Solutions to Peak Oil Vulnerabilities:

A Response Plan for Lawrence, Kansas

The Lawrence Mayor's Peak Oil Task Force

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SITUATION ANALYSIS

Peak oil does not mean the end of oil, but the end of cheap oil. Peak oil will have a costly inflationary effect on all aspects of our industrial society, including portable liquid fuels, agriculture (including planting, fertilizing, and harvesting), oil-dependent delivery of other energy sources, asphalt pavement, plastics, hydraulics and lubrication, and building materials.

In 2006, the United States Department of Energy (DOE) defined "peak oil" as "the theory that the world's oil production rate will reach a maximum and then decline." In an accompanying report, the DOE quoted petroleum geologist Colin J. Campbell and petroleum engineer Jean H. Laherrere, who concluded that "[t]he world is not running out of oil--at least not yet. What our society does face, and soon, is the end of the abundant and cheap oil on which all industrial nations depend."¹

In 2007, the U.S. Government Accountability Office studied 21 separate peak oil analyses from sources as diverse as the International Energy Agency, Volvo, the United States Department of Energy, *Oil & Gas Journal*, Merrill Lynch, Germany's Federal Institute for Geosciences and Natural Resources, and Shell Oil. The GAO concluded, "Most studies estimate that oil production will peak sometime between now (2007) and 2040." The GAO report included these sources and predictions:²

<u>Source</u>	Prediction
 Geological Society of America 	Before 2010
• Oil & Gas Journal	Before 2010
Merrill Lynch	Before 2020
• Volvo	Before 2020
 Federal Institute for Geosciences 	
and Natural Resources (Germany)	Before 2030
 International Energy Agency 	Before 2040
• U.S. Department of Energy	Before 2050
• Shell Oil	Before 2050

The GAO report shows expert consensus that peak oil is a matter of when, not if. Even in describing the extensive oil shale deposits in the western United States, the RAND Corporation has concluded that volatile worldwide prices for crude oil, combined with environmental concerns, will continue to inhibit the development of those deposits.³

¹ U.S. Department of Energy, "Peak Oil: The Tipping Point," 2006, <u>http://fossil.energy.gov/programs/reserves/npr/npr_oil_shale_program.html</u>.

² "Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production," February 2007, <u>www.gao.gov/new.items/d07283.pdf</u>. The most pessimistic estimate was from *World Oil* magazine (2000-2010); the most optimistic was from France's *Ministére de l'Economie Des Finances et de l'Industrie* (2010-2130).

³ "As with many commodities, crude oil prices are highly volatile. To hedge against the possibility of downward price movements, investments in projects with high capital costs, such as oil shale development, tend to be deferred until a sufficient safety cushion builds up between anticipated production costs and what the market is willing to pay. An added degree of uncertainty is associated with the potential response of OPEC nations to various market and technical developments.... The two currently constraining problems are high oil shale

Peak oil also means that as global demand continues to rise, extraction cannot keep pace. In 2010, the International Energy Agency (IEA) revised its earlier estimate, concluding that worldwide crude oil production would never again reach the 2006 peak of 70 million barrels per day. The following IEA chart depicts declining supplies of crude oil from current fields and known fields yet to be developed. It further indicates that new oil sources from fields yet to be discovered and from unconventional sources may not equal those declining supplies; the upward trend in the chart comes only from natural gas liquids and "unconventional" oil sources (such as tar sands).⁴



Projections of the world's liquid energy sources to 2035.

Predicted irregularities of demand and extraction rates may well sustain a volatile price cycle. In 2011, the U.S. Congressional Research Service listed other variables that could cause unstable oil prices, including "international politics, war, changing economic patterns, and structural changes within the energy industry...."⁵ Earlier, in 2010, the Congressional Research Service reported that price volatility already had prompted oil companies to close refineries, thus further

production costs and uncertainties in future crude oil prices. The longer-term constraints involve resource access and water availability." James T. Bartis, Tom LaTourrette, Lloyd Dixon, D.J. Peterson, Gary Cecchine, "Oil Shale Development in the United States," RAND Corporation, 2005,

http://www.rand.org/pubs/monographs/MG414.html.

⁴ "Has the World Already Passed 'Peak Oil'?" National Geographic, 9 November 2010, <u>http://news.nationalgeographic.com/news/energy/2010/11/101109-peak-oil-iea-world-energy-outlook/;</u> "Is 'Peak Oil' Behind Us?" New York Times, 14 November 2010, <u>http://green.blogs.nytimes.com/2010/11/14/is-peak-oil-behind-us</u>. Regarding unconventional oil, IEA reported, "Unconventional oil resources are thought to be huge several times larger than conventional oil resources. The rate at which they will be exploited will be determined by economic and environmental considerations, including the costs of mitigating their environmental impact. Unconventional sources of oil are among the more expensive available: they require large upfront capital investment, which is typically paid back over long periods. Consequently, they play a key role in setting future oil prices..." (<u>http://www.iea.org/Textbase/npsum/weo2010sum.pdf</u>). "The age of cheap oil is over," reported IEA's chief economist ("Has the World Already Passed Peak Oil?").

⁵ James K. Jackson, "The U.S. Trade Deficit, the Dollar, and the Price of Oil," U.S. Congressional Research Service, 2 March 2011, <u>www.fpc.state.gov/documents/organization/158478.pdf</u>. diminishing oil-product supplies.⁶ Price volatility also could stymie oil-exploration investment because the return on investment would be unpredictable.⁷

So peak oil is an economic crisis, not merely environmental, with worldwide inflationary repercussions, particularly in industrial economies. Mitigating the increased prices and reduced supplies associated with peak oil will involve using less oil for all its applications, not just the burning of it.

The International Energy Agency has proposed four strategies to address oil shortages:⁸

- 1. Reducing demand
- 2. Switching fuels
- 3. Stockpiling emergency reserves
- 4. Increasing extraction

Peak oil, by definition, rules out reliance on strategy #4: increasing extraction. But the first three strategies can apply to any scale – from international to local – and this plan pursues each of those strategies to varying degrees. Strategy #3 (stockpiling emergency reserves) is limited by the price, supply, and durability of fuels. Strategy #2 (switching fuels) has local production and supply limits. Only strategy #1, reducing demand, can be effective in all sectors, including transportation; food supply; energy delivery; water, wastewater, and solid waste treatment; emergency services; and communications.

Some of the ways that scarce oil could affect our community seem obvious, such as reduced fuel supplies for transportation. But other areas of impact are less obvious, including the production and/or transportation of international and regional food supplies; the continuation of water supply and waste disposal; the operation of heavy equipment; and the use of fossil fuel-based chemicals for agriculture and landscaping. Analysis of the four strategies listed above suggests that in each area of peak oil vulnerability, Lawrence's responses will consist primarily of reduced reliance on oil, with multiple specific methods for addressing each particular challenge.

If our community fails to anticipate and respond to the end of affordable, plentiful oil, the eventual scarcity and expense of everything dependent on petroleum may well leave Lawrence with a limited and unappealing range of choices. But if Lawrence is proactive in transitioning to lower oil use, it may be able to choose optimal transportation modes and lifestyles. The challenge is to develop local alternatives to oil before the need becomes severe. A related challenge involves presenting those local alternatives as opportunities that Lawrence's citizens will embrace.

⁶ Anthony Andrews, Robert Pirog, and Molly F. Sherlock, "The U.S. Oil Refining Industry: Background in Changing Markets and Fuel Policies," U.S. Congressional Research Service, 22 November 2010, www.fpc.state.gov/documents/organization/152626.pdf.

⁷ "Peaking of World Oil Production: Impacts, Mitigation, & Risk Management," U.S. Department of Energy, February 2005, <u>www.netl.doe.gov/publications/others/pdf/oil_peaking_netl.pdf</u>; http://www.netl.doe.gov/energy-analyses/refshelf/.

 ⁸ "The Key Challenges to Energy Security," International Energy Agency, 26 January 2006, www.iea.org/ieanews/davos.pdf; www.iea.org/publications/index.asp.

Community Vulnerabilities

Lawrence's greatest areas of vulnerability to peak oil are transportation; food supply; water, wastewater, and solid waste treatment; and energy delivery. Each chapter of this report outlines the vulnerabilities associated with one of those broad areas of concern; each chapter also proposes ways of addressing those vulnerabilities. This report also acknowledges vulnerabilities within emergency services functions. However, the "Overview of Recommendations and Implementation Strategies" section of this report notes the City's existing plan to address fuel-and energy-related threats to those functions.

Key Conclusions

This report, *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas,* is based on the following key conclusions:

- 1. Reliable sources, including the U.S. Department of Energy, predict that worldwide demand for oil soon will exceed known worldwide supply and extraction rates.
- 2. Oil and oil-related products will become increasingly expensive and difficult for communities to procure.
- 3. Lawrence is vulnerable to peak oil challenges in areas such as transportation; food supply; water, wastewater, and solid waste treatment; energy delivery; emergency services; and communications.
- 4. Reducing local demand for and consumption of oil and oil-related products will be Lawrence's most immediately effective strategy for coping with peak oil challenges.
- 5. Lawrence should initiate adaptive measures before the need becomes severe.
- 6. Communicating peak oil challenges and recommended actions to the citizens of Lawrence will increase the effectiveness of adaptive measures.

The goal of this report is to chart a course for a resilient local government, a resilient business community, and resilient patterns for living and working.

OVERVIEW OF RECOMMENDATIONS AND IMPLEMENTATION STRATEGIES

The purpose of *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas,* is to anticipate negative consequences for the city, plan for energy conservation in governmental and non-governmental realms, identify beneficial energy and related land use policies, and address peak oil-related threats to emergency preparedness. The plan recommends tactics both for a long-term energy transition and for short-term supply-related crises.

The plan's central objective is to address consequences of and solutions to possible interruptions and/or increased prices of

- Portable liquid fuels
- Delivery of oil-derived products
- Delivery of petroleum-dependent services and other forms of energy

The plan's central components

- Anticipate peak oil impacts in key economic sectors of our community
- Plan for petroleum alternatives and conservation in the governmental and nongovernmental realms
- Identify emergency preparedness procedures for possible sudden interruptions of oil supplies

The central strategy is for City government to

- Continue to take the lead in choosing and implementing beneficial energy and land use policies, including consideration of the recommendations of this report
- Expand efforts to educate and encourage the citizenry to understand the need for conservation and reduced consumption of oil and related products and services
- Expand efforts to educate and encourage the citizenry to increase energy efficiency in their homes, businesses, and lives

In general, this plan divides recommended actions into governmental and non-governmental responses.

Governmental Responses

Local government can foster a transition to reduced oil use by

- Continuing to develop current policies that address oil-supply and oil-cost challenges
- Revising City policies that may hamper conservation efforts
- Creating new incentives that encourage and reward conservation⁹
- Drafting new conservation polices, such as zoning codes that facilitate solar access (access to sunlight for energy)

⁹ Once such program is the Property-Assessed Clean Energy (PACE) program: "Property-Assessed Clean Energy (PACE) Programs," U.S. Department of Energy Solution Center, <u>http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/pace.html</u>.

Additionally, the Lawrence City government can continue its efforts to curb its own reliance on petroleum and petroleum-related products, particularly in fleet operations, parks and forestry, and water and wastewater handling.

Non-Governmental Responses

Just as each chapter in this report proposes specific governmental responses to peak oil challenges, each chapter also proposes specific individual and organizational responses. In the area of transportation, for example, individuals can reduce their reliance on automobiles by walking, carpooling, bicycling, and using mass transit. Local organizations can accommodate and perhaps reward members and employees who avail themselves of those opportunities. In the area of food supply, individuals and organizations can increase their support of local food suppliers and can begin local small-scale composting, gardening, and animal husbandry operations.

Top Recommendations

The Lawrence Mayor's Peak Oil Task Force presents the following 10 recommendations as the highest-priority recommendations within this report. These 10 are not ranked in order of importance; rather, they reflect the order of their appearance within the report. Additional information on these 10 recommendations appears in this report's appendixes, which contain all the task force recommendations.

- 1. Continue to implement fuel reduction policies and programs for the municipal fleet, such as route management, telecommuting, electric vehicles, and anti-idling measures.
- 2. Continue to develop and implement policies that facilitate efficient transportation design and planning, including a "Complete Streets" program and promotion of alternative fuel technologies.
- 3. Commit to a growth pattern that supports mixed-use developments that are compact and sustainable with convenient accessibility for biking and walking.
- 4. Continue to work with local and regional partners (e.g., Topeka, Kansas City, Johnson County, and Mid-America Regional Council) to enhance and promote services that integrate public transit into a regional transportation plan.
- 5. Redraw the City's Urban Growth Area boundaries to preserve high quality soils for agricultural uses.
- 6. Add edible landscape features, such as fruit trees, nut trees, and community gardens, to City Parks and Recreation horticulture plans.
- 7. Partner with the Chamber of Commerce and economic development interests to aggressively recruit businesses engaged in research and manufacturing of renewable energy technologies.
- 8. Create incentives for local producers and consumers to reduce solid waste through volume-based charges for residential waste.
- 9. Reduce Lawrence's water consumption (and related energy expenditures) through measures such as inverted rates (i.e., charging more per unit for higher use).
- 10. Inform citizens about potential peak oil-related challenges; guide community on how to respond and prepare.

Relationship to Lawrence's Climate Protection Plan

In March 2009, the Lawrence City Commission adopted the *Climate Protection Plan for the City of Lawrence*. Many of the goals and recommendations in the *Climate Protection Plan* are similar to those listed here in *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas*.

Recommendations to mitigate climate disruption and peak oil challenges include transitioning away from dependency on fossil fuels. The primary difference is that climate change strategies generally focus on reducing fuel consumption to reduce carbon emissions. Peak oil strategies, on the other hand, focus on preparing for transportation and lifestyle changes that will occur as the result of anticipated supply decreases/price increases of fossil fuels -- in particular, petroleum.

Because of the overlapping relationship between the issues of peak oil and climate change, the peak oil recommendations in this plan are presented as complementary to the City's *Climate Protection Plan*.

Relationship to the Douglas County Local Emergency Operations Plan

Lawrence's Peak Oil Task Force considered including a chapter that detailed recommended actions for City emergency services in the event of a disruption of such services related to peak oil. The task force's research, however, showed that the Douglas County *Local Emergency Operations Plan* already has addressed this concern.

Lawrence City Resolution No. 6840 (7 July 2009) formally adopted the Douglas County *Local Emergency Operations Plan* as the City's plan. The Douglas County plan specifies the following:

In a disaster situation or an event requiring the resources of Douglas County in an emergency situation, the Emergency Operations Plan will be implemented and activated in accordance with pre-established guidelines. The Plan may be implemented in part, or in whole, depending on the level of response required for the emergency.

In its list of resources that could be affected by disasters, the City/County plan includes "fuels." Further applicable information on the Douglas County *Local Emergency Operations Plan* is located in Appendix A. The Peak Oil Task Force recommends that aspects of the *Local Emergency Operations Plan* that apply to managing emergency services during peak oil-related crises be considered complementary to this report.

Relationship to FEMA's National Incident Management System

Similar to the *Local Emergency Operations Plan*, FEMA's National Incident Management System (NIMS) specifies "a systematic, proactive approach to guide departments and agencies at all levels of government, non-governmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment." Following consultation with the Lawrence Police Department, the Peak Oil Task Force recommends that Douglas County Emergency Management officials continue to meet periodically with supervisory personnel from City and County emergency service providers to review duties and areas of cooperation specified by NIMS and the *Local Emergency Operations Plan*.

A Note on Land Use Policies

This report gathers recommended actions for Lawrence's peak oil challenges into topic chapters such as Transportation and Food. The Peak Oil Task Force debated whether to include a separate chapter on Land Use policies, an area of vital importance to Lawrence's peak oil adaptation measures. After much discussion, the task force decided to distribute the land use policies throughout the relevant topic chapters; for example, land use policies regarding transportation are in the Transportation chapter. The task force does not mean for this organizational approach to diminish the core importance of land use policies in addressing Lawrence's peak oil challenges. The task force further notes that the Rocky Mountain Land Use Institute of the University of Denver has compiled many practical options and model code provisions already adopted by other communities.¹⁰ Many of those ideas are reflected within this report's land use recommendations.

Implementation Responsibility

Because of the civic, financial, and regulatory aspects of many of the following recommendations, implementation of much of this report ideally will be the responsibility of the Lawrence City government.

In other instances, recommendations using such terms as *promote, encourage, investigate,* or *explore*, although generic, may best be implemented with City input but may also rely on the assistance of local individuals, organizations, institutions, and businesses that have an interest or role in implementation.

Because of the relationship of this report to the *Climate Protection Plan*, it is anticipated that the City-County Sustainability Coordinator will help lead, or at least assist, in the implementation of peak oil recommendations approved by City government.

A Note on Process

The Lawrence Mayor's Peak Oil Task Force was established by the City Commission September 2, 2008, by Resolution 6795. The task force was charged with:

- assessing Lawrence's exposure to diminishing supplies of oil and natural gas and making recommendations to address vulnerabilities;
- seeking input on negative impacts of peak oil and proposing solutions;
- acquiring and studying data on the issues of peak oil and natural gas depletion and the related economic and societal consequences;
- developing recommendations regarding strategies the City can take to mitigate the impacts of declining energy supplies;
- developing an emergency plan, if deemed appropriate;

¹⁰ "Sustainable Community Development Code and Reform Initiative," Rocky Mountain Land Use Institute, <u>http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code</u>.

• and proposing methods of educating the public about peak oil.

It was also envisioned that the task force would coordinate with existing boards, commissions, and task forces studying environmental issues.

Following is a list of those individuals appointed to the task force in 2008:

Scott Allegrucci Michael Almon Rex Buchanan Rob Chestnut Paul Dietz Tom Kern Joe King Charles Marsh Dean Palos Paula Phillips Nancy Thellman Dan Wildcat Scott Zaremba

The efforts of the principal contributors to the final recommended document should be acknowledged. These individuals have spent countless hours drafting, reviewing, and refining the report: Scott Allegrucci, Michael Almon, Rex Buchanan, Joe King, Charles Marsh, Dean Palos, and Nancy Thellman.

Task force members also received important input from the Lawrence Sustainability Advisory Board; Lawrence and Douglas County Sustainability Coordinator Eileen Horn; Director of Emergency Operations for Douglas County Teri Smith; Douglas County Emergency Management Planner Sheila Meggison; Douglas County Emergency Management Assistant Director Jillian Rodrigue; Fleet Manager Steve Stewart; Utilities Programs Manager Jeanette Klamm; Assistant Public Works Director Tammy Bennett; and many other members of the City and County staffs.

In particular, members of the Lawrence Mayor's Peak Oil Task Force gratefully acknowledge the invaluable leadership of Assistant City Manager Cynthia Wagner.

TRANSPORTATION

Transportation Vulnerabilities

Lawrence's increasing suburban, low-density development, in which homes often are distant from work/shop/play destinations, requires automobile use and an extensive road system for most trips: Urban space required for automobiles can be up to 80 times the amount of space required for pedestrians.¹¹

Lawrence's dependence on automobiles is indicated by these figures from the U.S. Census Bureau:

- 16.7 percent of Lawrence households have three or more automobiles.
- 39.3 percent of Lawrence households have two automobiles.
- 38 percent of Lawrence households have one automobile.
- 6 percent of Lawrence households have no automobiles.

The U.S. Census Bureau reports that Douglas County's "mean travel time to work" is 20.2 minutes. The Census Bureau further reports that:

- 73 percent of Lawrence's working adults drive alone to work in a car, truck, or van.
- 13.2 percent carpool in a car, truck, or van.
- 6.3 percent walk.
- 4.4 percent work at home.
- 1.6 percent use bicycles.
- 1.2 percent use public transportation.¹²

With approximately 255 million passenger vehicles in the United States,¹³ there are 1.03 cars per licensed driver, and, as evident in Lawrence, some families own three or more cars.¹⁴

According to the U.S. Department of Energy, "Automobiles represent the largest single oilconsuming capital stock in the U.S.,"¹⁵ consuming 8.997 million barrels of "finished motor gasoline" per day.¹⁶ The Department of Energy further reports that "Transportation alone

¹¹ Compared with a pedestrian, who needs five square feet of space standing and 20 square feet of space walking, one car requires 400 square feet of parking area and 1,500 square feet when moving 30 miles per hour. Source: "Road Space Reallocation," Victoria Transport Policy Institute, <u>www.vtpi.org/tdm/tdm56.htm</u>.

¹² "Profile of Selected Economic Characteristics: 2000," Lawrence, Kansas, U.S. Census Bureau, <u>http://quickfacts.census.gov/qfd/states/20/2038900lk.html</u>. "American Community Survey 2008: Douglas County, Kansas," U.S. Census Bureau, <u>http://goo.gl/008mq</u>.

¹³ "Table 1-11: Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances," U.S. Bureau of Transportation Statistics, <u>www.bts.gov/publications/national_transportation_statistics/html/table_01_11.html</u>.

¹⁴ "Vehicles per Household and Other Demographic Statistics," U.S. Department of Energy, <u>http://www1.eere.energy.gov/vehiclesandfuels/facts/2010_fotw618.html.</u>

¹⁵ "Peaking of World Oil Production: Impacts, Mitigation, & Risk Management," U.S. Department of Energy, February 2005, <u>www.netl.doe.gov/publications/others/pdf/oil_peaking_netl.pdf</u>; http://www.netl.doe.gov/energy-analyses/refshelf/.

¹⁶ "Consumption/Sales," U.S. Department of Energy, <u>http://tonto.eia.doe.gov/dnav/pet/pet_cons_psup_dc_nus_mbblpd_a.htm</u>.

accounts for more than 50 percent of world consumption of liquid fuels, and its share increases over the projection period [through 2035].¹⁷ In the United States, transportation accounts for 65 percent of oil consumption.¹⁸

In 2007, the U.S. Government Accountability Office released a peak oil report in which it concluded:

The U.S. economy depends heavily on oil, particularly in the transportation sector. World oil production has been running at near capacity to meet demand.... [D]evelopment and widespread adoption of alternative transportation technologies will take time and effort.... Key alternative technologies currently supply the equivalent of only about one percent of U.S. consumption of petroleum products, and [the Department of Energy] projects that even under optimistic scenarios, by 2015 these technologies could displace only the equivalent of four percent of projected U.S. annual consumption.... [A] reduction in world oil production could cause transportation fuel shortages that would translate into significant economic hardship.¹⁹

Top Five Recommended Actions for Transportation Vulnerabilities

The overriding goal of most cities' transportation systems is to provide optimal, safe, convenient, and affordable mobility for its residents and businesses. Added to these goals for Lawrence are the enhancement of our community's existing high quality of life, minimization of adverse environmental impacts, and support for our community's economic vitality and growth. Lawrence residents, business owners, organization managers, and government leaders should all, ideally, assume leadership roles in considering the following strategies.

- 1. Continue to implement fuel reduction policies and programs for the municipal fleet, such as route management, telecommuting, electric vehicles, and anti-idling measures.
 - A. Direct each municipal department to develop and implement an individual fuel reduction plan that tracks mileage and has measurable goals.
 - B. Continue to improve route management efficiencies for municipal fleet (e.g., geographic information system monitoring).²⁰
 - C. Support telecommuting as an option for non-manual-work municipal employees, where feasible and appropriate.
 - D. Increase the use of alternative power sources, including onboard solar panels for mobile electronics (e.g., radios, computers, and air conditioners) so that

¹⁷ "International Energy Outlook 2010," U.S. Department of Energy, July 2010, <u>www.eia.doe.gov/oiaf/ieo</u>.

¹⁸ "Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production," U.S. Government Accountability Office, February 2007, http://www.gao.gov/products/GAO-07-283.

 ¹⁹ "Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production."

²⁰ Geographic Information Systems, <u>www.gis.com</u>.

emergency vehicles don't have run to continuously.

- E. Establish a bicycle fleet for municipal workers and/or expand the City's current use of industrial tricycles.
- F. Begin converting the City vehicle fleet to plug-in electric vehicles.
- G. Implement anti-idling policies (specified in Appendix B).
- 2. Continue to develop and implement policies that facilitate efficient transportation design and planning, including a "Complete Streets" program and promotion of alternative fuel technologies.
 - A. Optimize the use of existing transportation infrastructure and invest in new transportation improvements that meet access and mobility needs with less fuel.
 - B. Continue the adoption and expansion of a "Complete Streets" policy to build and maintain a "complete street network" that supports combined pedestrian, bicycle, transit, and auto trips for users of all abilities and ages.²¹
 - C. Implement the following changes to reduce the use of petroleum-based asphalt:
 - i. Maintain the City's program of reducing street width standards, where feasible and appropriate (e.g., residential streets).
 - ii. Continue to allow use of recycled asphalt and other cost-efficient recycled paving materials where feasible and appropriate.
 - D. Promote existing and new alternative fuel technologies (e.g., attract alternative fuel manufacturers and distributors).
- 3. Commit to a growth pattern that supports mixed-use developments that are compact and sustainable with convenient accessibility for biking and walking.
 - A. Carefully weigh the long-range cost and benefits as well as indirect impacts (e.g., more miles driven) of extending new infrastructure (e.g., roads and sewers) in undeveloped areas.
 - B. Identify potential neighborhoods throughout the city where limited mixed-use zoning might be authorized to attract small neighborhood-scale retail, professional, and civic services where these services would be beneficial and are not now within walking distance.
 - C. Establish flexible zoning and other regulations to encourage, in appropriate locations, the types and number of housing units that could make neighborhood-scale retail, professional, and business services financially feasible.

²¹ National Complete Streets Coalition, <u>www.completestreets.org</u>.

- 4. Continue to work with local and regional partners (e.g., Topeka, Kansas City, Johnson County, and Mid-America Regional Council) to enhance and promote services that integrate public transit into a regional transportation plan.
 - A. In conjunction with a regional transportation plan, develop park-and-ride lots (including consideration of existing lots for this purpose).
- 5. Create and promote public education and outreach programs that facilitate voluntary behaviors that reduce fuel use, and apply for state (e.g., KDOT) and federal funding to support:
 - A. Carpooling
 - B. Bicycling
 - C. Walking
 - D. Telecommuting, teleconferencing, and other methods to reduce travel
 - E. Mass transit

Additional Recommended Actions

Appendix B of this report includes the full list of additional recommended actions for transportation vulnerabilities, including emergency-response solutions.

FOOD

Agricultural Production Vulnerabilities

Both direct and indirect energy are required to complete the full cycle of food production in modern U.S. agriculture. Direct energy, or "on-the-farm energy," comes largely from refined fossil fuel products used for planting, harvesting, fertilizing, spraving, and transporting machines and product. Indirect energy, or "off-the-farm energy," requires a variety of energy resources, but particularly fossil fuels for manufacturing of fertilizers and pesticides, as well as fuel for transporting products from source to final destination.

Petroleum, natural gas, and coal are all important energy resources for U.S. agriculture. In fact, the "food chain" in the United States accounts for up to 20 percent of the nation's fossil fuel consumption.²² More specifically, a University of Michigan study found that it takes seven to 10 calories of energy to produce one calorie of food in the United States.²³ So whether as diesel fuel and lubricants to operate farm machinery, petroleum-based inputs in the form of fertilizers, herbicides, and pesticides to increase crop yields, or fuel for the trucks, trains, planes, and ships that transport food to its final destination (oftentimes more than 1,000 miles from farm to plate),²⁴ oil is integral to the American agriculture industry. Any substantial reduction of oil availability, then, becomes a threat to our farmers' ability to produce food for our region and for the world.

It should be noted that alongside peak oil, additional stressors also will challenge our agricultural sector's ability to keep pace with a rapidly changing world. These stressors include the increasing global population, the increasing cost of agricultural inputs, agriculture's expanding role in biofuel production, and decreasing acres of available productive agricultural land -- two acres of farmland are converted to developed uses every minute of every day in America.²⁵

Taken alone, any one of these factors puts a heavy strain on our current agricultural system. But in combination, these stressors combine to present American farmers with a tremendous future burden: to grow more products for more people with fewer and/or more-expensive natural resources. Our aim should be, then, to reduce these stressors where we can.

While we may not be able to substantially change global patterns, closer to home we can make adjustments to help ensure the long-term resilience of our local and regional food system in a rapidly changing world.

In response to changing energy patterns and public demand, local governments across America are incorporating into their comprehensive plans provisions for the establishment of local and

²² Rachel Oliver, "All About: Food and Fossil Fuels," CNN, 17 March 2008, http://edition.cnn.com/2008/WORLD/asiapcf/03/16/eco.food.miles/.

²³ Martin C. Heller and Gregory A. Keoleian, Life Cycle-Based Sustainability Indicators for Assessment of the U.S. Food System, University of Michigan Center for Sustainable Systems, 6 December 2000, http://css.snre.umich.edu/css_doc/CSS00-04.pdf. ²⁴ The National Sustainable Agriculture Information Service, "Reducing Food Miles," 25 February 2011,

https://attra.ncat.org/attra-pub/farm_energy/food_miles.html.

²⁵ American Farmland Trust, "Farming on the Edge," 2009, www.farmland.org/resources/fote/default.asp.

regional sustainable food systems. Responding to this trend, the American Planning Association (APA) recently published a national resource for communities to use in pursuing responsible food-system planning. The APA's *Policy Guide on Community and Regional Food* states:

• The American Planning Association, its Chapters and Divisions, and planners support a comprehensive food planning process at the community and regional levels.... Planners support the creation of local and regional food planning mechanisms that integrate major local planning functions (such as land use, economic development, transportation, environment, parks and recreation, public safety, health and human services, and agricultural preservation).

In short, planning now for a resilient food system for our future is not out of step with the rest of the country, nor is it cutting edge. Incorporating food system planning into long-range community planning is becoming a common best practice in cities large and small throughout the nation.

What We Know About Our Own Regional Food System

A recent food system analysis profiles the agricultural production of Douglas, Jefferson, and Leavenworth counties. Statewide, we know wheat, corn, and soybeans make up the majority of crops produced; a review of crops grown in our tricounty region reflects this same reality, as seen in the following chart:²⁶



Most of the wheat grown in Kansas is used for human consumption. The other major grains,

²⁶ "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas," March 2011, Production Chapter, pp. 2-3, Douglas County Food Policy Council. <u>http://douglas-county.com/depts/ad/su/su_fpc.aspx?category_id</u>=.

including corn (which accounts for the most bushels produced in the state),²⁷ and soybeans are used for human consumption but also increasingly for animal consumption and biofuel production. A very small percentage of Kansas agriculture is devoted to growing fruits and vegetables—food groups increasingly valued as contributing to the long-term health of our citizens. In the tri-county area, 386 acres are devoted to orchards, vegetable, and berry production, representing less than 0.1 percent of total crop production. Though small in number, these acres represent 4.36 percent of the state's total land in fruit and vegetable production.²⁸

These numbers force a difficult question: Given current patterns of production and consumption, will our region be able to adequately feed itself in a diminished-oil world? If there is doubt, then the next question must be: What role can the Lawrence and Douglas County agricultural sector play in transitioning our region to a less oil-dependent, more sustainable food future?

Our region's capacity to grow all categories of food and thus help ensure future food security depends on the availability of highly productive land; ample water; food system infrastructure that includes food processing, warehousing, and distribution facilities; and skilled and willing farmers.

Our current food system assets include

- 8,416 acres of Class I soils. These fertile soils line the Kansas River and surrounding creeks and tributaries. These are soils that can and do support nearly all cultivation practices, from commodity crops to nutrient-intense locally marketed fruit and vegetable crops.²⁹
- 27,629 miles of streams, and three significant aquifers that supply our watershed. Unlike much of Kansas, we are not dependent upon widespread irrigation and have access to significant rainfall.³⁰
- A rich agricultural heritage and 3,380 farmers in our tri-county region with the know-how to successfully produce all kinds of crops in our particular climate,³¹ having an economic impact of \$135 million in revenue from all agricultural production in the tri-county region, and \$41 million in Douglas County.³²
- Strategic location through close proximity to two of the largest Kansas cities and food markets -- Topeka and Kansas City -- and easy access to major transportation routes such as Interstate 70 and Kansas Highway 10.

Some of these are natural assets that we already have in abundance, and some of these assets are

²⁷ "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas."

²⁸ "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas."

²⁹ United States Department of Agriculture Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

³⁰ Kansas Division of Water Resources, <u>www.ksda.gov/dwr/</u>.

³¹ "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas."

³² "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas."

at varying degrees of risk. Taking peak oil seriously requires some strategic planning now to ensure adequate agricultural assets for the future. One important local resource to aid our understanding as we move forward is the tri-county food shed analysis, "Building a Deep-Rooted Local Food System: A Food System Analysis of Douglas, Jefferson, and Leavenworth Counties in Kansas," which has been referenced in this food chapter. This study was commissioned in 2009 by the Douglas County Food Policy Council. Recently completed, the study can be used to inform a set of policy recommendations to support a vibrant local food system for Lawrence, Douglas County, and the entire tri-county region.³³

As peak oil shifts the burden of food production from a centralized system to more regionalized and localized systems, it will be increasingly important to protect the viability of our county's whole agricultural sector. Establishing a substantial local food system is just one important response to the peak oil challenge, but it is an important response and will take time—likely decades. The shift required to change peoples' food buying habits as well as a whole nation's food producing and distribution habits represents significant technological as well as cultural challenges, but the reality of diminishing oil resources will, by necessity, push the transition along.

Non-Farm Food Sources

With increasing awareness of food system issues, more and more people are growing at least a portion of their own food in their own gardens. The National Gardening Association estimates that for 2009, 38 percent of 114 million households had food gardens—almost 20 percent more than in 2008.³⁴

Home, community, and school gardens are all ways to increase resilience in a diminished-oil world. However, to meet the larger needs of community-wide food demand, a more organized, public/private agricultural enterprise may be needed: Urban-edge agriculture is one approach that many communities are encouraging; at the same time, many cities are allowing more intense urban agriculture practices within their bounds. Lawrence's neighbor to the east, Kansas City, Kan., is a national leader in urban agriculture with its Cultivate Kansas City program having succeeded in passing one of the most comprehensive urban agriculture-related zoning and regulation policies in the country in 2010. With the support of Lawrence's City Commission in 2009, local regulations now reflect acceptance of small flocks of poultry as a backyard enterprise within city limits, and, with the help of public/private partnerships, school district USD 497 now boasts upwards of 10 new school gardens with the promise of more to come. All of these are projects that signal a changing food system in response to a changing world.

³³ "Building a Deep Rooted Local Food System: A Food System Analysis for Douglas, Jefferson, and Leavenworth Counties in Kansas." The report can be accessed at www.douglas-county.com, "Food Policy Council" <u>http://douglas-county.com/depts/ad/su/su_fpc.aspx?category_id</u>=).

³⁴ National Gardening Association, Impact of Home and Community Gardening in America Survey, 2009, www.gardenresearch.com/files/2009-Impact-of-Gardening-in-America-White-Paper.pdf; http://www.gardenresearch.com.

Top Five Recommended Actions for Food Vulnerabilities

- 1. Redraw the City's Urban Growth Area boundaries to preserve high quality soils for agricultural uses.
 - A. Encourage brownfield and infill development as alternatives to non-agricultural development of high quality soils.
- 2. Add edible landscape features, such as fruit trees, nut trees, and community gardens, to City Parks and Recreation horticulture plans.
 - A. Partner in this effort with the local organization Lawrence Fruit Tree Project.³⁵
- 3. Partner with organizations such as the Douglas County Food Policy Council to create a food security plan that sets out goals, policies, and strategies for increasing local and regional food production. Such a plan would create a vision that, over time, would help establish a resilient local and regional food system that takes into account area population-growth projections, area agricultural capabilities, area skilled farmer assets, and the city's shared desire to be a healthy and prosperous community for generations to come.
- 4. Partner with Douglas County, Farm Bureau, K-State Extension Office, USD 497, Johnson County Community College, Growing Growers, and similar organizations to build vocational training programs targeting food system-related jobs. This agriculturally related business incubator could train new farmers in sustainable agriculture practices, food processing, marketing and distribution, culinary arts, agritourism, hospitality, community education, homesteading skills, and recreation. Such an ambitious project might take the form of an urban edge incubator farm such as the Intervale Farms Program in Burlington, Vermont.³⁶
- 5. Partner with Douglas County Extension Office's Master Gardeners Program and others to begin a Community Gardens Initiative: Continue to inventory vacant City lots that might be converted to sustainable, organic food-producing community gardens; provide incentives for neighborhood gardens such as rain catchment devices and access to City composting; and encourage community garden collaboration with local food banks as a free source of fresh, wholesome food for food-insecure citizens.

Additional Recommended Actions

Appendix C of this report includes the full list of additional recommended actions for food vulnerabilities, including emergency-response solutions.

³⁵ Lawrence Fruit Tree Project, <u>http://lawrencefruittreeproject.wordpress.com</u>.

³⁶ Intervale Farms Program, "Creating Opportunities for New Farmers," www.intervale.org/programs/agricultural_development/intervale_farms.shtml.

ENERGY DELIVERY

Energy Delivery Vulnerabilities

While the price of petroleum fuels is of primary concern due to peak oil inflation, other energy sources including natural gas, coal, uranium, biofuels, and renewable energy (for example, solar and wind power) all depend on petroleum for extraction and delivery. Therefore, energy sources other than petroleum are likewise subject to peak oil inflation in proportion to the amount of petroleum required to produce them. Because energy fields are now historically smaller, of lower quality, and more remote, more petroleum input is required for extraction, so the Energy Return on Energy Invested (EROEI) is dropping.³⁷ And just as petroleum is vulnerable to supply disruption from geopolitical factors and price volatility, energy geopolitics could also affect the price and availability of these other energy sources.

The Achilles heel of energy supplies is the need for non-interruptibility, because the critical feature of their end-use is the ability to power-up and power-down at will. Virtually every operational component of shipping and transit, manufacturing, commerce, and housing is designed with automated features that fail if energy supply is interrupted. As for fossil energy equipment that is not dependent on automation, such as power tools, construction equipment, and small appliances, their functioning could be curtailed by an interruption of fuel supplies. Except for sudden emergencies, the continuous delivery of our primary energy supplies is never allowed to be interrupted. Today, the supply of fossil fuel energy constitutes 84 percent of our total energy use, 47 percent of the total energy use being petroleum.³⁸

The availability and price of petroleum has a direct effect on the availability and price of all other sources of energy: coal, uranium, natural gas, and vehicular fuels. With petroleum as the primary source, non-petroleum energy sources are dependent on it at the secondary and tertiary levels. On the secondary level, the equipment used for drilling natural gas wells and mining coal or uranium is diesel-powered equipment. This includes drill rigs, on-site electric power generators, mud pump engines, hydraulic fracturing pumps, mine shaft drills, diesel-electric power shovels, coal washing pumps, coal slurry pumps, coal or uranium belt elevators, uranium milling operations, uranium tailings slurry pumps, and more. On the tertiary level, the transport of equipment, crews, and fuels to the well field or mine face requires petroleum fuels, as does delivery of the extracted natural gas, coal, and uranium to distribution hubs or to power generating

U.S. Electric Power Industry Net Generation by Fuel, 2009



Source: U.S. Energy Information Administration. Annual Energy Review 2009 (August 2010)

³⁷ Matthew Wild, "Global Hydrocarbons Peak," Peak Generation, 18 February 2011, http://peakgeneration.blogspot.com/p/global-hydrocarbons-peak.html.

³⁸ "Fossil Fuels," Institute for Energy Research, www.instituteforenergyresearch.org/energy-overview/fossil-fuels.

stations.

Our technological society is dependent on electricity for lighting, space heating, air conditioning, mechanical drive, pumps, telecommunications, information processing, and more. And coal is used to generate almost half of U.S. electricity.³⁹ A gradual rise in oil prices would prompt coalbased utilities to raise electricity rates, affecting affordability of all end-uses. A sudden disruption of oil supply would challenge the typical two-month coal stockpile at most generating stations (uranium is refueled less frequently).⁴⁰ Any interruption in supply could cause inconsistent voltages and phases for end-users. Worse yet, if electric supply into the grid is not continuously balanced against changing demand, brownouts could result.

If the coal fuel cycle suffers price inflation because of petroleum-related cost increases, utilities will have an incentive to replace coal-electric generation stations with natural gas burning stations.⁴¹ And natural gas is supposedly a cleaner fuel than coal, so some policy analysts consider it as a "bridge fuel" to a low-emissions future. Natural gas has the lowest carbon content of any fossil fuel.⁴² When natural gas is used instead of coal, CO2 stack emissions per MMBtu (million BTUs) are reduced by more than 40 percent. A natural gas turbine is also up to 59 percent more fuel efficient than a typical coal burning electric plant.⁴³ Natural gas is also used for space heating, cooking, domestic and commercial water heating, air conditioning, and industrial process heat. Its utility is dependent on end-users' receiving a continuous and pressure-stable supply. And competing with these uses of natural gas is its use as a feedstock for agricultural fertilizers,⁴⁴ many plastics, consumer products and packaging, hydrogen fuel cells, and compressed natural gas vehicles.

But according to the *Energy Bulletin*, published by the Post Carbon Institute, conventional natural gas extraction in North America peaked in 2001 and is now in "terminal decline."⁴⁵ This negative projection has been temporarily averted by using "hydraulic fracturing" of natural gas wells, about which environmental concerns have been raised, to release previously unreachable reserves. So natural gas seems, at present, to be a cheaper alternative to petroleum. However, several court challenges involving severe environmental damage from "fracking" could soon reverse that price premium.⁴⁶ Also, hydraulic fracturing, like other non-petroleum energies, relies on petroleum products at various stages from inception to completion. In addition, industry insiders and state and federal agencies are expressing increased skepticism about the promise of

 ³⁹ "Coal," Institute for Energy Research, <u>www.instituteforenergyresearch.org/2008/08/26/coal-facts</u>.
 ⁴⁰ "Coal Supply Shrinking but Still Ample," Reuters, 6 July 2010,

www.reuters.com/article/2010/07/06/usa-coal-supply-genscape-idAFN0634359020100706?rpc=44.

⁴¹ Matthew Van Dusen, "Coal's Sunset: Will Natural Gas Replace Coal Power Plants?" General Electric Txchnologist, 29 May 2011, <u>http://goo.gl/1g3ih</u>.

⁴² "Voluntary Reporting of Greenhouse Gases Program," U.S. Energy Information Administration, 31 January 2011, <u>www.eia.doe.gov/oiaf/1605/coefficients.html</u>.

⁴³ "Electric Generation Using Natural Gas," Natural Gas.org, <u>www.naturalgas.org/overview/uses_eletrical.asp</u>.

⁴⁴ Christian Petersen, "Why Are Fertilizer Prices High?" eHow, <u>www.ehow.com/about_6728078_fertilizer-prices-high_.html</u>.

 ⁴⁵ Seppo Korpela, "Oil and Natural Gas Depletion and Our Future," *Energy Bulletin*, Post Carbon Institute, 12 July 2007, <u>www.energybulletin.net/node/32146</u>.

⁴⁶ Chris Hedges, "'Clean' Energy and Poisoned Water," truthdig, 25 May 2009, www.truthdig.com/report/item/20090525_clean_energy_and_poisoned_water/.

natural gas.⁴⁷ And finally, a May 2011 analysis by geoscientist J. David Hughes disputes the idea that U.S. natural gas can be a "bridge fuel" from high-carbon sources of energy such as coal and oil to a renewable energy future. The report focuses on many factors: freshwater contamination, toxins disposal, considerable increase of U.S. extraction rates, massive infrastructure build-out, and full-cycle greenhouse gas (GHG) emissions from shale gas that may also be worse than previously understood and possibly worse than coal.⁴⁸

Therefore, in the context of peak oil inflation, utilities and commercial fuel suppliers are seeking to identify alternative energy source scenarios with the greatest likelihood of price and supply stability. But as unappealing as our dependency on geopolitically unstable petroleum sources and volatile petroleum prices is, the alternatives, all of which involve petroleum use, may be worse.

Delivery of electricity from the Westar Lawrence Energy Center is tied to rising petroleum costs to supply the coal. Although optimistic projections see a 250 year supply of coal, a number of analysts are projecting high-quality accessible coal reserves to peak closer to 2030.⁴⁹ In an

attempt to avoid the petroleumprice component of coal, there is a move to revive nuclear powered electricity by loan guarantees and tax subsidies, by extending the licenses of existing nuclear generating stations, and by building new ones.⁵⁰ Another alternative is to ramp up wind and solar electricity from their current 3 percent of the



⁴⁷ Ian Urbina, "Behind Veneer, Doubt on Future of Natural Gas," New York Times, 27 June 2011, www.nytimes.com/interactive/us/DRILLING DOWN SERIES.html?scp=1&sq=urbina&st=cse.

David Hughes, "Will Natural Gas Fuel America in the 21st Century?" Post Carbon Institute, 29 May 2011, www.postcarbon.org/report/331901-will-natural-gas-fuel-america-in.

⁴⁹ David Roberts, "Blackout: Heinberg on Dwindling Coal Reserves and the Siren Song of 'Clean Coal," Grist, 27 July 2009, www.grist.org/article/2009-07-27-blackout-heinberg-on-dwindling-coal-reserves-and-the-siren-song-. The accompanying chart is from "Coal: Resources and Future Production," Energy Watch Group, March 2007, http://www.peakoil.net/publications/coal-resources-and-future-production.

Jim Snyder, "Nuclear Energy Firms Seek More Than Loan Guarantees for Revival," The Hill, 1 February 2010, http://thehill.com/business-a-lobbying/78943-nuclear-energy-industry-seeks-more-than-loan-guarantees-forrevival.

U.S. market. Unfortunately, nuclear and renewable electricity both have a large petroleum requirement to manufacture the infrastructure (and operate the uranium fuel cycle), so neither may prove to be an alternative to petroleum itself. There is just no escaping the inflationary impacts of peak oil.

If energy delivery at the front end cannot avoid petroleum-related cost increases, costlier energy would most likely prompt conservation and adaptation by end-users. Any creative adaptation will need to be carefully monitored, with safety guidance provided. For example, some citizens may install home-scale wind turbines and solar electric collectors that may not meet code or may have safety and maintenance issues. Others may deactivate furnaces and replace them with wood heat stoves that require proper chimney design and maintenance. If more expensive electricity drives up the cost of air conditioning, workplaces may experience at least a partial reduction of air conditioning. Lack of air conditioning means a drop in worker productivity and jeopardizes heat-generating computers. Costlier electricity could curtail refrigeration for commercial uses such as grocery stores, restaurants, and pharmacies. For homes, it is inconceivable to go without refrigeration.

Finally, not only will peak oil inflation raise the price of liquid transportation fuels, lubricants, and hydraulics, but peak oil also will inflate the delivery cost of those materials. The delivery of portable liquid fuels (gasoline, diesel, ethanol) to end-users is dependent on diesel tanker ships, diesel/electric port facilities, and diesel tanker trucks. This two-layer fuel inflation could make a big dent in private auto use and also could impact applications of heavy equipment. For example, diesel price increases for the heavy equipment needed to service much of U.S. manufacturing could seriously impact profitability. Builders accustomed to dramatic modifications to site contours will reduce their earth moving equipment budgets. The fuel surcharge for trucking sand and quarry rock, the main cost of those materials, would put a damper on that business. Many self-employed tradespeople with a van or pickup full of tools would see their profit margin diminish with each fuel fill-up.

Top Five Recommended Actions for Energy Delivery Vulnerabilities

- 1. Partner with the Chamber of Commerce and economic development interests to aggressively recruit businesses engaged in research and manufacturing of renewable energy technologies.
 - A. Create local incentives such as green tax abatements to attract firms specializing in renewable energy technologies.⁵¹
- 2. Install shade structures at selective City parking areas and equip them with solarelectric panels to charge batteries of plug-in electric vehicles and plug-in hybrid vehicles.
- 3. Adopt code provisions for solar access rights. The code would establish a definition of solar access, specifications for position and height of new construction and tree plantings, a "grandfather" clause for existing structures and trees, solar access code

⁵¹ "Breaking the Mold in Solar Power," Cnet News, 21 February 2007, <u>http://news.cnet.com/Breaking-the-mold-in-solar-power/2100-11392_3-6161136.html</u>.

review for new situations, and a mechanism for dispute resolution. Such provisions would guarantee the rights of property owners to south-facing solar access that is clear and unobstructed by newly constructed or remodeled buildings and newly planted deciduous or coniferous trees. At present, the only provision for such solar easements are voluntary between private individuals and recorded with the Register of Deeds of Douglas County in accordance with KSA 58-3801.

- 4. Westar Energy should implement rebates for ratepayers to purchase and install renewable energy systems that will offset future generation capacity need. An example of rebates by utilities in other states is \$1.50/Watt, not to exceed \$7,500, for residential customers, and \$1.50/Watt, not to exceed \$37,000, for commercial customers.
- 5. Buy renewable energy systems for all the benefits that will accrue, even without state tax credits or utility rebates. While the financial payback may be smaller than in some other states, regardless, a payback it is.

Additional Recommended Actions

Appendix D of this report includes the full list of additional recommended actions for energy delivery vulnerabilities, including emergency-response solutions.

WATER, WASTEWATER, AND SOLID WASTE

Water, Wastewater, and Solid Waste Data

City data from 2009 detail the scope of water, wastewater, and solid waste management within Lawrence:⁵²

- Daily water demand for the City of Lawrence averaged 9.5 million gallons with a peak of 18 million gallons.
- Drinking water treatment capacity expanded from 26.5 million gallons a day to 41.5 million gallons a day.⁵³
- 3.46 billion gallons of drinking water was produced.
- 10,902 feet of water line was installed.
- 3.827 billion gallons of wastewater was treated.
- 106,477 tons of solid waste was generated, 28 percent of which (30,314 tons) was recycled.
- Approximately 60 percent of the solid waste was residential; 35 percent was commercial.

Following are the components and vulnerabilities of the water, wastewater, and solid waste systems.

Water and Wastewater Components and Vulnerabilities

The City's Department of Utilities treats and provides drinking water; it also collects and treats Lawrence's wastewater. The Water Treatment Division operates two water supply treatment plants. The Kaw River Water Treatment plant takes water from the Kansas River and alluvial wells and has a capacity of 16.5 million gallons per day.⁵⁴ The Clinton Reservoir Water Treatment plant takes water from the reservoir and has a capacity of 20 million gallons per day.⁵⁵ The City also provides drinking water to five rural water districts and Baldwin City. The Water Distribution Division "is responsible for installation, maintenance, inspection and repair of the water pipelines that deliver drinking water."⁵⁶

The City's Wastewater Collection Division maintains the sanitary sewer system that collects and delivers wastewater to the Wastewater Treatment Plant. That system includes 400 miles of sewer mains and 38 lift stations.⁵⁷ The Wastewater Treatment Plant, at 1400 E. 8th Street, has the capacity to treat an average of 12.5 million gallons per day.⁵⁸

Pumps at the City's water treatment plants and wastewater treatment plants operate on electricity and are thus are vulnerable to peak oil situations within power-supply industries. The primary

⁵² City of Lawrence Annual Report 2009, <u>www.ci.lawrence.ks.us</u>. City of Lawrence Utilities 2009 Annual Report, <u>www.lawrenceks.org/utilities/annual_report</u>. "Solid Waste Management Plans: Five Year Worksheet, 2009, <u>http://lawrenceks.org/public_works/solidwaste</u>.

⁵³ The City also provides drinking water to five rural water districts and Baldwin City.

⁵⁴ City of Lawrence Utilities staff.

⁵⁵ City of Lawrence Utilities staff.

⁵⁶ City of Lawrence Water Distribution Division, <u>http://lawrenceks.org/utilities/water_distribution_division</u>.

⁵⁷ City of Lawrence Collections Division, <u>http://lawrenceks.org/utilities/collection</u>.

⁵⁸ City of Lawrence Utilities staff.

use of liquid energy fuels occurs in the departments that service sewer lines and water mains and must travel to read meters. Those departments averaged approximately 22,000 miles driven per month in 2009, primarily in support of meter reading, service of lines, and maintenance. ⁵⁹ The City's Water Distribution Division, for example, has a regular program of pipe replacement.

With its pumps, aerators, lights, and heating/air-conditioning needs, Lawrence's Wastewater Treatment Plant is the City's most intensive user of electricity. Additionally, the plant's collection network requires 38 lift stations primarily because, while city terrain does slope toward the treatment plant, changes in elevation in that slope necessitate pumping to supplement gravity.⁶⁰

Lawrence's fresh water comes from both the Kansas River and Clinton Reservoir. The relevant concern for peak oil is the cost inflation and possible intermittency of electricity to power the distribution network.

Solid Waste Components and Vulnerabilities

Waste management in Lawrence, which includes residential collection, commercial collection, and waste reduction and recycling, is the responsibility of the Solid Waste Division. Solid waste is currently delivered to the Douglas County/Jefferson County Sanitary Landfill located in Jefferson County and operated by N.R. Hamm Quarry, Inc. City staff indicates the landfill has a capacity to take, at a minimum, another 50 years' volume of waste and more likely has capacity to last for 80 to 100 years.⁶¹ Residential charges for waste collection are a flat fee. Commercial charges are based on volume.

Peak oil situations could affect solid waste management processes in countervailing ways. On the one hand, the rising cost of petroleum, as fuel and feedstock for consumer products, packaging, and building materials, could depress sales of those products, creating a subsequent decline in the waste stream. On the other hand, some percentage of consumption will continue, and fuel costs for collecting and recycling or dumping the waste will rise. Parts of the waste stream may be illegally diverted or improperly recycled.

The operation of vehicles for the collection and transportation of waste accounts for the primary use of liquid fuels in solid waste management. Fleet miles averaged 43,639 miles per month through most of 2009, and 44,625 in 2008.⁶² Such vehicles must be capable of handling large volumes, navigating city streets, and traveling at higher speeds to the landfill, all of which affect fuel efficiency.

The City's Climate Protection Task Force recently made recommendations related to waste reduction; City staff is currently reviewing, for City Commission consideration, options for volume-based charges for residential waste. However, volume reduction -- through recycling and other means -- would not contribute significantly to fuel savings unless collection routes were reconfigured and/or rescheduled in light of waste reduction. In 2007, Lawrence's per capita

⁵⁹ City of Lawrence Utilities staff.

⁶⁰ City of Lawrence Utilities staff.

⁶¹ City of Lawrence Utilities staff.

⁶² City of Lawrence Utilities staff.

recycling rate was 35 percent. Solid waste produced per capita has declined slightly since 1998, and per capita recycling has increased slightly.⁶³ The City currently lacks a comprehensive, citywide recycling program.

The City currently collects and composts yard waste, primarily grass and leaves, at its facility on 11th Street. That compost is made available to the public. Through this program, plant nutrients are retained and the haul to the landfill in Jefferson County is avoided; however, transportation to and from the City composting site still requires energy.

Top Three Recommended Actions for Water, Wastewater, and Solid Waste Vulnerabilities

- 1. Create incentives for local producers and consumers to reduce solid waste through
 - A. Volume-based charges for residential waste
 - B. Development and implementation of guidelines for residential composting
- 2. Reduce Lawrence's water consumption (and related energy expenditures) through measures such as
 - A. Revision of existing City ordinances, codes, and standards as necessary to enhance water-conserving principles
 - B. Mandating efficient plumbing fixtures and appliances⁶⁴
 - C. Inverted rates (i.e., charging more per unit for higher use)
 - D. Adoption of guidelines to encourage graywater use⁶⁵
- 3. Reduce wastewater and water usage through
 - A. Installation of low volume showers, toilets, washing machines, and other water-using appliances at home and at work⁶⁶
 - B. Landscaping with plants that require little water

⁶³ City of Lawrence 2007 Recycling Annual Report, City of Lawrence Solid Waste Division, <u>http://www.lawrenceks.org/wrr/</u>.

⁶⁴ Dallas Water Utilities, <u>www.savedallaswater.com/pdf/ConservationStrategicExecSummary.pdf;</u> <u>http://savedallaswater.com</u>.

⁶⁵ "Graywater: Laws and Regulations," California's Integrated Water Reuse Management Center, www.whollyh2o.org/policies/item/91.html.

 ⁶⁶ "Flex Your Power," <u>http://www.fypower.org;</u> "Energy Star: Clothes Washers for Consumers," <u>http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CW.</u>

Additional Recommended Actions

Appendix E of this report includes the full list of additional recommended actions for water, wastewater, and solid waste vulnerabilities, including emergency-response solutions.

COMMUNICATIONS PLAN

Communications Vulnerabilities

A primary area of communications vulnerability associated with peak oil might well be a lack of public awareness about the nature of peak oil and the potential consequences of increasing prices and decreasing supplies of oil-related products. For example, a July 2011 national survey found that fewer than half of Americans -- 44 percent -- believed that "sharp increases in oil prices would be 'very harmful' to health."⁶⁷ Therefore, some recommended actions in this chapter involve assessing community awareness of peak oil issues and educating community members about peak oil challenges and productive actions that can be taken now.

A second area of communications vulnerability associated with peak oil is communication media's reliance on fossil fuels for production and distribution. As noted earlier in this report, for example, even the coal-generated electricity that serves local radio, TV, online, and print media relies on oil for transportation from the mines to the power plants. Some recommended communications actions, therefore, are decidedly low tech. Those tactics include disseminating peak oil response information though public meeting places such as schools, churches, libraries, and community organizations, including neighborhood associations.

Overview of Peak Oil Communications Plan

- Assess community knowledge of and attitudes about peak oil issues.
- Inform citizens about potential peak oil-related challenges and potential consequences.
- Guide citizens on how to respond and prepare.
- Plan for emergency communications systems and messages.
- Addendum: Possible "recommended actions" messages to citizens (in Appendix F)

Top Five Recommended Actions for a Peak Oil Communications Plan

- 1. Assess community knowledge of and attitudes about peak oil issues.
 - A. Prepare a knowledge-and-attitudes survey that could be administered to community groups.
 - i. Seek area university support for this survey.
 - ii. Tabulate responses to assess community knowledge of and attitudes about peak oil issues.

⁶⁷ Matthew C. Nisbet, Edward Maibach, and Anthony Leiserowitz, "Framing Peak Petroleum as a Public Health Problem: Audience Research and Participatory Engagement in the United States," *American Journal of Public Health*, 21 July 2011, <u>http://ajph.aphapublications.org/cgi/content/abstract/AJPH.2011.300230v2</u>.

- B. Review findings from the knowledge-and-attitudes survey to help shape the content of peak oil communications.
- 2. Inform citizens about potential peak oil-related challenges; guide community on how to respond and prepare.
 - A. Create a City peak oil website; post this report on the website.
 - B. Announce the site through a news release to city news media.
 - C. Publicize the presence of the site through existing City-citizen communication systems.
 - D. Expand site content as locally relevant peak oil news emerges (for example, the formation of community gardens).
- 3. Seek communication assistance from community groups.
 - A. Ask local nonprofit organizations that are already are addressing different aspects of sustainability to discuss this plan and related peak oil issues with their members and in their outreach efforts.
 - B. Identify other key groups that could assist in education and outreach, including neighborhood associations, churches, fraternal organizations, and similar groups. Ask these community groups to help disseminate prepared challenge and response information and to serve as information centers during peak oil emergencies.
- 4. Include peak oil references in relevant City plans and strategy statements.
 - A. Ensure that new City planning documents and processes acknowledge, as appropriate, peak oil challenges and recommended actions.
- 5. Join a neighborhood association.
 - A. In peak oil-related emergencies, such organizations ideally would assist in communication of problems and responses.

Additional Recommended Actions

Appendix F of this report includes the full list of additional recommended actions for a peak oil communications plan, including emergency-response solutions.

APPENDIX A LOCAL EMERGENCY OPERATIONS PLANS

The Douglas County *Local Emergency Operations Plan* establishes "Emergency Support Functions" to address "Incidents of Critical Significance." The plan specifies that one such incident could involve "Energy and Utilities," and, with the following language, it establishes these guidelines for addressing such an emergency:

Emergency Support Functions

The Emergency Operations Plan (EOP) applies a functional approach that groups the capabilities of municipal and county departments and agencies and the American Red Cross into Emergency Support Functions (ESFs) to provide the planning, support, resources, program implementation, and emergency services that are most likely to be needed during Incidents of Critical Significance. The county response to actual or potential Incidents of Critical Significance is typically provided through the full or partial activation of the ESF structure as necessary. The ESFs serve as the coordination mechanism to provide assistance to municipal governments or to county departments and agencies conducting tasks of primary county responsibility....

ESF-12 Energy and Utilities

Primary Agencies: Douglas County Public Works Department / Westar Energy / Kaw Valley Electric / City of Baldwin Public Works Department / Kansas City Power and Light / City of Eudora Public Works Department / City of Lawrence Department of Utilities

Responsible for coordination, prioritization, and restoration of public utilities and services to include emergency power and gas. Support includes but is not limited to the following:

- Assessing system damages and requirements to restore such systems.
- Prioritizing restoration of services.
- Coordinating public utility equipment and personnel as required.
- Providing guidance for utility information and conservation.

Additionally, the "Resource Support" section of the Douglas County *Local Emergency Operations Plan* includes the following language:

Resource Support

Primary Agencies: Douglas County Emergency Management Department / Douglas County Purchasing Department

Responsible for providing logistical management and resource support to emergency support functions in response and recovery efforts to include emergency relief supplies, facilities, equipment, fuel, office supplies, contracting services, and other resources which may be required. Support includes but is not limited to the following:

- Maintenance of inventories of resources available locally.
- Location and identification of necessary logistical support and resources.

- Establishment and administration of depot and distribution facilities.
- Coordination of state and federal resources.
- Negotiation of contracts for support of emergency actions.
- Provision of requested resources to other emergency support functions and other agencies and governments active in emergency response.

APPENDIX B TRANSPORTATION RECOMMENDED ACTIONS

Transportation Response Strategies

The overriding goal of most cities' transportation systems is to provide optimal, safe, convenient, and affordable mobility for its residents and businesses. Added to these goals for Lawrence are the enhancement of our community's existing high quality of life, minimization of adverse environmental impacts, and support for our community's economic vitality and growth.

Recommended Governmental and Non-Governmental Actions

Lawrence residents, business owners, and organization managers, as well as government leaders, should all, ideally, assume leadership roles in considering the following strategies.

- A. Alternative Energies and Reduction of Demand
 - 1. Continue to implement fuel reduction policies and programs for the municipal fleet, such as route management, telecommuting, electric vehicles, and anti-idling measures.
 - a. Direct each municipal department to develop and implement an individual fuel reduction plan that tracks mileage and has measurable goals.
 - b. Continue to improve route management efficiencies for municipal fleet (e.g., geographic information system monitoring).⁶⁸
 - c. Support telecommuting as an option for non-manual-work municipal employees, where feasible and appropriate.
 - d. Increase the use of alternative power sources, including onboard solar panels for mobile electronics (e.g., radios, computers, and air conditioners) so that emergency vehicles don't have run to continuously.
 - e. Establish a bicycle fleet for municipal workers and/or expand the City's current use of industrial tricycles.
 - f. Begin converting the City vehicle fleet to plug-in electric vehicles.
 - g. Implement anti-idling policies noted below (Section B).
 - 2. Create public education and outreach programs that encourage voluntary behaviors that reduce fuel use, and apply for state (e.g., KDOT) and federal funding to support:

⁶⁸ Geographic Information Systems, <u>www.gis.com</u>.

- a. Carpooling
- b. Bicycling
- c. Walking
- d. Telecommuting, teleconferencing, and other methods to reduce travel
- e. Mass transit
- 3. Continue to develop and implement policies that facilitate efficient transportation design and planning, including a "Complete Streets" program and promotion of alternative fuel technologies.
 - a. Optimize the use of existing transportation infrastructure and invest in new transportation improvements that meet access and mobility needs with less fuel.
 - b. Continue the adoption and expansion of a "Complete Streets" policy to build and maintain a "complete street network" that supports combined pedestrian, bicycle, transit, and auto trips for users of all abilities and ages.⁶⁹
 - c. Implement the following changes to reduce the use of petroleum-based asphalt:
 - i. Maintain the City's program of reducing street width standards, where feasible and appropriate (e.g., residential streets).
 - ii. Continue to allow use of recycled asphalt and other cost-efficient recycled paving materials where feasible and appropriate.
 - d. Promote existing and new alternative fuel technologies (e.g., attract alternative fuel manufacturers and distributors).
- 4. Facilitate the zoning for and safety of locating battery exchange stations strategically throughout the city, for depleted electric vehicle batteries to be traded for fresh ones.
- 5. Legalize Neighborhood Electric Vehicles -- some models resemble golf carts -- for use on City streets with appropriate restrictions.⁷⁰
- B. Idling Policies
 - 1. Adopt community-wide anti-idling regulations for all vehicles to reduce air pollution as well as to reduce fuel consumption; such regulations should be subject to air conditioning concerns for mass transit passengers and the generation of air pressure for brakes and door operation. Once adopted, aggressively enforce, particularly for buses and heavy trucks.

⁶⁹ National Complete Streets Coalition, <u>www.completestreets.org</u>.

⁷⁰ "Neighborhood Electric Vehicles," U.S. Department of Energy, <u>http://www1.eere.energy.gov/vehiclesandfuels/avta/light_duty/nev/index.html</u>.

- 2. Promote conversion of diesel trucks and other commercial trucks to include a secondary power source (e.g., generator or electric plug-in) to run lights and air conditioning so that the primary engine need not idle to power these functions.
- C. Land Use, Zoning, and Urban Growth
 - 1. Commit to a growth pattern that supports mixed-use developments that are compact and sustainable with convenient accessibility for biking and walking.
 - a. Carefully weigh the long-range cost and benefits as well as indirect impacts (e.g., more miles driven) of extending new infrastructure (e.g., roads and sewers) in undeveloped areas.
 - b. Identify potential neighborhoods throughout the city where limited mixed-use zoning might be authorized to attract small neighborhood-scale retail, professional, and civic services where these services would be beneficial and are not now within walking distance.
 - c. Establish flexible zoning and other regulations to encourage, in appropriate locations, the types and number of housing units that could make neighborhood-scale retail, professional, and business services financially feasible.
 - 2. Continue to preserve vacant zoned industrial and manufacturing land for future development, particularly in areas that already have rail access or are close to major roadways or to inter-modal transport facilities.
 - 3. Continue to evaluate the City's existing zoning and subdivision regulations with a view to encouraging energy efficiencies along with flexibility and support for opportunities for innovative design as well as the adaptive reuse of existing older structures, including residences.
 - 4. In order to expand housing choices, to reduce housing inefficiencies, and to promote compact development objectives, revise the maximum density regulations, allowing second dwelling units in single-family residences, sometimes referred to as "granny flats."
- D. Public Transit Policies
 - 1. Continue to work with local and regional partners (e.g., Topeka, Kansas City, Johnson County, and Mid-America Regional Council) to enhance and promote services that integrate public transit into a regional transportation plan.
 - a. In conjunction with a regional transportation plan, develop park-and-ride lots (including consideration of existing lots for this purpose).

- 2. Provide "transit prioritization traffic flow," a system providing signal prioritization for buses as well as for emergency vehicles. (e.g., Opticom GPS System).⁷¹
- 3. Encourage the Lawrence School District to develop programs or support for families with school age children to safely walk or bike to school (e.g., walking school buses).
- 4. Promote existing public transit with an employer/commuter financial incentive program. Commuter choice programs offer federal tax incentives or employee-paid pretax benefits for public transportation.⁷²
- 5. Increase funding to improve the City's public transit service. Possible sources include federal and state funding for operation as well as for capital expenses; additional taxes; assessment districts; and public-private partnerships.
- 6. Continue to add new or replace older diesel buses with alternative fuel-using vehicles such as electric, hybrid-electric, and natural gas.
- 7. Use the Internet and related technologies to ensure on-time coordinated bus service and to provide easy to understand and readily accessible scheduling information.
- 8. Create innovative pilot programs to expand transit ridership. Such programs might include:
 - a. Free or reduced fare zones for downtown or other major activity destinations such as the South Iowa Street or 6th Street commercial corridors or the KU campus
 - b. Special transit "circulator" service (e.g., shorter run times and small service area) that connects downtown and the KU campus; South Iowa Street businesses; and other areas of the city, as needed
 - c. Continuation and expansion of special transit promotions such as fare-free days and free transit service for special events (e.g., KU sports and fireworks displays)
 - d. Incentive transit-pass programs that allow businesses and neighborhoods to buy annual passes in bulk
 - e. In partnership with Johnson County, expanded K-10 Connector service directly to downtown Lawrence as well as weekend and special events service (e.g., KU sports)

⁷¹ Opticom GPS System, <u>www.gtt.com/Products/OpticomGPSSystem</u>.

⁷² CommuterChoice, <u>http://www.commuterchoice.com/index.php?page=employers&sub=employers_supporting</u>

- f. Using City, state, or federal funding to establish a taxi voucher program for certain eligible population groups (e.g., elderly, disabled, low-income) similar to the Manhattan, Kansas, program that has been in operation for more than 20 years⁷³
- E. Parking
 - 1. Reduce the number of automobile parking spaces required per development.
 - 2. Grant planning and zoning credit for on-street parking adjacent to development to satisfy required off-street parking standards.
 - 3. Provide businesses with an in-lieu-of option to mandatory parking requirements (e.g., providing transit passes, supporting alternate transportation modes for their employees, or providing shared parking).
 - 4. Increase bicycle parking opportunities.
 - 5. Expand the bicycle parking space provisions for City-owned facilities and commercial, multi-family and industrial developments, including priority locations nearest to building entrances.
 - 6. Create a resident parking program for neighborhoods surrounding the KU campus.
- F. Biking and Pedestrian Policies
 - 1. Make bicycling safer, easier, and more secure through increased street safety measures, bicycle security, and bicycle access including the following measures:
 - a. Continue to designate and provide signage for routes and trails.
 - b. Continue to expand the on-street bicycle lane network with well-marked lane striping.
 - c. Where feasible, develop and maintain off-road trails or provide physical barriers separating cyclists safely from auto traffic.
 - d. Continue to actively monitor and repair potholes and other damaged road surfaces in bicycle lanes.
 - e. Assure coherent pedestrian and bicycle signage and way-finding as well as adequate lighting for safety.

⁷³ "Manhattan, Kansas, Taxi Voucher Program," <u>www.ci.manhattan.ks.us/index.aspx?NID=282</u>.

- f. Continue to review and enforce bicycle safety standards, including those involving safety equipment (e.g., reflectors and lights visible from front, side, and rear).
- g. Re-engineer vehicle pavement loops to detect bicycles in left-turn lanes and at demand-actuated traffic signals.⁷⁴
- 2. Promote workplace policies that encourage employees to bicycle and walk.
- 3. Establish a goal to become a Bicycle Friendly Community designated at the platinum level by the League of American Bicyclists.⁷⁵
- 4. Establish a goal and implement a policy of adding two miles of bicycle lanes and one mile of side paths a year. As the policy prompts greater bicycle use, increase the goals of miles per year.
- 5. Review and modify laws and policies affecting bicyclists, and ensure that effective procedures are in place for handling violators and for training law enforcement officers.
- 6. Plan for and aggressively pursue funding for bicycle facilities in anticipation of emerging demand for increased bicycling for utility purposes (e.g., school, work, and shopping).
- 7. Close the gaps in bicycle lane networks and pedestrian sidewalk networks.
- 8. Implement the bicycle facilities network as equal with motorized transportation modes, in stand-alone projects and in conjunction with roadway construction and reconstruction.⁷⁶
- 9. Provide adequate bicycle parking facilities in locations that minimize the threat of theft or vandalism.
 - a. Install bicycle lockers and bicycle locker membership programs for high volume biking destinations (e.g., downtown).
- 10. Implement a bicycle-sharing program for renting a standardized bicycle either by key card, daily pass, or subscription, at locations such as the Amtrak station, colleges, and shopping centers.⁷⁷

⁷⁴ "Bicycle Detection Program: Santa Cruz, California," <u>www.bicyclinginfo.org/bikesafe/case_studies/casestudy.cfm?CS_NUM=707</u>; Steven G. Goodridge, Ph.D., "Detection of Bicycles by Quadrupole Loops at Demand-Actuated Traffic Signals," <u>www.humantransport.org/bicycledriving/library/signals/detection.htm</u>.

⁷⁵ "League of American Bicyclists: Bicycle Friendly Community," www.bikeleague.org/programs/bicyclefriendlyamerica/communities.

⁷⁶ "United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations," 11 March 2010, <u>www.dot.gov/affairs/2010/bicycle-ped.html</u>.

- 11. Continue to upgrade and expand the City's existing network of sidewalks, and continue to require that sidewalks be included as part of the future construction of all arterial and collector streets in the city.
- 12. Continue to improve pedestrian crossings with countdown signals and similar technologies to improve pedestrian safety.
- 13. Assure the provision of adequate pedestrian amenities (e.g., seating, drinking fountains, restrooms) in active pedestrian areas.
- 14. Evaluate neighborhoods on their degree of accessibility to transportation options and services and use this rating system to encourage the development of more walkable and bikeable connectivity.
- 15. Utilize the model codes from the Rocky Mountain Land Use Institute⁷⁸ for bicycle and pedestrian mobility systems and public transit.
- G Carpooling and Car Sharing
 - 1. Develop and use park-and-ride lots (including consideration of existing lots for this purpose). Develop park-and-ride lots that support trips of 20-plus miles to support trips to Topeka and to locations in the Kansas City area.
 - 2. Promote, support, and use car-sharing opportunities such as Zipcar⁷⁹ and Smart Jitnev⁸⁰ and implement messaging and education strategies that encourage residents to use shared vehicles.
 - 3. Encourage state officials in charge of the state vanpool program to allow Lawrence non-state-government employees working in Topeka to utilize the program.
 - 4. Encourage fellow residents and volunteer organizations to consider establishing reliable ride services for their friends or organization members or others in need of infrequent transportation assistance (e.g., elderly or disabled).
- Freight Travel H.
 - 1. Support and facilitate the efficient movement of freight and prudent infrastructure investments that would support freight operations.

⁷⁷ SmartBike, <u>www.smartbike.com</u>. "Unchain Bicycle Sharing," http://daily.sightline.org/2011/08/18/unchain-bike-sharing/

⁷⁸ "Sustainable Community Development Code and Reform Initiative," Rocky Mountain Land Use Institute, http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code. ⁷⁹ Zipcar, <u>www.zipcar.com</u>.

⁸⁰ "Smart Jitney: A Modest Proposal," Community Solutions, <u>www.communitysolution.org/rideshare.html</u>.

- 2. Support the establishment of multi-modal freight facilities.
- 3. Encourage rail to serve industrial clusters and provide service for moving agricultural products from farms to elevators and to urban centers.
- 4. Encourage freight vendors such as individual trucking and rail companies to use efficient, coordinated, and sustainable transportation technologies to reduce travel.
- I. Alternative Fuels and Improved Fuel Efficiency
 - 1. Support innovative efforts to develop alternative fuel sources, including natural gas and electric motors.
 - 2. Support the creation of governmental/non-governmental entities to locate charging stations for electric vehicles and plug-in hybrid vehicles. If feasible, facilitate the permitting of solar photovoltaic panels or urban-scale wind turbines in such stations.
 - 3. Work with Westar Energy to facilitate "smart garage" programs, with smart meters and electric vehicle charging stations located in home garages.
 - 4. Provide incentives for using for electric vehicles and plug-in hybrid vehicles, including designating special reserved parking locations or parking ticket abatement.

Emergency Response Guidelines

The County/City *Local Emergency Operations Plan* specifies that during "Incidents of Critical Significance," transportation needs will be overseen by an Emergency Support Function (ESF) group:

ESF-1 Transportation

Primary Agency: Douglas County Public Works Department Responsible for coordinating countywide transportation support to local governments and voluntary organizations. Support includes, but is not limited to the following:

- Overall coordination of transportation assistance to other emergency support functions, local governments, and voluntary agencies requiring transportation capacity to perform emergency response missions.
- Prioritization and/or allocation of county transportation resources.
- Processing transportation requests from county, municipal, and voluntary agencies. This ESF will coordinate evacuation transportation as its first priority.
- Operational coordination of ground, air, and rail.

The *Local Emergency Operations Plan* further specifies that "[e]ach agency, department, or organization with responsibilities under this plan will develop and maintain written guidelines for carrying out their assigned tasks. Those Standard Operating Guidelines, policies, and practices will be considered supplements to this plan."

As the Emergency Support Function dedicated to transportation periodically reviews its plan to

accommodate the changing needs of the community, the Peak Oil Task Force recommends that the plan address the following concerns. The guidelines should address: 1) chain of command; 2) management systems, including coordination, duties and lines of authority – who reports to whom; 3) emergency response actions, including verification of the shortage, fuel reserves and of adequate fuel for essential government and emergency service operations, specific voluntary and mandatory actions to be taken, and monitoring; 4) information and communication systems, including continual public awareness and messaging; and 5) energy conservation strategies.

Examples of "non-mandatory" measures that might be considered from the District of Columbia Energy Emergency Plan include:

- Use of public transportation
- Priority gasoline for vanpools
- Staggered retail service station operating hours
- Work schedule alteration
- Ridesharing
- Bicycle use
- Telecommuting/teleconferencing/videoconferencing
- Vehicle maintenance

Examples of "mandatory" measures to be considered from the District of Columbia Energy Emergency Plan include:

- Minimum fuel purchase
- Odd-even gasoline purchasing
- Mandatory employer ridesharing
- Reduction of public vehicle use
- Compressed workweek
- Mandatory one- or two-day vehicle stickers, eliminating private vehicle use one or two days each week
- Reduced retail hours to reduce the number of trips made to retail outlets

APPENDIX C FOOD RECOMMENDED ACTIONS

Recommended Governmental Actions

- A. City Government Actions
 - 1. Redraw the City's Urban Growth Area boundaries to preserve high quality soils for agricultural uses.
 - A. Encourage brownfield and infill development as alternatives to non-agricultural development of high quality soils.
 - 2. Add edible landscape features, such as fruit trees, nut trees, and community gardens, to City Parks and Recreation horticulture plans.
 - A. Partner in this effort with the local organization Lawrence Fruit Tree Project.⁸¹
 - 3. With the City's waste removal and recycling services currently under study, devise and implement a strategy for gathering and composting food and organic waste for large-scale composting. This compost could provide for soil amendment in community gardens, school gardens, home gardens, and local agricultural producers.
- B. City Partnership Actions
 - 1. Partner with organizations such as the Douglas County Food Policy Council to create a food security plan that sets out goals, policies, and strategies for increasing local and regional food production. Such a plan would create a vision that, over time, would help establish a resilient local and regional food system that takes into account area population-growth projections, area agricultural capabilities, area skilled farmer assets, and the city's shared desire to be a healthy and prosperous community for generations to come.
 - 2. Partner with Douglas County, the Lawrence Douglas County Planning Department, Farm Bureau, and others to establish a mechanism for banking high capability farmland for future needs. With the help of land-trust experts such as National Land Trust, Kansas Land Trust, and American Farmland Trust, explore mechanisms such as the Land Evaluation Site Assessment (LESA), Transfer of Development Rights (TDR), and other planning tools for development and farmland preservation.
 - 3. Partner with Douglas County, Farm Bureau, K-State Extension Office, USD 497, Johnson County Community College, Growing Growers, and similar organizations to

⁸¹ Lawrence Fruit Tree Project, <u>http://lawrencefruittreeproject.wordpress.com</u>.

build vocational training programs targeting food system-related jobs. This agriculturally related business incubator could train new farmers in sustainable agriculture practices, food processing, marketing and distribution, culinary arts, agritourism, hospitality, community education, homesteading skills, and recreation. Such an ambitious project might take the form of an urban edge incubator farm such as the Intervale Farms Program in Burlington, Vermont.⁸²

- 4. Partner with Douglas County Extension Office's Master Gardeners Program and others to begin a Community Gardens Initiative: Continue to inventory vacant City lots that might be converted to sustainable, organic food-producing community gardens; provide incentives for neighborhood gardens such as rain catchment devices and access to City composting; and encourage community garden collaboration with local food banks as a free source of fresh, wholesome food for food-insecure citizens.
- 5. Partner with leadership from local farmers markets to enhance farmers market venues, providing, where possible, permanent facilities with both covered outdoor stalls and indoor stalls for winter and inclement weather. Such enhancements would increase public access to locally grown food throughout the year.
- 6. Partner with Douglas County, K-State Extension Office, Kansas Department of Agriculture, local legislators, and others to devise and implement a system of incentives to strengthen the whole agricultural sector in Douglas County.
- 7. Partner with Douglas County to build a working relationship with the State of Kansas and with neighboring cities in the northeast region to work toward a sustainable, regional food system. As with economic development initiatives, it holds true that working toward a regional food system will only strengthen the local food system. In light of the world's changing food future, it would be in the City's interest to have well-established relationships with other food planners and food producers in the region for a proactive, collaborative approach to planning a resilient food system for the years ahead.
- 8. Partner with the City-County Sustainability Coordinator, the Douglas County Extension Service, and others to help coordinate and promote citizen-education opportunities regarding gardening and other aspects of a sustainable food supply.

Recommended Non-Governmental Actions

- C. Grow food organically in home gardens and consider permaculture, "edible landscaping," and/or chemical-free techniques to decrease use of fossil fuel-based fertilizers and pesticides in lawn and garden activities.
- D. Participate in the City composting program. Compost kitchen waste for home garden use.

⁸² Intervale Farms Program, "Creating Opportunities for New Farmers," www.intervale.org/programs/agricultural_development/intervale_farms.shtml.

- E. Within existing zoning and covenant restrictions, organize neighborhood composting and neighborhood sustainable, organic gardens.
- F. Support local food producers through farm stands, farmers markets, Community Supported Agriculture (CSA) subscriptions, and Buy Local programs.
- G. Encourage school garden and Farm to School programs in USD 497 to supply fresh, wholesome food to schools.

Emergency Response Guidelines

In the event of a full-scale disruption of the community's food supply, communication of foodrelated news and coordination of food distribution efforts will be key. In the short term, Emergency Management Services should be alerted for management of such a crisis. Large-scale food preparers such as schools and restaurants may need to route unused or unwanted food supplies to local food banks for immediate distribution. In the longer term, if a sudden shift in the food system were to occur, the City may need to consider large scale food production on City-owned open land such as vacant lots, golf courses, and recreational fields if privately owned agricultural land is not readily available.

Of course, there is no practical path to quickly grow a community's way out of an oil-related food shortage. A city's best response to peak oil is to proactively transition some of its current food system away from reliance on fossil fuel-based production and delivery to a more localized, sustainable, non-fossil fuel dependent system.

APPENDIX D ENERGY DELIVERY RECOMMENDED ACTIONS

Government Solutions for Energy Delivery

Electricity is the most broadly used and main form of energy delivered to homes and businesses in Lawrence. Electricity delivery has local technical solutions in the form of solar electric collectors and wind generators. Because most applications of electricity require noninterruptibility, both of these technologies require electric storage in the form of on-site batteries or electric grid inter-tie. Another option for wind or solar electric backup is an on-site "uninterruptible power source" (UPS), although these systems typically use fossil fuel.

Black Hills Energy Corp. delivers natural gas by pipeline to Lawrence homes and businesses. Alternatives for local methane (natural gas) production are limited in their potential, but an existing application is on-site methane collection and use at the Kaw Sewage Treatment Plant (if reasonably collectible amounts remain after the City completes its anaerobic digester upgrade). There is also potential to tap the methane within the Hamm Sanitary Landfill and bottle it. More generally though, response to potential cutoff of natural gas would be addressed within the realm of emergency and social services. There are, however, alternatives to natural gas that can be developed locally, such wood heat, space heating with solar hot air collectors, and water heating with solar fluid collectors.

Recommended Governmental Actions

- A. Partner with the Chamber of Commerce and economic development interests to aggressively recruit businesses engaged in research and manufacturing of renewable energy technologies.
 - 1. Create local incentives such as green tax abatements to attract firms specializing in renewable energy technologies.⁸³
- B. Install shade structures at selective City parking areas and equip them with solarelectric panels to charge batteries of plug-in electric vehicles and plug-in hybrid vehicles.
- C. Adopt code provisions for solar access rights. The code would establish a definition of solar access, specifications for position and height of new construction and tree plantings, a "grandfather" clause for existing structures and trees, solar access code review for new situations, and a mechanism for dispute resolution. Such provisions would guarantee the rights of property owners to south-facing solar access that is clear and unobstructed by newly constructed or remodeled buildings and newly planted deciduous or coniferous trees. At present, the only provisions for such solar

⁸³ "Breaking the Mold in Solar Power," Cnet News, 21 February 2007, <u>http://news.cnet.com/Breaking-the-mold-in-solar-power/2100-11392_3-6161136.html</u>.

easements are voluntary between private individuals and recorded with the Register of Deeds of Douglas County in accordance with KSA 58-3801.

- D. Revise the Subdivision Regulations to require solar access, either by street orientation or building-on-lot orientation, so the longer building axis is orientated facing south.
- E. Establish policies that determine the size and placement of wind turbines based on considerations particular to the functional needs of wind technology, rather than determined by size and height restrictions that apply to satellite dishes, microwave towers, and similar installations.
- F. Revise the Street Tree Planting Policy so that the south faces of buildings are exposed for winter angle solar access and not blocked by tree limbs. (Because the sun is lower in southern sky in the winter, this revision would not mean similar solar exposure in other, warmer seasons.)
- G. Request the Kansas Legislature to institute a renewable energy tax credit for individuals who buy such systems, similar to the federal tax credits and those of many other states.
- H. Renegotiate the Lawrence solid waste contract between Hamm Sanitary Landfill and the City of Lawrence to include provisions for tapping and capturing methane gas for bottling and sales. Proceeds could be shared between both contractual parties, which could offset a portion of Lawrence solid waste fees.
- I. Continue to expand public-private financing tools for renewable energy projects such as the Bowersock Mills hydroelectric North Powerhouse.
- J. Continue to pursue any funding sources (federal, state, or foundations) to implement energy conservation and renewable energy applications on all City of Lawrence facilities.

Recommended Non-Governmental Actions

Individuals and small businesses have few means to influence the larger context of centralized energy delivery. Large-scale energy delivery technologies and resource extraction operations are guided by the decisions of corporations and state and federal legislators and regulatory bodies. Though unable to effect solutions for centralized energy delivery, local individuals and small businesses may be able to reach solutions by creatively adapting to rising energy prices and/or adopting alternative technologies and living patterns.

That said, there are some local businesses that are in a position to implement solutions to the central energy delivery infrastructure, Westar Energy being the most notable (Black Hills Energy Corp. is now a diversified national provider for a seven state region). The Lawrence Chamber of Commerce, though not involved directly in energy delivery, is another entity that might be able to bring its influence to bear on the larger corporate and government energy decisions. And, finally, citizen advocacy groups have greater potential than isolated individuals to influence these larger corporate and government energy decisions.

- K. Westar Energy should implement rebates for ratepayers to purchase and install renewable energy systems that will offset future generation capacity need. An example of rebates by utilities in other states is \$1.50/Watt, not to exceed \$7,500, for residential customers, and \$1.50/Watt, not to exceed \$37,000, for commercial customers.
- L. Buy renewable energy systems for all the benefits that will accrue, even without state tax credits or utility rebates. While the financial payback may be smaller than in some other states, regardless, a payback it is.
- M. Buy uninterruptible power supply (UPS) devices to protect sensitive data and automated systems in the event of temporary power outages.
- N. Prepare an on-site supply of non-perishable food items that will store without refrigeration. These could include root crops, commercial canned goods, home canned goods, freeze dried foods, and similar supplies.
- O. Prepare an on-site supply of flashlights, lanterns, candles, batteries, a solar or crank radio, drinking water, and similar supplies.

Emergency Response Guidelines

- P. In the event of a system-wide and abrupt energy delivery interruption, four distinct emergency responses will be required.
 - 1. First, essential City services that require liquid fuels or electricity must be provided by some means.
 - 2. Second, the Douglas County Emergency Management Department would need to address potential crises in the public and/or private realm.
 - 3. Third, as directed by the Douglas County Local Emergency Operations Plan, the Douglas County Sheriff's Office would need to address potential social unrest or illegal activities due to citizen panic over energy shortages. The Lawrence Police Department would continue to work closely, as it currently does, with the Sheriff's Office and all emergency service providers within the city and county for routine and emergency response situations. In addition to emergency response guided by the Local Emergency Operations Plan, law enforcement cooperation and coordination would be guided by the National Incident Management System (NIMS), a FEMA program designed to provide "a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment."
 - 4. Fourth, Westar Energy would need to implement its internal emergency response

plan.

- Q. In the event of a sudden and multi-jurisdiction interruption of petroleum and other energy forms that includes the City of Lawrence, various city agencies should respond to provide essential services as continuously as possible, to assess the extent of the energy interruption, to secure critical energy reserves and acquire and replenish those reserves, and to maintain safety among the citizenry, especially the most vulnerable population groups. The most notable City agencies involved should be the City Manager's office, Fire and Rescue, Police, Public Works, Utilities, Planning, and the Communications Department. The local media should be apprised of the nature and extent of the crisis and provided information to broadcast to the citizenry about how to best cope with the situation and how the City departments will be responding.
- R. The Douglas County *Local Emergency Operations Plan* of March 2009 delineates "Incidents of Critical Significance," one of which is "Energy and Utilities." For any given such incident, response priorities are established and groups and agencies are identified to perform the relevant needed functions. Appendix A of this Peak Oil Plan contains a synopsis of the *Local Emergency Operations Plan* for a sudden and multijurisdiction interruption of petroleum and other energy forms.
- S. In addition to providing for safety among the citizenry, the Lawrence Police Department should be on the alert for incidents of fuel theft, general looting, or social unrest.
- T. Douglas County Emergency Management officials should meet periodically with supervisory personnel from City and County emergency service providers to review duties and areas of cooperation specified by NIMS and the Local Emergency Operations Plan.
- U. Westar Energy has adopted its own emergency response plan to respond to a major interruption of its coal deliveries. The plan is the Manual Load Shed Plan, and it follows the North American Electric Reliability Corporation (NERC) reliability standards. The Westar Energy Center takes delivery of coal by train in the approximate amount of 7,000 tons per day. It has a stockpile on hand of 30-45 days' worth for electricity generation. If coal deliveries are interrupted, the plan involves voluntary electricity interruption to large users, voluntary conservation by individuals, possible rolling blackouts, use of its on-site stockpile of coal, and the burning of stored fuel oil if needed. Westar can also bring electricity from the Wolf Creek Nuclear Generating Station, as well as from its 300 megawatts of wind capacity, if available.

APPENDIX E WATER, WASTEWATER, AND SOLID WASTE RECOMMENDED ACTIONS

Recommended Governmental Actions

- A. Create incentives for local producers and consumers to reduce solid waste through
 - 1. Volume-based charges for residential waste
 - 2. Development and implementation of guidelines for residential composting
- B. Increase public education programs regarding water conservation.
- C. Reduce fuel consumption through
 - 1. Optimized routing of solid waste collection
 - 2. Reduced number of solid waste pickups
 - a. Such a change would need to take into account the impact of longer-term waste storage at private residences.
 - 3. Increased recycling and composting (to reduce number of pickups)
 - 4. Use of alternative fuel and energy sources (electric, natural gas, fuel cell) for highefficiency vehicles, utility pumps, and lift stations
 - 5. Continued exploration of the potential use of gravity-based systems to reduce energy consumption by the pumping stations
- D. Reduce Lawrence's water consumption (and related energy expenditures) through measures such as
 - 1. Revision of existing City ordinances, codes, and standards as necessary to enhance water-conserving principles
 - 2. Development of a water conservation program
 - 3. Mandating efficient plumbing fixtures and appliances⁸⁴
 - 4. Inspection of City facilities to replace inefficient plumbing fixtures with low-wateruse fixtures

⁸⁴ Dallas Water Utilities, <u>www.savedallaswater.com/pdf/ConservationStrategicExecSummary.pdf</u>; <u>www.savedallaswater.com</u>.

- 5. Implementation of a faucet aerator and showerhead retrofit program⁸⁵
- 6. Implementation of a toilet retrofit program⁸⁶
- 7. Implementation of a water-efficient washing machine program⁸⁷
- 8. Implementation of a pre-rinse spray nozzle program for commercial restaurants, schools and hospitals⁸⁸
- 9. Inverted rates (i.e., charging more per unit for higher use)
- 10. Identification of excessive use to encourage leak plugging
- 11. Adoption of guidelines to encourage graywater use⁸⁹

Recommended Non-Governmental Actions

- E. Reduce wastewater and water usage through
 - 1. Installation of low volume showers, toilets, washing machines, and other water-using appliances at home and at work⁹⁰
 - 2. Landscaping with plants that require little water
 - 3. Use of residential and commercial rainwater catchment systems with the capacity to store rooftop runoff volumes from a 1-inch rain
- F. Reduce solid waste through
 - 1. Implementation of reuse/reduce/recycle waste management at home and at work
 - 2. Support of reduced and/or reusable packaging
 - 3. Support of biodegradable packaging

⁸⁵ "Flex Your Power," <u>www.fypower.org/index.html</u>.

⁸⁶ "Flex Your Power," www.fypower.org/index.html.

⁸⁷ "Energy Star: Clothes Washers for Consumers,"

www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CW. ⁸⁸ Dallas Water Utilities, www.saveda<u>llaswater.com</u>.

⁸⁹ "Graywater: Laws and Regulations," California's Integrated Water Reuse Management Center, www.whollyh2o.org/policies/item/91.html.

⁹⁰ "Flex Your Power," <u>www.fypower.org/index.html;</u> "Flex Your Power," <u>www.fypower.org/index.html</u>; "Energy Star: Clothes Washers for Consumers," <u>www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CW</u>.

4. Composting of yard and food waste

Emergency Response Guidelines

Peak oil situations may require prioritization of resources and needs, affecting times of day or areas of service for water, wastewater, and solid waste services.

Ideally, emergency response plans for disruptions in water, wastewater, and solid waste services already exist. The *Local Emergency Operations Plan* for Douglas County states: "Special purpose jurisdictions (fire, school, drainage, water and sewer, hospital, flood control districts) will develop mitigation, preparedness, response, and recovery planning and capabilities for their own jurisdictions." In that plan, Emergency Support Function #8 (Public Health and Medical Services) charges specified primary agencies (Lawrence-Douglas County Health Department, Bert Nash Community Mental Health Center, Lawrence Humane Society, and Lawrence Memorial Hospital) to "Advise on potable water sources and the disposition of solid waste and wastewater" during times of disaster and emergency. A related charge to the "Douglas County/City Water Departments" is, in the event of a disaster or emergency, to "Restore water service to the disaster area as soon as possible."

⁹¹ Douglas County Local Emergency Operations Plan, www.douglas-county.com/depts/em/preparedness/docs/pdf/emplan_6.pdf; <u>http://www.douglas-county.com/depts/em/em_home.aspx</u>.

APPENDIX F PEAK OIL COMMUNICATIONS PLAN RECOMMENDED ACTIONS

Recommended Governmental Actions

One of the most important roles of local government will be to use *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas,* to inform community members about vulnerabilities of and solutions to peak oil -- particularly if the survey recommended below reveals low levels of community knowledge regarding peak oil challenges, potential consequences, and recommended actions.

- A. Assess community knowledge of and attitudes about peak oil issues.
 - 1. Prepare a knowledge-and-attitudes survey that could be administered to community groups.
 - a. Seek area university support for this survey.
 - b. Tabulate responses to assess community knowledge of and attitudes about peak oil issues.
 - 2. Review findings from knowledge-and-attitudes survey to help shape the content of peak oil communications.
- B. Inform citizens about potential peak oil-related challenges; guide community on how to respond and prepare.
 - 1. Create a City peak oil website; post this report on the website.
 - a. Announce the site through a news release to city news media.
 - b. Publicize the presence of the site through existing City-citizen communication systems.
 - c. Expand site content as locally relevant peak oil news emerges (for example, the formation of neighborhood food gardens).
 - 2. Prepare an inexpensive brochure that concisely describes basic peak oil challenges and solutions. The brochure could direct readers who seek more information to the City's peak oil website.
- C. Incorporate a summary of Lawrence's peak oil challenges and recommended actions into an <u>inexpensive</u> public-information campaign with a slogan, logo, and related educational materials.

- 1. Include recommended business actions (both ongoing and emergency responses) in educational materials.
- 2. Include recommended individual actions (both ongoing and emergency responses) in educational materials.
- 3. Seek area university creative support for such a campaign.
 - a. Journalism 676: Strategic Campaigns courses at the KU School of Journalism and Mass Communications have accepted government agencies as clients in the past. The goal of Journalism 676 is to prepare a communications campaign and sample communications materials for a designated client.
- D. Integrate key challenge and solution messages into current City-citizen communication systems.
 - 1. Include in relevant speeches and presentations by City officials.
 - 2. Include in billing statements.
- E. Include peak oil references in relevant City plans and strategy statements.
 - 1. Ensure that new City planning documents and processes acknowledge, as appropriate, peak oil challenges and recommended actions.
- F. Create and publicize a peak oil speakers bureau for media and community group appearances.
 - 1. Develop list of key, clearly expressed challenges.
 - 2. Develop list of key, clearly expressed ongoing responses that should begin now. (The top recommendations from this report could help constitute such a list.)
 - a. Such responses should be for organizations as well as individuals.
 - 3. Develop list of key, clearly expressed emergency actions.
 - a. Such responses should be for organizations as well as individuals.
 - 4. Create a PowerPoint presentation that specifies challenges and recommended responses.
- G. Encourage area media to begin in-depth coverage of *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas.*
- H. Enlist the help of the Chamber of Commerce and related groups to present challenges

and proposed responses to community businesses and business leaders.

- 1. Approach groups such as Leadership Lawrence and the Rotary Club.
- I. Encourage area energy-supplying companies to help promote knowledge of *Solutions to Peak Oil Vulnerabilities: A Response Plan for Lawrence, Kansas.*
- J. Seek communication assistance from community groups.
 - 1. Ask local nonprofit organizations that are already are addressing different aspects of sustainability to discuss this plan and related peak oil issues with their members and in their outreach efforts.
 - 2. Identify other key groups that could assist in education and outreach, including neighborhood associations, churches, fraternal organizations, and similar groups.
 - 3. Ask these community groups to help disseminate prepared challenge and response information and to serve as information centers during peak oil emergencies.
- K. Meet with school board to see if peak oil information could be integrated into school curricula.
- L. Offer individual-response brochures at area gas stations.
- M. Encourage City communications officials to publicize successful responses to peak oil challenges through the proposed website, news releases, and other media.
- N. Create a system of competitions and awards for exemplary peak oil responses.
- O. Evaluate the success of peak oil messages.
 - 1. Develop an evaluation sheet for presentations.
 - 2. Monitor traffic to peak oil website.
 - 3. Re-administer the knowledge-and-attitudes survey one year after the implementation of the above tactics to assess levels of community knowledge and attitudes.

Recommended Non-Governmental Actions

- P. Join a neighborhood association.
 - 1. In peak oil-related emergencies, such organizations ideally would assist in communication of problems and responses.
- Q. Gain familiarity with Solutions to Peak Oil Vulnerabilities: A Response Plan for

Lawrence, Kansas, and the City's peak oil website.

- R. Offer to assist with citywide communication of peak oil challenges and solutions. Communication functions specified within this report include:
 - 1. Survey preparation, administration, and interpretation
 - 2. Public-information campaign preparation and administration
 - 3. A speakers bureau
 - 4. Possible preparation of a peak oil school curriculum
 - 5. Distribution of materials to neighborhood associations and community service groups
 - 6. Preparation of possible competition and awards programs for exemplary peak oil responses

Emergency Response Guidelines

- S. In a peak oil-related emergency, the City should consider the following communication actions.
 - 1. If energy resources allow, use the peak oil website for community response guidelines.
 - 2. Use low-tech delivery information-delivery systems (e.g. face-to-face and/or paper).
 - a. Use public schools, libraries, churches, and community-service organizations for distribution of information.
 - b. Identify liaisons within each group to receive messages and coordinate distribution of those messages.
 - 3. Seek support of neighborhood associations for message distribution.
 - a. Identify liaisons within each group to receive messages and coordinate neighborhood distribution.

Addendum: Possible Solutions Messages to Citizens⁹²

Increase your self-sufficiency for transportation, shelter, and food through the following actions:

⁹² This list includes messages from the San Francisco Peak Oil Preparedness Task Force Report, March 2009, www.sfenvironment.org/downloads/library/peakoil_final_report.pdf; www.sfenvironment.org.

- 1. Reduce dependency on cars.
- 2. Acquire a reliable bicycle.
- 3. Use community mass transportation.
- 4. Buy locally.
- 5. Use less heating fuel, living with the thermostat lower and taking shorter and less frequent showers.
- 6. Increase the insulation of your home.
- 7. Explore sharing garden produce, meals, and other resources.
- 8. Join a neighborhood association and other community organizations.
- 9. Decrease reliance on imported foods; increase reliance on locally produced foods.
- 10. Begin a household garden and/or participate in a community garden.
- 11. Begin a composting process.
- 12. Learn about canning and other food-preservation techniques.