

Moving New York City toward Energy Independence

How creation of an Energy Shortage Plan
will prepare the City
for energy price volatility
and accelerate the long-term transition
to energy sustainability

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Summary

Fuel prices have been stable and low, but we're entering an era in which prices are rising and will be more volatile. As we've learned from the oil shocks of the 1970s and the aftermath of Hurricane Katrina, prices can skyrocket when even small amounts of oil are taken off the market. And with rising energy demand, accelerating fuel depletion, decreasing spare production capacity, and heightened political instability, oil price shocks are inevitable.

Our use of oil is now widely described as an addiction, and energy independence is increasingly recognized as the solution. Both short-term and long-term efforts to conserve energy and develop alternate fuel supplies are necessary if we are to begin moving New York City and the U.S. toward energy independence. Long-term transitions have been the focus of discussion until now, but an international crisis or natural disaster could trigger a fuel price shock tomorrow. Planning for the City's long-term sustainability should anticipate such disruptions.

This report will lay out a roadmap of pragmatic steps towards a sensible energy future, starting with creation of an energy shortage contingency plan, briefly considered by the City Council in 2004. Similar plans are being created now in Portland, Oregon and San Francisco. By addressing this issue, New York City can be a national leader in energy preparedness. Within long-term efforts to make the City more sustainable are initiatives that can conserve energy in a hurry. By prioritizing them for prompt implementation, the same investments also buy greater resiliency in the face of temporary disruption.

City agencies, civic groups and businesses working together on the plan will find where to cut energy costs while boosting green manufacturing and service sectors, slowing global warming, and paving the way for next steps toward sustainability. Local advocates have already identified a host of innovations for using energy more efficiently in transportation, buildings and urban design.

Transportation accounts for most fuel use. Initiatives to increase use of mass transit and reduce reliance on cars will enhance our comfort and air quality, while making the City more resilient to fuel price shocks. Support is growing for more express bus routes, changing street parking rates, and congestion pricing. Maximizing regional use of electric streetcars, rail networks and buses would reduce car use even further.

Making new buildings more energy efficient will cut fuel use and costs, but for big savings we need to retrofit the enormous stock of older buildings. Simple acts such as caulking cracks, replacing old refrigerators, switching to high efficiency lights, tuning up boilers, and installing solar water heaters can lead to significant energy savings. When a concentrated public education campaign combines them all, as is being done on an entire block in the Lower East Side, energy savings of 30% can be achieved.

Right now, solar and wind provide only a tiny fraction of our electricity needs. Lots of small solar electric and thermal power systems on top of houses and buildings, and larger solar and wind systems in rural areas can take pressure off our overstretched electric grid. To grow the renewable energy market in New York, we need to expand net metering, which allows owners of these systems to both use and produce electricity on the utility grid.

To implement the massive changes needed in our national energy economy, visionary Federal leadership is essential. The Boxer-Sanders bill, perhaps the most effective of the climate change bills in Congress today, deserves support as an initial step. Yet it and other measures being considered don't go far enough. A plan that does is *Energize America*, whose twenty points enable the U.S. by 2020 to reduce both oil imports and greenhouse gas emissions by 50%, generate 25% of our electricity from renewable sources, create 2,000,000 new energy-related American jobs and save 1,000,000 at-risk automobile industry jobs. New York City's leadership will help make it happen.

Part I: Preparing for Fuel Volatility

Achievements so far

The forward-thinking Mayor and Council have furthered New York City's identity as one of the nation's greenest cities. In 2005, the Council passed 12 environmental bills, one of which will require new City-owned or operated construction to meet green building standards for energy efficiency.¹ Ongoing and future initiatives are outlined in the Council report, "Working toward a Sustainable City: Accomplishments and Agenda," which can serve as a template for other municipalities.²

In 2006, Mayor Michael Bloomberg announced the creation of an Office of Long-Term Planning and Sustainability,³ a greenhouse gas inventory for the City, and PlanYC, aimed at creating a sustainable city by 2030.⁴ These are remarkable accomplishments by proactive leaders well equipped to address new challenges.

The gap in municipal emergency planning

The City's Energy Policy Task Force reported in 2004 that future electricity needs could be partly met with energy conservation but did not consider the stability of natural gas supplies or other forms of energy security.⁵ And, like other local governments, New York City has prepared for hurricanes, extreme heat and cold, utility disruptions and terrorist attacks.⁶ However, unlike power outages that can be resolved quickly, sudden fuel price spikes to \$4 or \$5 per gallon could affect business, trucking, heating, commuting and delivery of city services for weeks or months. Anticipating mitigation of such effects, currently outside existing Office of Emergency Management scenarios, would be prudent.

¹ "9 Green Ways to Reform," NYC League of Conservation Voters, http://www.nylcv.org/publications/2006/9_greenways_to_reform_the_new_york_city_council.

² "Working Towards a Sustainable City," NYC Council, Sept. 2005, http://www.urbanagenda.org/Working%20Towards%20A%20Sustainable%20City_PDF.pdf.

³ "Mayor Bloomberg Announces Creation of Office of Long-Term Planning and Sustainability," NYC.gov, Sept. 21, 2006, http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pagelD=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2006b%2Fpr335-06.html&cc=unused1978&rc=1194&ndi=1.

⁴ PlanYC 2030, <http://www.nyc.gov/html/planyc2030/html/home/home.shtml>.

⁵ "New York City Energy Policy: An Electricity Resource Roadmap," NYC Energy Policy Task Force, Jan. 2004, http://www.nyc.gov/html/om/pdf/energy_task_force.pdf; "Energy Needs Not as Urgent as Anticipated, City Says," NY Times, June 26, 2006, <http://www.urbanagenda.org/publications/NY%20Times%20Article.pdf>.

⁶ NYC Office of Emergency Mgmt., <http://www.nyc.gov/html/oem/html/home/home.shtml>; U.S. Dept. of Homeland Security, <http://www.ready.gov>.

Reconsidering an energy shortage plan

While much progress in energy policy is already taking place, we are not adequately prepared for sudden fuel volatility, nor are we thinking in terms of a comprehensive transition beyond oil dependency. An energy shortage contingency plan would prepare City government functions for such disruptions by educating City staff, the business community, and the public on energy conservation measures that could be implemented instantly.

The Council's Environmental Committee staff reported in 2004 on the City's growing demand for electricity, obstacles in meeting it, and vulnerability to events like the blackout of August 2003.⁷ Council members held a hearing on Intro. 374 (*Creating an Energy Shortage Plan*) but did not take further action on it.⁸ This plan encompasses a determination by City officials and energy experts of vulnerability of City operations to energy insecurity, a compilation of ways for the public and private sectors to cut energy use quickly, and stages for emergency responses which include action guidelines and public communications. A plan like this, particularly if it considers liquid fuels, natural gas and electricity, is vitally important.

Planning for energy vulnerability will reinforce other efforts

All energy efficiency and conservation initiatives will not only decrease fuel use but also decrease fuel bills, slow global warming, clean the environment, create new jobs, and improve national security. By prioritizing actions that will specifically conserve energy in emergencies for an energy shortage plan, policy makers can pay for both short- and long-term plan elements at the same time.

A shortage plan also focuses public attention on energy issues that affect citizens personally in the event of an emergency. Many Americans are concerned about global warming but do not perceive it as an immediate personal risk - its current impacts fall upon safely distant people and places - and any influence on their own communities will be in the future. Lacking a sense of urgency, global warming gets lower priority than other national problems. On the other hand, fuel shock impacts will be clear and immediate.

⁷ Environmental Protection Committee Report to NYC Council on Intro. 374, June 23, 2004, <http://webdocs.nycouncil.info/attachments/61517.htm>.

⁸ Text of Intro. No. 374, <http://webdocs.nycouncil.info/textfiles/Int%200374-2004.htm?CFID=42808&CFTOKEN=77756073>.

Even global warming naysayers not moved by environmental concerns are likely to support energy conservation efforts which support national security or entrepreneurial opportunity.⁹

Resolutions and plans in other areas

San Francisco¹⁰ and Portland¹¹ have already passed energy vulnerability resolutions and have started to develop their contingency plans. Portland's City Council created a task force to identify key short-term and long-term energy vulnerabilities and to make recommendations by early 2007 about how to respond to uncertainties in the supply and affordability of oil. Portland's Departments of Planning, Transportation and Sustainable Development prepared a substantial briefing book for task force members.¹² After 40 meetings, the group issued a draft report with eleven recommendations for reducing oil use.¹³ Citizens in Tompkins County, New York have drafted a county management plan to deal with the effects of fuel shocks.¹⁴

Creating a contingency plan

Even though the City reacted effectively to both the massive August 2003 blackout and the July 2006 Queens outage, there is room to improve the City's response and the electricity transmission infrastructure responsible for both events. A Portland report asked officials to envision such a situation – with possible responses to a range of fuel price scenarios, with price increases of varying duration, rapidity and magnitude – and to identify vulnerable areas of municipal operations:¹⁵

⁹ "Communicating the Risks of Global Warming: American Risk Perception, Affective Images and Interpretive Communities," Anthony Leiserowitz, U. of Oregon, http://www.uoregon.edu/~ecotone/pubs_assets/ClimateCommunication.pdf.

¹⁰ Full text of San Francisco resolution, <http://www.energybulletin.net/15086.html>.

¹¹ "Portland establishes task force," PPO policy working group, May 12, 2006, <http://www.portlandpeakoil.org/cs/5-10pressrelease>; City of Portland Office of Sustainable Development, July 6, 2006, <http://www.portlandonline.com/osd/index.cfm?a=122243&c=41625>.

¹² Task Force Briefing Book, City of Portland Office of Sustainable Development, July 25, 2006, <http://www.portlandonline.com/shared/cfm/image.cfm?id=124321>.

¹³ "Navigating the Transition from Oil and Natural Gas," City of Portland, Feb. 2007, <http://www.portlandonline.com/osd/index.cfm?c=42894>.

¹⁴ "Tompkins County Relocalization Plan," Tompkins County Relocalization Project, March 2006, <http://www.ibiblio.org/tcrp/doc/project.htm>; <http://tclocal.org>.

¹⁵ "White Paper: Future Oil Price Uncertainty and Metro," Daniel Lerch, Office of the Chief Operating Office, Metro, Portland, Oregon, April 18, 2006, <http://www.ompoc.org/PDF/0606/MetroOilUncertaintyWhitePaper.pdf>; http://www.metro-region.org/library_docs/council/oil_supply_uncertainty_ppt.pdf.

- *How would \$100-\$150 per barrel oil affect New York City's ability to provide essential services such as police and fire response?*
- *How long would it take for price hikes to impact City operations?*
- *When would some services need to be cut? And which ones?*
- *How would this affect fee-based services like buses and subways? When should constituents be alerted to possible service cutbacks and price increases? Will those price increases be affordable?*

A pair of International Energy Agency reports suggests measures to have ready for emergencies. *Saving Oil in a Hurry* suggests:¹⁶

- highway speed limits
- increased fuel taxes
- reduced fees for public transit
- car pooling
- driving bans
- telecommuting
- compressed work weeks of fewer but longer days

Saving Electricity in a Hurry reviews measures taken by governments of California, Arizona, Brazil, Sweden, New Zealand, and Norway to quickly reduce electricity consumption:¹⁷

- mass media campaigns
- changing thermostat settings
- shorter showers
- improved equipment efficiency
- quick price adjusting

Inventory of government agencies and services can determine vulnerabilities for which to develop appropriate mitigations. This inventory can include an analysis of energy use by department for the previous fiscal year to determine:¹⁸

- fuel use

¹⁶ "Saving Oil in a Hurry," International Energy Agency, 2005, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1474.

¹⁷ "Saving Electricity in a Hurry," International Energy Agency, 2005, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1481.

¹⁸ White Paper, David Room, Energy Preparedness, April 25, 2006, <http://energypreparedness.net/resources/whitepaper/1>.

- amount (in kilowatt hours, gallons or therms)
- cost
- cost as percentage of each department's budget
- energy mix of departments with highest percentage use and cost

Then the effectiveness of contingency plans can be assessed by:

- examining planning assumptions regarding future energy use and price:
 - current assumptions
 - projected scenarios of escalating volatile and increasing prices
- performing a sensitivity analysis of impact of alternative scenarios
- determining how long existing contingency plans will keep various systems running (e.g., sanitation, water, fire)

Involving civic and business leadership

One way to involve many stakeholders in the decision-making process is interactive community planning forums, such as those conducted after the events of September 11, 2001 by 400 organizations under the leadership of the Municipal Arts Society. Over 200 volunteer workshop facilitators brought together over 3,000 people in 230 workshops to share ideas about rebuilding downtown. Participants melded 19,000 ideas into a report consisting of 49 vision statements.¹⁹

Although planning for future contingencies will be different from coming together after a recent and deeply felt trauma, there are a variety of ways to involve a broad spectrum of the community in the planning process, as suggested by social scientists involved in community organizing.²⁰ City programs that clearly define positive energy choices and explain how and why they reduce energy vulnerability improve the chances that people will adopt these behaviors:²¹

Encouraging specific, concrete actions that are effective in reducing resource use ... is a promising initial approach ... people might install energy-efficient lights, recycle bottles and newspapers, buy recycled products, and carpool or use mass transit. ... [R]esearch

¹⁹ Imagine NY, <http://imagineny.org/>; Civic Alliance, <http://www.civic-alliance.org>.

²⁰ "Energy Descent Pathways," Rob Hopkins, MSc dissertation, U. of Plymouth, 2006, www.transitionculture.org; World Café, <http://theworldcafe.com/index.html>; Open Space Technology, <http://www.openspaceworld.org/cgi/wiki.cgi?AboutOpenSpace>.

²¹ "Psychological Contributions to Achieving an Ecologically Sustainable Future for Humanity," Stuart Oskamp, Journal of Social Issues, Fall 2000, http://www.findarticles.com/p/articles/mi_m0341/is_3_56/ai_69391493; "Can we use fear as a motivator for change?", Rob Hopkins, Transition Culture, March 28, 2006, <http://www.energybulletin.net/14442.html>.

shows that simply providing information without strengthening motivation has very little effect.

Industry task forces

Individual businesses can prepare for fuel volatility with short-term measures and long-term energy and efficiency investments. Each sector has unique energy needs, opportunities and resources, and those most at risk from higher energy costs will have the greatest incentive to prepare in advance. Industry-specific task forces will bring practical business experience to the City planning process and can help guide private efforts.

Economic development opportunities

Major investments will be needed to produce equipment and materials for retrofits, and to build infrastructure for:

- Solar and wind energy and biofuels
- Alternative vehicles and mass transit
- Energy conservation
- Green building

These industries can bring economic growth to both upstate and downstate New York. In the last two years, investment and entrepreneurial activity in these sectors have grown vigorously, but have been concentrated in California and Massachusetts. New York State policy has been focused on increasing use of clean technologies within the state, but should expand to supporting growth of clean technology companies already within the state and attracting new ones.²² Building strong public support for emergency energy conservation would grow those markets. Cost-saving through energy efficiency will appeal to everyone.

²² “Cleantech: A New Engine of Economic Growth for New York State,” January 2007, Partnership for New York City and NYC Investment Fund, <http://www.nycp.org/publications/CleantechReport.pdf>.

Part II: Making Transportation More Efficient

Using cars more efficiently

Alternative liquid fossil fuels

Dr. Roger Bedzek and colleagues at the National Energy Technology Laboratory studied how the U.S. could mitigate its dependence on foreign oil by simultaneous national crash programs in vehicle fuel efficiency, coal liquefaction (also known as coal to liquids or CTL), oil shale and enhanced oil recovery. These efforts, Dr. Bedzek reports, would produce significant savings, create millions of jobs, and generate billions in tax revenues, but would take over 20 years and more than \$2.6 trillion investment to accomplish full results. If begun immediately, the crash programs would save the U.S. 14 million barrels of oil per day; if begun in 2016, the 2026 result would a savings of only 5 million barrels per day – so even its boosters admit that any realistic implementation will barely start to address future fuel demand.²³ Since this approach ignores the climate change impacts of maintaining current levels of fossil fuel use it cannot be recommended. It also does not question the premises that our transportation needs can only be met by our present reliance on cars and trucks, and by current technologies and energy sources. These options, and changes in consumer behavior and government planning, can create functional transportation systems.

Biofuels

Biofuels include ethanol, which can be made from corn and other plants, biodiesel from soybeans and other oil seed, and biodiesel processed from used cooking oil.

Requiring State government vehicle fleets to buy minimum amounts of biodiesel would create jobs and bring investment to rural upstate areas.²⁴ Entrepreneurs have already begun collecting waste vegetable oil in New York City for processing into biodiesel.²⁵

²³ “Economic Impacts of Liquid Fuel Mitigation Options,” Roger Bedzek et al., National Energy Technology Laboratory, May 2006, <http://media.globalpublicmedia.com/RM/2006/05/hirsch2.pdf>.

²⁴ “Biodiesel – Petroleum with Vegetable Oil,” Gotham Gazette, December 2005, <http://www.gothamgazette.com/article/environment/20051214/7/1679>; “Statewide Feasibility Study for a Potential New York State Biodiesel Industry,” June 2003, NYSERDA, <http://www.nyserda.org/publications/biodieselreport.pdf>.

²⁵ “Turning Grease into Green Gas: Red Hook Refinery to Make Fuel from Fries,” Metro NY, Sept. 28, 2006, http://ny.metro.us/metro/local/article/Turning_grease_into_green_gas/4749.html.

There are questions about which plants are the best raw materials for making sustainable biofuels with a net gain of energy: switchgrass or other inedible woody plants are better than corn, soy is better than corn, and mixtures of native perennial prairie grasses may be even better than soy.²⁶

In any case, current biofuel production is limited. Future production may compete with food production and will probably never replace gasoline as used today.²⁷ Most replacement of fuel demand will have to come from greater efficiency in vehicle design, use and transportation systems.

Alternative high-efficiency vehicles

High mileage gas/electric hybrid vehicles like the Toyota Prius are already popular, and cab drivers are starting to make the switch.²⁸ These gains could be furthered by combining hybrid-electric propulsion with lightweight steels or ultralight carbon composite parts. Amory Lovins of the Rocky Mountain Institute estimates that such construction could profitably increase fuel mileage to 66 miles per gallon for light trucks and 92 miles per gallon for cars. Retooling the U.S. car, truck and plane industries would require a massive investment which would be paid back by savings resulting from doubled or tripled fuel efficiency.²⁹

Plug-in hybrid vehicles could be run partly on biodiesel and could serve as storage batteries for electricity produced by solar or wind power systems. A study produced for the Department of Energy found that off-peak electricity from renewable sources could power 84% of the country's 220 million vehicles if they had plug-in hybrid electric technology.³⁰

²⁶ "Corn dog," Slate, July 19, 2005, <http://slate.com/id/2122961>; "Study finds mixed prairie grasses better source of biofuel, Dec. 13, 2006, <http://www.renewableenergyaccess.com/rea/news/story?id=46825>.

²⁷ "Ethanol won't solve energy problems," Associated Press, July 10, 2006, http://www.usatoday.com/tech/news/2006-07-10-ethanol-study_x.htm?POE=TECISVA; Energy Farms Network, <http://www.energyfarms.net>; "Biodiesel beats ethanol in biofuel battle," New Scientist, July 10, 2006, <http://www.newscientisttech.com/article/dn9519-biodiesel-beats-ethanol-in-biofuel-battle>; "Can't see the future for the trees," Adam Fenderson, Energy Bulletin, August 2, 2006, <http://www.energybulletin.net/20171/html>.

²⁸ "Soaring gasoline prices inflict pain on cabbies, drivers, city budget," New York Sun, August 16, 2005, <http://www.nysun.com/article/18634>; "Hybrid vehicles," Gotham Gazette, July 2005, <http://www.gothamgazette.com/article/environment/20050720/7/1486>; Toyota Prius, <http://www.toyota.com/prius>.

²⁹ "How to live without oil," Amory Lovins, Newsweek, August 8, 2005, <http://msnbc.msn.com/id/8769620/site/newsweek>; <http://www.oilendgame.com>; "Securing America: Solving Our Oil Dependence through Innovation," NRDC, February 2007, <http://www.nrdc.org/air/transportation/oilsecurity/plan.pdf>.

³⁰ "The plug in hybrid for sustainability without oil," Andrew Frank, ASPO-USA, October 2006, http://www.aspo-usa.com/fall2006/presentations/pdf/Frank_A_Boston_2006.pdf; "Mileage from megawatts," December 11, 2006, <http://www.pnl.gov/news/release.asp?id=204>.

NYC Department of Transportation has over 70 electric vehicles.³¹ NYC Transit Authority operates over 400 compressed natural gas buses, and plans to operate 550 hybrid-electric buses by the end of 2006.³²

Congestion pricing

Traffic congestion costs the region over \$13 billion annually and over 37,000 lost jobs, estimates the Partnership for New York City.³³ Congestion pricing, in which an E-ZPass system automatically bills daytime driving into a congested area, has been successfully adopted in London and Singapore. In central Manhattan congestion pricing would reduce congestion, traffic, travel time, and fuel waste from traffic jams; it would also redirect travelers to mass transit and entrepreneurial shared transit services, according to the Regional Plan Association.³⁴ The Manhattan Institute, a conservative think tank, thinks it is politically possible if the times and places where congestion is most severe are carefully targeted.³⁵

Ride Sharing

Ride sharing systems already allow New York metropolitan area residents to share cars and find carpool and van pool partners. The proposed Ride Share program would create a new nationwide transport system, connecting drivers and riders with cell phones via a tracking and scheduling database to be modeled after the nation's airline and automobile reservation systems.³⁶

Out of cars and onto mass transit

Centering urban design around transit, not cars

Transit-oriented development, increasingly popular among planners, encourages compact, mixed-use development near new or existing public transportation infrastructure that serves housing, transportation and neighborhood goals. Its

³¹ NYC Dept. of Transportation, <http://www.nyc.gov/html/dot/html/motorist/alternativefuel.html>.

³² http://www.mta.info/nyct/facts/ffenvironment.htm#clean_bus.

³³ "Growth or Gridlock: The Economic Case for Traffic Relief and Transit Improvement for a Greater New York," Dec. 2006, <http://www.pfnyc.org/publications/Growth%20or%20Gridlock.pdf>

³⁴ "An Exploration of Motor Vehicle Congestion Pricing in New York," Jeffrey Zupan & Alexis Perotta, Regional Plan Association, Nov. 2003, http://www.rpa.org/pdf/eno_summary.pdf.

³⁵ "Battling Traffic: What New Yorkers Think about Road Pricing," Bruce Schaller, Dec. 2006, http://manhattan-institute.org/html/rdr_03.htm.

³⁶ <http://www.zipcar.com>; <http://www.commuterlink.com>; <http://litm.org>; "Ride-Share: A Modest Proposal," <http://www.communitysolution.org/rideshare.html>.

pedestrian-oriented design encourages residents and workers to drive their cars less and ride mass transit more.³⁷ Suburban sprawl is not only discouraged but replaced by green space and agricultural areas adjacent to cities and towns.³⁸

Reversing the contemporary practice of planning cities around cars will save fuel. It makes sense to use transportation money not to build fuel-wasting highways but to build bus, trolley and light rail transit within cities and a rail network to connect those cities.³⁹

Although many New York residents do not own cars, and the City has one of the world's best public transit systems,⁴⁰

New York's approach to transportation – like most cities – has been described as first making sure that “all the cars are happy.” That should change. The priority should be making sure that New Yorkers, and the people who spend their days here, have a safe, clean, and efficient environment for going about their business and recreation. If that means burdening cars, that's what should be done ... The larger goal, though, has to be developing and implementing a congestion-busting plan that gets as many vehicles as possible off the streets. The long-sought Cross Harbor Rail Freight Tunnel, which would bring goods to the city by freight rail, could take many trucks off the streets ... Improved, and better funded, public transit, could convince more drivers to abandon their cars. There needs to be better rapid bus lines, increased subway and commuter rail capacity and smarter use of the great resource surrounding the city: waterways ... The boldest step of all would be imposing serious fees on people who bring cars into the bottom third of Manhattan.

Support is growing in New York City for measures which get people out of cars into more efficient modes of transit.⁴¹ The Citywide Coalition for Traffic Relief, representing over 130 organizations, calls for improved pedestrian and bicycle routes, parking reform, traffic calming, reduced truck impact and congestion

³⁷ “Transit Oriented Development: Transit Resource Guide,” American Public Transportation Association, http://www.apta.com/research/info/briefings/briefing_8.cfm; Congress for the New Urbanism, <http://www.cnu.org>.

³⁸ Ecocity Builders, <http://www.ecocitybuilders.org>; “Cities can save the earth: an urban solution to climate change, species extinction and peak oil,” Richard Register, Sept. 9, 2006, Post Carbon Institute, <http://www.postcarbon.org/node/4190>.

³⁹ Rail-Volution: Building Livable Cities with Transit, <http://www.railvolution.com>.

⁴⁰ “How New York (and other big cities) should solve the traffic problem,” Carolyn Curiel, The New York Times, September 13, 2006, <http://www.transalt.org/press/media/2006/559.html>.

⁴¹ “Putting Cars Behind,” Enrique Peñalosa, Gotham Gazette, October 16, 2006, <http://www.gothamgazette.com/article/fea/20061016/202/2000>.

pricing.⁴² Midtown traffic, which consists of 14% trucks and 60% cars, could be redirected to other modes: 90% of driving commuters had access to public transportation which they chose not to use.⁴³ Removing the many hidden subsidies for car parking and making the price for curbside parking reflect its true cost would encourage many of those drivers to take mass transit.⁴⁴

Transportation initiatives for New York City to explore include:

- removing hidden subsidies for driving cars
- adjusting parking fees
- supporting services providing shared car and van rides
- increasing bus service, especially express bus and Bus Rapid Transit
- increasing alternative fuel and electric vehicle fleets
- installing electric streetcar and light rail systems, like Vision 42
- implementing congestion pricing
- implementing Auto Free NY's plan to maximize use of subway and rail
- planning and building more intercity passenger and freight train capacity

Buses

Getting commuters onto high occupancy buses reaps much more conservation per dollar than shifts to different fuels or the like. Bus service improvements are the lowest hanging fruit in terms of mode switching from private auto. Traveling only 7.5 miles per hour on average, New York City buses are too slow and spend only 54% of their time in motion.⁴⁵

Bus Rapid Transit sets up dedicated lanes for express buses. When introduced on two routes in Los Angeles, it sped up buses by about 30%. Over the next two years Los Angeles is setting up 28 Bus Rapid Transit corridors covering 450

⁴² Citywide Coalition for Traffic Relief, <http://www.trafficrelief.org>.

⁴³ "East River Bridge Tolls: Revenue, Traffic, Mobility & Equity Impacts," Shaller Consulting, for Transportation Alternatives, September 17, 2003, <http://www.schallerconsult.com/pub/tollrpt.pdf>.

⁴⁴ "The High Cost of Free Parking," Ryan McGreal, April 14, 2005, <http://www.raisethehammer.org/index.asp?id=072>.

⁴⁵ "Bus Systems for the Future," International Energy Agency, 2000, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1091; "Mode Shift in the 1990s," Schaller Consulting, August 2001, <http://www.schallerconsult.com/pub/modeshft.htm>.

miles.⁴⁶ Citizens in New York City are calling for something similar, and an MTA study on rapid transit bus routes is currently underway.⁴⁷

A four-year plan to maximize use of subway and rail

Light rail, subway and trains are more energy efficient than buses, so making the best use of existing rail assets can reduce our dependence on cars.⁴⁸ Auto-Free NY documents fifteen relatively low cost transit strategies that could be implemented in four years, including:⁴⁹

- lower transit fares
- upgrade bus service in neighborhoods far from subway stations
- increase service and integrate fares among Metro North, NJ Transit, LIRR and NYC subway systems, using Penn Station as a regional hub
- replace existing toll booths with automated nonstop tolling systems
- charge higher rates for driving into congested areas with good mass transit, with special rates and allowances to remove the burden of these charges for low income and disabled motorists and commercial vehicles
- raise parking prices
- lower amount of street parking
- promote pedestrian-friendly business districts in the boroughs
- designate a network of streets for walking and cycling only
- encourage research, development and testing of human, renewable and solar vehicles
- close Manhattan's busiest pedestrian streets to motor vehicles and supply with streetcars (5% of borough's mileage, about 30 miles of streets), including Broadway, 42nd Street, and a grid in Lower Manhattan

Auto-Free NY estimates that these measures, which will become increasingly plausible when gasoline rises to \$5 per gallon for extended periods of time, would lower car use 20% in Manhattan and 5% citywide.

⁴⁶ "Faster Buses?" Bruce Schaller, Gotham Gazette, June 2006, <http://www.gothamgazette.com/article/transportation/20060614/16/1884>.

⁴⁷ "Riders, pols, call for more express service," December 14, 2006, Queens Chronicle, http://www.zwire.com/site/news.cfm?newsid=17591642&BRD=2731&PAG=461&dept_id=575596&rfti=; NYC Bus Rapid Transit Study in process, <http://www.mta.info/mta/planning/brrt/index.html>.

⁴⁸ Richard Heinberg, *The Oil Depletion Protocol*, New Society Publishers, 2006, pp. 46-47.

⁴⁹ "Livable City Plan," Auto-Free NY, <http://www.auto-free.org/4yrplan.html>; Vision 42: an auto-free light rail boulevard for 42nd Street, <http://www.vision42.org>.

Electric trains, streetcars and light rail

Nearly 99% of goods shipped to the City arrive by truck, and the Federal Highway Administration expects regional truck traffic to rise 50% by 2020.⁵⁰ Anything interfering with the stream of trucks carrying food and other goods into the City would cause major problems. Diverting some of this transportation load to freight trains would not only reduce pollution and congestion, but would reduce vulnerability to fuel shocks.

In 2002 two-thirds of U.S. oil consumption was used for transportation. Railroads are probably 8 times more energy efficient than heavy trucks. Electric railroads are cheaper to operate than vehicles relying on liquid fuel and can carry more freight because they accelerate and break faster and have no delays for refueling. The switch from railroad to trucking, facilitated by cheap oil prices, will probably be reversed as oil becomes more expensive. Powering railroads by electricity and transferring half of truckloads to rail should save 6.3% of U.S. oil consumption. Urban electric street cars and trolley could eventually be run on solar or wind power.⁵¹ Electric streetcar systems have been launched in Seattle, Portland, Little Rock, Tampa and many other U.S. cities.⁵²

Local agriculture, local manufacturing

Higher transportation costs will alter the economics of agriculture and manufacturing. During both World Wars, Americans planted Victory Gardens which at one point were producing roughly 40% of America's vegetables.⁵³ These days food in the U.S. usually travels 1,500 to 2,500 from farm to table, losing nutritional value, sending dollars out of the region and contributing to global warming along the way.⁵⁴ Large amounts of fossil fuels are used in water pumping, production of fertilizers and pesticides, as well as food processing, refrigeration and transportation.⁵⁵ Rising and volatile oil prices will make local

⁵⁰ "Truck Route Management and Community Impact Reduction Study," executive summary, New York City Department of Transportation, May, 2006, p. 1, <http://www.nyc.gov/html/dot/pdf/execsum.pdf>; "Green freight," Tri-State Transportation Campaign, <http://www.tstc.org/issues/freight.html>.

⁵¹ "A 10% reduction in America's Oil Use in Ten to Twelve Years," Alan Drake, Light Rail Now, May 2006, http://www.lightrailnow.org/features/f+lrt_2006-05a.htm.

⁵² "Streetcars: Getting the most bang for the buck," Rail-Volution Conference 2006, http://www.railvolution.com/rv2006_pdfs/rv2006_205a.pdf; "Street Smart: Streetcars and Cities in the 21st Century," <http://www.reconnectingamerica.org/html/TOD/StreetcarBook.htm>.

⁵³ "Fifty Million Farmers," Richard Heinberg, Energy Bulletin, Nov. 17, 2006, <http://www.energybulletin.net/22584.html>.

⁵⁴ "Home grown: the case for local food in a global market," Brian Halweil, Nov. 2002, Worldwatch Institute, <http://www.worldwatch.org/node/827>; Cornell University Cooperative Extension, <http://nyc.cce.cornell.edu/urbanfood>; Just Food, <http://www.justfood.org/if/index.html>.

⁵⁵ "Oil and Food: A Rising Security Challenge," Danielle Murray, Earth Policy Institute, May 9, 2005, <http://www.earth-policy.org/Updates/2005/Update48.htm>.

agriculture more competitive with large-scale agribusiness. There will be more programs such as the one in Westchester County connecting immigrants who want to work as farmers, agricultural operations threatened by development, and the New York City Greenmarket system.⁵⁶

Proximity to Manhattan's central business district is already critical to many industries, such as food production, commercial laundries, building services contractors and specialty garment and printing businesses. Volatile and increasing fuel prices will make local businesses increasingly competitive with those dependent upon far-flung supply chains.⁵⁷

⁵⁶ "Yorktown Heights Journal: Where Dairy Cows Once Grazed, Okra and Jalapeños Flourish," Fernanda Santos, The New York Times, Sept. 15, 2006, <http://www.nytimes.com/2006/09/15/nyregion/15farm.html>.

⁵⁷ The Mayor's Office of Industrial & Manufacturing Businesses, <http://nyc.gov/html/imb/html/home/home.shtml>.

Part III: Energy Efficient Buildings

New York City's new green building law will ensure that some new buildings will meet high standards of energy efficiency, but the vast majority of existing buildings are chronically wasting energy. Energy efficiency retrofits are not as glamorous as installation of solar panels but are far more cost effective. Many energy efficiency building upgrades and equipment purchases will pay for themselves in a few years through energy savings. Owners should start by replacing low efficiency incandescent light bulbs with compact fluorescents and older model fluorescent tube lights (T10s and T12s) with T8s and T6s. Upgrading an old refrigerator to a highly efficient Energy Star model will probably save more energy and money than getting a solar photovoltaic system to generate electricity.⁵⁸

	kWh/year	Cost/year (\$0.20/kWh)	Annual Savings
Light bulbs (60-watt or equivalent):		6 hours/day:	
incandescent	131	\$26.28	\$17.50
compact fluorescent	43	\$ 8.78	
Refrigerators (18-cubic foot GE):			
1985 model	1800	\$278.00	\$196.00
2005 model	600	82.00	
Solar electric panels (1200 kWh/year)	1200 (the amount of electricity saved by replacing an older refrigerator)	\$4,000.00 one-time cost (\$10,000 minus rebates and tax credits)	

Sensors may be useful to turn off lights when no one is around, particularly in rooms that are intermittently vacant, basements, closets, and out-of-the-way places.

Building owners should have an energy audit to review lighting, heating, ventilation and air conditioning systems, and then carry out recommended repairs and upgrades, install insulation, and plug leaks that waste energy by

⁵⁸ Adapted from Figures 4.5 and 4.6, Feasibility Study for Greening A Block; personal communication, Jeff Perlman, Brightpower, Inc., <http://www.greeningablock.org>.

losing heated or cooled air. More than half of New York City housing units are heated with natural gas, one third with oil, and the remainder with electricity, bottled gas or other sources.⁵⁹ With recent spikes in oil and gas prices, these fuel-saving actions make sense.⁶⁰

Boiler experts have demonstrated that most residential buildings in New York City have the capacity to save 40% of their heating fuel through proper configuration and tuning of their existing heating system, making boiler maintenance training for building owners, managers, superintendents and porters a great investment. A typical 15-30 unit walk-up building on the Lower East Side can save 200-300 gallons of fuel per apartment per year.⁶¹ An audit with a complete review of the building's heating system should lead to recommended adjustments, repairs and upgrades.⁶² Properly tuned heating systems not only use less energy but are easier to adjust to resident needs and are more comfortable. Greening A Block, a proposed demonstration project to bring state-of-art energy efficiency improvements to a concentrated area in the East Village, is expected to cut both heating fuel and electricity use an average of 30%.⁶³

Garnered from numerous sources, including groups listed below, charts for various ways of saving energy in buildings are laid out in the Feasibility Study for Greening A Block.⁶⁴ Guidance and resources for saving energy in small buildings is available from GreenHomeNYC⁶⁵ and New York Energy \$mart Communities.⁶⁶ Courses are taught by the Association for Energy Affordability, low-cost courses or a one-year certificate program in Building/Housing Superintendency Technology at the Department of Environmental Control Technology, NYC College of Technology, and free courses are available at the NYC Department of Housing Preservation and Development.⁶⁷ Con Ed provides energy-saving tips and the option to buy green energy.⁶⁸ KeySpan offers grants

⁵⁹ Feasibility Study for Greening A Block, <http://www.greeningablock.org>.

⁶⁰ "Residential Heating Oil Prices: What Consumers Should Know," U.S. EIA, <http://www.eia.doe.gov/neic/brochure/heatingoil2005/index.htm>; http://www.eia.doe.gov/oil_gas/natural_gas/info_glance/natural_gas.html; <http://tonto.eia.doe.gov/dnav/ng/hist/n3020us3m.htm>.

⁶¹ Feasibility Study for Greening A Block, <http://www.greeningablock.org>.

⁶² Heating fuel conservation, Superintendents Technical Association, <http://www.nycsta.org/oilconservation.htm>.

⁶³ Greening A Block, <http://www.greeningablock.org>.

⁶⁴ Greening A Block, <http://www.greeningablock.org>.

⁶⁵ GreenHomeNYC, <http://www.greenhomenyc.org>.

⁶⁶ NYSERDA, <http://www.getenergysmart.org>; <http://www.nyserda.org>.

⁶⁷ <http://www.aeanyc.org/>; <http://www.citytech.cuny.edu>; <http://www.nyc.gov/hpd>.

⁶⁸ <http://www.coned.com/customercentral/energysavingtips.asp>; <http://www.poweryourway.com>.

for energy efficient renovations.⁶⁹ Apollo Alliance has compiled many approaches to planning, creating and financing high performance buildings.⁷⁰

After improving efficiency, solar hot water and heating systems may be a possibility. Most of the solar heating systems in the U.S. are used for heating swimming pools,⁷¹ but rooftop solar thermal systems could supply 25-55% of the water heating and some of the building heating load. Solar thermal systems can convert about 70% of solar energy into heat, opposed to 18-19% efficiency of solar electric panels converting sunlight into electricity, so that slight roof shading is less of a problem. Residential solar water heating systems cost about 10 times as much as electric and natural gas water heaters, but pay for themselves in 4-8 years in fuel savings and last 15-40 years. However, the thousands of opportunities for reasonably price solar thermal retrofits on flat-roofed New York City buildings won't happen until the overall costs of building the systems are reduced. High labor costs and burdensome building regulations keep solar thermal systems more costly than established but inefficient heating systems.⁷²

⁶⁹ http://www.keyspanenergy.com/corpinfo/community/cinderella_all_all.jsp.

⁷⁰ "New Energy for Cities: Energy Saving and Job Creation Policies for Local Governments," Apollo Alliance, <http://www.apolloalliance.org/docUploads/new%5Fenergy%5Fcities%2Epdf>.

⁷¹ "American Energy: The Renewable Path to Energy Security," Worldwatch Institute/Center for American Progress, p. 31, Sept. 2006, www.americanenergynow.org.

⁷² Personal communication, entrepreneur and solar energy designer and installer Richard Klein, Quixotic Systems, Inc., <http://www.quixotic-systems.com/solarfaq/index.html>.

Part IV: Electricity

Meeting electricity needs

Rising demand for electricity is straining the capacity of the power grid.⁷³ Weaknesses in the electric transmission system triggered the Northeast blackout of August 2003 and the Queens outage of July 2006. New York City is required by State law to produce 80% of its own power supply within city limits; there are also physical limits as to how much electricity can be transmitted into the City from upstate power plants.

In the 1990s, the belief in abundant North American gas supplies led to natural gas becoming the fuel of choice for new power plants.⁷⁴ Many experts contend North American natural gas supplies have already peaked,⁷⁵ and the Geological Survey of Canada says that Canada will not be able to meet U.S. natural gas shortfalls.⁷⁶ City power plants run mostly on natural gas, with some relying on fuel oil nos. 2 or 6, or kerosene.⁷⁷ If the price of natural gas goes up, so will the price of electricity.

With little public debate, the U.S. is moving towards increased reliance on imported liquefied natural gas (LNG). Additional LNG will be imported from facilities that have not yet been built but will be extremely expensive. These facilities will be more vulnerable to supply disruption than domestic facilities and

⁷³ "Global Electricity Grids Strained," BBC News, June 9, 2005, <http://news.bbc.co.uk/2/hi/business/4076938.stm>.

⁷⁴ "If winter is bitter, brace for a natural gas crunch," Mark Clayton, Christian Science Monitor, November 29, 2005, <http://www.csmonitor.com/2005/1129/p01s02-usec.html>; "New England power outages possible," December 6, 2005; MSNBC, <http://www.msnbc.msn.com/id/10355379>.

⁷⁵ "Natural Gas: It Is Not a Pretty Picture!," Dr. Robert Hirsch, The Annapolis Center for Science Based Public Policy, <http://www.annapoliscenter.org>; "A Case Study on Peak Energy: The U.S.'s Natural Gas Disaster," Matthew Simmons, Simmons & Co. International, May 25, 2004, <http://www.simmonsco-intl.com/files/ASPO%20B&W%202004.pdf>; "High Noon for Natural Gas," Julian Darley, <http://www.highnoon.ws>; The Post Carbon Institute, <http://www.postcarbon.org>.

⁷⁶ "Natural Gas in North America: Should We Be Worried?" David Hughes, Geological Survey of Canada, ASPO World Oil Conference, October 26, 2006, http://www.aspo-usa.com/fall2006/presentations/pdf/Hughes_D_NatGas_Boston_2006.pdf.

⁷⁷ "New York City's Solar Energy Future," p. 4, The Center for Sustainable Energy at Bronx Community College, January 2006, <http://www.bcc.cuny.edu/InstitutionalDevelopment/CSE/Documents/CUNY%20MSR%20-%20Market%20for%20PV%20in%20NYC.pdf>.

will be controlled by foreign governments⁷⁸ and subject to outbidding by other countries.

The potential of energy from solar, wind and water

Theoretically, either domestic solar or wind resources could meet all our electricity needs. Solar photovoltaic panels on rooftops and parking lots and wind turbines in windy valleys, coastal plains and mountains could supply all U.S. electric and transportation power needs. 30% of our current electricity could be generated by desert solar power plants in 3.4% of the land of New Mexico or solar panels on half the nation's rooftops and facades.⁷⁹ Wind resources in Kansas, North Dakota and Texas could provide 100% of the nation's electricity. Many energy experts think the potential of renewable energy electricity is so much greater than alternative liquid fuels, which compete with food for acreage, that future transportation will be fueled by electricity.

According to a German Aerospace Centre report it is both economically feasible and desirable to cut U.S. CO2 emissions by almost 75% within the next 43 years through a massive increase in renewable energy and efficiency improvements alone. These reductions can be achieved without nuclear power, and while virtually ending U.S. dependence on coal.⁸⁰ A similar report from the American Solar Energy Society comes to the same conclusion.⁸¹

Renewable power can be generated at either centralized plants (like today's fossil and nuclear fuel-burning power plants) or distributed (often on-site) systems. Distributed generation is less vulnerable to disruption and benefits both urban revitalization and economic growth.⁸²

Small wind systems are well suited for rural backyards but are unlikely within New York City because of slow wind speeds, engineering risk and insurance

⁷⁸ "The Critical Needs to Examine More Carefully the Role of Liquefied Natural Gas in Meeting Future U.S. Energy Needs," Andrew Weissman, publisher, EnergyBusinessWatch.com, part 1, May 17, 2005, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1008; part 2, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1009.

⁷⁹ James Quigley, Ph.D., Center for Sustainable Energy at Bronx Community College, <http://www.csebcc.org>; "American Energy: The Renewable Path to Energy Security," Worldwatch Institute, September 2006, pp. 20, 31, <http://www.americanenergynow.org>.

⁸⁰ "Energy Revolution: A Blueprint for Solving Global Warming," GAC, Jan. 2007, <http://www.renewableenergyaccess.com/rea/news/infocus/story?id=47208>.

⁸¹ "Tackling Climate Change in the US," ASES, Jan. 2007, <http://www.ases.org/climatechange>.

⁸² "Rethinking the Grid: Distributed Generation and Urban Development, Jeff Perlman, American City, April 2005, http://www.americancity.org/article.php?id_article=117; "Energizing the Future: The Benefits of Renewable Energy for New York State, March 2005, Office of New York State Comptroller Alan Hevesi, <http://www.osc.state.ny.us/osdc/renewableenergy.pdf>.

liability.⁸³ Wind power can be generated by large wind farms upstate or offshore, where wind resources are very good but often face community opposition, skeptical local officials, uncertain federal subsidies and transmission problems.⁸⁴ In the meantime, would-be wind power users in the city can buy it through Con Ed Solutions.⁸⁵

Except for the Bronx, New York City consists of islands surrounded by water. In terms of energy, water has been used for cooling power plants instead of generating pollution-free energy. Installation of tidal turbines, essentially underwater versions of wind turbines, has begun off Roosevelt Island in the East River. The complete project would provide up to 10 megawatts, and another 40 megawatts could be installed elsewhere in the harbor.⁸⁶

Solar power is especially suitable for the city, as solar panels have no moving parts to vibrate or fall off roofs. Solar panels are most productive during peak use on hot summer days and can help stabilize a strained power grid. Professor Richard Perez of SUNY Albany has found that both New York City and New York State have very good access to sunlight.⁸⁷ According to the Bronx Community College Center for Sustainable Energy, solar photovoltaic systems are the largest potential source of renewable energy within the City. As of November, 2005 solar PV projects supplied only 0.002% of the City's power needs,⁸⁸ a study prepared for NYSERDA says that it can provide 18% of the City's needs by 2022.⁸⁹

The following government actions and incentives would stimulate the green power market to reach its potential:

- stable and consistent tax credits
- long-term power purchase agreements with renewable power producers
- access to high-voltage transmission lines

⁸³ "Small Wind Electric Systems: A New York Consumer's Guide," U.S. Dept. of Energy, February 2005, <http://www.nrel.gov/docs/fv05osti/37499.pdf>.

⁸⁴ Support Long Island Offshore Wind Power, <http://www.lioffshorewindenergy.org>.

⁸⁵ Con Ed Solutions, <http://www.conedsolutions.com/gp/default.asp>.

⁸⁶ Verdant Power, <http://www.verdantpower.com>.

⁸⁷ NY Solar Energy Industries Association, <http://nyseia.org>; "Meeting Peak Demand with Photovoltaics," R. Perez, Atmospheric Sciences Research Center, SUNY, 2001; <http://www.asrc.cestm.albany.edu/perez/peak-ny/meeting-peak-loads-with-pv.pdf>.

⁸⁸ "New York City's Solar Energy Future," The Center for Sustainable Energy at Bronx Community College, January 2006, <http://www.bcc.cuny.edu/InstitutionalDevelopment/CSE/Documents/CUNY%20MSR%20-%20Market%20for%20PV%20in%20NYC.pdf>.

⁸⁹ "Energy Efficiency and Renewable Energy Resource Development Potential in New York State: Vol. 4: Renewable Supply Technology Report," J. Plunkett, A. Shipley, D. Hill and C. Donovan (2003b), http://www.dps.state.ny.us/rps/Volume_4_Final_082803.pdf.

- expanded transmission capacity connecting producers with users
- regulatory changes mandating increased renewable power purchases by grid operators
- renewable energy purchasing requirements for City agencies and large private users⁹⁰
- government supports, incentives and tax credits to bring the price and level the playing field with heavily subsidized fossil and nuclear fuel power
- net metering to allow on-site renewable energy producers to sell surplus power back to the grid would make installation of solar PV systems on large commercial roofs profitable

New Jersey standards and practices for renewable power are widely considered the national model. A 2007 report from the Bronx Community College Center for Sustainable Energy recommends City and State policies to encourage continued growth of solar power within the City, including:⁹¹

- increased PV funding under the State Renewable Portfolio Standard
- creating a NYC-specific fund for PV system installation
- substantial incentives scheduled to decline over time
- explore bulk procurement
- explore alternative ownership and financing mechanisms
- dialog between Con Ed and system installers on technical barriers
- removing redundant or unnecessary interconnection & code requirements
- remove or raise current caps on size of PV systems
- require PV through City green building mandates

Actions recommended by New York City Apollo Alliance include:⁹²

- incentives for greater energy efficiency in City housing stock
- adopt stringent home furnace efficiency standards
- raise energy efficiency standards for City schools
- expand investment in green building and real estate development
- create a carbon tax
- improve NYSERDA outreach via decentralization and renter programs
- include sustainability standards in all State-funded development projects

⁹⁰ "Powering the Big Apple: Policy and System Factors Affecting the Deployment and Use of Renewable Power in New York City," Stephen Hammer, London School of Economics, 2004; http://www.bcc.cuny.edu/InstitutionalDevelopment/CSE/Solar_Power_oct-1.tfm; "Transatlantic Energy," Stephen Hammer, Sallan Foundation, Feb. 27, 2006; <http://www.sallan.org/newviews/archives/2006/02/000055.php>.

⁹¹ "New York City's Solar Energy Future, Part II: Solar Energy Policies and Barriers in New York City," January 2007, <http://www.csebcc.org>.

⁹² "Repowering Gotham: State Action to Build New York City's New Energy Economy," NYC Apollo Alliance, Dec. 2006, <http://www.urbanagenda.org/pdf/repoweringgotham.pdf>.

- update the State Environmental Quality Review Act (SEQRA) to include project contribution to global warming as main topic for review
- support mass transit and traffic alleviation projects in NYC
- revise electricity metering and billing to encourage efficiency and renewable energy generation
- institute smart metering and time-based rate systems
- unbundled electricity by separating utility bills from rent
- decouple utilities' financial health from amount of electricity they distribute
- expand net metering to all commercial and industrial power customers

Decentralized, renewable energy production is resilient

Greater connectivity and speed in our technological, economic and social systems has given us great benefits. The economic pressure to make things faster and cheaper leads companies to remove all slack in production and distribution. This makes systems more susceptible to sudden and catastrophic breakdown. Damage in one part of a tightly interconnected system can cascade more readily to other parts of the system.⁹³

How can we reduce the dangers? The answers will vary from system to system, but some general principles are clear. First, we need to encourage distributed and decentralized production of vital goods like energy and food. The more power we produce with solar panels on our rooftops, the less vulnerable we'll be to energy disruptions far away.

Decentralized renewable energy production also lessens the influence of foreign energy producers and industries, while creating entrepreneurial opportunities.⁹⁴

A renewable-energy economy could be a decentralized free-market paradise. Imagine a network of small power producers, ranging from the family that invests in some extra solar panels to the city that owns a fleet of wind turbines – all feeding electricity into a robust electric grid, sharing electrons with Internet-like intelligence and resilience.

⁹³ "Caught up in our own connections," Thomas Homer-Dixon, NY Times, Aug. 13, 2005; <http://www.homerdixon.com/articles/20050813-nytimes-connections.html>; *The Upside of Down*, Island Press, 2006, <http://www.homerdixon.com>.

⁹⁴ "Where is the energy for freedom?" Kelpie Wilson, Truthout, Jan. 18, 2007; http://www.truthout.org/docs_2006/011807L.shtml.

Part V: Conclusion

City government, civic and business leaders should begin planning now for future volatility in fuel price and supply. Addressing the present gap in City emergency planning with creation of an energy shortage contingency plan will address both short- and long-term goals. The preparation and public education needed to conserve energy quickly during fuel volatility events will marshal the broad public support needed to make real progress towards energy independence. These actions will also create jobs, clean the environment, lower energy costs, and confirm New York City's leadership in energy and environmental policy.

The results of the recent midterm election holds promise for generating the national leadership necessary to deal with the serious problems we are now facing. Several Congressional initiatives deal with global warming and other issues of environmental degradation, and whatever their fate, far more comprehensive action will be needed. Preparing for energy volatility at a local level may focus public demand for national action.

Appendix A

National Security Threats of Oil Dependence

Americans take it for granted that gasoline should be inexpensive and unlimited, but these conditions are not guaranteed. We now import some 13 million barrels of oil per day – over 60% of total U.S. daily consumption – at an annual cost of \$300 billion. The world demand for oil is now at nearly 86 million barrels per day, with the U.S. accounting for nearly a quarter of it and with absolute demand growth in China and the U.S. about equal.

World oil production capacity is growing slowly, barely able to meet world demand. With such a tight balance, even slight supply disruptions can trigger price spikes and shortages.

The world's energy delivery system is highly vulnerable to natural disasters and political and economic manipulation. Trouble can come from hot spots like Iran, Iraq, Saudi Arabia, and Venezuela or transit choke points such as the straits of Hormuz and Malacca. Military intervention in Iran would increase the likelihood of a blockade. Supply disruptions and terrorist attacks in "Oil Shockwave" – a crisis simulation exercise carried out by a bipartisan team of national security experts led by Senators Lugar and Lieberman – quickly drove the oil prices to over \$150 per barrel and gasoline and heating oil to over \$5 per gallon.⁹⁵ These risks were dramatized in CNN's April 2006 documentary, "We Were Warned: Tomorrow's Oil Crisis".⁹⁶

A Category 5 hurricane roars through Houston, destroying oil refineries, drilling platforms and pipelines – the complex system that provides a quarter of our nation's daily fuel supply. Three days later, terrorists attack two key oil installations in Saudi Arabia, the world's largest supplier. In the days and weeks that follow, gasoline prices hit record highs, food prices soar as trucks cannot afford to make deliveries, and Americans begin to realize that their very way of life is in peril. In *We Were Warned: Tomorrow's Oil Crisis*, CNN's Frank Sesno explores the potential ripple effects of this frightening scenario. The events depicted are hypothetical, but oil experts believe the scenario is entirely plausible. His interviews with energy experts reveal that we are nearing the point at which the

⁹⁵ Securing America's Future Energy, <http://www.secureenergy.org>; "Outcome grim at oil war game," Washington Post, June 24, 2005; <http://www.washingtonpost.com/wp-dyn/content/article/2005/06/23/AR2005062301896.html>.

⁹⁶ "We were warned: tomorrow's oil crisis," CNN, March 18, 2006, <http://transcripts.cnn.com/TRANSCRIPTS/060318/cp.01.html>; <http://www.cnn.com/2006/EDUCATION/03/14/cnnpce.we.were.warned/index.html>.

world, led by the U.S. and China, will begin to consume more oil than can be pumped from the ground and the oceans.

Similarly, the December 2005 *US News and World Report* showed that heating oil and natural gas shortages in a cold Northeastern winter could lead to blackouts, industrial shutdowns, layoffs and breakdowns in public services.⁹⁷

According to a 2006 poll by the Pew Research Center, two-thirds (67%) of the American public said that decreasing our dependence on Middle East oil is “a very important step in preventing terrorism.”⁹⁸ Calls for a massive shift towards energy conservation and renewable energy are also coming from national security advocates, corporate leaders and military analysts. like the Council on Foreign Relations,⁹⁹ Senator Richard Lugar, former Secretary of State George Schultz, former CIA Director James Woolsey (now representing the Committee on the Present Danger), FedEx CEO Frederick Smith, retired Marine Corps commandant General P.X. Kelley, and New York Times columnist Thomas Friedman. There’s even an Army Corps of Engineers report calling for all Army facilities to go green.

No one who is honestly assessing the decline of American leverage around the world due to our energy dependence can fail to see that energy is the albatross of U.S. national security.

Sen. Richard Lugar (R-Ind.)
chair of the Senate’s Foreign Relations committee¹⁰⁰

[A] single well-designed attack could send oil to well over \$100 a barrel and devastate the world’s economy. That reality, among other risks, and the fact that our current transportation infrastructure is now locked into oil, should be sufficient to convince any objective observer that oil dependence today creates serious and pressing dangers for the U.S. and other oil-consuming nations.

Former Secretary of State George Schultz

⁹⁷ “The big chill,” Marianne Lavelle, U.S. News and World Report, Dec. 19, 2005, <http://www.usnews.com/usnews/biztech/articles/051219/19energy.htm>.

⁹⁸ “Diminished public appetite for military force and mideast oil,” September 6, 2006, <http://people-press.org/reports/display.php3?ReportID=288>.

⁹⁹ “National Security Consequences of U.S. Oil Dependency,” CFR, Oct. 2006, <http://www.cfr.org/content/publications/attachments/EnergyTFR.pdf>.

¹⁰⁰ “Energy is the albatross of U.S. national security, Lugar says,” Office of Senator Lugar, March 13, 2006, <http://www.lugar.senate.gov/pressapp/record.cfm?id=252509>; “Energy Security: Issues Related to Potential Reductions in Venezuelan Oil Production,” U.S. GAO, June 27, 2006, <http://lugar.senate.gov/energy/venezuela>.

Former CIA Director James Woolsey
now representing Committee on the Present Danger¹⁰¹

Could a mere 4 percent shortfall in daily oil supply propel the price of a barrel to more than \$120 in a matter of days? That's what some oil market experts are saying, and if they're correct, we face the very real possibility of an oil shock wave that could send our economy reeling. Such a rapid rise in fuel costs would have profound effects that could severely threaten the foundation of America's economic prosperity...

Frederick Smith, CEO, FedEx
General P. X. Kelley, (ret.), former Marine Corps
commandant
co-chairs of the Energy Security Leadership Council

Other members of the Council include top executives of Domino's Pizza, Goldman Sachs, Southwest Airlines, Dow Chemical, and Waste Management¹⁰²

Sorry, but being green, focusing the nation on greater energy efficiency and conservation, is not some girlie-man issue. It is actually the most tough-minded, geo-strategic, pro-growth and patriotic thing we can do. Living green is not for sissies. Sticking with oil, and basically saying that a country that can double the speed of microchips every 18 months is somehow incapable of innovating its way to energy independence - that is for sissies, defeatists and people who are ready to see American values eroded at home and abroad...Green is the new red, white and blue.

Thomas Friedman, The New York Times¹⁰³

Foreign Policy magazine surveyed over 100 top national security experts, and found that one of the top recommendations for weakening terrorist networks was

¹⁰¹ "Oil and Security," George Schultz & James Woolsey, Committee on the Present Danger, August 5, 2005, <http://www.fightingterror.org/pdfs/O&S8-5-05.pdf>.

¹⁰² Securing America's Future Energy, http://secureenergy.org/energycouncil_members.php.

¹⁰³ "No Mullah Left Behind," Thomas Friedman, NY Times, Feb. 13, 2005, <http://www.nytimes.com/2005/02/13/opinion/13friedman.html?ex=1266037200&%2338;en=4befe6472bb26145&%2338;ei=5088&>; "The New Red, White and Blue," Thomas Friedman, The New York Times, Jan. 10, 2006, <http://www.sustainablebusiness.com/news/sbnews.cfm?id=8386>.

reducing U.S. dependence on foreign oil.¹⁰⁴ An increasing number of military analysts write about this.¹⁰⁵

Dependence on imported oil, particularly from the Middle East, has become the elephant in the foreign policy living room...we must also find a way to extricate ourselves from reliance on the Middle East and other oil-producing countries. ...The simultaneous loss of several oil-producing nations due to boycott, sabotage, or war would be an economic catastrophe.

Lt. Col. John Amidon, USAF, Aug. 2005¹⁰⁶

We must act now to develop the technology and infrastructure necessary to transition to other energy sources...Our best options for meeting future energy requirements are energy efficiency and renewable sources...Energy efficiency is the least expensive, most readily available and environmentally friendly way to stretch our current energy supplies...the potential savings for the Army is about 30 percent of current and future consumption...The Army needs to present its perspective to higher authorities and be prepared to proceed regardless of the national measures taken or not taken.

Army Corps of Engineers, Sept. 2005¹⁰⁷

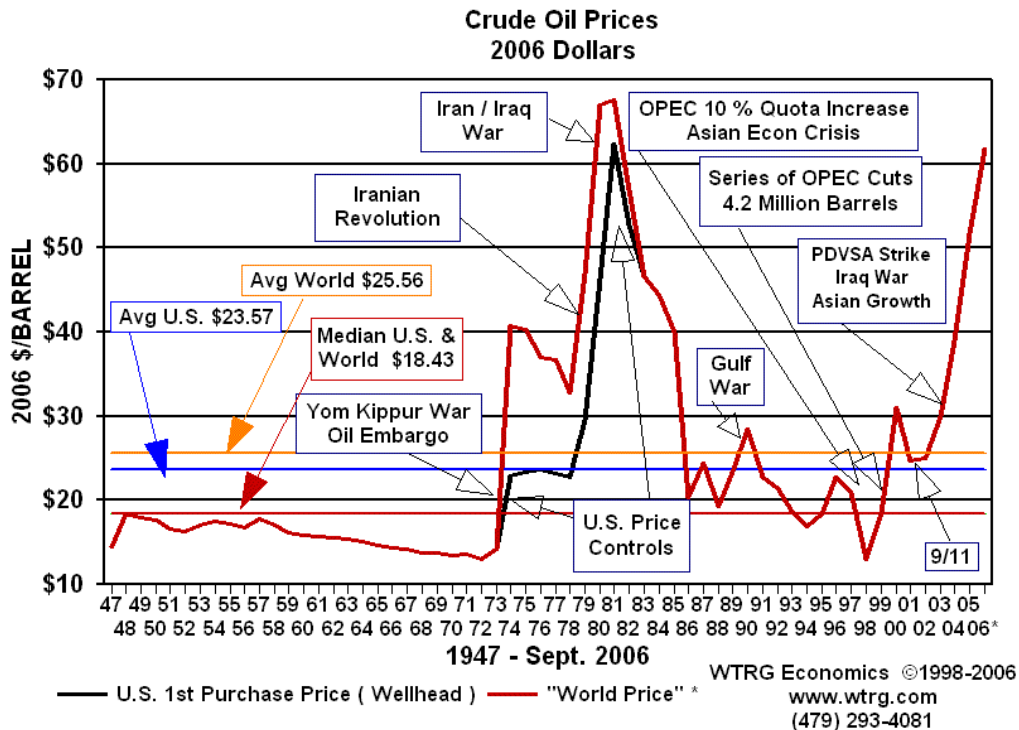
¹⁰⁴ "The Terrorism Index," Center for American Progress, June 14, 2006, <http://www.americanprogress.org/issues/2006/06/b1763037.html>.

¹⁰⁵ "Pentagon and Peak Oil: a Military Literature Review," Sohbet Karbuz, Energy Bulletin, July 13, 2006, <http://www.energybulletin.net/18056.html>.

¹⁰⁶ "America's Strategic Imperative: A Manhattan Project for Energy," John Amidon, *Joint Forces Quarterly*, issue 39, http://www.ndu.edu/inss/Press/ifa_pages/editions/i39/i39_essaywin_04.pdf.

¹⁰⁷ "Energy Trends and their Implications for U.S. Army Installations," Donald Fournier and Eileen Westervelt, U.S. Army Corps of Engineers Energy Research & Development Center, Sept. 2005, <http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=A440265&Location=U2&doc=GetTRDoc.pdf>.

Appendix B Rising Energy Demand and Oil Prices



Between 1986 and 1999 oil cost between \$15 and \$22 per barrel but in the last few years has shot up to nearly \$80, carrying the price of gasoline upwards as well.¹⁰⁸ Within months of its peak the price dropped to \$50. Many factors affect fuel prices, including high corporate profits, speculation, the growing gap between depleting supplies and growing demand, and the so-called fear premium. Because fuel prices rise and fall with fears, the relative calm of 2006 lowered prices. With the return of disruptions, prices are more likely to rise steadily, swing wildly, or spike, as they did in the 1970s.¹⁰⁹

¹⁰⁸ Average price for light sweet crude, 1965-2004, [BP Statistical Review of World Energy](http://www.bp.com/sectiongenericarticle.do?categoryId=9009495&contentId=7017954), <http://www.bp.com/sectiongenericarticle.do?categoryId=9009495&contentId=7017954>.

¹⁰⁹ "Roller coaster at the pump," New York Times editorial, October 8, 2006, http://www.nytimes.com/2006/10/08/opinion/08sun2.html?_r=2&oref=slogin; "Reading the gas pump numbers," Michael Klare, TomDispatch, September 26, 2006, <http://www.tomdispatch.com/index.mhtml?pid=124698>.

Energy demand is growing rapidly in Asia, particularly in China and India.¹¹⁰ By 2030 the International Energy Agency (IEA) predicts a 53% rise in global energy demand, with over 70% of that increase coming from developing countries.¹¹¹

Energy use in the U.S. also continues to rise. In 2005 the U.S. used 20.7 million barrels of oil a day, about three times as much as China. While Chinese demand doubled between 1995 and 2005, the increase was by 3.6 million barrels per day. At the same time, U.S. demand increased 2.9 million barrels per day.¹¹²

The U.S. Energy Information Agency (EIA) expects world demand to grow to 98 million barrels per day by 2015 and 118 million barrels per day by 2030.¹¹³ The IEA 2006 World Energy Outlook warns that continuing on this course makes countries vulnerable to supply disruptions and price shocks, while amplifying global climate change.¹¹⁴

Spare production capacity – the ability to respond to sudden demand increases by bringing idle oilfields into production – has dropped sharply. In 2002 the EIA estimated 5.5 million barrels per day of spare crude oil production; today that capacity has shrunk to 1 million barrels per day. Most of that spare capacity is in Saudi Arabia and other OPEC countries.¹¹⁵

Events in several volatile regions could trigger rapid change in the world oil market. Iran sits on the eastern flank of the Straits of Hormuz through which most Persian Gulf oil travels. Its oil minister has warned that his country will use oil as a weapon against the imposition of sanctions.¹¹⁶ The president of the Council on Foreign Relations has warned that a Western attack on Iran could drive the price of oil to well over \$100 per barrel.¹¹⁷ The Saudi ambassador to the U.S. has warned that military action against Iran would turn the whole gulf

¹¹⁰ "Rescuing a planet under stress," Lester Brown, Worldwatch Institute, July 3, 2006, <http://www.energybulletin.net/17779.html>; <http://www.worldwatch.org/node/3866>.

¹¹¹ "The World Energy Outlook 2006 Maps out a cleaner, cleverer and more competitive energy future," IEA, http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=187; <http://www.worldenergyoutlook.org/2006.asp>.

¹¹² BP Statistical Review of World Energy, June 2006, <http://www.bp.com>.

¹¹³ U.S. EIA International Energy Outlook 2006, Chapter 3, <http://www.eia.doe.gov/oiaf/ieo/pdf/oil.pdf>.

¹¹⁴ "Watchdog warns of one energy crisis after another," November 8, 2006, The Times (UK), <http://business.timesonline.co.uk/tol/business/economics/article629188.ece>.

¹¹⁵ International Monetary Fund, World Economic Outlook, September 2006, chart 1.16, http://www.imf.org/external/pubs/ft/weo/2006/02/chp1pdf/FIG1_16.pdf.

¹¹⁶ "Iran warns it may use oil as a weapon if its interests attacked," Forbes, June 25, 2006, <http://www.forbes.com/finance/feeds/afx/2006/06/25/afx2838311.html>.

¹¹⁷ "Too soon to talk of attacks against Iran, Richard Haas, Financial Times op-ed, April 11, 2006, http://www.cfr.org/publication/10428/too_soon_to_talk_of_attacks_against_iran.html.

into “an inferno of exploding fuel tanks and shut-up facilities,” and world oil prices could triple.¹¹⁸

Saudi Arabian infrastructure is vulnerable to attack by domestic militants, who are fiercely opposed to the royal family. An attack on the giant Ras Tanura loading facility, which processes half of all Saudi production – a tenth of global production – could take that oil off the market for at least 6 months.¹¹⁹

Venezuela, among the top 10 countries in total proven oil reserves, supplies about 11% of U.S. imports of oil and petroleum products and wholly owns five U.S. refineries. Most Venezuelan crude oil not used domestically is exported to the U.S. A Venezuelan oil embargo would significantly raise U.S. oil prices.¹²⁰

¹¹⁸ “Oil prices could spike, Saudi warns,” U.S. News & World Report, June 20, 2006, <http://www.usnews.com/usnews/biztech/articles/060620/20oil.htm>.

¹¹⁹ “The breaking point,” Peter Maass, New York Times, August 21, 2005, <http://www.petermaass.com/core.cfm?p=1&mag=124&magtype=1>; <http://www.energybulletin.net/8112/html>; “Terror’s next target,” Gal Luft and Ann Korin, Journal of International Security Affairs, December 2003, www.iags.org/n0111041.htm.

¹²⁰ “Issues related to potential reduction of Venezuelan oil production,” U.S. General Accounting Office, June 2006, <http://www.gao.gov/new.items/d06668.pdf>.

Appendix C

Changing National Energy Policy

The energy policy of the Bush Administration and Congressional allies focuses on expanding fossil fuel supplies and does not adequately address pollution and climate change. Examples include proposed \$100 gasoline rebate checks, and support in the Energy Bill of 2005 for drilling in fragile ecosystems as well as subsidies for the fossil fuel and nuclear industries - which are also generous campaign contributors.¹²¹ Over the last five years, U.S. energy prices and oil company profits have risen, and U.S. dependence on foreign oil has increased from 56% to 65%.¹²²

Positive action has been taken by states and cities to deal with our energy, pollution and climate change problems, including renewable portfolio standards, the Northeastern Regional Greenhouse Gas Initiative, and the U.S. Mayors Climate Protection Agreement.¹²³ The U.S. Mayor's Council Best Practices report lists several of the ways in which cities are cutting fuel use.¹²⁴ The results of the 2006 midterm elections offer hope that the national leadership necessary for success will emerge.

Some principles to guide government action

- **Supply problems or higher energy prices could erupt at any time.** Preparing short-term responses for these disruptions will help prepare for necessary long-term transitions.
- **The cheapest source of energy is efficiency.** Start by conserving energy and boosting efficiency before considering new generation.

¹²¹ "Bush energy plan whacks conservation," Christian Science Monitor, May 31, 2006, <http://www.csmonitor.com/2006/0531/p02s01-uspo.html>; "Secrets of Cheney's Energy Task Force Come to Light," Project Censored, <http://www.projectcensored.org/publications/2005/8.html>; "Report of the National Energy Policy Development Group," <http://www.whitehouse.gov/energy>; http://www.halliburtonwatch.org/about_hal/energytf.html; "Senators to push for \$100 gas rebate checks," CNN, April 27, 2006, <http://www.cnn.com/2006/POLITICS/04/27/gas.rebate>; "Oil and Gas: Long Term Contribution Trends," 2006, Center for Responsive Politics, <http://www.opensecrets.org/industries/indus.asp?Ind=E01&cycle=All>.

¹²² "Five year review of Bush energy policy," May 16, 2006, U.S. House of Representatives Committee on Government Reform, <http://www.democrats.reform.house.gov/story.asp?ID=1055&Issue=Energy+Policy>.

¹²³ "Democratic Energy – Renewable Portfolio Standards," The New Rules Project, <http://www.newrules.org/electricity/rps.html>; Regional Greenhouse Gas Initiative, <http://www.rggi.org>; ICLEI USA, <http://www.iclei.org/index.php?id=391>; <http://www.kyotousa.org>; <http://www.seattle.gov/mayor/climate>.

¹²⁴ "Energy & Environment Best Practices," U.S. Council of Mayors, May 2006, http://usmayors.org/uscm/best_practices/EnergySummitBP06.pdf.

- **Invest in solutions that are sensible and safe, and address energy security and global warming simultaneously.** Making up for imported fuels with coal or alternative liquid fuels made from coal, oil shale or tar sands will worsen global warming. Carbon sequestration technology is still experimental. Building more nuclear reactors multiplies security risks and long-term radioactive waste. If we “use renewably generated electricity efficiently,” we get the whole package.¹²⁵
- **Centralized systems are vulnerable to disruption and terrorism. Decentralized systems are resilient.**
- **Invest in energy production with a good net gain.** Investment should be made in new energy sources and technologies with a positive energy return on investment, including capital and environmental costs.¹²⁶ Poorly chosen investments could waste billions of dollars and cause trillions of dollars in climate change destruction.
- **Neither legislative standards nor market economics alone are adequate.** Market economics does not account for hidden costs of oil dependence. New technologies and power sources that are not immediately cost-competitive with oil may not get the investments they need to grow quickly. The federal government traditionally provides funds for research into new technologies, but even now nuclear and fossil fuel power account for most of the energy research budget. We need legislation that leverages the financial power of markets, plus incentives and taxes that reward energy-saving actions.
- **Necessary responses will take time and money – lots of it.** Scaling up other sources of energy will require political, financial and public support. Building the infrastructure will take decades. There may be energy shortages in the meantime.
- **Pragmatic responses may be unpopular.** President Carter responded to the oil shocks of the 1970s by starting the strategic petroleum reserve, incubating the ethanol and solar power industries, promoting fuel efficiency standards for cars, encouraging people to turn down their thermostats, encouraging energy efficiency developments, and pledging to stop growth of oil imports. Many conservation initiatives were reversed in the 1980s.¹²⁷

¹²⁵ “Unified Green Field Theory,” Dave Roberts, January 11, 2007, http://www.tompaine.com/articles/2007/01/11/unified_green_field_theory.php.

¹²⁶ “World Energy Modeling,” Dick Lawrence, ASPO-USA, October 2006, http://www.aspo-usa.com/fall2006/presentations/pdf/Lawrence_D_Boston_2006.pdf.

¹²⁷ “Carter Tried to Stop Bush’s Energy Disasters – 28 Years Ago,” Thom Hartman, Common Dreams, May 3, 2005, <http://www.commondreams.org/views05/0503-22.htm>.

- **Changing systems is more efficient than changing individual vehicles.** The greatest oil savings will not come from improving the efficiency of individual cars but from making our transportation system itself more efficient. Investing in mass transit will save energy and money; building new highways to serve sprawling suburbs will waste vital resources, even if everyone drives Priuses.
- **Reduce the need for transportation.** Local production and transit-oriented development will reduce the use of energy for transportation.¹²⁸
- **Cooperate with other nations to produce a steady, dependable, gradual, and fair reduction in fuel use.** The Oil Depletion Protocol would enable nations to cooperatively reduce their oil dependence in an orderly manner. Each year participating nations would reduce oil imports and exports by about 2.6 percent.¹²⁹

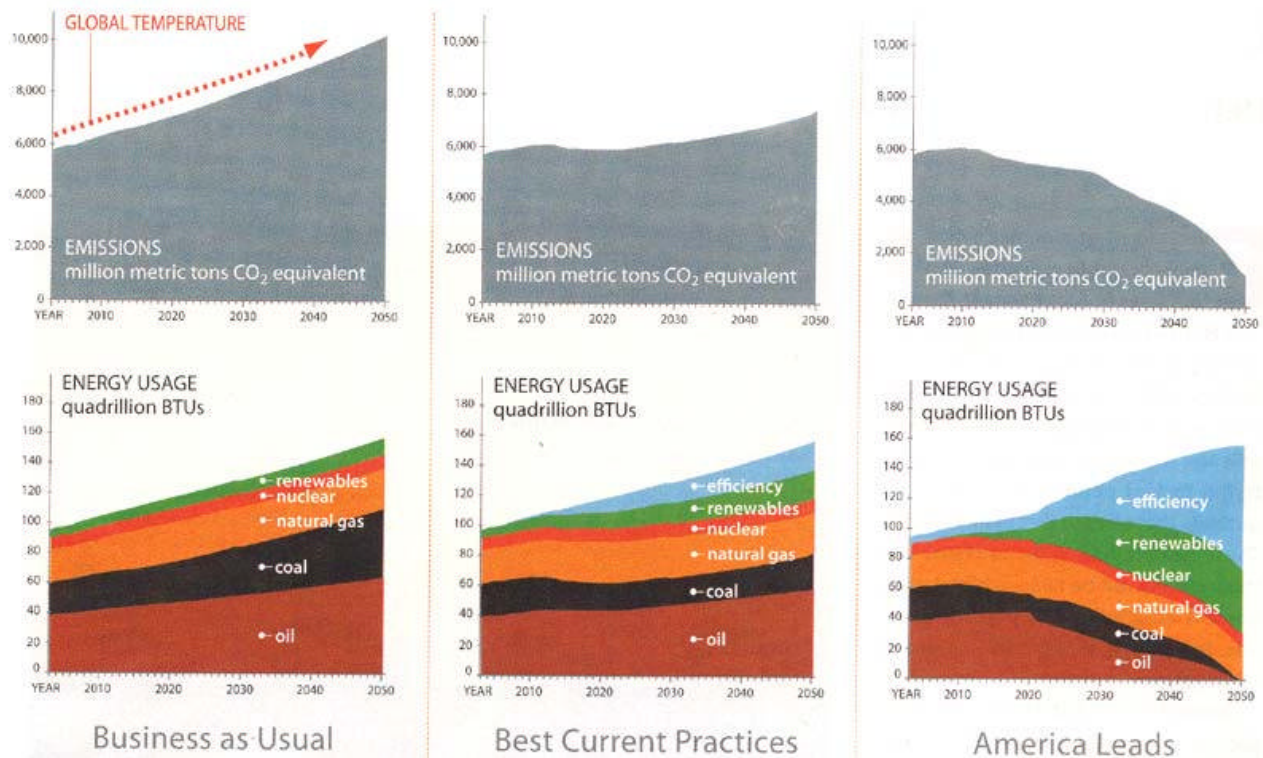
Standards are inadequate to transform national energy use. Concrete incentives and tax reforms are required. These include:¹³⁰

- time-of-day meters which charge more for electricity at peak times
- unbundling electricity from rent charges
- higher fees for driving and parking
- doubling the nickel deposit on beverage containers
- charging for plastic bags
- taxing carbon

¹²⁸ The Post Carbon Institute, <http://www.postcarbon.org>.

¹²⁹ Richard Heinberg, *The Oil Depletion Protocol*, New Society Publishers, 2006, <http://www.oildepletionprotocol.org>.

¹³⁰ Carbon Tax Center, <http://www.carbontax.org>; "Fuel Tax Magic," June 24, 2006, Gristmill, <http://www.energybulletin.net/17574.html>; "To Move Mountains, Fix Markets: an Economist's Prescription for a Sustainable NYC," Sept. 2006, <http://www.sallan.org/newviews/archives/2006/09/000159.php>.



Three energy futures, Sierra Club¹³¹

Current Congressional global warming bills

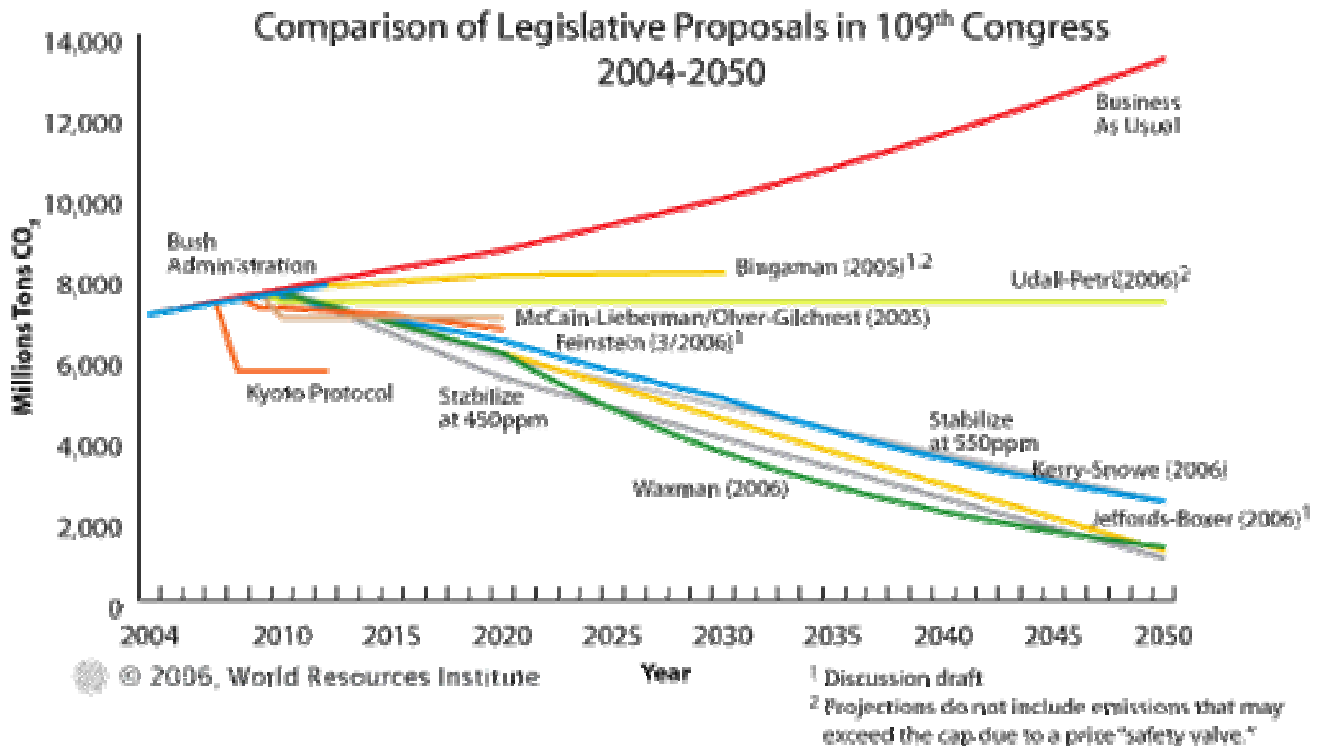
Congressional efforts to roll back tax giveaways to big oil companies are a step in the right direction.¹³² The new interest in global warming bills is also welcome, but there are big differences in how effective the proposed bills could be. Looking at the goal of stabilizing atmospheric carbon emissions at levels that avoid permanent climate destruction, a World Resources Institute analysis found that the Jeffords-Boxer, Waxman, and Kerry-Snow bills would be helpful, while the McCain-Lieberman, Udall-Petri and Bingaman bills merely avoided the massive carbon increases of a business-as-usual approach.¹³³

¹³¹ "Three Energy Futures," Sierra Club, http://www.sierraclub.org/sierra/200701/images/the_fix_charts2.jpg.

¹³² "House rolls back big oil subsidies," website of Speaker Nancy Pelosi, <http://www.speaker.gov/legislation?id=0009>.

¹³³ "Global warming legislation in the 109th Congress," World Resources Institute, November 2006, http://www.wri.org/newsroom/topic_content.cfm?cid=4182; "How Low Should We Go? A Legislative Guide for Reducing Global Warming Pollution," Natural Resources Defense Council, December 2006, http://www.nrdc.org/legislation/factsheets/leg_061218.pdf.

The Global Warming Pollution Reduction Act, introduced in 2006 by now-retired Vermont Senator James Jeffords has been reintroduced by new Vermont Senator Bernie Sanders. The legislation would reduce greenhouse gas emissions to 1990 levels by 2020 and 80% further by 2050. To reach those goals, the bill would mandate reductions in greenhouse gas emissions through strict standards for electric power plants and vehicles, conservation and new, cleaner energy technologies.¹³⁴ It is endorsed by many environmental groups. While it should be passed, we need to do even more.



The Energize America 2020 Plan

Congressman Roscoe Bartlett (R-MD), a conservative Republican and former research scientist, calls for a national effort to reduce energy dependence, an effort equivalent to World War II's Manhattan Project.¹³⁵ Perhaps the closest thing to such a national plan is *Energize America 2020*, a suite of proposed Federal acts collaboratively built by thousands of experts and citizen activists at

¹³⁴ Website of Senator Sanders, <http://www.sanders.senate.gov/files/global-warm-release.cfm>.

¹³⁵ Congressman Roscoe Bartlett, Legal Times, June 12, 2006, <http://www.bartlett.house.gov/UploadedFiles/Legal%20Times%206-12-06.pdf>; <http://www.bartlett.house.gov/Issues/Issue/?IssueID=2033>.

the Daily Kos website, an online political community with roughly 500,000 daily visitors. The plan's twenty proposed Federal acts aspire by 2020 to:¹³⁶

- provide the U.S. with energy security
- reduce oil imports and greenhouse gas emissions by 50%
- generate 25% of U.S. electricity from renewable sources
- create 2 million new energy-related American jobs
- save 1 million at-risk auto jobs.

The plan addresses:

- passenger vehicle fuel efficiency
- transportation industry efficiency
- vehicle fleet conversion
- restoration of passenger rail
- wind energy production tax credits
- solar roofs
- renewable portfolio standards
- net metering
- home energy efficiency

The plan also proposes:¹³⁷

- market-based frameworks for evaluating proposed initiatives in nuclear power, biofuels and coal
- public-private partnerships to research, develop and commercialize energy efficiency and renewable energy
- level playing field for efficiency and renewables against heavily subsidized nuclear and fossil fuel industries

¹³⁶ Energize America website, <http://www.ea2020.org/>; May 18, 2006 report, http://www.ea2020.org/drupal/files/060518_EA_2020_v5_FINAL.pdf.

¹³⁷ While the NYC Sierra Club does support this report, the Sierra Club does not necessarily endorse every proposal in the Energize America report.

Appendix D Global Warming

Coal, oil and natural gas were formed over millions of years by heating and compressing organic materials. Burning these fuels releases their stored carbon as carbon dioxide, a greenhouse gas which traps heat in the atmosphere. Since the start of the Industrial Revolution, atmospheric concentrations of carbon dioxide have risen sharply. Antarctic ice cores of the past 900,000 years show that current carbon dioxide and methane concentrations are 30% and 130% higher, respectively, and the rate of increase 200 times higher than previously recorded.¹³⁸ Hundreds of scientists collaborating on the UN's Intergovernmental Panel on Climate Change have concluded that humans are responsible for climate change and its effects will be increasingly severe.¹³⁹

Climate change will cause more variable, erratic and violent weather, including more and stronger hurricanes, such as the record 28 tropical storms and Atlantic hurricanes of 2005, including 3 Category 5 hurricanes. The damage to Gulf Coast oil and natural gas infrastructure will likely be repeated.¹⁴⁰

Debate now centers on when a tipping point of irreparable harm will be reached and how deeply carbon emissions need to be cut. Carbon dioxide emissions are currently increasing 2% annually; best estimates are that stabilizing atmospheric carbon 100 years from now requires cuts of 60-80%, a goal within reach if an angry, informed public demands action.¹⁴¹ Currently only about 20% of the U.S.

¹³⁸ "Surface Temperature Reconstructions for the Last 2,000 Years," <http://www8.nationalacademics.org/onpinews/newsitem.aspx?RecordID=11676>; "CO₂ 'Highest for 650,000 Years,'" BBC, November 24, 2005, <http://news.bbc.co.uk/1/hi/sci/tech/4467420.stm>.

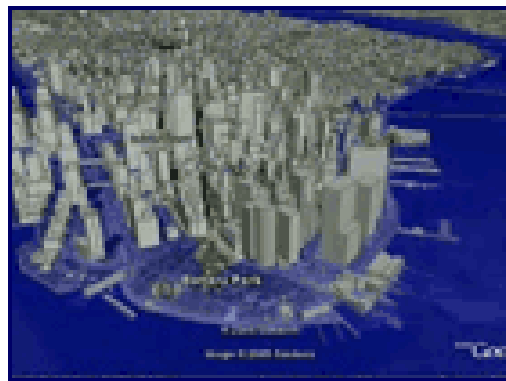
¹³⁹ <http://www.ipcc.ch/>; http://news.yahoo.com/s/nm/20070201/sc_nm/globalwarming_dc.

¹⁴⁰ "Global warming surpassed natural cycles in fueling 2005 hurricane season," National Center for Atmospheric Research, June 24, 2006, <http://www.yubanet.com/cgi-bin/artman/exec/view.cgi/21/37949>; "Global warming, not just heat wave," InterPress Service, July 21, 2006, <http://www.commondreams.org/headlines06/0721-06.htm>.

¹⁴¹ "Debate on climate shifts to issue of irreparable damage," Washington Post, January 29, 2006, <http://www.washingtonpost.com/wp-dyn/content/article/2006/01/28/AR2006012801021.html>; "It's not too late," op-ed, James Hansen, International Herald Tribune, December 13, 2005, <http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=5888&method=full>; "Global warming approaching point of no return," The Independent, January 23, 2005, <http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=5056&method=full>; The Intergovernmental Panel on Climate Change, <http://www.ipcc.ch>; "Undersea gas could speed global warming," Reuters UK, July 20, 2006, http://today.reuters.co.uk/news/newsArticle.aspx?type=scienceNews&storyID=2006-07-20%192850Z_01_N19270382_RDRIDST_0_SCIENCE-ENVIRONMENT-METHANE-SEAS-DC.XML&archived=False; "Warming hits tipping point," The Guardian, August 11, 2005, <http://www.guardian.co.uk/climatechange/story/0,12374,1546824,00.html>; "The Threat to the Planet: Actions Required to Avert Dangerous Climate Change," James Hansen, July 10, 2006, p. 44, http://sallan.org/pdf-docs/Hansen-SOLAR_2006.pdf.

and Chinese population worries a great deal about global warming, even through Wal-Mart, Rupert Murdoch and Goldman Sachs take it very seriously.¹⁴² Increased media coverage will help us move toward the necessary combination of multiple efforts, including efficiency, renewable and sustainable energy, and carbon sequestration.¹⁴³

Failure to act does not bode well for humans. Rising sea levels, flooding, violent storms and droughts could displace hundreds of millions of people and annually cost between 5 and 20% of global gross domestic product.¹⁴⁴ New York City, which is mostly islands, is vulnerable to storm surges from more violent and more frequent storms and hurricanes and to flooding from rising sea levels as glaciers melt. The projected flooding in New York City, Miami, Boston and Washington, D.C. has been vividly portrayed online and in Al Gore's "An Inconvenient Truth."¹⁴⁵



¹⁴² "Wal-Mart Sustainability Meeting Focuses on Climate Change, Supply Chain, July 17, 2006, http://www.greenbiz.com/news/news_third.cfm?NewsID=33279; Pew Global Attitudes Project, June 13, 2006, <http://www.pewresearch.org/reports/?ReportID=27>; "Sustainability: green sky thinking," Brand Republic, July 14, 2006, <http://www.brandrepublic.com/bulletins/breakingnews/article/569819/sustainability-greensky-thinking>; "Goldman Sachs Environmental Policy Framework," http://www2.goldmansachs.com/our_firm/our_culture/corporate_citizenship/environmental_policy_framework/docs/EnvironmentalPolicyFramework.pdf.

¹⁴³ Sierra Club Cool Cities campaign, <http://www.sierraclub.org/globalwarming>; "Winning the Oil Endgame," Lovins et al., Rocky Mountain Institute, <http://www.oilendgame.com>; "Plan B: Rescuing a Planet under Stress and a Civilization in Trouble," Lester Brown, Earth Policy Institute, 2003, http://www.earth-policy.org/Books/PlanB_contents.htm; "Stabilization wedges," Jamais Cascio, December 14, 2005, <http://www.worldchanging.com/archives/003861.html>.

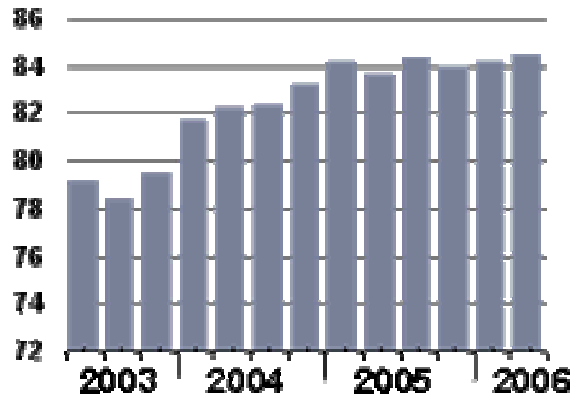
¹⁴⁴ "UK Report: Warming Will Damage Economy," October 30, 2006, Washington Post, <http://www.washingtonpost.com/wp-dyn/content/article/2006/10/30/AR2006103000361.html>; "Stern Review Report on the Economics of Climate Change," October 2006, http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

¹⁴⁵ "Climate Change Information Resources, New York Metropolitan Region," March 2005, Columbia University, <http://ccir.ciesin.columbia.edu/nyc/index.html>; National Environmental Trust, http://www.net.org/globalwarming/sea_level; "An Inconvenient Truth," <http://www.climatecrisis.net>.

Appendix E

Fuel Depletion and Volatility

Fossil fuels are limited natural resources, and we are encountering their limits. We will soon be moving from 150 years during which the oil supply increased every year, to a future in which the oil supply decreases every year. While there is controversy as to when this will occur, there is no dispute that it will be sometime within the next 30 years.¹⁴⁶



Growing demand is outpacing supply, which has been flat since 2005 at 86 million barrels per day.¹⁴⁷

[T]he era of easy oil is over ... many 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, even politically.¹⁴⁸

For example, the much-touted Jack No. 2 oil field in the Mexican Gulf lies 28,000 feet below the seabed, itself under 7,000 feet of water.¹⁴⁹

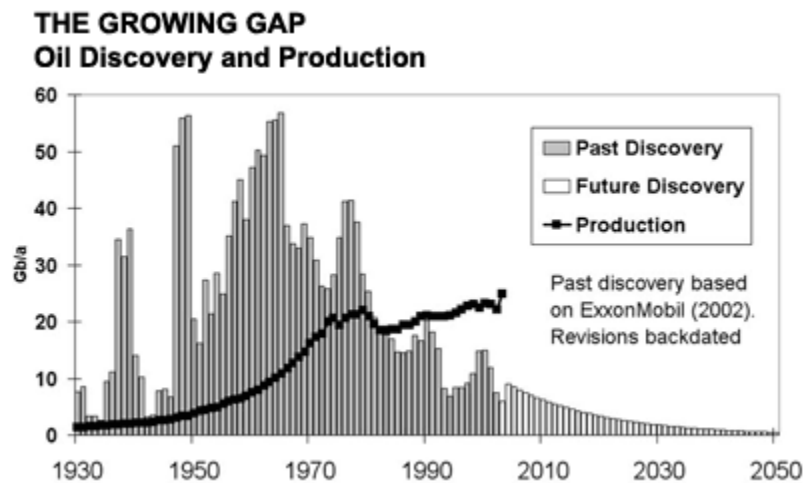
¹⁴⁶ "The Debate over Hubbert's Peak: A Review," Moujahed Al-Husseini, GeoArabia, vol. 11, no. 2, 2006, Gulf PetroLink, Bahrain, p. 22, http://www.gulfpetrolink.net/Peak_AlHusseini.pdf; The Association for the Study of Peak Oil, <http://www.peakoil.net>, <http://www.aspousa.org>; "Long Term World Oil Supply Scenarios," U.S. DOE Energy Information Agency, August 18, 2004, http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/worldoilsupply/oilsupply04.html; "Megaprojects Analysis Explained," Chris Skrebowski, June 2006, http://www.odac-info.org/bulletin/documents/megaprojects_explained.htm; <http://www.odac-info.org/PeakOilUKConferenceProceedings.htm#Chris>; <http://transitionculture.org/?p=416>.

¹⁴⁷ International Energy Agency Oil Market Report, <http://omrpublic.iea.org>.

¹⁴⁸ Chevron Oil Company, <http://www.willyoujoinus.com/vision>.

¹⁴⁹ "Hyping Jack No. 2," Tom Whipple, Falls Church News-Press, September 14, 2006, <http://www.energybulletin.net/20469.html>.

As Exxon Mobil data depicts, new oil discoveries worldwide peaked in the 1960s, making it extremely unlikely that large new discoveries will change the situation. New oil production – both to meet new demand and to make up for decline in existing fields – will have to come from new wells being drilled and enhanced oil recovery in existing fields.



Forecasts of rising world oil production from the U.S. Energy Information Agency and International Energy Agency are premised on the ability of Saudi Arabia, the world's leading oil producer, to continue raising its output. However there are indications that Saudi oil production is beginning to decline.¹⁵⁰ EIA, IEA and OPEC data suggests that Saudi production fell 8% in 2006.¹⁵¹

When half the oil in a field has been removed, the remaining oil becomes more difficult and expensive to extract and requires more refining, which raises the price. In these mature fields, water or natural gas is injected underground to increase pressure; steam may also be injected underground to melt stranded oil.¹⁵² Some of the measures used may increase short-term production but decrease the total amount of oil recovered.

The history of U.S. oil production is instructive. Commercial oil extraction began in 1859, and discovery of new oil fields peaked in the 1930s. For a long time, the U.S. not only produced all the oil it needed but was a leading oil exporter as well.

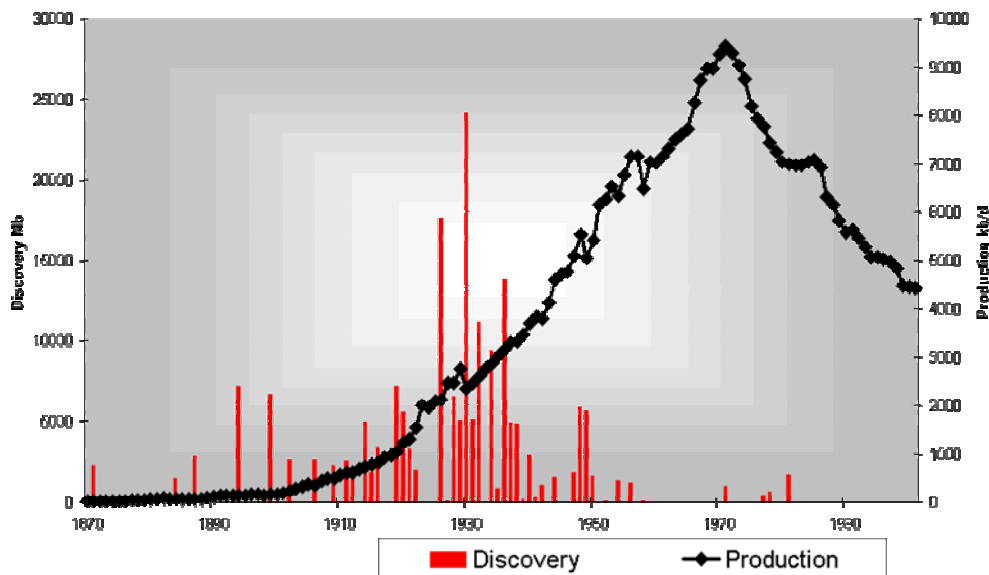
¹⁵⁰ "The Energy Crisis Has Arrived," Matthew Simmons, presentation to U.S. Department of Defense, June 20, 2006, <http://www.simmonsco-intl.com/files/Energy%20Conversation.pdf>; "The Breaking Point," Peter Maass, The New York Times, August 21, 2005, <http://www.petermaass.com/core.cfm?p=1&mag=124&magtype=1>; <http://www.energybulletin.net/8112.html>.

¹⁵¹ "Saudi Arabian oil declines 8% in 2006," Stuart Staniford, The Oil Drum, March 2, 2007; <http://www.theoil drum.com/node/2325>

¹⁵² "Saudi Arabia tests potential for unlocking heavy-oil reserves," July 10, 2006, Wall Street Journal, <http://www.post-gazette.com/pg/06191/704785-28.stm>.

Domestic production grew steadily until it peaked in 1970. Since then, U.S. production has declined.¹⁵³ Today we produce one-third of the oil we consume.

US-48



Worldwide oil discoveries peaked in the 1960s. Production is in decline in 33 of the 48 largest oil-producing countries, including Chad, New Guinea, Cameroon, Congo, Syria, Peru, Oman, Egypt, Colombia, Norway, Gabon, Tunisia, Yemen, New Zealand, Argentina, Pakistan, Denmark, Mexico, The United Kingdom, and Australia.¹⁵⁴ Oil production from all countries outside the former Soviet Union and OPEC remains flat, as new production has not been enough to offset annual declines of 4-7%.¹⁵⁵

The U.S. Energy Information Agency predicts that world oil production will peak in 2037 followed by a permanent decline.¹⁵⁶ Long term world oil production forecasts vary based on geological estimates of the total amount of the world's ultimately recoverable oil reserves. Estimates fall into one of three positions: around 2, 3 or 4 trillion barrels. By 2005, the world had consumed about 1 trillion barrels, with proven reserves reported to be another 1.2 trillion barrels. Analysts at the U.S. Geological Survey generously expect world reserves and oil recovery

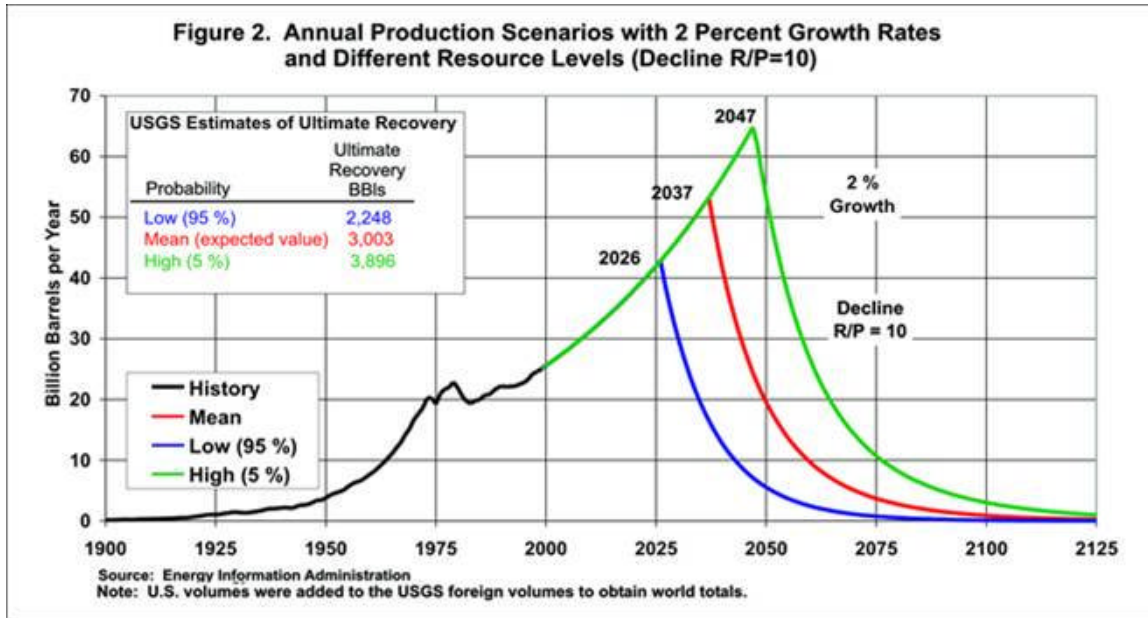
¹⁵³ U.S. EIA, http://www.eia.doe.gov/emeu/aer/pdf/pages/sec5_6.pdf; graph from presentation by Richard Heinberg.

¹⁵⁴ Chevron, <http://www.willyoujoinus.com/issues/alternatives/?s=section3>.

¹⁵⁵ "Recent Trends in Exploration Results and the Implications for Future Liquid Petroleum Supply," pp. 8, 9, 15, Michael Rodgers, PFC Energy, October 26, 2006, ASPO-USA Conference, http://www.aspo-usa.com/fall2006/presentations/pdf/Rodgers_M_Boston_2006.pdf.

¹⁵⁶ "Long Term World Oil Supply Scenarios," U.S. Energy Information Agency, Aug. 2004; www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/worldoilsupply/oilsupply04.html.

rates to increase, so they add speculative reserves to their calculations for a total of around 3 billion barrels. The Association for the Study of Peak Oil and Natural Gas (ASPO), an international group of petroleum geologists and other scientists, dismiss EIA projections based on USGS data, as overly optimistic.¹⁵⁷



Also, there is doubt of OPEC claimed reserves. In 1985, several OPEC nations sharply increased their claimed proven reserves, which enabled them to increase their production quotas. Their claimed reserves have not diminished over time despite years of production, but country records are not open to external audits.

ASPO predicts peak in 2010.¹⁵⁸ ASPO-USA forecasts a peak between now and 2015, depending on a growing number of geopolitical and other non-geologic factors.¹⁵⁹ A U.S. Government Accountability Office report on peak oil is set for release in spring 2007. Many experts it surveyed believe that conventional oil supplies have already peaked.¹⁶⁰ Depletion also affects natural gas.

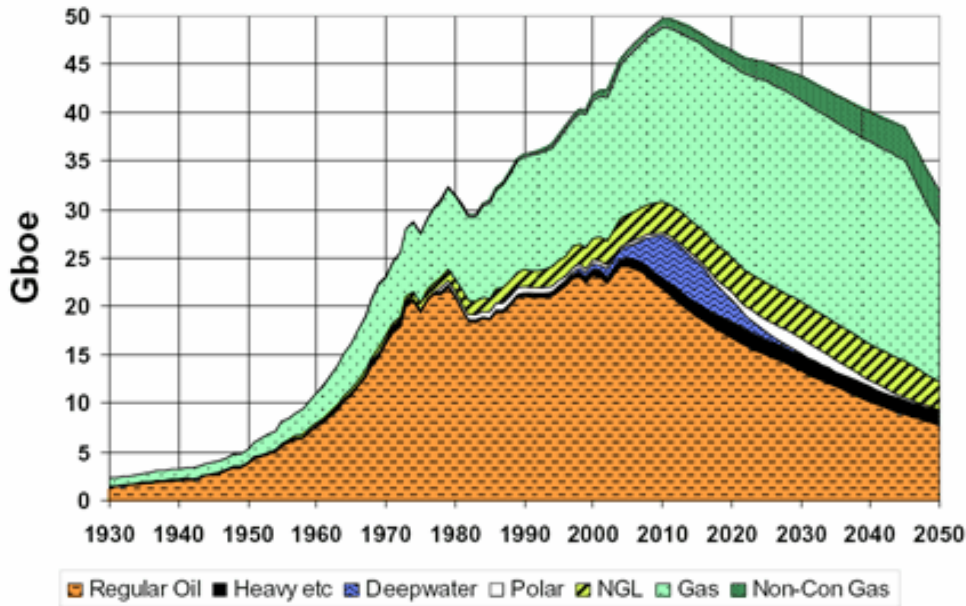
¹⁵⁷ "The Debate over Hubbert's Peak: a Review" by Moujahed Al-Husseini, GeoArabia, vol. 11, no. 2, 2006, Gulf PetroLink, Bahrain, p.22, http://www.gulfpetrolink.net/Peak_AlHusseini.pdf

¹⁵⁸ The Association for the Study of Peak Oil ; <http://www.peakoil.net>.

¹⁵⁹ http://www.odac-info.org/bulletin/documents/megaprojects_explained.htm;
<http://www.odac-info.org/PeakOilUKConferenceProceedings.htm#Chris>; ASPO-USA,
<http://www.aspousa.org>; <http://transitionculture.org/?p=416>.

¹⁶⁰ "Congressman says U.S. report points to arrival of peak oil," Platts, Feb. 28, 2007;
<http://www.platts.com/Oil/News/6360268.xml>

**ASPO: OIL & GAS PRODUCTION PROFILES
2005 Base Case**



The Hirsch report, commissioned by the U.S. Department of Energy, details how rising fuel prices expected to follow peak production will affect the economy, and recommends Federal responses. The lead author is the former director of the U.S. nuclear fusion program.¹⁶¹

The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking.

Numerous news sources have reported on the peaking of the world's oil supplies:

¹⁶¹ Dr. Robert Hirsch, biographical notes, http://www.d-n-i.net/fcs/hirsch_bio.htm; "Peaking of World Oil Production: Impacts, Mitigation, & Risk Management," Hirsch et al., Science Applications International Corporation (SAIC), February 2005, http://www.mnforsustain.org/oil_peaking_of_world_oil_production_study_hirsch.htm; http://www.bartlett.house.gov/UploadedFiles/the_hirsch_report.pdf.

- *The New York Times*, February 28, 2006, editorial: "The end of oil"¹⁶²
- *New York Newsday*, April 22, 2006, editorial¹⁶³
- *ABC News Australia*, July 10, 2006, documentary: "Peak Oil?"¹⁶⁴
- *Chicago Tribune*, July 29, 2006: "A Tank of Gas, a World of Trouble"¹⁶⁵
- *Bloomberg.com*, August 31, 2006: "Peak Oil Forecasters Win Converts on Wall Street to \$200 Crude"¹⁶⁶
- Oil industry analysts PFC Energy, Groppe Long & Litell, and Petrie Parkman & Co.
- Oil industry entrepreneur T. Boone Pickens
- Financial analyst Jeffrey Rubin (chief economist for CIBC World Markets)
- Mayor John Hickenlooper of Denver
- Billionaire investor Richard Rainwater of Texas
- Former President Bill Clinton and Vice-President Al Gore¹⁶⁷

News about fuel depletion is archived online at Energy Bulletin.¹⁶⁸

¹⁶² "The end of oil," Robert Semple, Jr., *The New York Times*, February 28, 2006, <http://www.energybulletin.net/13368.html>.

¹⁶³ *Newsday* editorial, April 22, 2006, <http://www.energybulletin.net/15279.html>.

¹⁶⁴ "Peak Oil?" Four Corners, *ABC News Australia*, July 10, 2006, <http://www.abc.com.au/4corners/content/2006/s1680717.htm>.

¹⁶⁵ "A Tank of Gas, a World of Trouble," *Chicago Tribune*, July 29, 2006, http://www.chicagotribune.com/news/specials/chi-oilsafari2-htmlstory_0,3163462.special.

¹⁶⁶ "Peak Oil Forecasters Win Converts on Wall Street to \$200 Crude," *Bloomberg.com*, August 31, 2006, <http://www.bloomberg.com/apps/news?pid=20601109&sid=arur.i7moHMs&refer=news>.

¹⁶⁷ "Commentary: Prominent CERA official – 'Peak Oil theory is garbage'," Steve Andrews, September 11, 2006, http://www.aspo-usa.com/index.php?option=com_content&task=view&id=49&Itemid=9.

¹⁶⁸ *Energy Bulletin*, <http://www.energybulletin.net>.

Appendix F

Energy Shortage Contingency Plan

Int. No. 374 (introduced in 2004)

By the Speaker (Council Member Miller) and Council Members Gennaro, Addabbo, Baez, Brewer, Clarke, Fidler, Foster, Gentile, Gerson, James, Koppell, Liu, Lopez, Martinez, McMahon, Monserrate, Nelson, Palma, Quinn, Recchia, Reed, Sanders, Stewart, Vann, Weprin and Jackson

Title

A Local Law to amend the New York city charter, in relation to creating an energy shortage contingency plan.

Body

Be it enacted by the Council as follows:

Section 1. Chapter 1 of the New York City charter, is amended by adding thereto a new § 20 to read as follows:

§20. Energy shortage contingency plan. a. On or before January 1, 2005, the Mayor shall assess the energy needs of the City and prepare and implement a contingency plan specifying actions to be taken to prevent shortages and to respond to shortages of energy to protect public health, safety, and welfare. This plan shall include, but not be limited to, the following: (1) energy emergency response stages and corresponding guidelines regarding the declaration of each stage; (2) a communications structure by which information regarding energy emergencies and energy emergency response stages is shared with the public; (3) conservation strategies to reduce energy usage by city agencies and the private sector; (4) rules concerning energy usage and appropriate methods for enforcing such rules for each of the energy emergency response stages; and (5) coordination with appropriate state and city entities, such as the New York State Independent System Operator, the Public Service Commission, the New York State Energy Research and Development Authority, the Department of Small Business Services, the Department of Environmental Protection and the Economic Development Corporation. This plan shall be submitted to the Speaker of the Council, the Public Advocate and the Comptroller immediately upon its completion.

b. The Mayor shall review the plan required by subdivision a of this section no later than January 1, 2008, and no less often than every three years thereafter, at which times the Mayor shall revise such plan, as appropriate. Any such revision shall be completed within four months of any review undertaken in accordance with this subdivision.

c. Immediately upon completion of each review undertaken pursuant to subdivision b of this section, the Mayor shall submit to the Speaker of the Council, the Public Advocate and the Comptroller a revised plan and a letter explaining why revisions were made and determined to be necessary, except that if the plan has not been revised, the Mayor shall submit a letter to that effect to the Speaker of the Council, the Public Advocate and the Comptroller, which shall include an explanation of why no revisions were made.

§2. This local law shall take effect immediately.