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Post Carbon Cities: Planning for Energy and Climate Uncertainty

A Guidebook on Peak Oil and Global Warming for Local Governments

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Executive Summary



***Post Carbon Cities: Planning for Energy and Climate Uncertainty* provides guidance and support to local government officials and staff for meeting three critical goals: breaking community dependence on oil, stopping community contributions to global warming, and preparing the community to thrive in a time of energy and climate uncertainty.**

The most direct strategy for achieving these goals is to *reduce consumption* and *produce locally*: reduce the community's overall resource consumption, and develop the capacity of local farmers and manufacturers to provide for the community's basic needs. The more your community can get its energy and basic goods from local sources, the less vulnerable it will be to rising and unstable oil prices, and the less it will contribute to climate change.

Energy and climate uncertainty Most credible observers now recognize that our global climate faces radical change in the coming decades if we do not take immediate and far-reaching action. Peak oil (the coming high point and subsequent decline of world oil production) is not as widely understood, but presents a similarly complex set of challenges.

Time is short to prepare for peak oil and global warming. At current rates of fossil fuel consumption we will most likely pass peak oil by 2010*, and we seriously risk widespread, catastrophic climate change if we do not begin dramatically reducing global carbon emissions.¹

The key problem posed by both peak oil and global warming is ultimately one of *uncertainty*: these phenomena are creating changes in economies and ecosystems at the global, regional and even local levels that we cannot easily predict. For local governments—responsible for managing local public services, planning for future land use and transportation, and protecting the community's economic and social health— this uncertainty creates a wide variety of risks and vulnerabilities. How will local economies be affected if the price of oil exceeds \$100 a barrel? How will regional climate shifts affect the local water supply? Local government decision makers need to understand and respond to these challenges.

Executive Summary

Incentives to act locally As many southeastern U.S. municipalities discovered after Hurricane Katrina knocked out regional fuel pipelines in 2005, state/provincial and federal government agencies do not have the ability to meet every jurisdiction's resource needs in times of crisis. Local governments, however, have the flexibility, capacity and motivation to address risk management and emergency response needs in ways that higher-level government agencies cannot.

Local governments have strong financial incentives to address peak oil and climate change. Reducing local oil dependence and carbon emissions means pursuing energy-efficient buildings, locally-controlled energy sources, compact transit-oriented land uses, alternative transportation modes and other aims that are energy prudent, and thus ultimately fiscally conservative. When the challenges created by peak oil and climate change are not future risks but present problems, those communities that have prepared will have distinct advantages over those that haven't.

Local governments are well-positioned to address peak oil and climate change because they have influence over three key areas of urban spatial and economic development:

- **Building construction and energy efficiency.** Through zoning codes, building codes and the permitting process, municipalities can encourage building designs that save energy and resources.
- **Local land use and transportation patterns.** Municipal land use and transportation planning decisions directly influence whether people and businesses will have mobility choices that allow them to save energy and money.
- **Local economic activity.** Municipal economic development initiatives are opportunities to encourage development in low-energy, zero-carbon directions, by both incentive and example.

Four Initial Steps Over the last fifteen years, hundreds of local governments in the U.S. and Canada have begun systematically reducing their greenhouse gas emissions in response to global warming. And since 2004, when oil prices climbed beyond 15-year highs, a growing number of local and regional government agencies in both countries have begun responding to the threats posed by peak oil.

Drawing from the experiences of these local governments, here are **four initial steps** that your own city can take to address peak oil and global warming:

1: Sign the Mayors Climate Protection Agreement (U.S.) / Endorse the World Mayors and Municipal Leaders Declaration on Climate Change. For U.S. mayors, signing the Climate Protection Agreement commits your city to greenhouse gas reduction in the absence of federal leadership. Both U.S. and Canadian cities can also contribute to international carbon mitigation efforts by signing the Declaration on Climate Change. See www.coolmayors.com and www.iclei.org/montrealsummit.

2: Join ICLEI's Cities for Climate Protection Campaign[†] to get your city started on reducing energy use and greenhouse gas emissions, and to connect to the resources and expertise of the leading global movement of local governments working on climate

change. See www.iclei.org.

3: Sign the Oil Depletion Protocol, which sets a target for reducing oil consumption across your community. Signing the Protocol sends a signal to citizens, business leaders and municipal staff that your city is serious about reducing its energy vulnerability. See www.oildepletionprotocol.org.

4: Establish a Peak Oil Task Force to quickly identify the challenges and vulnerabilities your community faces as a result of peak oil. A task force is also a valuable way to



introduce community stakeholders to the challenges of energy uncertainty, and engage them in developing a broad-based response. See *Appendix: Establishing a peak oil task force.*

Five principles for the long term Integrate these **five principles** into your local government's decision-making and planning processes to comprehensively address energy and climate uncertainty over the long term:

1. Deal with transportation and land use (or you may as well stop now). Fundamentally rethink your municipality's land use and transportation practices, from building and zoning codes to long-range planning. Make land use and transportation infrastructure decisions with 100-year timeframes. Organize with neighboring jurisdictions to address the land use and transportation challenges of energy and climate uncertainty at a regional level.

2. Tackle private energy consumption. Use the tools you already have to encourage serious energy conservation and efficiency in the private sector. Engage the business community aggressively, challenging your local business leaders to reinvent the local economy for the post-carbon world.

3. Attack the problems piece-by-piece and from many angles. Meet your energy and climate uncertainty response goals with multiple, proven solutions, pursuing many different kinds of solutions at different scales. Enlist the entire community, setting clear community goals and spurring action from all sides to meet them.

4. Plan for fundamental changes... and make fundamental changes happen. Educate and involve your fellow elected officials, staff and community stakeholders about energy and climate uncertainty, challenge them to come up with serious solutions. Lead your city's transition by integrating peak oil and climate change considerations in your own decisions.

5. Build a sense of community. In short, do anything you can to get people talking with each other, forming relationships, and investing themselves in the larger community.

Join the conversation online The Post Carbon Cities network is a resource for everyone who works with or for local governments. Our website at www.postcarboncities.net provides news feeds and special features, resources for policymakers and planners, and a forum where elected officials, municipal staff and others can share and discuss their common problems, challenges, best practices and lessons learned.

We welcome your participation in this dialog; we can all learn much more, much faster, by sharing our successes and our failures, building an ever-richer knowledge base. Please visit us online and join the growing movement of municipal leaders who are preparing their communities for the challenges of energy and climate uncertainty.



* According to an increasing number of petroleum analysts, we seem to be facing an undulating plateau of world oil production from 2007 onward, with permanent decline likely underway by 2010. See page 12.

† In 2006 James Hansen, director of NASA's Goddard Institute for Space Studies, publicly called for immediate, broad-based action to reduce carbon emissions, saying "we have a very brief window of opportunity to deal with climate change...no longer than a decade, at the most."

‡ The ICLEI (International Council for Local Environmental Initiatives) Cities for Climate Protection program works with cities around the world to track and reduce local greenhouse gas emissions. In Canada, this program is implemented for ICLEI by the Federation of Canadian Municipalities as "Partners for Climate Change"; see <http://www.iclei.org>.

Preface

What is this guidebook?

Post Carbon Cities: Planning for Energy and Climate Uncertainty is a guidebook for local governments on "peak oil" (the moment at which global oil production hits its highest point, followed by a permanent decline) and global warming. It provides a sober look at the challenges that peak oil and global warming are creating for local governments, and explains what local decision-makers can do to address these challenges.

The Guidebook is divided into six sections:

Section 1 Introduction describes how peak oil and global warming are creating a new problem of energy and climate uncertainty, and what this means for local governments.

Section 2 The End of Cheap Oil and Natural Gas describes the issues surrounding world oil and natural gas production decline, and their implications for both local economies and the global economic system.

Section 3 Local Challenges, Local Advantages explores why local governments should be concerned about energy and climate uncertainty, and identifies the advantages that local governments have for addressing the problem.

Section 4 Responses to Energy and Climate Uncertainty reviews the experiences of U.S. and Canadian municipalities that have already begun planning for energy and climate uncertainty, and derives "lessons learned" from these actions.

Section 5 Transitioning to the Post Carbon World proposes four initial steps that local governments should take to start addressing energy and climate uncertainty, and five principles to guide long-range planning.

The Appendix includes guidelines for starting a local task force on peak oil, a special section on systems thinking as a tool for municipalities, and other resources.

Who should use this guidebook, and why?

Post Carbon Cities: Planning for Energy and Climate Uncertainty is written specifically for people who work with and for local governments in the U.S. and Canada: elected officials, managers, planners, engineers, policy analysts, program staff and others. Consultants and concerned citizens will also find this guidebook useful for understanding the issues and responsibilities that municipal leaders face in confronting peak oil and global warming.

This guidebook fills a gap in the resources currently available to local government decision-makers on planning for the changing global energy and climate situations of the 21st century. While many resources exist for community energy planning, energy efficiency and greenhouse gas mitigation, little has yet been written for local governments about the challenge of peak oil and the need to begin adapting to those effects of climate change that are now unavoidable.

About the Author

Daniel Lerch is Program Manager of Post Carbon Institute's Post Carbon Cities program. He has worked with urban land use and transportation planning issues for over ten years in the public, private and non-profit sectors, and is a co-founder of The City Repair Project, an award-winning non-profit organization working on community public space issues. Mr. Lerch has a Bachelor of Arts in Urban Studies from Rutgers University in New Jersey and a Master of Urban Studies from Portland State University in Oregon.

Post Carbon Cities program

Post Carbon Cities is a program of Post Carbon Institute. Post Carbon Cities helps local governments understand the challenges posed by peak oil and climate change, and provides resources for elected officials, planners, managers and others to develop plans and responses appropriate to their communities. The Post Carbon Cities website, www.postcarboncities.net, is a forum for news, discussion, policy tools and other resources related to local government actions on peak oil and global warming. Please visit us online and join this growing movement of cities developing effective local responses to energy and climate uncertainty.

About Post Carbon Institute

Post Carbon Institute (www.postcarbon.org) helps communities everywhere understand and respond to the challenges of fossil fuel depletion and climate change. We conduct research, develop resources and assist groups and individuals who are leading their communities in making a smooth transition to a world that is no longer dependent on hydrocarbon fuels nor emitting climate-changing levels of carbon: the post-carbon world.

Post Carbon Institute is headquartered in Sebastopol, California with offices in Washington, D.C.; Portland, Oregon; Vancouver, British Columbia; and Queensland in Australia. Our advisors and fellows include some of the world's foremost experts on energy resource depletion and sustainability.

Founder and President

Julian Darley

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1. Introduction



1.1 **The new challenge of uncertainty** Over just the last few years, major government, business and community leaders in the United States and Canada have been changing their expectations about the future of energy and the environment.

Most credible observers now recognize that our global energy supply and our global climate face radical change in the coming decades if we do not radically change the way our industrialized economies consume energy. Global warming is widely accepted as a serious problem needing immediate and far-reaching action. Peak oil—the coming decline of global oil production—is not as widely understood, but presents a similarly complex set of challenges.

The problem posed by peak oil and global warming is ultimately one of *uncertainty*: both phenomena are creating changes in economies and ecosystems at the global, regional and even local levels that we cannot easily predict. For local governments—responsible for managing local public services and planning for future land use and transportation—this new uncertainty creates a wide variety of risks and vulnerabilities. How will local jobs be affected if the price of oil hits \$100 a barrel? How will regional climate shifts affect the local water supply? Local governments need to understand and respond to these challenges.

This section will:

- introduce the issues of peak oil and global warming,
- describe how these phenomena are creating uncertainty about our energy supplies and climate, and
- explain the urgency for local governments to address this pressing problem.

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

...[W]e have at most ten years – not ten years to decide upon action, but ten years to alter fundamentally the trajectory of global greenhouse emissions.

– James Hansen, Director, NASA Goddard Institute for Space Studies, "The Threat to the Planet," New York Review of Books, 13 July 2006

Introduction

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

–Donald Fournier and Eileen Westervelt, US Army Corps of Engineers, “Energy Trends and Their Implications for U.S. Army Installations”, Sept. 2005

...[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, 13 March 2006

1.2 Peak oil and energy uncertainty A changing world

The fundamental factors of world oil supply and demand are changing. Global demand for oil is rising as the less-developed world—led by China and India—rapidly industrializes, and the developed world continues to grow. The giant oil fields of the 20th century are declining, however, and oil discoveries have been declining since the mid-1960s. Major oil companies like Chevron admit that much of the most-easily accessible oil has already been extracted, making oil production increasingly dependent on significant and expensive changes in production methods.¹

World oil production is also becoming increasingly concentrated in countries at risk of instability and countries that are rivals to Western economic interests; Saudi Arabia, Russia, China, Iran and Venezuela together account for nearly 35% of world production. Oil and natural gas are powerful political tools that producer countries like Russia and Iran have increasingly proven willing to use, or threaten to use, to further their own interests.

The responses to these changes vary widely. Some scientists and advocates focus on an impending peak of world oil production when oil companies will no longer be able to increase production to meet demand. Some political leaders, especially in the U.S., take an “energy security” approach focusing on how foreign oil dependence creates worrisome economic and military vulnerabilities. Still others maintain that there is no near-term problem, and that we can rely on market forces to develop substitutes for oil, better oil production technology, and more oil-efficient products.

Experts may disagree on what these changes mean and how we should respond to them, but it’s important to note that nearly everyone agrees on at least two things: fundamental changes in global oil supply and demand are *real* and are happening *now*.

One of the main problems arising from these changes in global oil supply and demand is the potential for higher and more volatile oil prices. As a recent report for the U.S. Department of Energy 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.²

“Oil peaking”—or “peak oil”—refers to the point at which total global oil production cannot grow any further and begins to decline, an event that an increasing number of petroleum analysts predict happening by 2010. Ultimately, knowing the exact date is not critical. What matters is that oil prices will become volatile and progressively higher when demand increases and supply can’t keep up.

A big problem

None of this would be a real concern if the commodity in question were soybeans or pork bellies: demand and supply would find a new equilibrium without fundamentally threatening the global economy. Oil, however, is unlike any other commodity in three important ways.

First, oil is absolutely essential to the most basic functions of the industrialized world. Oil is the key raw material for gasoline, diesel, jet fuel, home heating oil, industrial oils, many chemicals and most plastics. Many industries are extremely dependent on oil in multiple forms; for example, the modern global food production and distribution system uses oil as a fuel for farming and transporting, and as a raw material for agrichemicals and packaging plastics. Instability in oil supply and price has serious potential consequences for virtually all sectors of the global economy, particularly transportation, agriculture and manufacturing.

The ready and cheap supply of oil and natural gas is currently as presupposed and essential to our economy as the supply of potable water is to our communities.

Second, there are currently no viable substitutes for oil at current rates of consumption. Oil is unlike any other raw material on earth in its "embodied" energy and practical applications. Although alternatives to oil do exist for many of its uses, whether as a transportable fuel (biofuels, fuel cells) or as a raw material (cellulosic plastics, biopesticides), these are generally vastly inferior to oil as resources for these applications. The logistical difficulty of shifting to oil substitutes is so great that even the European Union, which has pursued alternatives to oil use far more aggressively than the U.S. and Canada, has been able to set only a modest goal of increasing the biofuel share of all its transport fuels to 5.75% by 2010.

Finally, and most importantly, our entire economic system is built on the assumption that oil will always be readily available at affordable prices. The modern world's complex inter-firm and inter-governmental economic relationships, made up of movements of raw materials and goods across the globe, very much depend on the price and availability of oil being relatively predictable. If the price of oil becomes very high or very volatile or both, the globalized economy as a whole will face fundamental challenges.

The threat of global oil supply not meeting demand (whether or not it's referred to as "peak oil") is already creating change and uncertainty in diverse sectors of the global economy—for example, meat prices are rising because corn crops are being diverted to ethanol production³. At a broader scale, the threat of serious oil price volatility means our past assumptions about energy supplies and prices no longer hold. Throughout this guidebook, we'll refer to these peak oil-induced uncertainties in the global economy as *"energy uncertainty."*

1.3 Global warming and climate uncertainty At the 1992 UN "Earth Summit" in Rio de Janeiro, most of the world's governments agreed that global warming was a real and serious problem for all of humanity. It took fifteen years of politically-charged debate and half-hearted measures, however, before a critical mass of trans-national corporations and Western government, business and media leaders finally accepted the need to take serious and immediate action against greenhouse gas emissions⁴.

Although there is agreement that global warming has serious environmental, economic and social ramifications, there is still disagreement on what exactly will happen, when it will happen and what the specific regional and local effects will be. How will global warming shift regional growing seasons and water supplies? How likely is that major climate functions like the Gulf Stream will be fundamentally altered, and what impact will that have on our cities and economies? Is there a tipping point of carbon dioxide levels that, once reached, will trigger "runaway" climate change?⁵

Whereas peak oil and its effects have the potential to set off massive global economic disruption, global warming and its effects have the potential to set off massive global ecological disruption—which will then affect the global economy. Throughout this guidebook, we'll refer to these global warming-induced uncertainties about the environment and the economy as *"climate uncertainty."*

1.4 A job for government In the U.S. and Canada, it's generally accepted—at least in theory—that government should play a role where market forces cannot be expected (or trusted) to achieve fair and acceptable results for the common good. We expect our governments to ensure that basic services like utilities, schools and police protection are



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

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...[T]o ignore the fact of Peak Oil and 'let the markets decide' is naive at best and disastrous at worst. Human history is replete with examples of mismanagement of resources when left in the hands of the free markets.

- Eric Sprott & Sasha Solunac, Sprott Asset Management, National Post (Toronto), 2 Nov. 2005

available universally, and not just to the highest bidders. We also expect our governments to safeguard, to some extent, the environment and the economy: we regulate pollution and break up monopolies.

Global warming and peak oil are problems that market forces alone cannot solve in the most desirable ways for the common good. Markets respond to price signals—but mitigating the causes and preparing for the effects of global warming and peak oil takes years of broad, concerted effort. If we wait for price signals to start planning, it will be too late, and our economies and communities (and certainly the environment) will suffer.

Looking at the vulnerabilities created by peak oil and global warming, we must weigh the certain costs of acting against the potential costs of not acting. According to a growing number of analysts in both the public and private sectors, the risks of not addressing these vulnerabilities are economically and socially so great that it is in the interest of society that governments act now.

1.5 A job for municipalities Kathleen Leotta, Lead Transportation Planner with the multinational planning and engineering firm Parsons Brinckerhoff, researches how oil supply disruptions affect transportation systems, and what transportation management strategies have worked best in such scenarios. In studying the shutdown of oil pipelines in North Carolina following Hurricane Katrina in 2005, she found that many municipalities were left to fend for themselves when their oil stopped flowing:

A huge amount of their motor fuels was cut off; they didn't seem to quite realize how much of their finished fuels came through the pipelines. The state held the largest stockpiles of fuel, and when all the municipalities came to them to ask if they could give them some of their fuel, they said they couldn't because they didn't have enough for their own vehicles and fleets.

It's really the case that municipalities need to start thinking about some of these things on their own.⁶

Natural disasters are unusual and extreme events, but this story nevertheless has a valuable lesson for local government leaders: Know your municipality's vulnerabilities, because there isn't necessarily anyone else thinking about them.

Identifying and mitigating community vulnerabilities is one of the more important—if often unwritten—expectations we have of our local governments. Unfortunately, as with many other undertakings that aren't immediate or regular priorities, local governments often don't have the resources to address such vulnerabilities except in times of crisis, when it's too late to prepare.

Preparing for energy and climate uncertainty is much different than preparing for a hurricane, of course. In 2006, many municipalities saw first-hand how spikes in global oil prices directly and immediately impacted their core responsibilities when quickly rising asphalt prices caused street maintenance costs in many municipalities to double or even triple over 2005 (see *Box 5*, page 26). Changes in a fundamental economic factor like the price of oil—or a fundamental environmental factor like average temperatures—can have unexpected system effects that are difficult to predict.

Know your municipality's vulnerabilities, because there isn't necessarily anyone else thinking about them.

Identifying and mitigating community vulnerabilities is probably one of the more important—if often unwritten—expectations we have of our local governments.

Oil and energy prices affect just about everything a local governments can do, from providing basic services like public works and emergency response to long-range land use and transportation planning. The local effects of climate change are more difficult to predict, but they generally threaten many of the basic “ecological goods and services” that cities depend on, such as water supplies and favorable agricultural conditions. Prudent governments will want to identify their local vulnerabilities as early as possible and address them carefully and comprehensively.

1.6 Planning for energy and climate uncertainty We haven't really needed to think about fundamental energy issues since the oil crises of the 1970s because the global system of oil production and distribution has largely ensured the availability of oil at relatively affordable prices. As a municipal leader, this has meant that you could do every-

The challenge for municipalities is not to predict the future, but to approach the future with the right tools and the right information.

thing you needed to do—from updating the annual operating budget to getting multi-million dollar transportation projects into the federal funding process—without needing to consider the price or availability of energy in your community as a significant variable.

How, then, do we plan municipal budgets and activities when nobody knows if

the price of oil will steadily increase by 100% over the next five years, or spike next month for just a week, or stay right where it is for a decade? How do we plan for the local effects of climate change when they could very well range from relatively manageable to catastrophic? Any particular ten-year scenario of energy and climate trends will have unique implications for municipal responsibilities, and planning for the wrong scenario could be much more expensive than not planning at all.

As we'll explore throughout this Guidebook, the challenge for municipalities is not to predict the future, but to approach the future with the right tools and the right information. While most municipalities share some basic oil and gas vulnerabilities—such as in fuel for operating city vehicles and heating city buildings—the exact response that any one municipality undertakes will be unique because the context within which each municipality operates is unique. For this reason, we've focused the body of the Guidebook on general issues and process guidelines, instead of suggesting a one-size-fits-all response program or risk assessment template.

1.7 Urgency to act Time is short to prepare for peak oil and global warming. At current rates of fossil fuel consumption we will likely pass the peak of global oil production by 2020 (some analysts believe we have passed it already), and we seriously risk triggering catastrophic climate change if we do not start significantly reducing carbon emissions in the next ten years⁷. Local governments around the world need to act quickly and decisively.

Planetizen.com, the largest online network of city planners in the United States, named “Peak Oil and Planning for Alternative Energy” one of the Top Ten Planning Issues of 2005. It's important for municipalities to address both peak oil and global warming, not only to prepare their communities for an uncertain future but also to stay competitive with other municipalities and regions competing for firms and households. Those communities that manage these challenges successfully will have an advantage over those that don't.

Dealing with local dependencies on oil and natural gas—two of the most important materials to modern society, and simultaneously the most damaging to the climate—can be an extremely challenging and at times overwhelming task for local government leaders, both as public servants and as private citizens. Local communities can be extremely resilient, however, and time and again prove they are able to manage disruptive change. It's our hope that this Guidebook will help your community navigate these challenges as smoothly as possible.

I would say that most city planners are aware of our energy predicament. The biggest hurdle facing the city planners is that they're so swamped with the day-to-day workload... it's really hard for them to put aside enough time to devote to thinking about how they're going to handle new trends in city design...

I'm in a really lucky position right now. Our city is progressive-thinking, and our City Council is very supportive; they've given me some support and direction to work on [energy independence]... We have a very limited budget so they can't commit huge amounts of time and money, but they're not afraid to take a position on it.

– Alan Falleri, Director of Community Development, City of Willits, California

Making a government statement on peak oil

This section will help you (a municipal elected official or staff member) develop a way for your local government to make an official statement on peak oil that is appropriate to your local context.

A good way for a community to start engaging the challenges of peak oil is for the local government to officially recognize the problem in some way. This may be as simple as an internal staff report, as public as a special Town Hall meeting, or as high-profile as a City Council establishing a study commission.

A municipal statement gives a sense of direction, legitimacy and momentum to what could otherwise be an unfocused and contentious policymaking process. Such a statement can serve two goals:

- **Raising awareness**

Most citizens and businesses are aware that there is some connection between world events and the prices they pay for energy, but few pay close attention to the details of global oil supply and demand. Official municipal recognition of peak oil and energy uncertainty alerts the community to the fact that the issues even exist. The more households and businesses know about their community's oil and natural gas vulnerabilities, the more they will understand local government efforts to address them, and the better they will be able to mitigate community vulnerabilities privately.

Local officials and staff in particular need to be made aware of energy uncertainty, and encouraged to think creatively about what it may mean for the municipal functions they are responsible for. You might consider holding a special staff presentation or workshop on the topic. The depth and success of the city's response to energy uncertainty will largely depend on the support the effort has from managers and staff.

- **Getting the ball rolling**

Having some official acknowledgement of peak oil gives it legitimacy as an issue requiring municipal attention. It also sends municipal officials, staff and community members an important signal of support, enabling them to confidently begin working on this potentially controversial issue. This signal is especially important for staff in smaller jurisdictions, as limited resources often mean that non-immediate needs like long-term planning, forecasting and risk management won't get much attention without a clear indication of support from officials.

Here are two examples of what some municipalities have done to make a statement on peak oil:

- **Resolution**

A resolution passed by the elected body sends a strong message to both staff and the community about the seriousness of the peak oil problem. A resolution can also formally set a direction for municipal response.

- On April 28, 2006, the City of San Francisco passed a resolution recognizing the "critical" importance of affordable petroleum to the economy. It explicitly acknowledged the "unprecedented challenges of Peak Oil," and supported a city-wide assessment "with the aim of developing a comprehensive plan of action and response to Peak Oil." It also urged the Mayor to fund and direct the plan's development. (See *Box 14*.)
- On July 20, 2006, the City of Bloomington (Indiana) passed a resolution recognizing the "severe impact" petroleum scarcity would have on the economy. Among its statements are that the City Council:
 - "acknowledges the unprecedented challenge of peak global petroleum production,"
 - "recognizes that the City of Bloomington must prepare for the inevitability of oil peak, and encourages the community to become better informed on energy-related matters."
 - "supports adoption of a global depletion protocol," and
 - "directs the City Clerk to distribute this Resolution to [Indiana's state and Federal elected officials], and urges them to take action on the impending peak in petroleum production and prepare for its consequences."

See www.postcarboncities.net/node/180.

- **Report or White Paper**

An internal report or policy paper can quickly establish a basis for addressing energy uncertainty, and open space for further and more in-depth study and assessment:

- At the City of Burnaby (British Columbia), a January 2006 report on energy supply has helped raise awareness about the issue internally and has been used to provide back-

ground on certain City Council decisions, such as the promotion of bicycling infrastructure and opposition to freeway widening.

Available at <http://www.postcarboncities.net/node/164>.

- The City of Hamilton (Ontario), commissioned a report to broadly consider how the municipality might approach future energy constraints. The April 2006 report proposed specific goals and opportunities for energy use and production, and has given city officials a useful framework for bringing together programs on energy, air quality and carbon mitigation initiatives.
Available at <http://www.postcarboncities.net/node/267>.
- At Metro, the regional government of the Portland (Oregon) metropolitan area, an April 2006 policy white paper on future “oil supply uncertainty” related this issue to specific Metro responsibilities, establishing a basis for further assessment and future responses. Metro Council’s acceptance of the white paper got the issue favorable coverage on the front page of the daily business newspaper.
Available at <http://www.metro-region.org/article.cfm?ArticleID=18951>

See www.postcarboncities.net/resources for a regularly-updated collection of local government resolutions, ordinances and reports related to energy uncertainty.

Establishing a peak oil task force

This section will help you (a municipal elected official or staff member) develop a volunteer-based task force to inquire into the vulnerabilities your community faces in peak oil, and to develop recommendations for response actions.

A peak oil task force investigates the ways in which your community is dependent on oil and natural gas.

Mapping this dependency can be surprisingly difficult task; it requires more than just a list of all the ways oil is used in the community (see *Systems Thinking: A Tool for Municipalities* on page 79 for an in-depth discussion of identifying vulnerabilities in complex systems). This process can be complicated if you don't have a clearly-defined structure, process and goal to guide your inquiry.

Below are some suggestions for organizing and running a peak oil task force, based on the experiences of the cities discussed in Section 4.1. The actual scope and structure of your inquiry, however, will depend on the size of your community, the available resources and your ultimate goals.

Organizing the task force

Recruit the right members and staff

When the City of Portland set up its Peak Oil Task Force in 2006, the City's Office of Sustainable Development used an interview and referral process to ensure they were selecting people who knew their fields and knew how to work effectively in a collaborative group process. The Portland task force also benefited greatly from having a few City staff on hand to assist the process and assemble technical data, allowing members to concentrate on interviewing experts, researching impacts and digesting information.

There can be problems with volunteer task forces, however, including lack of clear direction, disruptive volunteers, and lack of time. While the organization and execution of any special inquiry must be done with care, municipalities should be especially mindful when undertaking volunteer-staffed inquiries to avoid wasting people's time.

—TIP: Involve key staff and influential community members in discussions right from the start.

Don't just rely on interested volunteers: recruit the editor of a local newspaper, the owner of an important local company, and the leader of a local religious or minority community. In addition to your own municipality's staff, consider involving key staff from neighboring or overlapping jurisdictions. The right mix of leaders, advocates and staff will add expertise, open doors and increase the credibility of your task force.

Define the problem

If you plan to launch a peak oil task force you will need a clear problem statement. Otherwise, it's easy for the people working on it to end up thinking about the problem in divergent ways, or to get too caught up in details.

Municipalities need to address peak oil and energy uncertainty in ways appropriate to unique local needs, resources and context. For example, one community may see peak oil as a threat to affordable gasoline; another may see it as a broad threat to their regional economic competitiveness; and yet another may need to focus all its attention on urgent electricity or heating and cooling needs. Whatever the objective, a clear, documented statement of the problem or objective will keep participants focused.

Define the process and the goals

Once you've defined the problem, you need to get everyone together on the process. Announcing the start of an organized process is an opportunity to tell staff and community members how they can contribute and toward what end. Are you undertaking a comprehensive, community-wide energy assessment, or developing an oil price shock contingency plan? Will your community want a long-term initiative to develop sustainability across all sectors, or is there only support for an ad hoc committee to find potential cost savings in energy diversification?

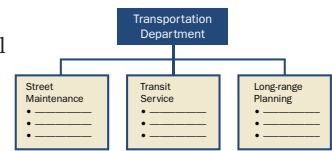
Structuring the inquiry

As mentioned above, the way you define the problem will help guide how the task force approaches it. In the same fashion, the way the task force structures its inquiry will define what kinds of information it will find and what conclusions it will reach. Thus it's very important to structure the inquiry with its end product in mind. For example:

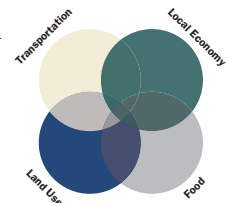
The first thing is to take stock. What kind of dependency do we have on the importation of materials and energy for the community, and what can we do locally—what can we do to relocalize?

- Councilmember Dave Rollo, City of Bloomington, Indiana

- **Departmental inquiry.** Are you only interested in identifying potential fiscal vulnerabilities of official municipal responsibilities? Then you may want to organize an internal assessment divided by department, with a focus on potential cost scenarios and clear roles for managers and staff to drive the process.



- **Sectoral inquiry.** Are you interested in general vulnerabilities of the entire community? Then you may want to establish a volunteer citizens commission and divide your assessment into broad areas like "Transportation," "Local Economy," and "Food." You'll need to carefully consider how to deal with challenges like overlapping data, and structure the inquiry in such a way that you don't get overwhelmed with information from the volunteer committees.



There are many different ways you can structure the inquiry. Risk analysts in the insurance industry use categorized checklists to identify vulnerabilities in well-understood conditions. On the other hand, a "blank slate" approach that uses brainstorming, expert interviews and multiple discussion rounds may be more appropriate for situations where there are more unknowns.

Identify crucial information needs early so you can structure your inquiry in the most useful way. If your community has one major employer, or is extremely dependent on one kind of trade or one mode of transportation, you will want to plan extra time for investigating the vulnerabilities that may affect such key points.

Be sure to enlist the help of the people who know your community and its economy intimately: agency managers and staff, business owners, community leaders, professors and researchers from a local college, etc. Whether as committee members or as interview subjects, nobody knows the specific challenges that volatile oil and gas prices may present to different sectors better than the people who work with them on a daily basis.

—**TIP: Have a clear structure for your assessment.**

Are you dividing up areas of inquiry into sectors like land use, food and economy, or by municipal responsibilities like emergency services, planning and public finance? How are you dealing with issues that fall into multiple categories? How are you differentiating between immediate needs and long-term needs?

—**TIP: Keep scoping, analysis, and solutions separate.**

It's easy to start talking about impacts, risks and potential responses all at the same time. Make sure you're not talking about possible responses until you've actually identified your community's most important vulnerabilities.

Running the inquiry

Start big

Before you begin asking detailed questions you should first collect basic supply and demand information from a "high altitude." You'll need this information to understand how the potential impacts of energy uncertainty will specifically affect your community. How are oil, motor fuels and natural gas delivered to your area? What agency or corporation operates the delivery infrastructure? If there is a shortage, who gets cut off first? What and who are the biggest users of oil and gas in your community?

Then move on to the most basic functions in your community: How does your food get there? Where is your main water supply? Where does your electricity come from and who controls the transmission infrastructure? What are the main industries in your community? As you collect information you may find you need to adjust the structure of your inquiry: for example, instead of one committee looking broadly at the local economy it may make more sense to split the effort between the traded sector (export-oriented) and non-traded sector (local market-oriented).

—**TIP: Identify key questions and information needs early.**

Is your local economy centered on a key industry? Talk to a representative business leader and learn what *their* vulnerabilities might be. Is your community expecting a lot of growth and new construction? Find out how current regulations are shaping the land use and transportation patterns that new development will produce.

Be comprehensive

The more wide-ranging your inquiry is, the better chance you'll have of capturing all the possible vulnerabilities that may affect your community. Identify the main influences on local economic, land use and transportation patterns. Don't think immediately in terms of oil and natural gas—oil and gas affect just about everything, so if you focus too narrowly at the outset, you may well miss an important vulnerability later on that at first didn't seem to have anything to do with oil or gas. Look especially to basic systems like water, sewer and emergency services.

Follow leads

As you develop a broad picture of your community's reliance on oil and natural gas, you can gradually determine where best to focus your assessment efforts. You may also come across intriguing information that points to unsuspected vulnerabilities. Take the time to look (if only briefly) into these tangents to see if they warrant further investigation: a key part of uncovering how a complex system works is following the leads that take us to something we didn't see before.

—**TIP: Avoid getting sidetracked.** Since oil and natural gas affect everything from the structure of the global economy to the way we go about our daily lives, it's easy to get sidetracked on details and "potluck conversation." Save discussions about the geopolitics of oil or the intricacies of plastics manufacturing for after the meeting, and keep your assessment focused on the impacts and vulnerabilities specific to your community.

Analyzing vulnerabilities

The goal of this step is to have the information from your inquiry digested and organized enough so that people can start making informed, grounded decisions about responses. In other words, you're not trying to uncover every vulnerability in your community, but rather you're trying to paint a clear enough picture of impacts and their potential ramifications so that leaders of agencies, departments, businesses, and neighborhoods have a basis for thinking through their own vulnerabilities and possible responses. Concentrate on the systems and the relationships.

To get the information to that useable point there are three kinds of analysis that are helpful: *digging in* to what you've collected so you can identify more specific vulnerabilities; *categorizing* vulnerabilities so that you can organize them in a way that is more in line with how you may actually respond to them; and *ranking* your vulnerabilities to indicate possible priorities for action. Again, depending on the structure and goals of your overall effort, there are different ways you might approach this step and different methods you may choose. The important thing is to process the information from your inquiry to make it as useful as possible and to ensure that it accurately and thoroughly describes your community's situation.

Digging in

It's easy to predict that higher oil prices will impact people's ability to drive, or that higher natural gas prices will impact people's ability to heat their homes—but how do we dig deeper to be sure we're developing a comprehensive picture of our vulnerabilities? There are many methods available for assessing the implications of risk and uncertainty, and we can use different methods to learn different things. Let's look at two methods that will give us different but useful results: (1) thinking through general impacts of different scenarios, and (2) thinking through the different levels of impact on one sector:

- **Scenarios.** The problem at hand is oil and gas price volatility and increases, so to capture an appropriately wide range of possible impacts it can be helpful to imagine different scenarios of oil price and supply. "What challenges might the community face if the price of oil gradually rose to \$100 per barrel over the following year? How might those challenges be different if oil prices jumped erratically between \$50 and \$200 over the next ten years? What would happen if there was a natural gas shortage in February?" Then you can think about how the actors, functions and systems you identified in your inquiry might respond.

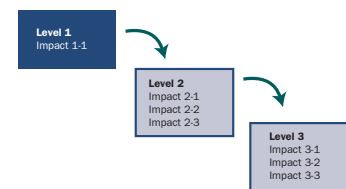
Scenario A	Scenario B	Scenario C
Impact A1	Impact B1	Impact C1
Impact A2	Impact B2	Impact C2
Impact A3	Impact B3	Impact C3
Impact A4	Impact B4	Impact C4
Impact A5	Impact B5	Impact C5
Impact A6	Impact B6	Impact C6
Impact A7	Impact B7	Impact C7

You can run a bowling ball across the entire city [of Canby], so there are no advantages of putting a big water tank up on a hill. To have pressure in that town you have to run pumps.

So even in a place where you'd think water is never going to be a problem, well guess what – even if we have water coming out of our ears I can't get it to anybody's house if I don't have electricity to pump it.

– Michael Jordan, COO, Metro regional government, Portland, Oregon (former City Manager, Canby, Oregon).

- **Levels of impact.** With this approach you focus on an issue, such as "emergency health care," and a general scenario, such as "significantly higher oil prices within the next few years." Then within that scenario, you list the things in your issue of focus that would be most immediately affected, and then think through how those first-level effects would cascade down to second, third and further levels.



For example, taking "emergency health care" as your topic, you might identify:

- First-level impacts on transportation costs, which then create...
- Second-level impacts on transport of patients, commuting costs of medical specialists, and delivery of materials, which then create...
- Third-level impacts on timely treatment of patients, ability to retain medical specialists at remote institutions, costs of providing care, and so on...

Categorizing

Toward the end of your inquiry and initial analyses, you will have a big list of potential vulnerabilities covering many different kinds of issues and functions. Even if you had researched impacts by sector, department, or some other division, you may decide to categorize (or add a layer of categorization on to) these vulnerabilities for final analyses and later discussions for possible responses.

The right set of categories can be particularly useful for delineating who will be responsible for developing and implementing responses to these vulnerabilities. For example, you may combine vulnerabilities from "Transportation," "Food" and "Emergency Services" and recategorize them primarily as "local issues," "regional issues," and "national issues," or "short-term," "medium-term" and "long-term." A good practice from the risk assessment field is to categorize risks by the way in which they will ultimately be addressed (for example, by the responsible department).

Ranking

As you develop the picture of potential impacts and vulnerabilities, you'll recognize that some are more probable than others, and some are potentially more serious than others. A common approach for ranking risks is to identify both the potential effect (magnitude) and likelihood (probability) of each risk.

The Portland Peak Oil Task Force sub-group on transportation and land use used this method, starting with a list of potential impacts:

- 1) There will be an increase in car sharing and carpooling.
 - 2) There will be a reduced demand for parking, freeing up land for other uses.
 - 3) There will be an increased demand for compressed work week, telecommuting, etc.
 - 4) There will be shorter, fewer car trips.
- etc.

They then ranked these potential impacts in a matrix by likelihood of occurrence and potential magnitude of effect:

LIKELIHOOD	EFFECT		
	Major	Significant	Minor
High	4, 5, 10	2, 14, 18, 20	1, 7
50-50	9, 19	16	3, 8, 17
Low	15	6, 13	11, 12

Thus the committee felt that impact #3, "There will be an increased demand for compressed work week, telecommuting, etc.," had a 50-50 chance of happening, but would have a minor impact on the city. In contrast they felt that impact #4, "There will be shorter, fewer car trips," both highly probably and would have a major impact on the city (i.e., in the local economy).

Ranking can be a useful way to sort through a large number of ideas from a brainstorm to pick out the most significant issues. It can also be helpful for identifying the kinds of impacts that may call for further inquiry, perhaps with a scenario approach or level-of-impact approach as above.

Developing Conclusions

Once you've identified and ranked your community's vulnerabilities, develop responses to these vulnerabilities as action points for the community and the local government. Don't get sidetracked: refer back to the task force's initial charge, and develop your responses to address the original problem statement. Also, be sure to keep the big picture in mind. Don't develop a recommendation that makes sense for one particular sector or application, only to find that it would be premature, ineffective or even counterproductive from a broader system perspective.

Below are four guidelines for developing useful responses to you community's peak oil vulnerabilities. You will also find ideas in following the "five principles" for local government responses to energy and climate change listed in *Section 5.3 What your city can do*.

1. Start simple

When the Willits (California) Energy Committee was discussing energy vulnerability responses for their first recommendations to City Council, they set a guideline to only consider options that were proven and immediately available: no relying on future technological developments, no complicated strategies, no overly expensive investments.

Energy consultants often advise clients to first find energy cost savings with the "low-hanging fruit." This often means doing relatively easy energy efficiency initiatives, but it can also mean looking through existing policies and programs for relatively easy adjustments that, collectively, will significantly reduce overall peak oil vulnerability. With creative approaches, such as allocating funds saved through new efficiencies to investments in more efficient technologies, easy initial steps can produce big returns over the long term.

2. Keep it appropriate

The recommendations of your task force need to be appropriate for the people who will be acting on them. Focus on recommendations that move specific processes forward, rather than broad mandates that require significant organizational and political momentum.

For example, a recommendation like "Build an inter-city rail system for the region" is not very useful on its own, as such big decisions are made through complex processes of regional transportation planning and investment that take decades, and involve thousands of stakeholders across multiple jurisdictions. A more process-oriented recommendation like, "Study the feasibility of developing high-quality public transit service that connects cities in the region," would likely be more useful.

3. Keep it broad

A short-term initiative that encourages people to drive less is a good, basic response to energy uncertainty: it spurs people to consciously reduce their dependence on oil. A long-term policy that encourages urban development in transit-friendly regional centers, and less development in outlying rural areas, is a better response: it creates land use patterns that make it easy for people to reduce their dependence on oil while also protecting regional farmland. Avoid "silo" and quick fix solutions, and instead develop broad responses that cross issues and share resources. Comprehensive sustainability planning frameworks like The Natural Step⁶⁷ are excellent tools for this.

You may also be able to achieve a broad effect by initiating a specific action that touches off a chain of events. For example, a new policy like, "The City requires all transportation planning activities to consider future oil/gasoline price volatility as a key factor" would effectively engage a whole set of professional managers, planners, and engineers on the problem, with results that will go far beyond anything a time-limited task force could do.

Finally, a broad response also plans for ongoing uncertainty and assumes that changes will occur over time, taking a page from "adaptive management" practices. Don't plan specifics too far ahead or make unfounded assumptions, otherwise the decisions you recommend this year may unwittingly constrain your options for dealing with next year's situation.

4. Seek out examples and experts

There is no lack of examples throughout the world of communities that are thriving economically while minimizing their dependence on oil and natural gas. For example, hundreds of European cities of all sizes have implemented energy-smart policies and initiatives in the last fifty years, many of which are easily transferable to U.S. and Canadian cities.

In many cases, just by asking questions and being curious, you force people to re-look at what they've done. With our senior staff sometimes when I probe on issues, they'll sort of shrug at the end of it and say 'You know, I don't know why we do it that way! We've always done it that way.'

You've got to go in and change the way your bureaucrats think. Once you've got them changing the way they're thinking, it becomes much easier for your whole municipality to respond positively to the challenges that we're going to be facing.

- Mayor Derek Corrigan, City of Burnaby, British Columbia

Cities in other parts of the world are pursuing urban sustainability as well, and often in extremely creative and low-cost ways. For example, the modern commercial center of Curitiba, Brazil (pop. ~1.65 million) has been lauded as “the most innovative city in the world” thanks to its unconventional and highly successful public transit, pedestrian mall, recycling, small business incubation, and flood control projects.

Presenting your findings, and cycling back

The way you present your task force findings will depend on the task force’s charge, its audience, the urgency of its recommendations and other factors.

For example, the task forces in Portland and Sebastopol both developed sets of recommendations for their respective City Councils. The Portland task force identified eleven major recommendations (see *Box 7*, page 43), accompanied by recommended action items. In comparison, the Sebastopol task force (see *Box 8*, page 48) made 66 individual recommendations across nine different sectors (such as “Vehicles,” “Water,” and “City Revenues”), and then grouped them in summary as five “first steps,” eight “implementation steps,” and four steps for “making broader connections.” Both task force reports described the vulnerabilities and impacts they identified.

As part of your task force recommendations you might include an item for reporting and follow-up, both to ensure that recommendations are acted upon and to adjust recommendations as needed. This is a good management practice for any program, but it’s essential for dealing with energy uncertainty: if recommendations are not adjustable, then they may eventually be locked on to solutions for problems that have changed. Keep in mind that as the situation changes, the available options and the ability to forecast change as well.

Post Carbon Cities: Planning for Energy and Climate Uncertainty

A Guidebook on Peak Oil and Global Warming for Local Governments

Post Carbon Cities: Planning for Energy and Climate Uncertainty is a guidebook on peak oil and global warming for people who work with and for local governments in the United States and Canada. It provides a sober look at how these two phenomena are quickly creating new uncertainties and vulnerabilities for cities of all sizes, and explains what local decision-makers can do to address these challenges. **Post Carbon Cities** fills an important gap in the resources currently available to local government decision-makers on planning for the changing global energy and climate context of the 21st century.

“Post Carbon Cities is an exceptionally clear and comprehensive call-to-action to those who actually work in the trenches of city governance. We don’t have any more time to waste getting ready for an energy-scarcer future, and for those who remain dazed and confused, this book is an excellent place to start.”

– James Howard Kunstler, author of *The Long Emergency* and *The Geography of Nowhere*

“How will we cope with a future of energy scarcity? As a policy maker I look to other communities for inspiration and ideas, but there’s been a lack of information on what local governments are doing to adapt to Peak Oil. Post Carbon Cities fills this gap: herein lies the roadmap plotted by the cities that are leading the way. Enthusiastically recommended!”

– Dave Rollo, City Council President, Bloomington, Indiana

“Post Carbon Cities will be very helpful to people involved in transportation and land use planning as they attempt to re-think land use patterns and the movement of people and goods for the economic, environmental and social well being of the planet. The timing could not be more critical!”

– Alan Falleri, Community Development Director, Willits, California

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