

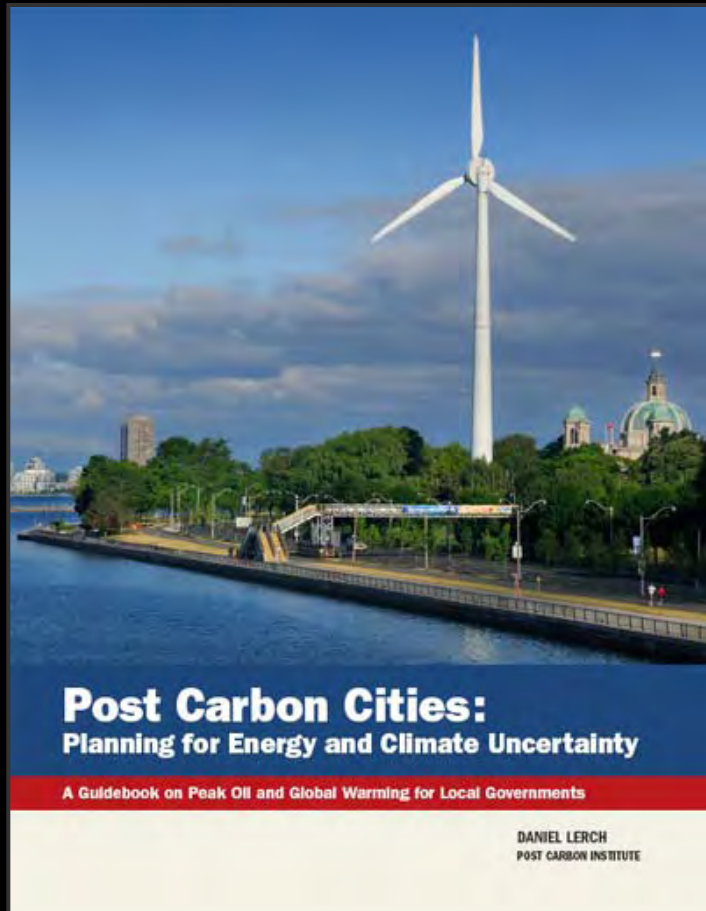


Post Carbon Cities: Planning for Energy and Climate Uncertainty

Daniel Lerch
Post Carbon Cities Program Manager

Post Carbon Institute

15 October 2008 - New York Metropolitan Transportation Council



113 pages, \$30.00

2nd printing May 2008

www.postcarboncities.net

***The first major guidebook
for local gov't on peak oil
and global warming.***

Discusses:

- What are the challenges?
- Why should local governments act?
- What should local governments do?

Bank says Saudi's top field in decline

by Adam Porter in Perpignan, France
Tuesday 12 April 2005 10:10 AM GMT

Speculation over the actual size of Saudi Arabia's oil reserves is reaching fever pitch as a major bank says the kingdom's - and the world's - biggest field, Gharwar, is in irreversible decline.

The Bank of Montreal's analyst Don Coxe, working from their Chicago office, is the first to make a number-cruncher to say that Gharwar's days are fated.

Coxe uses the phrase "Hubbert's Peak" to describe the situation. This refers to the seminal geologist M



Opec warns oil prices could rocket to \$500 a barrel

belfasttelegraph.co.uk

Monday, 28 July 2008

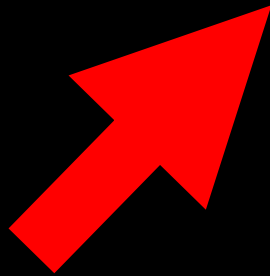
The nightmare scenario of oil reaching \$500 a barrel has been raised at the weekend by a member of OPEC's governing council.

The world's oil price fell sharply from current prices and could any time be brought under control.

Such a rise would also pose a serious threat to economic growth in oil importing countries.

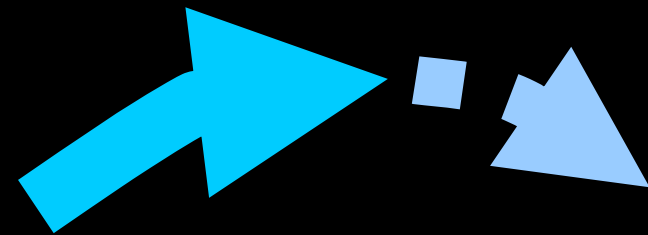
The fundamental factors of oil supply and demand are changing.

Demand is RISING...



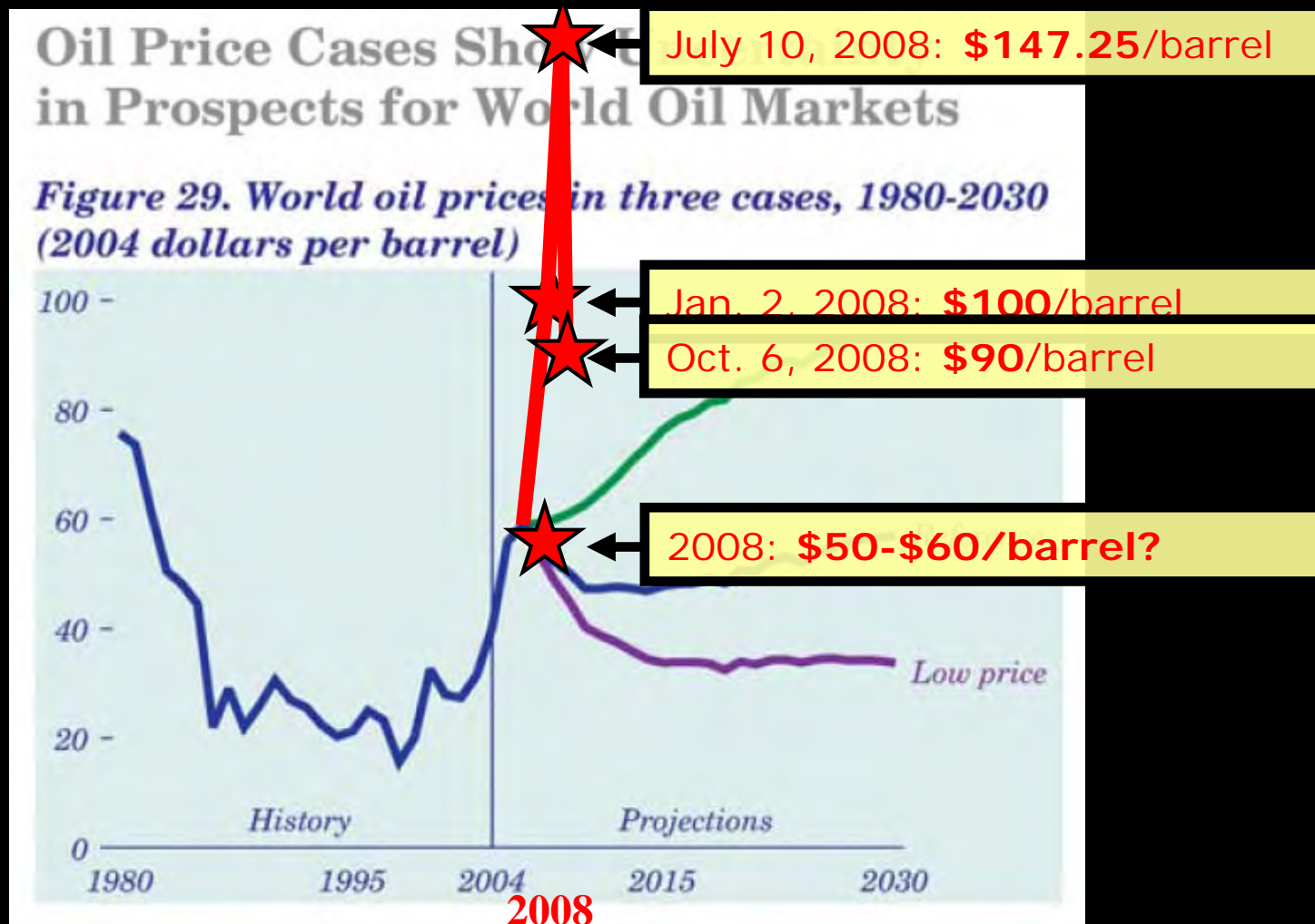
- Developing world is rapidly industrializing (China, India)
- Western world demand growth

...but Supply is LEVELLING, and will soon fall.



- The "easy oil" is gone
- Logistical (financial) limits to what can ultimately be produced

The old assumptions no longer fit...



U.S. Energy Information Administration, Annual Energy Overview 2006, p.64

...which means we can no longer rely on the usual 'experts'...

CNNMoney.com
A Service of CNN, Fortune & Money

Why oil won't hit \$100

By **Steve Hargreaves**, CNNMoney.com staff writer
August 7 2007; 1:17 PM EDT

NEW YORK (CNNMoney.com) -- Despite oil's record high last week, forget about crude going to \$100 a barrel.

Prices have already dropped about 7 percent since last week, and are likely to fall even more in the coming years.

That's the consensus of analysts who say rising production, the advent of biodiesels, and conservation measures will likely lead to lower oil prices by 2015.



Crude may not reach \$100 a barrel, but don't look for \$20 either.

http://money.cnn.com/2007/08/07/news/economy/cheap_oil/index.htm

...but fortunately, more and more leaders do see the problems ahead...

HOUSTON★CHRONICLE

By STAFF, Wednesday November 21, 2007

...Monday, in a front-page article, The Wall Street Journal reported that many Western oil industry executives have come round to that view. After years of discounting predictions of peak oil production, these industry leaders and

oil production will plateau during or before 2012.

www.chron.com/CDA/archives/archive.mpl?id=2007_4465038



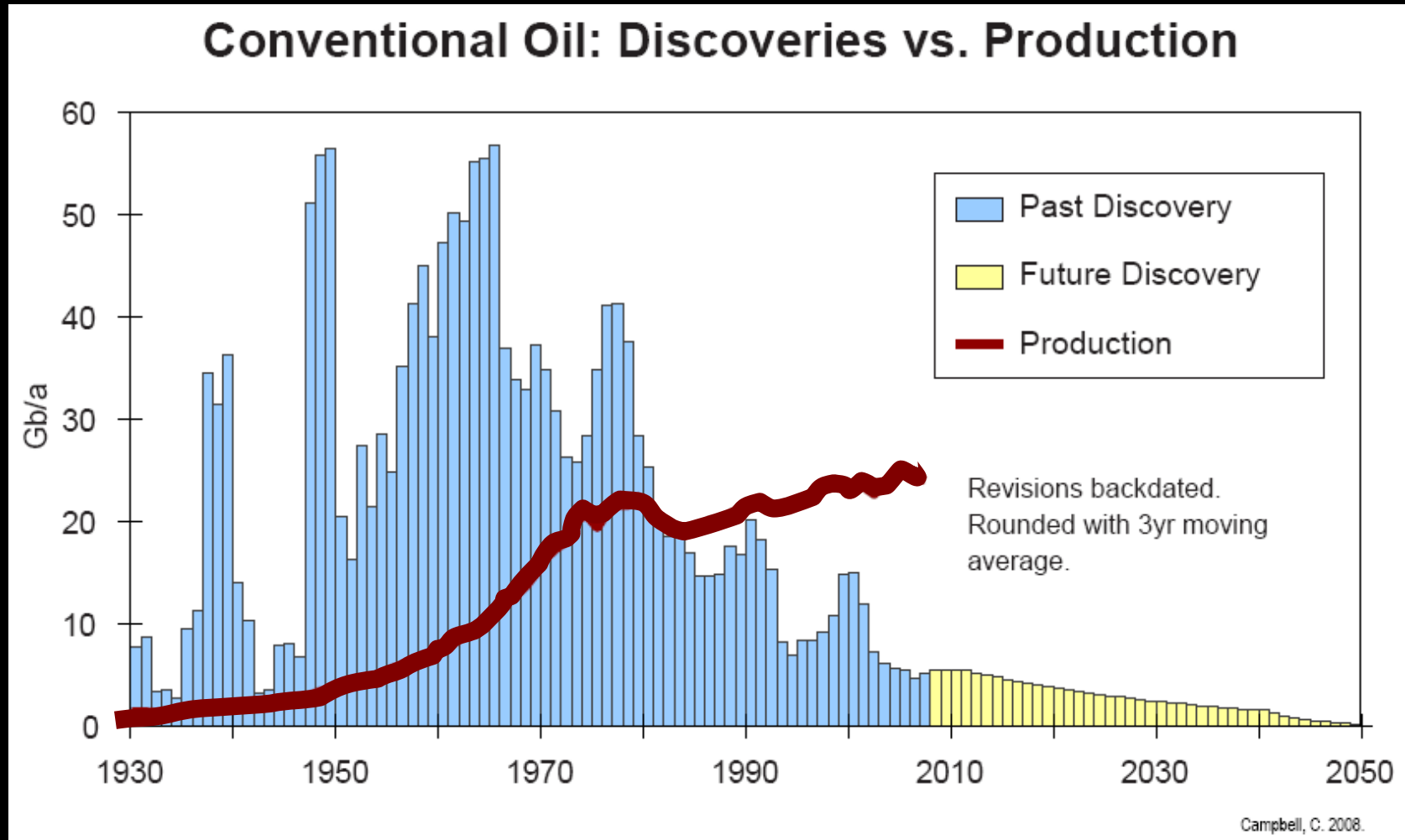
“ [T]here is growing concern that the supply of oil **may soon peak** as consumption continues to grow, known supplies run out and new reserves become harder to find.”

- **21 June 2008** issue of *The Economist*

A Very Brief Summary of the Peak Oil Problem

(in three points)

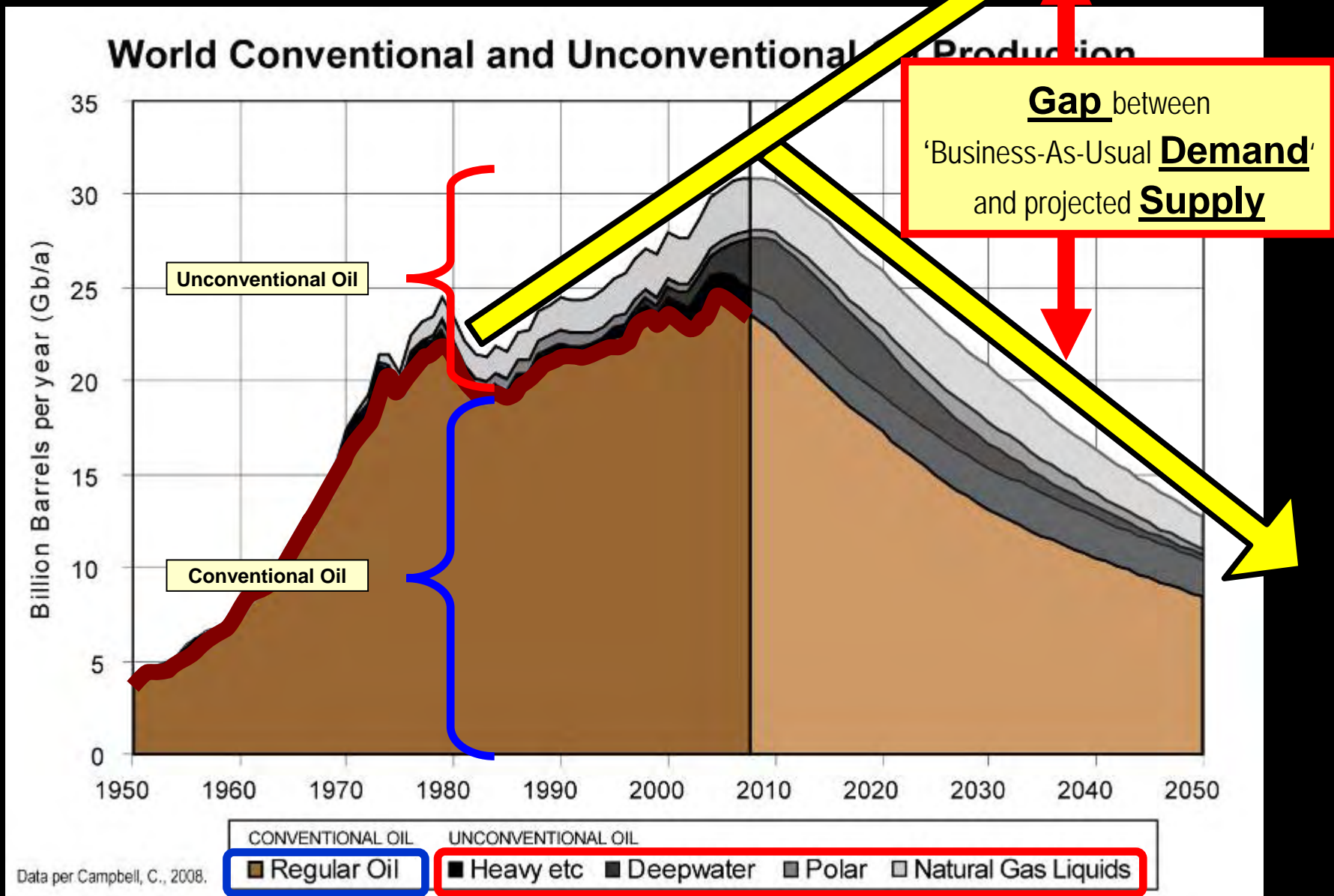
1. The era of “easy oil” is over. Discoveries peaked in the 1960s, production is plateauing now.



What's happening?

ENERGY

2. The "difficult oil" won't fill the gap.



3. There are no good substitutes available.

There is *nothing* of comparable versatility and quantity ready to replace oil.

BIOFUELS

COAL

NUCLEAR

HYDROGEN



“Oil makes it possible to transport food to the ...megacities of the world.

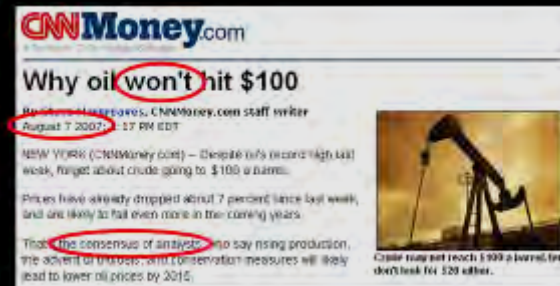
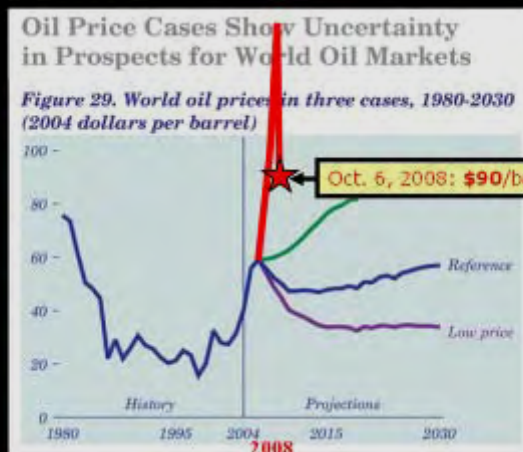
“Oil also provides the plastics and chemicals that are the bricks and mortar of contemporary civilization...”

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

Image credits clockwise from upper left: Tony Tremblay (istock), caribb (cc), sillydog (cc), IRRI Images (cc)

What does this mean for our decision-making? (as households, businesses, governments):

Higher Oil Prices +
Declining Supply + Rising Demand =
Oil Price / Supply Volatility



***This complicates our assumptions
that oil will continue to be...***



...available...



...and affordable.

What does this mean for government decision-makers?:

Peaking of World Oil Production: Impacts, Mitigation and Risk Management

Prepared for the U.S. Department of Energy
by Robert Hirsch, SAIC, et al, 2005



- “Timely, aggressive mitigation initiatives”
- At least “a decade of intense, expensive effort”
- Intervention by governments because the economic & social implications **“would otherwise be chaotic”**

Why is this a problem at the local level?

(in three points)

1. Price volatility of goods

High price of asphalt puts brakes on paving projects



Workers pour part of Interstate 40 in downtown Knoxville in this July 2008 photo. The high price of asphalt means state and local governments are pursuing fewer road projects these days. Bruce Wuesthich, senior director of engineering and public works for Knox County, said the county has not had to sacrifice capital projects — the building of new roads or major reconstruction projects that generally cost more than \$50,000. Instead, it has scaled back maintenance projects in subdivisions.

County hasn't quit new roads but halts maintenance work

BY ANDREW DEER
KNOXNEWS.COM

When Knox County awarded a bid for a road-resurfacing project near the beginning of the year, the price of asphalt was holding steady after a post-Hurricane Katrina spike. But by the time paving began two months later, the project cost shot up about 40 percent. It turned out to be 20 miles of road that

ON KNOXNEWS.COM

- Take a virtual tour of an asphalt plant
- See a detailed table and chart of historical asphalt prices

DID YOU KNOW?

Asphalt cement is a dark, viscous material found in crude petroleum. The cement is separated out in the oil refining process and transported to a plant near the paving site. Asphalt cement is mixed with hard material called aggregate to form asphalt concrete, also called bitstock. Asphalt pavement consists of a surface layer of asphalt concrete

projects that generally cost more than \$50,000. Instead, it has scaled back maintenance projects in subdivisions. The 20 miles of road cut from the paving list were all residential, he noted.

It takes more green to fill grocery bags

The Oregonian, 29 January 2008



...higher fuel prices and energy costs; higher transportation costs...

2. Potential for shortages and emergencies

guardian.co.uk

Factories close, supermarkets empty and jets run out of fuel as truckers' strike bites

- Spain promises tough response despite deaths
- Britain on alert as action threatens to

The Guardian, Thursday June 12 2008

Strike action by thousands of Spanish and ominous knock-on effects on food supplies. Lisbon airport ran out of fuel, car factories and supermarkets reported shortages.

<http://www.guardian.co.uk>

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

“... reported shortages.”

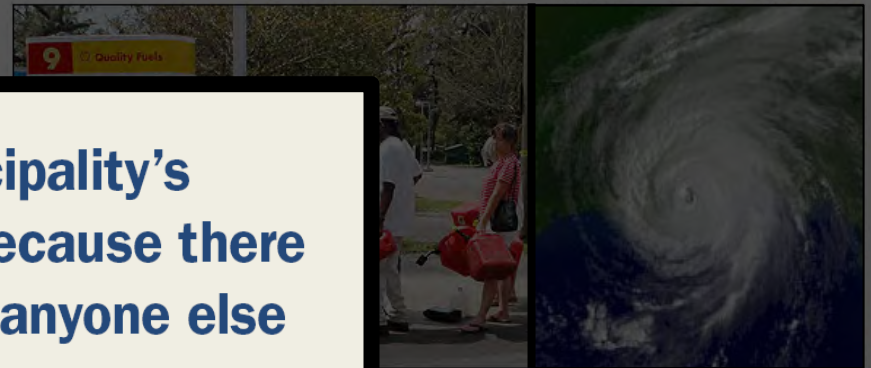
“...airport ran out of fuel...”

“...factories shut down...”

The New York Times

Business

Gas Prices Surge as Supply Drops



Kari Goodnough/Bloomberg News

fuel containers on Wednesday. Some states reported scattered...
ed the government about using oil from the strategic petroleum

By **JAD MOUAWAD** and **SIMON ROMERO**

Published: September 1, 2005

For the first time since the 1970's, gasoline lines reappeared yesterday in some corners of the country.

3. Long-term economic shifts

- How will the **global economy** adjust?
(global trade flows)

- How will this impact **regional and local economies**?
(relative advantage; provisioning systems)



How can cities...

- set meaningful budgets
- make long-range land use and transportation plans
- serve residents and the local business community

...with such uncertainty surrounding the most important material to our global, regional and local economies?



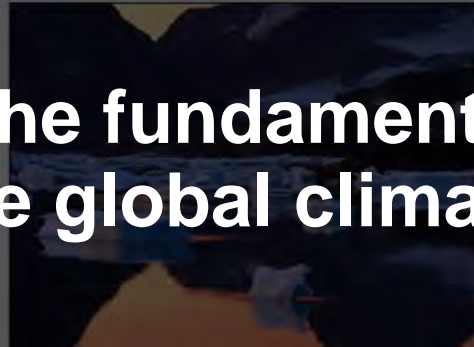
“ Energy Uncertainty ”

U.N.: 2007 seeing record extreme weather
Global land temperatures in January, April likely warmest on record

MSNBC staff and news service reports
Updated: 5:50 p.m. PT Aug 7, 2007

GENEVA - The world experienced a series of record-breaking weather events in 2007, from flooding in Asia to heat waves in Europe and a major fire in North Africa, the United Nations World Meteorological Organization said Tuesday.

The World Meteorological Organization said global land surface temperatures in January and April were likely the warmest since



...[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 warming.

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

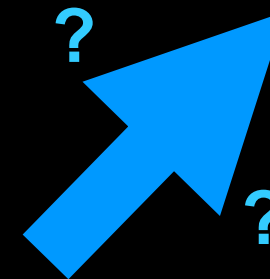
Some of the fundamental factors that influence the global climate are changing.

GHG concentrations are up dramatically, and RISING.



- Prior and continuing industrialization.
- 16 years since Earth Summit, little to show for it.

The average global temperature is rising, with uncertain consequences.



- Local effects? Economic effects?
- Trigger points? Feedback loops?

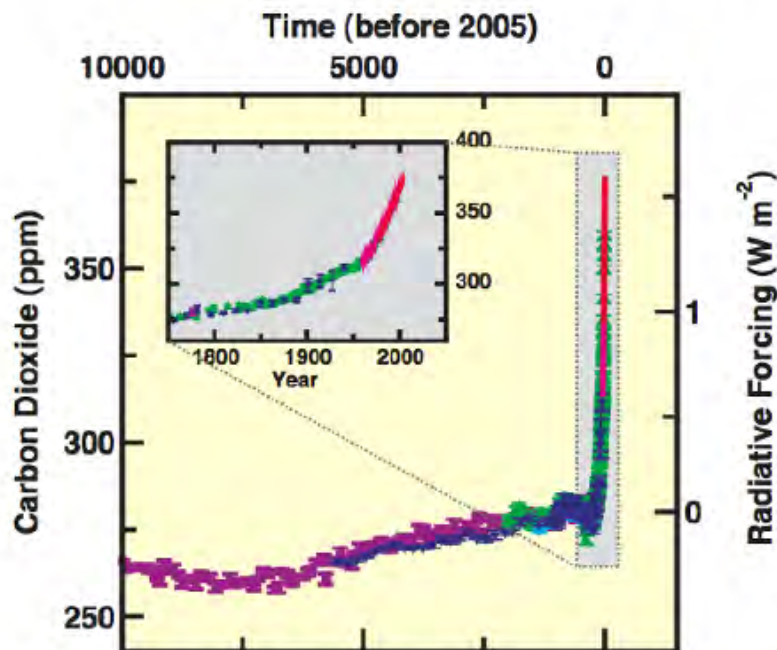
CAUSES: The debate is over...



INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

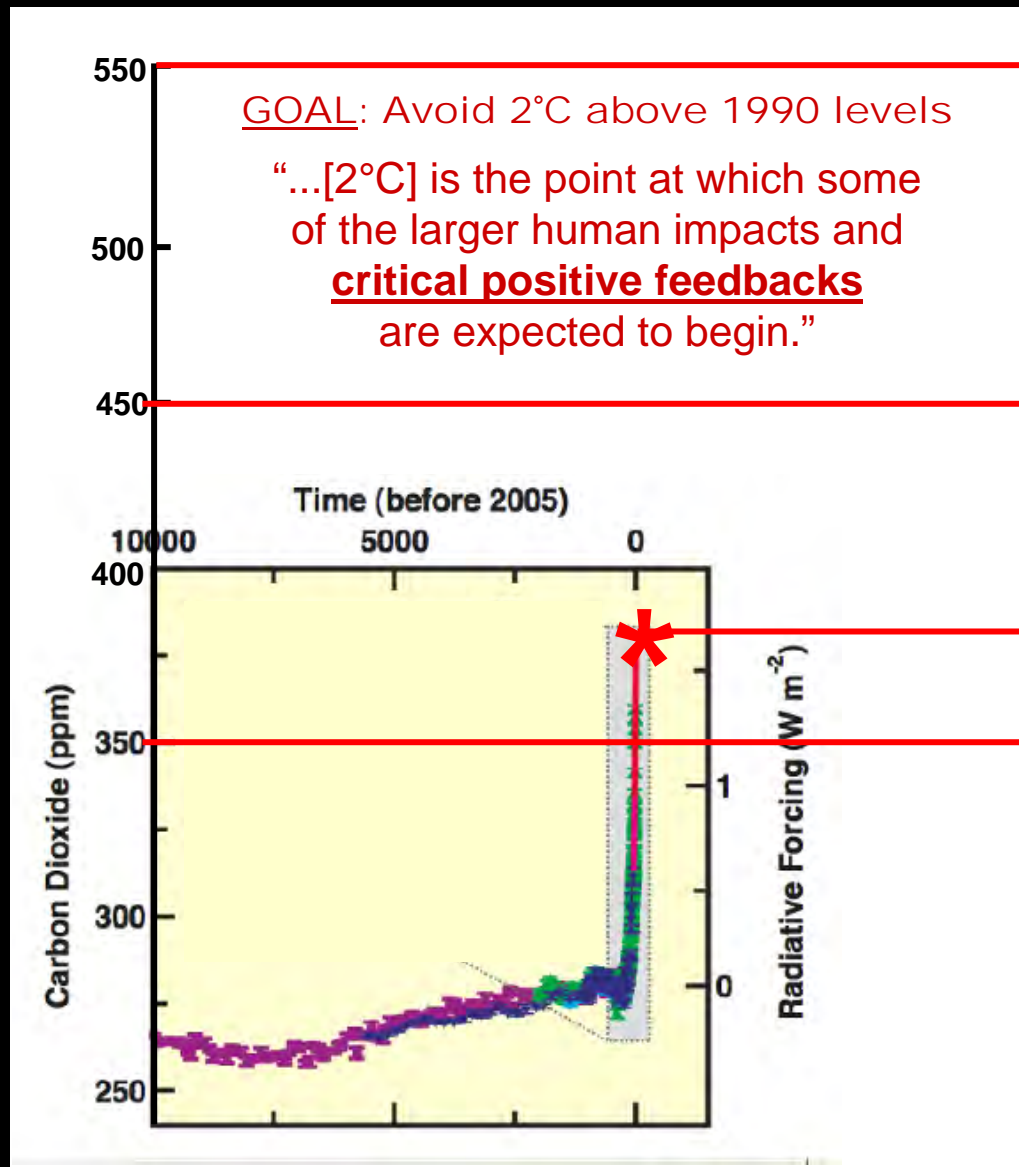


Changes in Greenhouse Gases from ice-Core and Modern Data



“Global atmospheric concentrations of [greenhouse gases] **have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values...**”

URGENCY: ...and it's worse than we thought.



~~550 ppm~~

~~450 ppm~~

~385 ppm NOW

350 ppm

Why is this a problem at the local level?

- **Dependence:**
 - Ecosystem services.
 - Economy and society are subsets of the environment.
- **Short-term challenges:**
 - Mitigation: Stop making it worse!
 - Adaptation: Deal with first effects.
- **Long-term challenges:**
 - Adaptation: How will local and regional climates change?
 - Adaptation: How will this affect global/regional/local economy?



“ Climate Uncertainty ”

The "Climate-Peak Convergence"

PEAK OIL

WHAT'S THE ISSUE?

1. The easy oil is gone.
2. The 'difficult' oil can't make up the difference.
3. There are no good substitutes.

WHY IS THIS A PROBLEM?

- Price volatility of goods
- Potential for emergencies
(unexpected price changes, occasional shortages)
- Long-term challenges
(how will global, regional and local economies respond?
how can municipalities budget and plan?)

GLOBAL WARMING

WHAT'S THE ISSUE?

1. We know that some effects are inevitable in the short term.
2. We don't know exactly how the global ecosystem will change in the long term.

WHY IS THIS A PROBLEM?

- Dependence on global ecosystem
- Short-term challenges
(dealing with first effects)
- Long-term challenges
(long-term changes to climates and economies)

*Energy and Climate
Uncertainty*



Local Action Plan on GLOBAL WARMING

April 2001

City of Portland & Multnomah County

Eric Stein, City Commissioner
Susan Anderson, Director
Office of Sustainable Development
1128 SW 7th Ave., Room 706
Portland, OR 97204
503.821.7222
www.sustainableportland.org

Bill Curran, Multnomah County Chair
Marta Rojas de Sotillo, Director
Department of Sustainable
Community Development
500 SE Hawthorne Blvd., Suite 520
Portland, OR 97214
503.986.5000
www.co.multnomah.or.us

City of Cambridge

CLIMATE

PROTECTION plan

LOCAL ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

PREPARING FOR CLIMATE CHANGE

A Guidebook for Local, Regional, and State Governments



Written by
Center for Science in the Earth System (The Climate Impacts Group)
Joint Institute for the Study of the Atmosphere and Ocean
University of Washington
King County, Washington

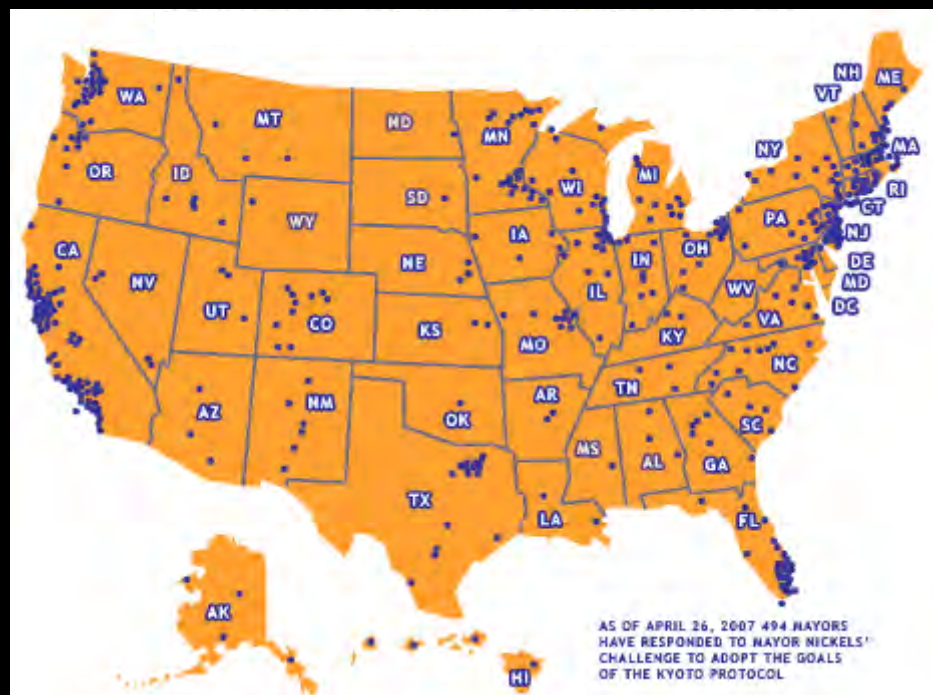
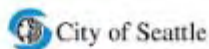
With an Introduction by King County Executive Ron Sims



U.S. MAYORS' CLIMATE PROTECTION AGREEMENT



CLIMATE ACTION HANDBOOK



As of Fall 2008,
nearly 900 mayors --from all 50 states
and representing the 10 largest cities--
have signed.

Table 2:
Selected Municipal and Regional Agency Responses to Peak Oil/Gas (per mid-2007)



Franklin Town, New York, 2,546 Passed resolution 6 December 2005 creating a Citizens' Commission to examine the issues raised by declining energy supplies and rising energy costs.

Resolution which creates...

...a Task Force.

City of Portland Peak Oil Resolution

RESOLUTION No. 36407

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

WHEREAS, global reserves of oil and natural gas are finite and sufficient substitutes are unlikely to be available in the immediate future; and

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

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

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

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

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

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

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

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

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




Portland, Ore.
Oakland, Calif.
Bloomington, Ind.

San Francisco, Calif.
Austin, Tex.
Brattleboro, Vt.

Spokane, Wash.
Haines, Alaska
Berkeley, Calif.

Franklin, N.Y.
Sebastopol, Calif.



THE CITY OF PORTLAND

DESCENDING THE OIL PEAK: NAVIGATING THE TRANSITION FROM OIL AND NATURAL GAS

REPORT OF THE
CITY OF PORTLAND PEAK OIL TASK FORCE
MARCH 2007

INTRODUCTION: PREPARING FOR PEAK OIL

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

TASK FORCE CREATED BY CITY COUNCIL

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

"Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas," Portland (Oregon) Peak Oil Task Force, March 2007; online at www.portlandonline.com/osd.

Four Subgroups

**Land Use /
Transportation**

Economy

**Public and
Social Services**

Food & Agriculture

Impacts and Vulnerabilities

Land Use /
Transportation

Economy

Public and
Social Services

Food & Agriculture

Two Pillars and 11 Recommendations

Reduce
Exposure

Strengthen
Community

Recommendations of the Portland Peak Oil Task Force

1. Reduce total oil and natural gas consumption...

by 50 percent over the next 25 years.



2, 3. Educate and engage the public and leaders

Inform citizens about peak oil and foster community and community-based solutions. Educate and engage business, government and community leaders to initiate policy change.



Reduce Exposure

Strengthen Community

4. Land use and transportation connection:

Support land use patterns that reduce transportation needs...



5, 6. Transportation infrastructure and choices:

Design infrastructure to promote transportation options and facilitate efficient movement of freight...



Reduce Exposure

Strengthen Community

7. Energy-efficient buildings:

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



LEED Platinum university building, Arizona

8. Farmland and food:

Preserve farmland and expand local food production and processing.



9. The Green Economy:

Identify and promote sustainable business opportunities.

Reduce Exposure

Strengthen Community

10. Social safety net:

Redesign the safety net and protect vulnerable and marginalized populations.



11. Emergency Planning:

Prepare emergency plans for sudden and severe shortages.



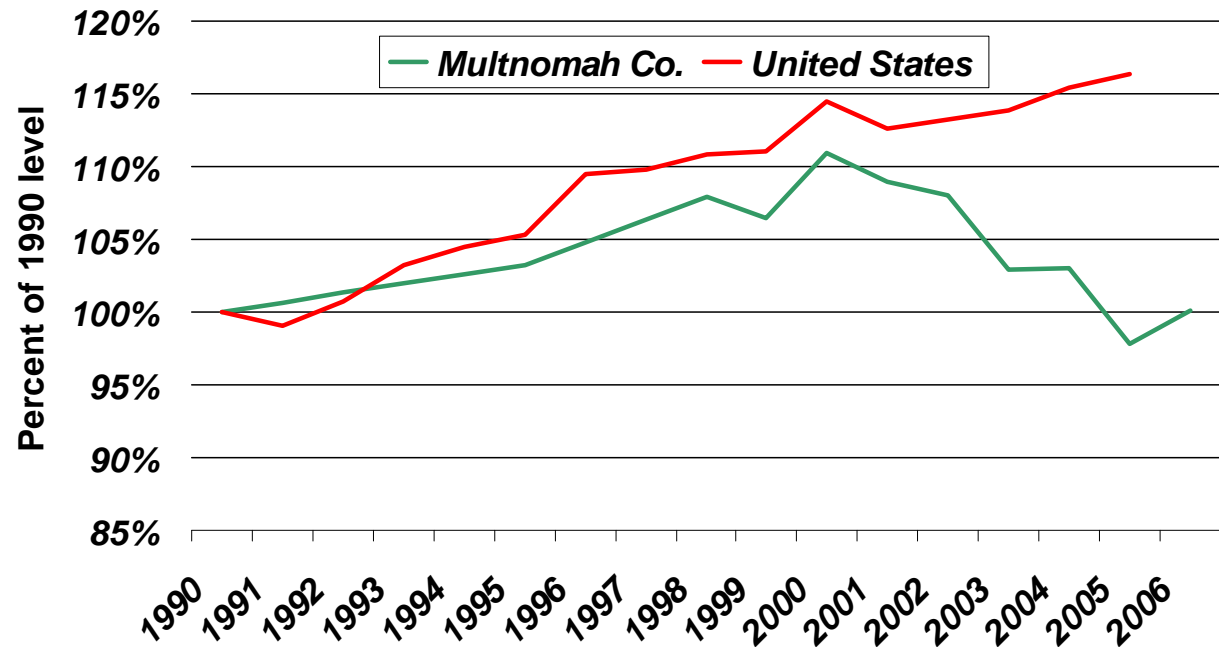
Reduce Exposure

Strengthen Community

What had Portland BEEN doing?

- Most **green buildings** in US (LEED)
- Highest per capita **hybrid auto** ownership in US
- **Transit ridership** up 85%
- **Bike trips** over bridges quintupled
- **Vehicle miles traveled** decreased 7% per capita
- **Gasoline sales** down 13% per capita
- **Household energy** down 5% per capita
- **City energy-efficiency** projects saving \$2.6M/yr
- **Recycling** rate more than tripled

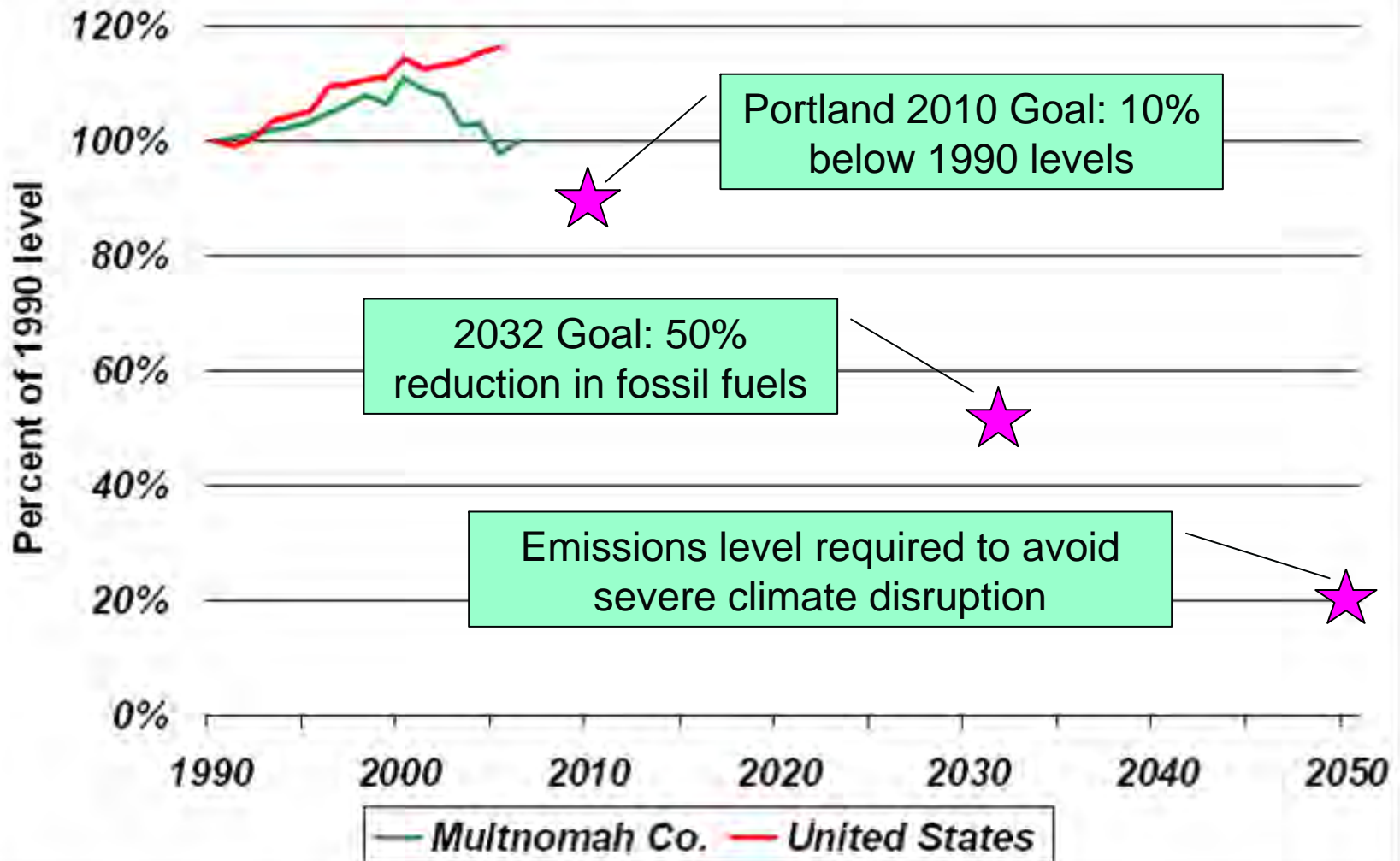
Greenhouse gas emissions trend



Portland Office of Sustainable Development

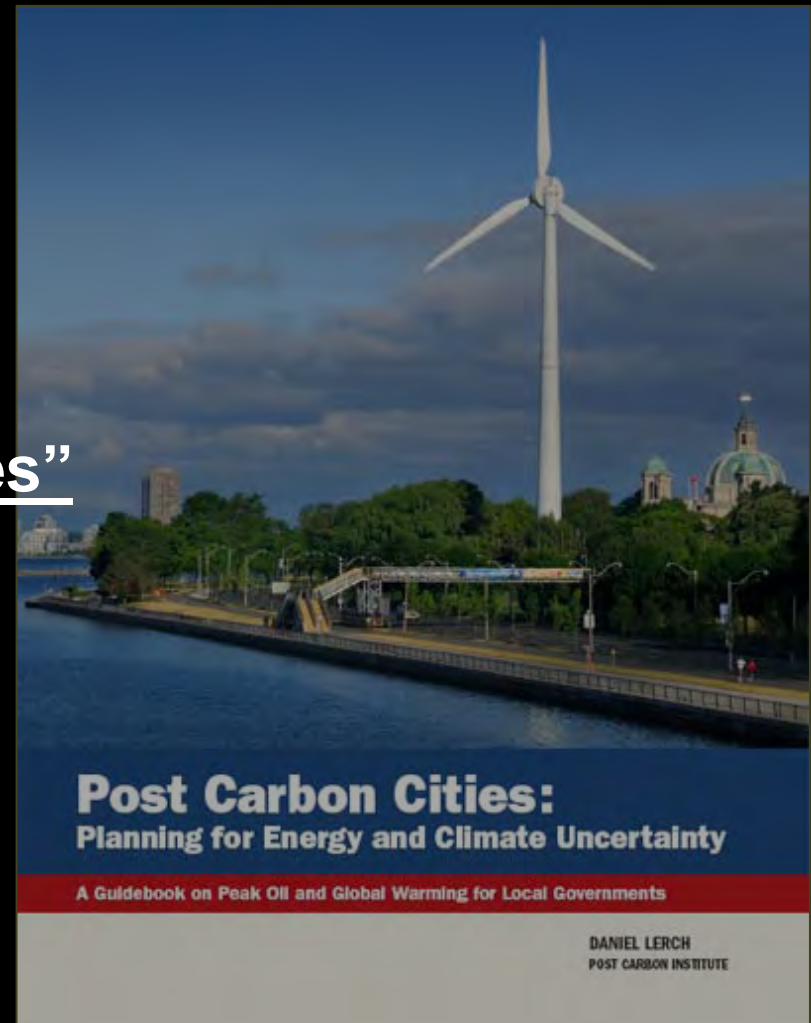


Greenhouse gas emissions trend



Portland Office of Sustainable Development

The “Five Long-term Principles”



1. Deal with transportation and land use (or you may as well stop now).



The built-in oil dependency of our cities and suburbs is the biggest obstacle to significantly reducing our energy use.

Incorporate peak oil and climate change in your long-range land use and transportation planning assumptions now. Don't just tinker with zoning codes and transportation funding—take the time and commit the resources to make serious changes:

- Fundamentally rethink your municipality's land use and transportation practices, from building and zoning codes to Are your regulations and procedures encouraging developers to build buildings and neighborhoods for a world without cheap oil? Are you encouraging the kinds of developments that will function poorly when gasoline is as expensive as today?

SUSTAINABLE COMMUNITY DEVELOPMENT CODES—THE NEXT WAVE IN LAND USE REGULATIONS

Presented By:
Christopher Duerksen
Molly Mowery
303-830-2890

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Citizens explore 100-year vision for city





2. Tackle private energy consumption.

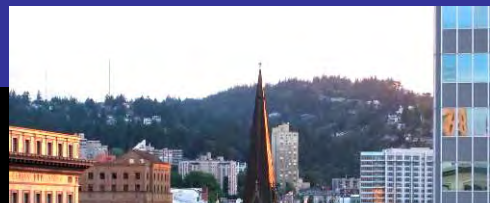
- Use the tools you already have to encourage serious energy conservation and efficiency in the private sector. Create strong incentives and support for innovations like zero-energy buildings⁶³, combined heat and power (CHP) systems, and industrial symbiosis⁶⁴. Lead by example in your public projects and public-private partnerships.
- Engage the business community aggressively. Resource efficiency saves money, and new "green" industrial and business practices are a growing opportunity for economic development. Challenge your local business leaders to reinvent the local economy for the post-carbon world.



Zero-energy housing, Germany

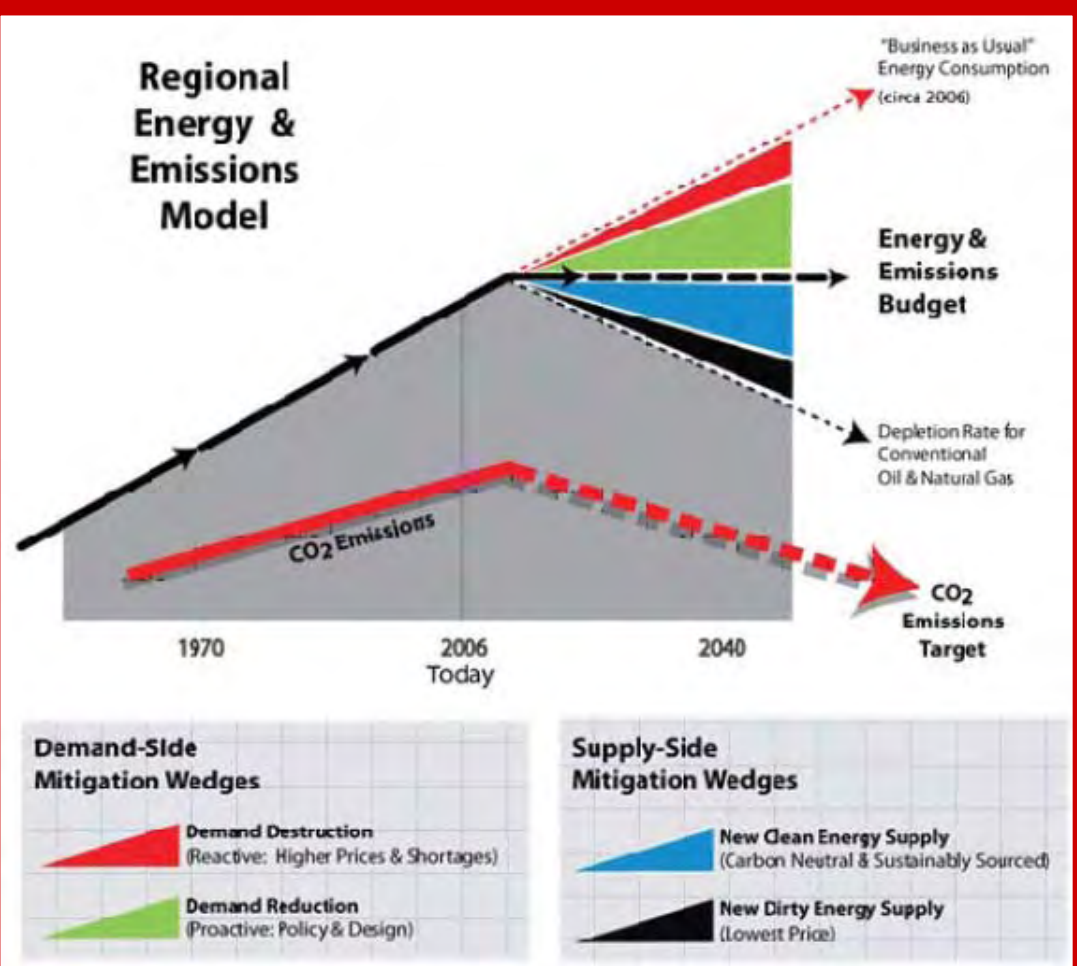
We're building buildings with 50 year lifespans. We can make decisions for the long term and lead by example, and change the private sector.

- Mayor Derek Corrigan, City of Burnaby, British Columbia



3. Attack the problems piece-by-piece and from many angles.

- Meet your goals with multiple "fixes" on energy and greenhouse kinds of solutions at different scales, from individual efficiency to rethinking the fundamental structure of society.
- Enlist the entire community. Success requires action from all sides—supply and demand, government and business—to meet them.



GRAPHIC: B. Davidson.



4. Plan for fundamental changes... and make fundamental changes happen.

- Educate and involve your fellow elected officials and staff energy and climate uncertainty, and the need to change their accordingly. These are the people who will be guiding your coming crises: raise their awareness of the problems and they to come up with the solutions.
- Educate and involve your stakeholders, which include business developers, planners, architects, landowners, financiers, engineers and citizens. Make sure they understand the seriousness of the challenge them to come up with serious solutions.
- Lead your city's transition by integrating peak oil and climate in your own decision-making. See to it that every project you smoothes the transition and reduces energy and climate vulnerability.



(cc) Robert Whitlock / flickr



(cc) citizenhelder / flickr

5. Build a sense of community.



Neighborhoods with a strong sense of community are usually the ones that fare best in the long run: citizens, businesses and local institutions help each other weather short-term challenges, and they organize to meet long-term challenges. The knowledge, skills, experiences, and social capital of a strong community contribute more to a city's resilience over time than any multi-million dollar infrastructure project.

More than anything else, the resilience that comes from a strong sense of community will help your city meet the challenges of energy and climate uncertainty.

5. Build a sense of community.



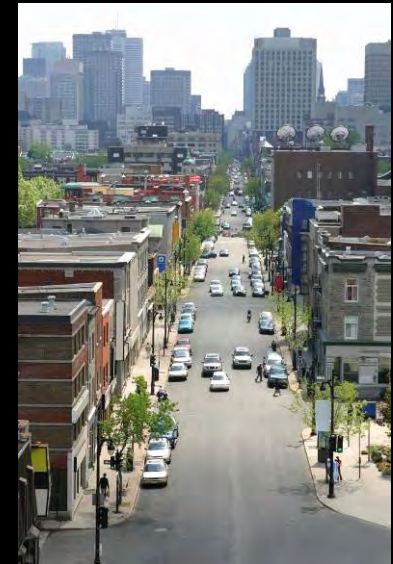
Build a sense of community throughout your city's neighborhoods:

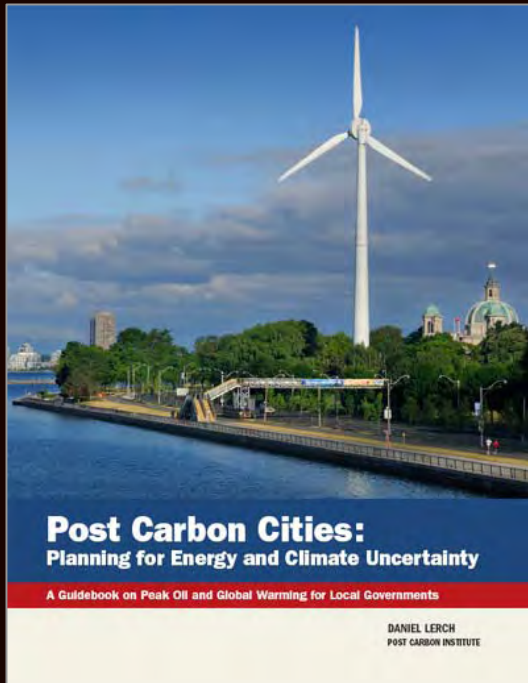
- strengthen the city's neighborhood associations;
- protect neighborhood-scale schools, and set up community-school partnership programs
- allow a mix of uses in both buildings and neighborhoods;
- protect affordable housing, and allow accessory dwellings ("granny flats");
- develop a community policing program;
- encourage street fairs and farmers markets;
- build public squares to encourage public interaction;

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



To break dependence on oil, stop contributing to global warming, and build resilient cities that can thrive in the new urban age of energy and climate uncertainty, the bottom line for local governments is this: “Reduce consumption, and produce locally.”





**Post Carbon Cities:
Planning for Energy and Climate Uncertainty**

A Guidebook on Peak Oil and Global Warming for Local Governments

DANIEL LERCH
POST CARBON INSTITUTE

\$30.00 USD
Quantity discounts available

Post Carbon Cities book and program
www.postcarboncities.net

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Post Carbon Institute