie within convenient walking and bicycle distance from households within the neighborhoods.

2. Map those portions of Portland neighborhoods that do NOT lie within ½-mile of a grocery store of neighborhood size (15,000 to 35,000) or larger.

3. Develop an action plan of measures to improve neighborhood accessibility, such as improved pedestrian and bicycle facilities; more flexible zoning to allow neighborhood-scale retail, professional and civic services, or to allow additional dwelling units to create a market for such uses.

4. Implement Metro's Corridor Study: designate Corridor stretches (portions of 82nd Avenue, e.g.) for revitalization (residential/retail/office), supported by frequent transit service.

5. Develop "location-efficient mortgage" programs in neighborhoods with a high degree of accessibility.

6. Encourage Metro to refine its modeling capabilities to enable it to evaluate the effects of combustion engine fuel increases on land use patterns and travel behaviors.

7. Encourage Metro to minimize expansion of the urban growth boundary (UGB).

8. Encourage Metro to provide permanent protection to prime farmland close to the UGB.

9. Place parking meters in well-developed retail districts (Hawthorne; NW 23rd; Gateway); earmark a portion of parking revenues for pedestrian/bicycle improvements within district.

10. Enhance “individual marketing” in those neighborhoods with low neighborhood accessibility to determine which measures would be most likely to reduce the number and length of SOV trips in the neighborhood.

Impacts Addressed

1. People living in neighborhoods without affordable travel options will spend an increasing portion of their disposable incomes on travel.

2. There will be reduced funding for transportation improvements – for transit, pedestrian and bicycle improvements as well as for road capacity for cars - due to reducing travel by gas-powered vehicles.

3. There will be reduced funding for transit operations.

4. The cost of housing will rise in more “accessible” neighborhoods.

5. Lower income households will be forced to the edges of communities, where transit service is poorer.

6. There will be fewer car trips.

7. There will be a shift of trips to walking, biking and transit.

8. There will be increased demand for telecommuting and compressed work week.

9. Mode shift is most likely to occur in discretionary, non-work trips.

10. There will be a reduced demand for parking.

11. There will be increased demand for housing and retail services near transit stops, especially near light rail and street car stops.

12. There will be an increased demand for retail, professional and civic services within walking and biking distance of more households.

13. There will be increased demand for new housing types, such as accessory dwellings, co-housing and live-work space.

Triple Bottom Line:

These recommendations also help achieve other recommendations from the Peak Oil Task Force and other important city and regional objectives:

- Improve citizens’ health (residents of compact, pedestrian friendly places suffer fewer chronic ailments than those of sprawling communities; residents of walkable

communities are less likely to be overweight; residents of compact communities spend 20 minutes a day less in a car than those in a low-density suburb; Cascade Scorecard, Sightline Institute, 2006)
- Reduce the capital and maintenance cost of services (asphalt up 13 percent since 2004, adding $100 million to highway projects on state's books; Oregonian, 7/31/06, Mayer)
- Reduce pressure to expand UGB
- Save nearby farmland for food security
- Improve air quality (motor vehicles are the largest source of air pollution; Cascade Scorecard, Sightline Institute, 2006)
- Reinforce city's carbon dioxide reduction plan.

Other Recommendations:

- Set an ambitious but achievable goal for the people of Portland: reduce the number of gallons of gas consumed by the average Portlander in a week from 8 to 5.3 gallons.
- Protect intermodal freight facilities to facilitate shift in freight modes in response to fuel price increases.

Impacts Addressed

1. Higher fuel costs will force companies to consider shifting from trucks to other modes.

2. Rail and ship freight facilities will become relatively more important f or movement of goods.

Findings:

- Vehicle Miles Traveled/Capita is dropping in region (from approx. 21.7 to 19.8 from 1996 to today). Cotugno class at PSU; PDOT handout.
- Cycling traffic in Portland has risen 257% in last ten years. BBC News series
- Crossings over four Portland bridges by bicycle commuters increased 15% in 2004 and 18% in 2005. PDOT
- Transportation consumes 28% of energy in U.S. U.S. DOE, Energy Information Administration, John Cogan
- If one in ten Americans used transit regularly, U.S. reliance upon foreign oil could be cut by 40%. APTA
- A doubling of density results in a 25-30% reduction in VMT. Reid Ewing, "Is Los Angeles-Style Sprawl Desirable?" Journal of the American Planning Association, Vol. 63, No. 1, Winter, 1997, p. 113.
- Increased density correlates with increased use of transit and walking. Age-Related Shifts in Housing and Transportation Demand: A Multi-disciplinary Study Conducted for Metro by PSU's College of Urban and Public Affairs, August 14, 2006.
- An average urban household uses 320 million BTUs/year; an average suburban household uses 440. Jennifer Henry, U.S. Green Building Council.
- Lower-income households are more likely to change their travel behaviors in response to rising gas prices than average households. Pew Research Center Survey of 1,182 Americans

- Lower income families are migrating to the suburbs.
- Portland is eliminating over 62 million car trips a year. BBC News series
- Greenhouse emissions have risen 13% over last 10 years in U.S.; down to 1990 levels in Portland. BBC News series
- Trips in downtown area are shifting to bicycle. Geller PSU slides.
- Work trips comprise only 20% of all trips in Portland.
- Mode use for work trips virtually unchanged from 1997 to 2004-05 (slight increase in drive-alone from 71 to 71.5%). PDOT citizen survey handout
- Cars and trucks are responsible for 38% of carbon monoxide emissions in city. PDOT "Facts About Portland 2003-04.
- Mode split comparisons with European cities shows that the big difference is pedestrian trips.
- Mode shifts are more likely to go to pedestrian/bicycle than transit (Europe; data: transit costs).
- Walking is the easiest mode shift to make; also the #1 choice of those considering a shift.
- Cost of parking is the most-often cited reason for not driving.
- People who live in walkable, mixed use neighborhoods have a 35% lower risk of obesity. L.D. Frank, American Journal of Preventive Medicine, 27, 87-96 (2004).

Potential Recommendations discussed by Land Use & Transportation Committee at October 5, 2006 meeting

Freight and Fuel

1. Charge taxes based on vehicle miles traveled.

2. Since each City resident gets a benefit from public rights-of-way (fire trucks, delivery vans, garbage trucks provide services to everyone), charge each resident a City of Portland transportation user fee for system maintenance and improvement.

3. Restrict types of vehicles allowed on roadways to specific times of day to reduce overall congestion.

4. Have dedicated freight lanes on roads and highways.

5. Create central passenger vehicle parking areas and move vehicles off of residential streets.

6. Create toll lanes that charge single-occupancy vehicles more or charge a toll to enter Portland in a single-occupancy vehicle.

7. Tax higher-weight passenger vehicles more than lower-weight ones.

8. Have truck delivery-only streets within the City.

9. Create short-sea shipping lines along the West Coast to move products between Mexico and Canada by water not by truck.

10. Ban package delivery by truck to individual addresses. Create distribution centers within urban areas where individuals can come and pick up their packages.

11. Build new rail transfer stations that are closer to the product.

12. Electrify the rail system to save on diesel fuel usage.

13. Build fuel refineries.

14. Attract alternative fuel manufacturers and distributors.

15. Tax alternative fuels the same as other fuels to help pay for transportation system maintenance.

16. Develop citizen-owned co-op fuels.

17. Take money earmarked for airport expansion and put it into other transportation programs like commuter rail, bridge maintenance, etc.

18. Continue to protect industrial and manufacturing land to allow for economic diversification if global economy falters.

Public Transportation – Potential Recommendations

19. Look for the most cost-effective ways to fully utilize the capacity of existing alternative modes of transportation. This is the short-term solution and is a marketing challenge.

20. Charge taxes based on vehicle miles traveled in a single-occupancy vehicle.

21. Since each City user gets a benefit from public rights-of-way and all modes can use streets, charge each resident and city-based employer/employee a City of Portland transportation user fee for system maintenance and improvement.

22. Have dedicated HOV lanes and bike lanes on roads and highways. Seattle currently has a more extensive HOV network and more company financial incentives.

23. At least double the on-street and garage parking fees in the City Center and other major shopping/employment areas like Lloyd Center, Gateway. This may push drivers into parking in residential areas. May also need to implement a residential zone parking permit system similar to Chicago's.

24. Develop viable intra-urban rail systems now. Could effectively connect Portland to Astoria, McMinnville, the Valley, perhaps even Bend, The Dalles and Pendleton.

25. Take money earmarked for airport expansion and put it into other transportation programs like commuter rail, bike lanes, sidewalks, etc.

26. Expand vanpools and carpools to special destinations like Ikea, casinos, coast resorts, ski areas, State Fair, etc. NYC/NJ does this.

27. Charge car-sharing companies a nominal on-street parking fee or no fee at all.

28. Make walking seem like a recognizable mode of transportation. This is a marketing challenge.

29. Continue to expand the light rail, streetcar, and bus systems now while there is funding still available.

30. Provide incentives for employers to change work patterns – compressed work weeks, job sharing, telecommuting, proximate commuting (transfer people to the branch office closest to their house).

31. Continue to expand the bike lane system, putting bike lanes on the most traveled routes for commuters, including large streets like Sandy Blvd and Foster. More bikes on even these high traffic routes makes for a better overall environment.

32. Continue to fund and implement the already existing alternative transportation programs and incentives, and the existing land use policies to encourage the continued reduction of personal trips-per-day.

33. Create more flexible multi-use zoning designations that will allow for the creation of employment centers around the City. Find ways to accommodate manufacturing, office, light industrial, service, and residential next to each other.

Potential Solutions to Peak Oil Impacts

34. Educate other cities within the State to the potential impacts of peak oil and help them develop into sustainable, well-planned communities to lessen the pressure on Portland to be the main economic driver and population growth supporter in the state.

35. Create a design-advisory team to help push high-quality building design as density increases.

36. Continue to acquire and retain large land parcels to be developed into public areas and public open space. Think about holding onto school lands for this reason.

37. Create even more flexible zoning to allow for live-work, light manufacturing, and urban agriculture within the City.

38. Focus on developing Regional and Town Centers outside the central city into viable "villages". Do not overlook already existing smaller neighborhood centers based on old streetcar suburbs – while these may not be listed in Metro's development scenario, many of the pieces of a "village" already exist in these areas and they may only need a single development investment to be re-energized.

39. Continue to fund several affordable housing programs, including those for workforce housing in an effort to have a city of mixed income levels, not just rich and poor.

40. Continue to educate people about ADU options.

41. Look at current parking policy and see if the required minimums for schools, and other large land users could be reduced or even dropped.

42. UGB – look at what really makes good agricultural land, consider it's economic impacts as well.

43. UGB – protect agricultural land from development by creating conservation easements.

44. Develop metrics to measure how effective our land use policies are so we can be proactive in spotting development trends instead of being reactive.

45. Increase development fees to reflect the true cost of development. Automobile-dependent development would pay the highest fees, sort of a fuel use charge.

46. Continue to create pedestrian-friendly, dense neighborhoods with access to employment, retail, social institutions, and public transportation.

Additional recommendations considered by Land Use & Transportation

Expand the "Drive less. Save More" campaign to include Peak Oil awareness.

Encourage businesses to adopt a "car sharing" mentality
Fostering the adoption of "multi-rider" transportation to reduce single occupancy trips

Offer consulting for businesses and citizens looking to prepare and make changes for Peak Oil
This can be paid for by citizens and businesses by passing a reasonable "Peak Oil Preparation" tax or diverting funds from other programs

Create or expand neighborhood introduction programs
Foster programs that help neighbors get to know one another (like City Repair)

Continue to encourage use of public transportation, biking, walking, and carpooling
Cities can learn from other cities leading the charge with success (Portland, San Francisco, etc.)

Foster neighborhood co-op owned fueling stations
Pair Oregon farmers making alcohol in their own micro-refineries / distilleries with neighborhoods that purchase the fuel from their own alcohol fuel co-op. (Fact: Alcohol can be used as a fuel)

Offer free parking for new Scooter riders
Encourages commuters to shift to efficient modes of transport. Exclude scooters that do not meet California air emissions standards.

Peak Oil Kits to hand out at the DMV
The City of Portland can internally create or outsource the creation of a "Peak Oil Intro Kit" to hand out along with all DMV transactions. This allows the city to track who has received this information for measuring awareness and outreach statistics.

The city could create a requirement that all new and renewing licensed drivers be required to watch a video covering the basics of changes people need to consider, and how they can help reduce the problems.

Appendix 5: Food & Agriculture Subcommittee Materials

Individuals Consulted

Pam Barrow, Northwest Food Processors Association
Jeff Boden, West Union Gardens
Rachel Bristol, Oregon Food Bank
Steve Cohen, Portland Office of Sustainable Development
Rosemarie Cordello
Judy Crockett, Portland Office of Sustainable Development
Jim Johnson, Oregon Dept of Agriculture
Mark Kendall, Oregon Department of Energy
Pam Leitch, Portland Permaculture Institute
Jack Mulder, Tillamook Creamery
Jeremy O'Leary
Oregon Agricultural Information Network, Oregon State University
Anthony Radspieler
Brian Rohter, New Seasons Markets
Patty Rueter, Portland Office of Emergency Management
Andy Schneider, Portland Office of Sustainable Development
Brent Searle, Oregon Department of Agriculture
Stuart Simon, Safeway
Mark Smith, Summit Foods
Mark Steele, NORPAC Foods
Lynn Youngbar, Portland Farmers' Market, Oregon Department of Agriculture Advisory Board

Materials Reviewed

Kenneth S. Deffeyes, *Hubbert's Peak, the Impending World Oil Shortage*

The Diggable City, a Portland State University student capstone project, June 2005. http://www.diggablecity.org/

Chad Heeter, *My Saudi Arabian Breakfast*

Richard Heinberg, *The Party's Over, Oil War* and T*he Fate of Industrial Societies*

Michael T. Klare, *Blood and Oil*

James Howard Kunstler, *The Long Emergency, Surviving the End of Oil*

Metro Fair Growth and Farmlands Project Committee Report

Richard Manning, "*The Oil We Eat*," from the book *Against the Grain*

Oregon Department of Agriculture, responses to questions asked by Peak Oil Task Force

Oregon State University Extension Service, 2005 Oregon County & State Agricultural Estimates; Special Report, Revised April 2006

Portland Multnomah Food Policy Council Conservation Easement Report

Portland Multnomah Food Policy Council Sub Committee on Land Use Recommendations

Paul Roberts, *The End of Oil: On the Edge of a Perilous New World*

Background Information about Oregon Agriculture

(compiled and editorialized by Marcus Simantel, August 2006)

1. **Oregon Agriculture is Big**
    a. Agriculture makes up over 10% of the state's economic activity
    b. 94% of Oregon's farms are family owned – in contrast to most U.S. agriculture
    c. 80% of Oregon's farm production is shipped out of state, and nearly half of that is shipped internationally
    d. Oregon's farmers produce over 225 different crops, only California and Florida have a more diversified agricultural industry
    e. Currently non-food crops are crucial for Oregon farm economic viability (nursery, grass seed, xmas trees, etc.) This "land banking" could be a positive for future local food production.
    f. Probably 95+% of current Oregon agricultural production would be considered "industrial " farming contrasted to less than 5% organic. (In the larger picture of ag much of organic is also produced using "industrial" methods and is shipped long distances.)
    g. Farm direct marketing such as CSAs, farmstands, u-pick operations, farmers markets – is a small but growing segment of Oregon agriculture

2. **Some Things Already Being Done** – that are related to our scope of work and are possible resources for us
    a. Tri-County Farm Fresh Produce Guide – a group of 60 – 70 local farmers that do direct marketing from their farms
    b. Portland Community Gardens - currently 30 – trying to expand, overseen by Portland Parks and Recreation
    c. Portland/Multnomah Food Policy Council – established in 2002 by city council and the county commission to advise on food issues such as land use/zoning, food access, institutional purchasing, etc. It has done a lot of work that fits in with our scope of work.
    d. The Diggable City Project Last year through the efforts of commissioner Saltzman and the Food Policy Council the city inventoried city owned properties that are under-utilized and that could be used for urban agricultural activities. Over 200 sites were identified. Three pilot projects are currently being pursued.
    e. Learning Garden Laboratory – SE 60th; Zenger Farm – SE Foster Rd; Jean's Farm – SE Johnson Creek Blvd; Try/On Life Community Farm – SW Boones Ferry Rd; all are efforts to reconnect children and adults with where their food comes from. These would be worth field trips for our group.
    f. Growing Gardens – an organization that teaches gardening, also has a school component
    g. ODA The Oregon Dept. of Agriculture will continue to be a key player in all aspects of our state's food system from production, processing, marketing, and regulating.
    h. Oregon State University Extension Service – not currently very active in Multnomah County due to county budget woes, but has a wealth of resources and

programs such as Master Gardener Program, 4-H program, nutrition education, food preparation and preservation, etc.

i. USDA United States Dept of Ag the elephant in the room, administers the farm bill – which is up for reauthorization in congress.
j. Portland's Office of Sustainable Development (OSD) an obvious player in our work
k. EcoTrust's efforts
l. The Chef's Collaborative
m. Slow Food Portland
n. Peak Oil Portland
o. Oregon Food Bank
p. And many more local groups that concern themselves with food

3. Some Land Use Items
    a. Senate Bill 100 Passed by the 1973 Oregon Legislature, SB 100 created Oregon's statewide land use planning system. The result is most of the best farmland in Oregon was protected from urban sprawl and development. (Measure 37 now puts that protection in jeopardy.)
    b. The "Big Look" The 2005 legislature passed SB 82 which says we need to take another look at our land use rules. Food people, especially those with peak oil concerns, need to pay attention to this. It is a three to four year project which just got under way this spring.
    c. The "New Look" Metro, our regional government in charge of planning and transportation for the region, is taking a "New Look" at its planning policies. Again, food people need to pay attention. Dick Benner on our task force is very involved in this and is an excellent resource.

FOOD/AGRICULTURE SUB GROUP RECOMMENDATIONS
DRAFT #4 - November 21, 2006

I. Educate The city needs to take actions that will help all citizens understand what is at stake with peak oil… individual, institutions, businesses, agencies.

- Key stakeholders in the food system need education about peak oil and its impacts so they can make appropriate plans.
- The city needs to provide financial incentives or similar measures so that farmers, processors, grocery stores, restaurants, food relief agencies, the Port of Portland, etc. have a plan in place for peak oil impacts.

II. Preserve Farmland The city should take an active role in preserving the productive capacity of its foodshed.

- The city should encourage appropriate agencies to preserve existing farmland and protect productive soils for agricultural use. It could include the creation of agricultural sanctuaries and conservancies as well as preventing the expansion of the urban growth boundary onto productive farmlands.
- The city should lobby to maintain and strengthen current farmland protections through the "New Look" process at Metro and the "Big Look" process at the state level.
- Where there is no natural "hard edge" available to protect farmland, uses compatible with adjacent farmland should be sought.
- The city should hold on to and preserve any land it already owns that would be suitable for urban agricultural uses such as lands identified by the Diggable City project.
- The city should direct more resources toward the Diggable City project, the community garden program, and other urban agriculture possibilities.
- The city should explore options to open up public and private land for food growing, e.g. financial incentives for leasing private land to the city for community gardens.

I**II. Expand direct marketing opportunities for local farmers**. The city should examine and adjust regulations to help farmers sell directly to consumers through additional farmers markets, farmstands, CSAs, and a public market.

IV. Strengthen current hunger relief and emergency agencies and systems. The Oregon Food Bank has systems in place to provide food to low income citizens. However this system is already stressed.

- The city should work with the Oregon Food Bank to develop plans to prepare for increased food demand from a higher percentage of the population.
- Working with ORVOAD and especially the Oregon Food Bank and Multnomah County, POEM should develop a comprehensive food plan to ensure that in case of a short-term or mid-term emergency, food supplies are adequate for Portland.
- The city should play a role in establishing major food warehousing in addition to current Oregon Food Bank and personal efforts. If there is a major societal breakdown, where would Portlanders get food after supermarket shelves are empty? We see this as a risk management must do.

V. Increase local food processing. PDC should prioritize food processing as an economic cluster, including incentives to encourage development.

VI. Educate citizens about growing, processing, preserving, and preparing foods.

- The city should work with Multnomah County to reinstate the OSU Extension Service to help address an increased need to educate citizens about food growing, processing, preserving, cooking, and composting.
- The city should work with the State and Multnomah County to increase nutrition education.
- Schools need to include a comprehensive study of "peak oil" and its implications. Schools need to teach more about nutrition, about where food comes from, how to grow, harvest, process, preserve and prepare foods, and how to compost food waste.

VII. Increase composting. The city should start planning for a local composting site.

Appendix 6: Economic Change Subcommittee Materials

Individuals consulted by the Economic Change Subcommittee

Art Ayers
Marge Bare, Meadows Group Realty Oregon
Joe Cortright, Impresa Consulting
Dave Ervin, Portland State University
Regina Hauser, Oregon Natural Step Network
Sheila Martin, Portland State University
Tom Potiowsky, Oregon Office of Economic Analysis
Ted Reichelt, Intel
Brian Rohter, New Seasons
Sarah Severn, Nike
Stuart Simon, Safeway
Amy VanVliet, State of Oregon
Dennis Wilde, Gerding Edlen

ECONOMIC CHANGE SUBCOMMITTEE
PRELIMINARY RECOMMENDATIONS
OCTOBER 25, 2006

1. The City should adopt recommendations of the Transportation and Land Use committee to foster alternative transportation and land use. Two of the biggest challenges to business competitiveness are commuting and moving freight. For example, we should support mixed use zones, that include small decentralized (neighborhood) manufacturing.

2. Set some big goals regarding reduction of fossil fuel use. Establish benchmarks and measurable goals with timeframe by industry sector. Consider adoption of the Oil Depletion Protocol, with a plan to meet the goal. Determine how much fossil fuel use comes from which sectors, from which activities, etc. This information may also be broken down per capita, per household, by square mile/neighborhood/block.

3. Identify and promote post-peak oil business opportunities. These might include sustainable building design services; renewable energy and conservation services and products; sustainable industrial design; repair/re-use/extending lifetime of various products, including remodeling of existing buildings. Catalog/inventory what we import from out-of-state and abroad, what products and services we will need, what resources we have available locally and establish programs (or plans) to produce those products or substitutes locally.

4. Encourage businesses to assess how they will be impacted by peak oil and natural gas taking into account their own energy intensity, that of their suppliers, as well as their customer's purchasing changes. Encourage business to re-invent themselves. Some businesses or business divisions may have to be re-invented in order to thrive in a less energy intensive environment.

5. Conduct a comprehensive examination of existing programs to see if they're adequate to help businesses adapt to changes required by peak oil – to assist existing businesses to survive, and new ones to get started. This includes regulations, incentives, infrastructure, business assistance and job retraining programs.

6. Outreach and education. Use case studies, personal impact calculators, business evaluations as tools to determine what impacts will be on their business sector. Ramp up OSD education efforts, coordinate with PDC and other industry specific business associations.

Appendix 7: Public Services Subcommittee Materials

Individuals consulted by the Public Services Subcommittee

Trell Anderson, Bureau of Housing and Community Development
Margery Bare, realtor
G. Daniel Bednarz, author "Public health in a post-petroleum world"
Elizabeth Baxter, Archimedes Movement
Pam Brown, Portland Public Schools
Catherine Diviney, Portland Public Schools
Andy Fridley, Portland Public Schools
Brian Hoop, Office of Neighborhood Involvement
Former Governor John Kitzhaber, Archimedes Movement
David Labby, Care Oregon
Wayne Lei, Portland General Electric
James Mason, Director of Multicultural Health for the Oregon Department of Human Services Public Health
Cathy Mincberg, Portland Public Schools
Judy Mohr-Peterson, Oregon Department of Human Services Client Caseload Forecasting Unit
Jim Newcomer, ConfluencePoint
Eric Pippert, State of Oregon Environmental Pubic Health
Carole Romm, Care Oregon; Central City Concern Board member
Patty Rueter, Portland Office of Emergency Management
Jeri Shumate, 211info
Bryan Winchester, Portland Public Schools
Kay Hall, consultant to the hospital industry
Deborah Ward, Oregon Department of Human Services Public Health Division

Materials Reviewed

Hirsch Report, February, 2005, "Peaking of World Oil Production: Impacts, Mitigation, & Risk Management." Report commissioned by the U.S. Dept. of Energy http://www.netl.doe.gov/publications/others/pdf/Oil_Peaking_NETL.pdf

Hirsch Report II, July, 2006, "Economic Impacts of U.S. Liquid Fuel Mitigation Options." Report commissioned by the U.S. Dept. of Energy http://www.netl.doe.gov/energy-analyses/pubs/Economic%20Impacts%20of%20U.S.%20Liquid%20Fuel%20Mitigation%20Options.pdf

U.S. Army Corps of Engineers Report, Sept. 2005, "Energy Trends and their Implications For U.S. Army Installations." Report on U.S. Army's understanding of the "known lifetime supply" of various fuel sources and the corresponding implications of shortages http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=A440265&Location=U2&doc=GetTRDoc.pdf

Jim Bell's San Diego/Tijuana Energy Sustainability Case Study**,** 2005. See the self-sustainability suggestions for city energy on pages 11-18. http://www.jimbell.com/Book2/Book2.pdf

The Oil Drum's Stuart Staniford charts and analyzes total global oil production each quarter as the information is released by the EIA and EIA to determine where we are. http://www.theoildrum.com/tag/plateau

Energy: Healthcare's Preconditional Crisis, Dan Bednarz, Energy & Healthcare Consultants, Pittsburgh, Pa.

Australian Association for the Study of Peak Oil & Gas, Health Sector working group, http://www.aph.gov.au/senate/committee/rrat_ctte/oil_supply/submissions/sub138.pdf

Australian Association for the Study of Peak Oil & Gas *Supplementary Submission to the Senate Inquiry into Australia's Future Oil Supply*, http://www.aspo-australia.org.au/References/Senate-ASPO/ASPO_HSWG_supplementary_submission-25-Sept.pdf

Australian Association for the Study of Peak Oil & Gas, Social Services Sector Working Group, http://www.aph.gov.au/senate/committee/rrat_ctte/oil_supply/submissions/sub134.pdf

Proposed Recommendations
Public and Social Services Subcommittee
November 8, 2006

Many of the recommendations from this subcommittee respond to the effects of the expected general economic downturn that will result from peak oil. Impacts of this downturn are already being felt among economically vulnerable populations. These populations will increase significantly as the economy worsens, increasing the demand for a wide range of social services.

OVERALL RECOMMENDATIONS FOR PUBLIC AND SOCIAL SERVICES

1. Ensure that funding and support for public health, social services, and housing at the City, County and State levels does not degrade in the event of revenues falling in an economic downturn. Resources may have to be reprioritized and reallocated to ensure necessary funding. Failure to do this may cause severe stress on the social fabric that will exacerbate peak oil impacts.
2. Strengthen community support networks and provide information about options and resources to help citizens prepare to mitigate the impacts of peak oil and natural gas on their lives. Peak oil will require increased reliance on local and community-based responses. It is critical to have cohesive, cooperative communities rather than individualistic, isolated, competitive ones.
3. All City bureaus should plan for the growth of vulnerable and marginalized populations in developing policies, plans, programs and budgets. They should be prepared to identify resources and measures to help these populations cope with the impacts stemming from peak oil and natural gas in their daily lives.

PUBLIC HEALTH AND MEDICAL HEALTH CARE

The focus of the recommendations related to health and public health focus on management of health care and the health care system rather than actual treatment of medical problems.

1. Support state and national efforts and explore City options to encourage or mandate health care providers and insurers to emphasize preventive care. Prevention is by far the lowest cost societal approach to health care. Lowering costs will leave more money for those who truly need medical help. For example, immunizations are essential to public health but could decline as the marginalized population increases due to the economic impacts of peak oil – ensuring immunization to all citizens will help protect public health and avert more expensive treatment later.
2. Facilitate a discussion among health care providers to expand health care and health care access (e.g., prescription drugs, universal care, immunization). Increasing costs of health care and numbers of uninsured will lead to more contagious diseases, more severe health issues before treatment is sought, and generally inefficient use of resources (e.g. indigent patients going to emergency rooms for treatment of non-emergency problems). Similar

facilitation served a key role in bringing parties together on the Healthy Communities Initiative several years ago.

3. The City should support prioritization models like an expanded Oregon Health Plan. Health care needs are rising independent of peak oil as the baby boom generation ages, and peak oil threatens aggravate the problem by limiting resources to meet the increased need. In the absence of a prioritization model, resources will be allocated by one's ability to pay.
4. Develop policies and programs to ensure reasonable employment, housing, nutritional and educational opportunities for low-income and marginalized populations. This will help prevent mental health- and health-related problems that would eventually wind up needing more expensive treatment by the medical or social services systems.
5. Encourage health care providers to identify how peak oil and natural gas will affect their ability to provide care. For example, they should inventory products dependent on declining oil and natural gas supplies, and identify and begin to transition to alternatives. They should also accelerate efforts to reduce energy use in their facilities as a hedge against rising energy costs.

HOUSING AND COMMUNITY DEVELOPMENT

1. Review rules, requirements and qualifications for program participation for housing, utility, and food assistance to determine which ones may need to be modified to respond to the effects of Peak Oil. For example, the City could allow renters to access weatherization programs even if the owner is not eligible for assistance. It may also include expanding programs to help low-income household provide necessary maintenance to prevent dilapidation or future problems which could threaten their ability to stay in the house.
2. Community (re-)development efforts should focus on improving and maintaining the existing community base, targeting areas where people have the least ability to respond. In a Peak Oil scenario, the ability of displaced people to maintain their standard of living will be reduced. Programs should therefore minimize both physical and economic displacement.

UTILITIES/ENERGY

1. The City should work with utilities and the Oregon Public Utility Commission to ensure that peak natural gas considerations are incorporated into utility Integrated Resource Plans. The City should also work to ensure that these considerations are incorporated into utility rates, policies, and programs, including provision of service or financial assistance to marginalized populations to prevent health or infrastructure problems related to inability to pay.
2. Accelerate efforts to improve energy efficiency and the increase the use of renewable energy. This includes programs and policies to improve efficiency of new and existing homes and buildings, reduce use of gasoline and diesel fuel in the city, and encourage the production and use of biofuels and renewable energy throughout the city. The City should

also work to influence policies and programs to accelerate energy efficiency and renewable energy in the Metro area and at the state level. The goal should be to reduce use of fossil fuels.

PUBLIC SCHOOLS

1. Plan for public schools to be used as distribution points for public services and community support. Design mechanisms to cover the full costs to the schools of providing these services.
2. Plan for city subsidization of school breakfast and lunch programs in the event of lower levels of federal support.

POLICE/FIRE/WATER/SEWER/SOLID WASTE

1. Police should plan for a gradual increase in drug and alcohol abuse, domestic violence, and other problems associated with an increase in unemployment, homelessness and marginalized populations. For example, this may require an increase in staffing or a reallocation of resources, such as reinforcing the emphasis on community policing.
2. Neither demand for nor provision of fire, water, sewer or solid waste services is expected to be greatly affected by peak oil and natural gas. However, to the extent they are affected, they are critical services and should be accorded priority access to necessary resources. In the meantime efforts should be make operations as energy efficient as possible and to transition to biofuels and renewable energy.

Overarching Subcommittee Recommendations
Public and Social Services Subcommittee
November 1, 2006

1. Establish indicators and metrics to know if and when peak oil effects are being experienced.
2. While change usually begins at the local level, Portland can be a voice for change nationally. Portland should consider working with the National Conference of Mayor's as an advocate for planning for Peak Oil Preparedness on the national level.
3. Investigate what options city has to raise revenues to adequately cover costs under a peak oil scenario. This is particularly true given the loss of gasoline revenues, and possible loss of other revenues due to economic impacts.
4. Support family planning, contraceptive use, and other reproductive health services.
5. All city bureaus should incorporate the consequences of peak oil in their strategic planning for staffing and modes of transportation.

6. Use the structures already in place in the City's emergency preparedness system for immediate disasters and add items necessary to address a Peak Oil "Long Emergency". Ensure that Portland collaborates closely with State emergency preparedness systems.
7. Portland should focus on planning and working with neighborhood communities for provision of food, shelter and water for its citizens.
8. If Peak Oil leads to increased local/regional dependence, carrying capacity should be determined to ensure that the city/region can support the population.
9. The city should consider integrating peak oil with the current climate change efforts into a standing, long-term initiative that includes, but is not limited to communications. The intention should be to educate citizens on an on-going basis as a way to increase community awareness and behavior change regarding use of energy.

Appendix 8: City of Portland Peak Oil Task Force Members

Task Force members served as volunteers representing their personal views. Affiliations are provided for identification purposes and do not indicate formal participation of an organization.

Richard Benner is an attorney for Metro. He previously served as director of the Oregon Department of Land Conservation and Development, was the first director of the Columbia River Gorge Commission, and was a senior staff attorney with 1000 Friends of Oregon.

Christine Caruso is a licensed architect and current vice president of the Portland Planning Commission. She has also served as Land Use Chair for the Roseway Neighborhood Association and Chair of the LivingSmartPDX design competition.

David Cohan is representing Portland Peak Oil and works for the Northwest Energy Efficiency Alliance. He has worked in the field of building energy efficiency for 16 years.

Angela Crowley-Koch is the executive director of the Oregon Chapter of Physicians for Social Responsibility. She has a background in public education campaigns in the areas of public health, global warming, the environment, peace and security.

Lesa Dixon-Gray is a social worker and public health professional with the Oregon Department of Human Services. She has extensive work experience in social services, public health systems and with low-income populations.

Allen Lee is a project director for Quantec, an energy consulting firm. He has worked in the energy consulting and analysis area for 30 years, including working on California's energy shortage contingency plan and serving as a senior scientist at Pacific Northwest National Laboratory. He has served on the Portland/Multnomah Sustainable Development Commission.

Jeanne Longley is a senior associate with the Zero Waste Alliance and has owned a consulting firm providing process improvement services. She is a board member of the Linnton Neighborhood Association and has an academic background in social psychology.

Bill Scott is the General Manager of Flexcar. He was chief of staff to Portland Mayor Neil Goldschmidt during the 1970's energy crisis and worked for PacifiCorp subsidiaries in coal mining, oil and gas exploration, and real estate. He was director of the Oregon Economic and Community Development Department and served two terms on the Oregon Progress Board.

Sallie Schullinger-Krause is a program director for the Oregon Environmental Council focusing on global warming and transportation. She previously worked for the Northwest Energy Coalition and Greenpeace, USA on global warming and clean energy issues.

Marcus Simantel is a retired farmer. He has served as chair of the Portland-Multnomah Food Policy Council as president of the Agri-Business Council of Oregon.

Randy White is an advertising executive for KPOJ talk radio and previously worked as marketing director of a software company.

Rowan Wolf is a sociologist at Portland Community College and has published widely on social inequality and resource scarcity. She advises a student group addressing peak oil.