

# **White Paper: Future Oil Supply Uncertainty and Metro**

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# 1 Purpose of this Report

The purpose of this White Paper is to explore how Metro may approach the possibility of future uncertainty in the supply and price of oil. It identifies future oil supply uncertainty as a timely risk management issue, and establishes a basis for the Metro Council to consider possible policy and program responses.

## 2 Emerging Issue

Over the last few years, an increasing number of leaders in business, government and science have warned that the factors of world oil supply and demand are entering a period of fundamental change. **Demand** for oil is projected to increase significantly as the less-developed world continues industrializing. The **supply** of oil, however, does not seem likely to increase commensurably (see Appendix B. Projections of the Peaking of World Oil Production). Major oil companies such as Chevron readily state that much of the most-easily accessible oil has already been produced, making increased oil production dependent on significant changes in production methods and sources. Also, potential civil and political instability in key oil-producing countries detracts from the stability of world oil markets. These changing factors of supply and demand thus raise **concerns about the certainty of our future supply of cheap oil.**

As a political issue in the U.S., **future oil supply uncertainty** is generally approached from either a security angle (“Energy Security”) or scarcity angle (“Peak Oil”). The “energy security” view focuses on the risk to U.S. interests posed by external forces, whether unfriendly governments or natural disasters, that may affect the supply and price of oil. The “peak oil” view focuses on a theorized imminent (within the next 30 years) decline of worldwide oil production. The views are not non-complementary, and both agree that **we are entering a period of uncertainty in oil supply and price**

Both views have been supported by established petroleum geologists, as well as by mainstream political figures such as U.S. Senator Richard Lugar (R-IN) and former National Security Advisor Robert McFarlane. Most proponents of these views seek to spur public and private actions to reduce the share of domestic energy consumption met by oil, and prepare systems and infrastructure for an energy future of constrained oil supplies. Although there is some disagreement about the urgency and veracity of all the details of these views, the general issue of future oil supply uncertainty seems sufficiently established to warrant serious consideration by Metro as the body responsible for long-term land use and transportation planning in the Portland metropolitan region.

“Most experts agree that we will reach the peak within 25 to 30 years.”

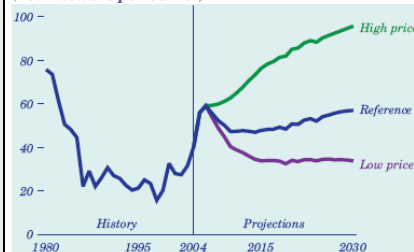
- Robert McFarlane (former National Security Advisor) and James Woolsey (former Director of the CIA), “America must end its dependence on oil.” Financial Times, January 23, 2006.

“The days of inexpensive, convenient, abundant energy resources are quickly drawing to a close.”

- Rep. Roscoe Bartlett (R-MD) quoting an Army Corps of Engineers report on the House floor, March 14, 2006.  
<http://www.energybulletin.net/13881.html>

### Oil Price Cases Show Uncertainty in Prospects for World Oil Markets

Figure 29. World oil prices in three cases, 1980-2030 (2004 dollars per barrel)



World oil price projections in the AEO2006 reference case, in terms of the average price of imported low-sulfur crude oil to U.S. refiners, are considerably higher than those presented in the AEO2005 reference case. The higher price path in the reference case does not result from different assumptions about the ultimate size of world oil resources but rather anticipates a lower level of future investment in production capacity in key resource-rich regions and a reassessment of the willingness of OPEC to produce at higher rates than projected in last year's outlook.

The historical record shows substantial variability in world oil prices, and there is arguably even more uncertainty about future prices in the long term.

- Energy Information Administration, United States. “Annual Energy Outlook 2006.”

### 3 Importance/Urgency

Whether created by political events or constrained production capabilities, uncertainty in future oil supply presents potentially significant challenges to governments at all levels. Oil scarcity *in itself* is not the problem (given enough time, the private sector will create alternatives to current oil-centric technologies) so much as the sheer difficulty of planning for future economic, land use and transportation patterns that may fundamentally change as the worldwide system of conventional oil production and consumption enters a period of fundamental —and potentially erratic— change.

“One thing is clear: the era of easy oil is over... [M]any of the world’s oil and gas fields are maturing. And new energy discoveries are mainly occurring in places where resources are difficult to extract, physically, economically, and even politically.

– From **Chevron’s** “Will You Join Us?” advertising campaign, February 2006.

#### 3.1 **Risk Factors**

Overall risk stems from three clear factors associated with a future period of oil supply uncertainty:

1. **Dependency:** Oil is, in the short-term, an assumed, essential, and non-interchangeable input of our economic system, from the global to the local levels.
2. **Volatility:** Sudden and severe fluctuations in oil prices will likely accompany a tightening of oil supply coincident with an expansion of demand.
3. **Uncertainty:** It has been historically difficult to establish accurate facts and realistic forecasts on oil supply and production for the long term, and will likely continue to be difficult.

##### 3.1.1 **Systems Dependencies on Oil**

The defining risk factor for this issue is the current sheer **dependence of our economic systems on oil**. This has three basic components:

a) **Oil as an assumed system input:**

The economic system of the industrialized world is built on an assumption of relatively stable oil supplies and prices. This is reflected in everything from the physical infrastructure used to transport goods and people (highways, airports, fleets of trucks and ships), to the innumerable relationships and agreements that establish where and how goods are produced, transported and consumed (trans-national companies, international trade agreements, nationwide distribution systems).

b) **Oil as an essential system input:**

Oil is a key raw material in the industrialized world, largely for motor gasoline, but also for jet fuel, home heating oil, industrial fuel oil, and plastics. Of particular concern is the reliance of the modern food system on oil as a fuel for farming and transporting, and a raw material for pesticides and plastics

“...[E]nergy is the albatross of U.S. national security...[T]here is not a full appreciation of our economic vulnerability...”

– Sen. Richard G. Lugar (R-IN), address to the Brookings Institution, March 13, 2006.

“Oil (and natural gas) are the essential components in the fertilizer on which world agriculture depends; oil makes it possible to transport food to the totally non-self-sufficient megacities of the world. Oil also provides the plastics and chemicals that are the bricks and mortar of contemporary civilization...”

– Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power*. 1991.

(packaging for transport and preservation)<sup>1</sup>. Instability in oil supply and price may thus have serious consequences for transportation, electricity production, manufacturing, agriculture, and other sectors of the economy.

- c) **Oil as a non-interchangeable system input:** Although alternatives to oil do exist for many of its key applications, whether as a fuel (biofuels, fuel cells, wind-generated electricity) or as a raw material (cellulosic plastics, biopesticides), they are generally marginal to oil as the dominant resource for these uses. Even the European Union, which is far more dependent on imported oil than the U.S., has only been able to set a modest goal of increasing the biofuel share of all transport fuels to 5.75% by 2010.<sup>2</sup>

The ready and cheap supply of oil is currently as presupposed and essential to our economy as the supply of potable water is to our communities. This factor alone makes any reasonable threat to the steady supply of oil cause for concern.

### 3.1.2 Supply and Price Volatility

The second key risk factor for this issue is the **increasing potential for sudden and severe fluctuations in oil prices** that will likely accompany a tightening of oil supply coincident with an expansion of demand. A February 2005 report for the U.S. Department of Energy (known as the “Hirsch Report” after the primary author) on the peaking of world oil production noted,

“...a shortfall of oil supplies caused by world conventional oil production peaking **will sharply increase oil prices and oil price volatility**. As oil peaking is approached, relatively minor events will likely have more pronounced impacts on oil prices and futures markets.”<sup>3</sup> (emphasis added)

As demonstrated by the 1970s oil crises, as well as recent events such as Hurricane Katrina or the March 2006 temporary shutdown of Nigerian production, even relatively small changes in oil production rates can have clear effects on oil prices in the U.S. Moreover, such price volatility may be expected to worsen given that roughly half of conventional oil production worldwide currently takes place in countries that potentially are either unstable or have competing geopolitical interests to the U.S.; Saudi Arabia, Russia, China, Iran and Venezuela alone account for nearly 35% of world production.

<sup>1</sup> It is a common misconception that fertilizers are oil-based and would similarly be affected by constrained oil supplies. Most fertilizers are in fact produced from natural gas-derived ammonia.

<sup>2</sup> Directive 2003/30/EC of the European Union, May 8, 2003, “on the promotion of the use of biofuels or other renewable fuels for transport.”

<sup>3</sup> Hirsch, Robert, et al. “Peaking of World Oil Production: Impacts, Mitigation, & Risk Management.” Report for the U.S. Department of Energy, February 2005. Page 30.

**CNN.com**

**CNN Presents Classroom:**

**We Were Warned: Tomorrow's Oil Crisis**

(CNN Student News) – Set your VCR to record the CNN Presents Classroom Edition: We Were Warned: Tomorrow's Oil Crisis when it airs commercial-free on Monday, April 3, 2006, from approximately 4:10 - 5:00 a.m. ET on CNN.

It is September 2009. A Category 5 hurricane roars through Houston, destroying oil refineries, drilling platforms and pipelines—the complex system that provides a quarter of our nation's daily fuel supply. Three days later, terrorists attack two key oil installations in Saudi Arabia, the world's largest supplier. In the days and weeks that follow, gasoline prices hit record highs, food prices soar as trucks cannot afford to make deliveries, and Americans begin to realize that their very way of life is in peril.

In *We Were Warned: Tomorrow's Oil Crisis*, CNN's Frank Sesno explores the potential ripple effects of this frightening scenario. The events depicted are hypothetical, but oil experts believe the scenario is entirely plausible. His interviews with energy experts reveal that we are nearing the point at which the world, led by the U.S. and China, will begin to consume more oil than can be pumped from the ground and the oceans. Tracking the global race to find new pools of oil, Sesno also considers the viability of alternative fuels, such as

“More and more oil will come from fewer and fewer countries, primarily the Middle East members of OPEC...”

“...[T]here are enormous uncertainties surrounding Russia's energy future.”

– International Energy Agency. “IEA Director Releases World Energy Outlook, Says Current Energy Trends ‘Call for Urgent and Decisive Policy Responses’.” October 16, 2004.

**Bloomberg**

**Oil Rises Above \$70 a Barrel in New York on Iran Supply Concern**

April 17 (Bloomberg) -- Crude oil rose above \$70 a barrel in New York for the first time since Hurricane Katrina on concern the dispute over Iran's nuclear program may disrupt shipments.

“The Iranian situation is getting no better and any combination of events could lead to a conflagration,” said Michael Fitzpatrick, vice president of energy risk management at Fimat USA Inc. in New York. “China's GDP is growing at over 10 percent so demand for oil will stay strong.”

### 3.1.3 Inherent Difficulties in Forecasting

A third key risk factor with this issue is the **difficulty of establishing facts and realistic forecasts on oil supply and production**. The complex system of oil production and consumption is perhaps the most essential factor defining the current geopolitical system. Reliable and accurate data on oil reserves are typically corporate or state secrets; it may not be in the immediate interest of oil suppliers and producers to acknowledge the diminishing of their source of economic and political power, particularly as many such states are potentially unstable or have competing geopolitical interests with regard to the U.S. Without reliable data, however, planners and policymakers will have difficulty forecasting just how oil supplies and prices will change in the future.



### 3.1.4 Mitigating Factors

In addition to the risk factors above, various mitigating factors should also be considered for this issue.

#### 1. Oil Production System Resilience:

As a multi-trillion dollar undertaking, the oil industry clearly has the resources to protect its interests. Technological advances have, in the past, increased oil output beyond initial projections, and have enabled previously inaccessible oil deposits to be produced. As easily-accessed “light sweet” crude oil reserves dwindle, alternative oil sources such as deepwater oil, polar oil and tar sands have already become more financially feasible to exploit.

#### 2. Economic System Resilience:

The world capitalist system is notable for its ability to respond to economic shifts and adopt new technologies without major government intervention.<sup>4</sup> Given enough time, the current economic system can reasonably be expected to respond to shifts in supply and demand with alternative energy and material sources, new technologies, new planning assumptions, and new behaviors. Governments can also be expected to undertake significant mitigating actions if the economic system is clearly threatened.

#### 3. Existing Alternatives to Oil:

Alternatives to oil as both an energy source and production material have existed for years and continue to develop. The economic attractiveness of “renewable” energy sources, cellulosic plastics and other non-oil materials can be expected to increase as oil supplies tighten.

A key characteristic of these mitigating factors is that they are all simply price-driven. They will contribute to future outcomes in ways that may be different than long-range planning efforts that comprehensively consider economic, environmental and social equity goals.

<sup>4</sup> To be sure, the world capitalist system also has proven its potential to encourage risky and potentially disastrous investment behavior, as evidenced by the Asian financial crisis of the 1990s.

## 3.2 Need for a Response

As a **risk management issue**, oil supply uncertainty can be summarized as such:

*We increasingly face the potential for economic crisis brought about by uncertainty in our supply of oil, but we are unable to accurately predict in what way that supply may be threatened, and how severe that threat may be.*

*Although the resilience of the world economic system in general –and the oil production system in particular– may sufficiently mitigate a crisis with ample time, these systems may not be able to respond in desirable ways to sudden and severe periods of instability.*

The February 2005 Hirsch Report called attention to the potential for economic hardship that may result from oil scarcity, and highlighted a need for aggressive, early, government-initiated mitigation actions addressing both supply and demand (see sidebox). Elected officials, scientists and others have also called for a range of actions at all levels of government, from local initiatives to encourage use of non-oil energy sources to federal proposals to expand international cooperation on energy issues.

Risk management for this issue will necessarily take different forms at different levels of government. With its mix of regional responsibilities (particularly for long-range planning and inter-jurisdiction coordination) Metro faces both unique challenges and unique opportunities for addressing the risks that oil supply uncertainty pose for the Portland metropolitan area.

“Peaking will result in dramatically higher oil prices, which will cause **protracted economic hardship** in the United States and the world...”

“Mitigation will require a **minimum of a decade** of intense, expensive effort...”

“**Intervention by governments will be required**, because the economic and social implications of oil peaking would otherwise be chaotic.”

– Hirsch, Robert. et al. “Peaking of World Oil Production: Impacts, Mitigation, & Risk Management”. Report for the U.S. Department of Energy, February 2005. (emphasis added)

## 4 Oil Supply Uncertainty and Metro

### 4.1 Defining the Issue

Oil supply uncertainty poses a risk management problem for Metro in the discharging of its Charter responsibilities and the execution of its internal operations. Metro Council and staff will need to consider the potential short-term and long-term ramifications of this problem, and determine the degree and manner in which to respond to it.

The following table is an initial step to broadly defining what oil supply uncertainty may mean for Metro. It lists Metro’s Charter responsibilities together with example long-term and short-term issues that might be considered in oil supply uncertainty planning scenarios.

**Table 1. Metro Charter Responsibilities, and Considerations for Oil Supply Uncertainty**

Charter Responsibility	Long-term Considerations	Short-term Considerations
<b>land-use and transportation planning</b> (primary responsibility)	<ul style="list-style-type: none"> <li>▪ dominant transportation modes</li> <li>▪ dominant land use and transportation patterns</li> <li>▪ local, regional and national economic patterns</li> </ul>	<ul style="list-style-type: none"> <li>▪ planning assumptions</li> </ul>
<b>solid waste disposal system</b>	<ul style="list-style-type: none"> <li>▪ kinds and quantities of disposed materials</li> </ul>	<ul style="list-style-type: none"> <li>▪ fuel for vehicles (contract negotiations with haulers)</li> </ul>
<b>enterprise operations</b> (Zoo, OCC, PCPA, Expo)	<ul style="list-style-type: none"> <li>▪ OCC dependence on national travel trends</li> </ul>	<ul style="list-style-type: none"> <li>▪ stable energy supplies for facilities</li> </ul>
<b>parks and open spaces</b>	<ul style="list-style-type: none"> <li>▪ land prices as affected by transportation patterns and modal split</li> </ul>	<ul style="list-style-type: none"> <li>▪ fuel for vehicles</li> </ul>
<b>planning and response coordination for natural disasters</b>	<ul style="list-style-type: none"> <li>▪ emergency response planning (i.e., for a protracted energy shortage?)</li> </ul>	<ul style="list-style-type: none"> <li>▪ emergency response planning (i.e., for a sudden energy shortage?)</li> </ul>
<b>development and marketing of data</b>	<ul style="list-style-type: none"> <li>▪ scenario forecasting</li> </ul>	<ul style="list-style-type: none"> <li>▪ scenario forecasting</li> </ul>

## 4.2 Approaching the Issue

Metro officials and staff will need to determine the extent to which oil supply uncertainty should be considered in the agency’s activities and plans. There are two key steps to approaching the issue:

1. **Characterizing the risks Metro faces.**
2. **Identifying the Metro activities that may be most vulnerable to impacts.**

### 4.2.1 Characterizing the Risks

Oil supply uncertainty will most clearly impact the price of oil; thus the **key risk** of this issue is potential **instability in the price of oil**. The specific risks inherent in oil price instability can be operationalized in oil price scenarios that consider relative *magnitude*, *rapidity* and *duration* of price instability episodes. For example, an “Energy Security” scenario of an unexpected political or military event temporarily affecting oil production may be characterized by a short-term but immediate and significant oil price shock. Alternatively, a “Peak Oil” scenario of gradually diminishing production may be characterized by long-term increasing price fluctuations, increasing average price, and eventual broad availability of oil substitutes.

Different oil price scenarios will have different ramifications for issues of concern to Metro planning and operations, from the energy needs for running day-to-day operations to the long-term assumptions of land use and transportation patterns.

**Contextual risks** may not necessarily be specific to Metro or to any given scenario, but should be considered when addressing Metro vulnerabilities. Identification of such relevant contextual risks is beyond the scope of this paper, but some examples include:

- **insufficient government reaction:** ex., future lack of federal leadership in fuel alternatives may make it difficult for new fuels or technologies to be implemented.



- **excessive government reaction**, aka the “Betamax Scenario”: ex., future aggressive federal leadership in fuel alternatives may favor a sub-par solution.
- **inter-regional impact**: ex., oil price instability may be significantly greater (or lesser) in metro Portland than in other regions, changing regional competitiveness in the global market.
- **extra-regional impacts**: ex., oil price instability elsewhere may impact global supply chains and markets in ways that significantly affect the metro Portland economy.
- **insufficient public understanding / awareness**: ex., Metro or other government responses that depart from the status quo may be opposed if they are not satisfactorily justified to the public.

## 4.2.2 Identifying Vulnerable Activities

Vulnerability in relation to oil supply uncertainty can likely be identified for all of Metro’s responsibilities. For example, long-term changes in oil prices may result in land use and transportation patterns in 2016 that are significantly different from the patterns we plan for (and invest in) in 2006. Alternatively, severe oil price instability over more than six months may discourage travel, and cut into Oregon Convention Center revenues. Such possibilities are too broad to usefully address, however; vulnerabilities are better identified at the level of specific Metro activities.

A vulnerability assessment would help determine which of Metro’s activities within its specific Charter responsibilities may be most significantly impacted by oil supply (and price) instability. This could take into consideration factors such as the importance of the activity to the region and the dependence (or assumption) of the activity on oil supply *stability*. For example, Metro’s primary responsibilities of land use and transportation planning are broken down, below, into the following aspects, each of which may relate to oil supply uncertainty in a different manner. At this level of detail, specific responses can be proposed for specific risks (see 4.3.2 below).

- **Land Use**
  - “New Look” at regional choices
  - 2040 Growth Concept
  - Urban growth boundary
  - Guides and Plans for Building Livable Communities
  - New area planning
  - Affordable housing
- **Transportation**
  - Transportation system planning: Regional Transportation Plan (RTP)
  - Transportation investment priorities: MTIP, TPP
  - Transportation research and modeling services
  - Transit-oriented development implementation
  - Transportation demand management

A final vulnerability “ranking” would likely include a mix of prioritized activities from different Charter responsibilities. For example, an informal discussion with Planning staff identified these four Metro activities as possibly the most sensitive to impacts from oil supply uncertainty.

- Transportation system planning (RTP process)
- Transportation investment prioritization (MTIP process)
- Growth management strategy and UGB expansion process
- Solid waste and recycling programs and hauling contracts

## **4.3 Addressing the Issue**

### **4.3.1 Previous Actions**

The Portland metropolitan region is already better suited than most major metropolitan areas in the U.S. to manage possible scenarios of oil supply constraint. Decades of foresighted land use and transportation planning have (compared to other major metro areas) reduced mean travel distances and enabled greater use of public transit, bicycling and walking as viable transportation modes. The pursuit of these **mobility** and **choice** goals has already helped reduce the growth rate of vehicle miles traveled in the region, and increase the share of transportation modes that are less susceptible to oil supply instability than private automobiles.

### **4.3.2 Directions for Further Action**

A good policy starting point for applying this broad issue to Metro's responsibilities is the existing 2040 Growth Concept. The Concept's goals of encouraging the development of "centers" and "corridors," and discouraging suburban sprawl, will help reinforce the existing favorable conditions for mobility and transportation choice throughout the region. The current "New Look" revision of the 2040 Growth Concept, and the periodic updates of the Regional Transportation Plan (RTP), are opportunities to build on these goals in ways that more specifically consider the potential ramifications of oil supply uncertainty.

Prioritizing these existing opportunities, here are four areas in which further action may be considered:

#### **1. As part of the "New Look" study and evaluation process:**

- Review the past 30 years of planning to produce an assessment of how well or how poorly the region has dealt with energy supply and prices since the first and second energy crises.
- Conduct a full MetroScope evaluation of the land use and transportation impacts of different oil cost increase scenarios (at both the consumer and produce levels) over a 15- to 30-year period.
- Develop a set of recommendations identifying what the State, Metro and local governments may change to better meet the challenge of oil supply uncertainty, and recognizing existing conditions and practices that should be emulated.

#### **2. As part of the RTP update:**

- Review the existing RTP to determine the adequacy of how it addresses the potential for oil supply uncertainty; consider alternative projects, or processes for envisioning, configuring and developing alternative projects.
- Develop or consider a set of criteria that Metro and other transportation entities could use as indicators that the world oil supply situation has developed such that price and behavior assumptions need to be changed.
- Develop a set of procedures and policies that would minimize the risk associated with oil supply uncertainty in selecting and developing RTP projects.

#### **3. Consider the oil supply uncertainty issue specifically within these existing activities:**

- "Ag/Urban Study"
- Solid Waste and Recycling: hauling contracts, recycling markets, etc.
- Enterprise operations (Zoo, OCC, etc.)

#### **4. Use these existing forums as resources for review and response on strategies:**

- Economic Advisory Board

- Joint Policy Action Committee on Transportation (JPACT), Transportation Policy Alternatives Committee (TPAC)
- Metro Policy Advisory Committee (MPAC), Metro Technical Advisory Committee (MTAC)
- Solid Waste Advisory Committee (SWAC)

### **4.3.3 Other considerations**

The following additional considerations are beyond the scope of this paper to fully develop but worth mention:

- A significant (i.e., protracted) impact on the economy will likely change the population/employment forecasts which drive Metro land use and transportation planning. Approached another way, it may be useful to identify a “tipping point” (i.e., a particular gasoline price) that signals a change to a new set of assumptions about projected land use and transportation patterns.
- It may be prudent to monitor certain key systems in the region that are vulnerable to impacts of oil supply, regardless of their immediate applicability to Metro concerns. These may include agriculture and food supply, public transportation (TriMet), electricity and heating oil, and other systems.
- Too much action can be as problematic as too little action. For example, if Metro is too aggressive in either densifying centers or expanding the UGB, our risk increases.
- At a threshold level, what sort of risks is Metro willing to take? Are there strategies Metro can pursue that are adaptable, correctable and/or reversible? Remember the lesson of the WPPSS (Washington Public Power Supply System) nuclear power plant projects of the 1970s and 80s: it’s hard to stop a big public investment once it’s started.
- How should the equity issue (i.e., the economic impact of marginal increases in fuel price will be regressive) best be approached?
- Key tracks for this issue: education, change in demand patterns, and structural questions.
- Key concepts for planning: conservation, efficiency, redundancy, framing.

## **5 Other Governments’ Responses**

### **5.1 City Governments**

As of March 2006, non-federal government reaction to oil supply uncertainty appears to be limited to a handful of jurisdictions, but interest does seem to be growing quickly. Denver Mayor John Hickenlooper is the most prominent non-federal official to explicitly connect local government policies to the issue. Oakland has a significant Sustainability Initiative, although it is not explicitly working with the oil supply uncertainty issue. On April 11, 2006, San Francisco became the largest U.S. city to pass a resolution regarding oil uncertainty.

In Portland, Commissioner Dan Saltzman is currently working with a citizen group (Portland Peak Oil) to bring a resolution to City Council in May calling for a “Peak Oil” task force. This task force will make recommendations to City Council on actions to “...mitigate the impacts of declining energy supplies in areas including, but not limited to: water, food security, essential transportation, essential health care, non-grid dependent communications, land use planning, and business and home energy use.” The City’s Office of Sustainable Development (headed by Commissioner Saltzman) continues to be a national leader in pursuing a wide range of tangible sustainability projects. These have most recently included a “green building” program to promote environmentally-conscious construction practices, the “Diggable City” project to

promote local agriculture, and negotiations to provide 100% of the City government's electricity needs from renewable energy sources.

The towns of Sebastopol (pop. 7,685) and Willits (pop. 5,609) in Northern California seem to have the most ambitious jurisdictional efforts to date related explicitly to oil uncertainty. In Willits, a comprehensive "localization" plan is being developed for the City by a grassroots group (WELL: "Willits Economic Localization"); the City supports the effort, but does not seem to have taken any official or formal steps towards policy formulation. In Sebastopol, the City Council is sponsoring an ad hoc "Energy Vulnerability Citizens' Committee" to develop contingency plans for providing primary (public safety; water) and secondary (transportation; schools) municipal services in various energy-constrained scenarios. Less comprehensive than Willits' community approach, it is government-driven and seems intended to lead to clear policy decisions.

City-oriented conferences and summits on Peak Oil and Energy Security have also begun taking place. Denver hosted a World Oil Forum in November 2005, likely the largest such conference of its kind to date. Leaders from Sebastopol and elsewhere are organizing an "Energy Vulnerability" summit (<http://www.ecoleader.org/>) in May 2006 for elected officials, managers and department heads from the five-county area north of San Francisco; the summit will be followed up by a larger conference in September for business leaders and community groups. In Portland, representatives from the City and Metro are collaborating with a non-profit organization, Illahee, and other organizations to host a regional symposium (<http://illahee.org/symposium>) in June for business and political leaders to learn about and discuss energy and water issues in Oregon.

The following table lists notable local governmental actions to date regarding oil supply uncertainty:

**Table 2. Notable Local Government Actions Regarding Oil Supply Uncertainty (U.S. and Canada)**

<b>Jurisdiction</b> (2004 pop.)	<b>State</b>	<b>Contact</b>	<b>Actions</b>
<b>San Francisco</b> 744,230	CA	Aaron Preskin President, Bd. of Supervisors 415-554-7450	<ul style="list-style-type: none"> <li>Resolution acknowledging the challenge of "Peak Oil" and the need for a plan of response and preparation (see Appendix).</li> </ul>
<b>Denver</b> 556,835	CO	Beth Conover Mayor's Sustainable Development Initiative 720-865-9000	<ul style="list-style-type: none"> <li>Mayor hosted World Oil Forum last year.</li> <li>Press conferences on Peak Oil.</li> <li>Efficiency measures in City infrastructure, fleet.</li> <li>Study of material dependencies on oil.</li> </ul>
<b>Portland</b> 533,492	OR	Brendan Finn Chief of Staff, Cmmr. Dan Saltzman 503-823-4151	<ul style="list-style-type: none"> <li>Considering Council resolution to establish Peak Oil Task Force.</li> <li>City Office of Sustainable Development pursuing various projects related to energy security, food security and other issues.</li> </ul>
<b>Oakland</b> 397,976	CA	Carol Misseldine Mayor's Sustainability Pgm. 510-238-6808	<ul style="list-style-type: none"> <li>Project to supply 50% of food from within 50 miles by 2015.</li> </ul>
<b>Burnaby</b> 197,292	BC		<ul style="list-style-type: none"> <li>Staff report completed Jan. 4, 2006, "Global Peak in Oil Production: The Municipal Context". (see Appendix)</li> </ul>
<b>Humboldt County</b> 128,529	CA		<ul style="list-style-type: none"> <li>Humboldt County General Plan 2025, Energy Element Background Technical Report. (<a href="http://www.redwoodenergy.org">http://www.redwoodenergy.org</a>)</li> </ul>
<b>Sebastopol</b> 7,685	CA	Larry Robinson City Councilor 707-823-1708	<ul style="list-style-type: none"> <li>Town Hall meeting in fall 2005, resulting in an ad hoc "Energy Vulnerability" Citizen's Committee to develop Contingency Plans for municipal services.</li> </ul>
<b>Willits</b> 5,098	CA	Alan Falleri Community Development	<ul style="list-style-type: none"> <li>Declaration supporting "sustainable localization" in a community energy audit and recommendations made by a local citizen group. (<a href="http://www.willitseconomiclocalization.org/Papers/Papers.htm">http://www.willitseconomiclocalization.org/Papers/Papers.htm</a>)</li> </ul>

## 5.2 Other Government Levels and Countries

At the federal level, Rep. Roscoe Bartlett (R-MD) and Rep. Tom Udall (D-NM) founded the Congressional Peak Oil Caucus in October 2005. Both have addressed the House of Representatives numerous times on energy issues related to the peak oil theory, most recently on March 14, 2006 when Rep. Bartlett presented a previously unreleased Army Corps of Engineers report on Army challenges in meeting its energy needs.

Internationally, government awareness of and action on oil supply uncertainty is, predictably, highest in European countries and Australia. These range from local efforts, such as the Kinsale, Ireland (pop. 2,257) “Energy Descent Action Plan,” to the recent declaration by the Swedish government that that country will be completely independent of oil by 2020. In between are studies, plans and projects, examples of which can be found in Appendix A. Elsewhere, Brazil’s aggressive development of ethanol has led to that fuel accounting for 40% of all of that country’s vehicle fuel, and Cuba has received acclaim for sustainably “localizing” most of its food and energy production following the virtual disappearance of its oil imports following the collapse of the Soviet Union.

## 5.3 Non-governmental efforts

Much of the political interest in this issue is still being driven by private citizens, whether as grassroots activists, independent researchers, or authors and lecturers.

- The Association for the Study of Peak Oil (ASPO), conducts research and distributes a widely-read newsletter by founder and retired petroleum geologist Colin J. Campbell. ASPO is based in Europe and has chapters in at least eight western countries. The US chapter of ASPO co-sponsored the Denver World Oil Forum in November 2005. <http://www.peakoil.net/>
- The Post-Carbon Institute, based in Vancouver, British Columbia, hosts a network of over 75 such grassroots groups, mostly in the U.S. and Canada. This includes groups such as Portland Peak Oil, WELL (in Willits, CA), and East Bay Peak Oil (Oakland, CA). <http://postcarbon.org>
- A growing number of news websites, weblogs, and other special interest websites focus on various aspects of this issue. Among some of the more popular and useful are:
  - [http://en.wikipedia.org/wiki/Peak\\_oil](http://en.wikipedia.org/wiki/Peak_oil)  
A good, relatively balanced issue starting point for overview information and links.
  - <http://www.energybulletin.net/>, <http://www.peakoil.com>  
News and messageboard sites.
  - ASPO’s and Post-Carbon Institute’s sites, listed above.

"Understanding depletion is simple. Think of an Irish pub. The glass starts full and ends empty. There are only so many more drinks to closing time. It's the same with oil. We have to find the bar before we can drink what's in it."

– Colin J. Campbell, Ph.D., retired petroleum geologist, founder of ASPO.

At the national level of advocacy, the Apollo Alliance (<http://www.apolloalliance.org/>) is a labor-backed non-profit seeking to build a “broad-based constituency in support of a sustainable and clean energy economy that will create millions of good jobs for the nation, reduce our dependence on foreign oil, and create cleaner and healthier communities.” At the state level, Oregon Apollo (<http://www.onwardoregon.org>) is a progressive non-profit pushing a ballot measure<sup>5</sup> to “spur the growth of Oregon’s biofuels industry and build the state’s clean energy braintrust through the creation of Centers of Excellence across the state.”

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<sup>5</sup> Chief petitioners for the measure are former Governor John Kitzhaber (D) and State Senator Ben Westlund (I-Bend).

Upcoming conferences include:

- “Local Solutions to the Energy Dilemma,” April 27-29, 2006 in New York City. Sponsored by Peak Oil NYC & Local Energy Solutions, LLC. <http://www.energysolutionsconference.org/>
- “Sustainable Energy Forum 2006: Peak Oil and the Environment”, May 7-9, 2006 in Washington, DC. Sponsored by the University of Maryland. <http://www.beyondpeak.org>
- “Energy Vulnerability: Can Local Public Policy Support a Competitive and Sustainable Economy in the Face of Rising Energy Costs?” May 19, 2006 in Petaluma, CA. A summit of elected and appointed officials from the five counties north of the San Francisco Bay Area. Sponsored by the Leadership Institute For Ecology and the Economy; <http://www.ecoleader.org/>.
- Fifth International Conference of the Association for the Study of Peak Oil and Gas (ASPO), July 18-19, 2006 in San Rossore (Pisa), Italy. [http://www.peakoil.net/ASPO\\_2006.html](http://www.peakoil.net/ASPO_2006.html)

## **Appendix A. Response Ideas from Other Sources**

### **1. International Energy Agency (IEA)**

*International Energy Agency. 2005. "Saving Oil in a Hurry: Measures for Rapid Demand Restraint in Transport." page xiv.*

### **2. Western Australia**

*Robinson, B. June 2002. "Global Oil Vulnerability and the Australian Situation: A background paper for WA State Sustainability Strategy." Government of Western Australia.*

### **3. San Francisco, California**

*Board of Supervisors, City of San Francisco. 2006. "Resolution acknowledging the challenge of Peak Oil and the need for San Francisco to prepare a plan of response and preparation." (Adopted April 11, 2006.)*

### **4. Burnaby, British Columbia**

*City of Burnaby, City Council Transportation Committee. 2006. "Global Peak in Oil Production: The Municipal Context."*

## 1. International Energy Agency

**Table E-2: Summary of direct cost-effectiveness of various policies**

Direct Cost Effectiveness Range	Measure	Other Potential Impacts	Oil Savings (from Table E-1)
<b>VERY INEXPENSIVE</b> Less than \$1 per barrel saved	<b>Carpooling:</b> large programme to designate emergency carpool lanes along all motorways, designate park-and-ride lots, inform public and match riders		Very Large
	<b>Driving ban:</b> odd/even licence plate scheme. Provide police enforcement, appropriate information and signage	Possibly high societal costs from restricted travel	Very Large
	<b>Telecommuting:</b> large programme, including active participation of businesses, public information on benefits of telecommuting, minor investments in needed infrastructure to facilitate		Large
	<b>Compressed work week:</b> programme with employer participation and public information campaign		Large
	<b>Tyre pressure:</b> large public information programme	Likely safety benefits	Moderate
	<b>Carpooling:</b> small programme to inform public, match riders		Moderate
<b>INEXPENSIVE</b> Less than \$10 per barrel saved	<b>Speed limits:</b> reduce highway speed limits to 90km/hr. Provide police enforcement or speed cameras, appropriate information and signage	Safety benefits but time costs	Very Large
	<b>Driving ban:</b> 1 in 10 days based on licence plate, with police enforcement and signage	Possibly high societal costs from restricted travel	Large
<b>MODERATE COST</b> Less than \$50 per barrel saved	<b>Bus priority:</b> convert all existing carpool and bus lanes to 24-hour bus priority usage and convert other lanes to bus-only lanes		Small
<b>EXPENSIVE</b> More than \$100 per bbl saved*	<b>Telecommuting:</b> Large programme with purchase of computers for 50% of participants		Large
	<b>Transit:</b> free public transit (set fares to zero); 50% fare reduction similar cost		Moderate
	<b>Transit:</b> increase weekend and off-peak transit service and increase peak service frequency by 10%		Moderate

\* Note: none of the listed policies are estimated to cost between \$50 and \$100 per barrel saved.



### Recommendations

**1. Formation of a broad-based Oil Vulnerability Task Force** is recommended to evaluate and communicate details of WA's oil vulnerability, both direct and indirect, and to develop appropriate responses. It will need to catalyse and coordinate industry, government and community approaches to the looming issue of future oil supply uncertainty.

**2. Proven cost-effective measures to reduce Perth's automobile dependence should be enhanced or implemented.**

(a) **The Perth Bicycle Network** should be completed and upgraded as a matter of urgency and bicycle networks developed for regional centres.

(b) **TravelSmart** programs should be implemented to cover the entire Metropolitan area and extended to regional centres.

(c) **A skilled and cohesive bicycle transport planning and engineering group** should be formed within the Planning and Infrastructure portfolio to promote, plan and coordinate the provision of bicycle facilities in urban areas and to ensure that all new roads and developments and all road modifications in urban areas always make provision for safe and convenient bicycle transport

A 20% reduction in Perth's petrol use can be realistically and rapidly achieved by the combination of TravelSmart programs, the completion of the bicycle network and the provision of Safe Routes to Schools for students to ride bicycles to school or walk

(d) **Funding for the provision of any major additional urban roads should be reviewed** in the light of the probable decrease in future automobile travel demand as a result of oil vulnerability and of the success of TravelSmart and the provision of non-automobile travel alternatives like better facilities for cycling, walking and public transport.

(e) **State motor-vehicle charges such as stamp duty, registration and third-party insurance should be progressively** modified in a revenue-neutral or revenue-positive manner to give substantial encouragement to the purchase of small fuel-efficient motor vehicles. A Federal-State initiative for a change from a vehicle-ownership basis for road user charges to a vehicle-use basis would reduce the current subsidies from those people who use their motor vehicles only a little towards those who use them more than average.

### 3. San Francisco, California

FILE NO. 060442

RESOLUTION NO. \_\_\_\_\_

1 [Peak Oil Plan of Response and Preparation]

2  
3 **Resolution acknowledging the challenge of Peak Oil and the need for San Francisco to**  
4 **prepare a plan of response and preparation.**

5  
6 WHEREAS, World oil production is nearing its point of maximum production  
7 ("Peak Oil") and will enter a prolonged period of irreversible decline leading to ever-increasing  
8 prices; and

9 WHEREAS, The United States has only 2 percent of the world's oil reserves, produces  
10 8 percent of the world's oil and consumes 25 percent of the world's oil, of which nearly 60  
11 percent is imported from foreign countries; and,

12 WHEREAS, The decline in global oil production threatens to increase resource  
13 competition, geopolitical instability, and lead to greater impoverishment; and,

14 WHEREAS, National oil companies own 72% of remaining oil reserves and 55% of  
15 remaining gas reserves<sup>1</sup>, and resource nationalism is increasingly dominating decisions of oil  
16 and gas development and trade relationships; and,

17 WHEREAS, The availability of affordable petroleum is critical to the functioning of our  
18 transportation system, the production of our food and of petrochemical-based consumer  
19 goods, the paving of roads, the lubrication of all machinery, and myriad other parts of the  
20 economy; and,

21 WHEREAS, San Francisco is entirely dependent on external supplies of petroleum,  
22 including the crude oil processed in Bay Area refineries; and,

23 WHEREAS, Price signals of petroleum scarcity are likely to come too late to trigger  
24 effective mitigation efforts in the private sector, and governmental intervention at all levels of  
25 government will be required to avert social and economic chaos; and,

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1 WHEREAS, The Department of Energy-sponsored study<sup>ii</sup> on mitigation of Peak Oil  
2 demonstrated that a twenty-year lead time is required for effective mitigation, while current  
3 measures supported by the federal government will replace only three-weeks worth of  
4 gasoline consumption by 2012<sup>iii</sup>; and,

5 WHEREAS, Alternative sources of transport fuels from coal and natural gas both  
6 require high energy inputs and increase total carbon emissions, and biomass-based fuels  
7 compete with soil fertility, impacting agricultural sustainability<sup>iv</sup>; and,

8 WHEREAS, Substitution of petroleum with other fossil fuels threatens even greater  
9 damage to water, air, soil, and species diversity through their extraction and combustion; and,

10 WHEREAS, North American production of natural gas has already peaked, and 46% of  
11 California's electricity supply is generated from natural gas; and

12 WHEREAS, San Francisco has demonstrated leadership in confronting challenges of  
13 environmental quality and energy security, promoting environmental and economic equity,  
14 and has a rich diversity of citizens committed to maintaining San Francisco's long-term  
15 viability; now, therefore, be it

16 RESOLVED, That the Board of Supervisors of the City and County of San Francisco  
17 acknowledges the unprecedented challenges of Peak Oil; and, be it

18 FURTHER RESOLVED, That the Board of Supervisors supports the adoption of a  
19 global Oil Depletion Protocol to provide transparency in oil markets, control price swings,  
20 address issues of equity in access to remaining oil resources, and provide a framework of  
21 predictability within which municipal governments can adjust to increasing oil scarcity; and, be  
22 it

23 FURTHER RESOLVED, That the Board of Supervisors supports the undertaking of a  
24 city-wide assessment study in order to inventory city activities and their corollary resource  
- requirements, evaluating the impact in each area of a decline in petroleum availability and of

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1 higher prices, with the aim of developing a comprehensive city plan of action and response to  
2 Peak Oil; and, be it

3 FURTHER RESOLVED, That the Board of Supervisors urges the Mayor to provide  
4 funding and direction to city departments for the development of a response plan.  
5  
6  
7

8 <sup>i</sup> "The Role of the National Oil Companies in a Changing World: Economic and  
9 Energy Relations", OPEC, 2004, at <http://www.saudinf.com/main/y7480.htm>

10 <sup>ii</sup> Robert L. Hirsch, R. Bezdek, R.Wendling, Peaking Of World Oil Production:  
11 Impacts, Mitigation, & Risk Management, February 2005, online at  
[http://www.mnforsustain.org/oil\\_peaking\\_of\\_world\\_oil\\_production\\_study\\_hirsch.htm3](http://www.mnforsustain.org/oil_peaking_of_world_oil_production_study_hirsch.htm3)

12 <sup>iii</sup> <http://www.eia.doe.gov/neic/brochure/renew05/renewable.html>

13 <sup>iv</sup> 4 L. Reijnders, "Conditions for the sustainability of biomass based fuel  
14 use", Energy Policy 34 (2006) 863–876  
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#### 4. Burnaby, British Columbia

Table: Possible Municipal Ideas as a Government

Strategy	Transportation	Heating	Other
New Energy Sources		Incentives to use sustainable energy sources in new buildings	
Efficiency	Preferred parking for hybrid vehicles and/or hybrid access to High Occupancy Vehicle lanes	Explicit discussion of energy in re-zoning reports	Greater role (in partnership with energy suppliers) in promoting energy efficiency programs
		Incentives (e.g., density bonuses, fast-track approvals) for buildings certified by Leadership in Energy and Environmental Design (LEED)	Use municipal publications for messages on consumption patterns and fuel-efficient habits
Consumption Patterns	Allow higher development densities in transit-oriented locations	Promote more temporal and spatial variation of interior temperatures in buildings	Engage other levels of government in a dialogue on coordinated responses to peak oil
	Improve quality and extent of pedestrian networks		Protect existing agricultural lands and encourage urban agriculture (e.g., in residential or commercial areas)
	Improve quality and extent of cycling networks		Support appropriate actions by outside agencies (e.g., protection of agricultural lands, more transit passes, implementation of pay-as-you-drive insurance)
	Enhance quality of bus stops (amenities)		Develop a plan for additional measures that may be needed post-peak
	Reduce investment in road capacity increases		
	Increase implementation of priority measures for select modes (transit, High-Occupancy Vehicles, trucks)		
	Consider Trip Reduction Plans for larger new developments		
	Work to bring amenities closer to where people live		
	Consider revising parking standards for commercial and multi-family residential developments		
	Evaluate energy impacts of various strategies (e.g., reducing the speed limit on Local Residential roads to 40 km/hr, converting traffic signals to roundabouts where feasible)		
	Increased use of parking meters		

Municipalities are also major employers, land owners, developers, and oil consumers. In these capacities, municipalities can lead by example, exhibiting best practices for other corporations. In the process, the market for more sustainable products is stimulated. Municipalities can also expect a direct financial benefit from operating more efficiently.

The City of Burnaby has done this in the past, for example through the building retrofits of the EnergyFit program, or by installing end-of-trip facilities for cyclists. Table A.2 presents a sample of the possibilities that are available to municipalities as corporate citizens.

**Table: Possible Municipal Ideas as a Corporate Citizen**

Strategy	Transportation	Heating	Other
New Energy Sources		New municipal buildings to consider on-site energy sources	Purchase renewable energy from BC Hydro or other sources
Efficiency	Purchase vehicles with exemplary fuel efficiency whenever possible (e.g., light-weight, hybrid, electric)	New municipal buildings to incorporate LEED principles	
	Research energy-saving retrofits to existing vehicles		
Consumption Patterns	Consider pay parking at municipal facilities and/or provide free transit passes to employees and reclaim the freed-up parking space	Explore conversion of existing building to alternative energy sources	Identify those major product purchases (e.g., asphalt) that are most strongly linked to oil prices
	Identify any positions for which telecommuting may be possible at certain times	Allow more temporal and spatial variation of interior temperatures in municipal buildings	Include energy considerations in purchasing decisions (e.g., buying more locally-produced items)
	Retrofit bicycle end-of-trip facilities into more municipal buildings		Review fiscal policies and financial projections (revenues and major expenses) to assess the possible impact of peak oil

## **Appendix B. Projections of the Peaking of World Oil Production**

*Hirsch, Robert. et al. "Peaking of World Oil Production: Impacts, Mitigation, & Risk Management". Report for the U.S. Department of Energy, February 2005. Page 19.:*

<u>Projected Date</u>	<u>Source of Projection</u>	<u>Background &amp; Reference</u>
2006-2007	Bakhtari, A.M.S.	Iranian Oil Executive <sup>1</sup>
2007-2009	Simmons, M.R.	Investment banker <sup>2</sup>
After 2007	Skrebowski, C.	Petroleum journal Editor <sup>3</sup>
Before 2009	Deffeyes, K.S.	Oil company geologist (ret.) <sup>4</sup>
Before 2010	Goodstein, D.	Vice Provost, Cal Tech <sup>5</sup>
Around 2010	Campbell, C.J.	Oil company geologist (ret.) <sup>6</sup>
After 2010	World Energy Council	World Non-Government Org <sup>7</sup>
2010-2020	Laherrere, J.	Oil company geologist (ret.) <sup>8</sup>
2016	EIA nominal case	DOE analysis/ information <sup>9</sup>
After 2020	CERA	Energy consultants <sup>10</sup>
2025 or later	Shell	Major oil company <sup>11</sup>
No visible peak	Lynch, M.C.	Energy economist <sup>12</sup>

<sup>1</sup>Bakhtari, A.M.S. "World Oil Production Capacity Model Suggests Output Peak by 2006-07." *OGJ*. April 26, 2004.

<sup>2</sup>Simmons, M.R. ASPO Workshop. May 26, 2003.

<sup>3</sup>Skrebowski, C. "Oil Field Mega Projects - 2004." *Petroleum Review*. January 2004.

<sup>4</sup>Deffeyes, K.S. *Hubbert's Peak-The Impending World Oil Shortage*. Princeton University Press. 2003.

<sup>5</sup>Goodstein, D. *Out of Gas – The End of the Age of Oil*. W.W. Norton. 2004

<sup>6</sup>Campbell, C.J. "Industry Urged to Watch for Regular Oil Production Peaks, Depletion Signals." *OGJ*. July 14, 2003.

<sup>7</sup>*Drivers of the Energy Scene*. World Energy Council. 2003.

<sup>8</sup>Laherrere, J. Seminar Center of Energy Conversion. Zurich. May 7, 2003

<sup>9</sup>DOE EIA. "Long Term World Oil Supply." April 18, 2000. See Appendix I for discussion.

<sup>10</sup>Jackson, P. et al. "Triple Witching Hour for Oil Arrives Early in 2004 – But, As Yet, No Real Witches." *CERA Alert*. April 7, 2004.

<sup>11</sup>Davis, G. "Meeting Future Energy Needs." *The Bridge*. National Academies Press. Summer 2003.

<sup>12</sup>Lynch, M.C. "Petroleum Resources Pessimism Debunked in Hubbert Model and Hubbert Modelers' Assessment." *Oil and Gas Journal*, July 14, 2003.





## **Appendix C. Resources**

A comprehensive list of relevant local government-level studies and initiatives is beyond the scope of this white paper. The following is a selective list of reports and other documents that may serve as resources for developing a policy response for Metro.

City	Country	Actions
	Australia	<ul style="list-style-type: none"> <li>Study: Dodson, J. and Sipe, N. "Oil Vulnerability in the Australian City." Griffith University, Brisbane, Australia. Urban Research Program. December 2005. "This paper assesses the resilience or vulnerability of urban communities to increased fuel prices and how the socio-economic impacts will be spread across different localities. In particular, the paper seeks to assess how different socio-economic groups will be affected by rising fuel costs, at the neighborhood level. We base our analysis on ABS Census variables that are combined to indicate potential household vulnerability to fuel price rises, based on existing levels of social disadvantage, household motor vehicle ownership and current dependence on motor vehicles for work trips.</li> </ul>
	Australia	<ul style="list-style-type: none"> <li>Robinson, B. "Global Oil Vulnerability and the Australian Situation: A background paper for WA State Sustainability Strategy." Government of Western Australia. June 2002.</li> </ul>
Burnaby, British Columbia	Canada	<ul style="list-style-type: none"> <li>Staff Report, "Global Peak in Oil Production: The Municipal Context". Burnaby, British Columbia, January 2006.</li> </ul>
Basel	Switzerland	<ul style="list-style-type: none"> <li>"2000-Watt Society" program, implemented in Basel by the Swiss Federal Institute of Technology, promotes a reduction of per-capita energy use in Switzerland from the current average to 6,000 watts to the 2,000-watt world average. The program includes applied research, professional symposia, and project partnerships with government bureaus of environment and energy, engineering and planning, and economy.</li> </ul>
Humboldt County, California	USA	<ul style="list-style-type: none"> <li>Humboldt County General Plan 2025, Energy Element Background Technical Report. (<a href="http://www.redwoodenergy.org/uploads/Tech%20Report%20Public%20Draft.pdf">http://www.redwoodenergy.org/uploads/Tech%20Report%20Public%20Draft.pdf</a>)</li> </ul>
New York City	USA	<ul style="list-style-type: none"> <li>Committee pre-report on a series of initiatives submitted to the New York City Council in 2004 on preparing for energy shortages, in response to recent heatwaves and a blackout. These initiatives would have amended the City charter in relation to ... "creating an energy shortage contingency plan,... the creation of an energy office and public awareness city-wide of energy efficiency and conservation measures, ...a survey regarding clean on-site power generation for city facilities, and... the creation of a program regarding building commissioning and energy efficiency and conservation training." <a href="http://webdocs.nycouncil.info/attachments/61517.htm">http://webdocs.nycouncil.info/attachments/61517.htm</a></li> </ul>
Oakland, California	USA	<ul style="list-style-type: none"> <li>Oakland's Sustainability Program (part of the Mayor's office, and under the direction of Sustainability Director Randy Hayes) includes a number of initiatives for energy efficiency and renewable energy. <a href="http://www.denvergov.org/admin/template3/forms/hayes.pdf">http://www.denvergov.org/admin/template3/forms/hayes.pdf</a></li> </ul>
Willits, California	USA	<ul style="list-style-type: none"> <li>WELL Energy Group. "Recommendations Towards Energy Independence for the City of Willits and Surrounding Community." August 2005. <a href="http://www.willitseconomiclocalization.org/Papers/Papers.htm">http://www.willitseconomiclocalization.org/Papers/Papers.htm</a></li> </ul>