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## The End Of Cheap Oil

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The issue of energy has been looming like a storm cloud on the horizon for over 30 years. North American society's understanding of energy supply and demand has been distorted, because we have had a virtually uninterrupted supply of cheap energy for several generations. Cheap energy has powered the manufacturing, automotive, home heating, agricultural and construction industries. In fact, North American prosperity has been fuelled by an abundant supply of cheap energy.

The facts about oil supply, our primary energy source, have been known for some time. The body of literature on oil supply is very compelling, but seldom makes the bestseller list. What is really surprising is the silence from the mainstream media and our elected officials about this enormous issue that has been bearing down on us for decades. The amount of oil in the earth has been estimated by international bodies to be 2 trillion barrels. In the past 140 years since initial oil production in 1860, we have used half of the world's supply, leaving approximately 1 trillion barrels. The current rate of oil consumption is 27 billion barrels a year which, when you do the calculations, leaves just 37 years of supply.

In addition to running out of our prime energy source by 2041, there are other commonly asked questions to consider when planning for the future:

1. Isn't there still lots of oil left? The "low hanging fruit" has already been picked: the remaining oil will be harder and more dangerous to extract. When it costs a litre of oil to retrieve a litre of oil, the economics of the situation will shut production down, leaving the most difficult sources untapped. In the meantime, extraction costs will continue to drive up prices.

2. Isn't this just another blip—remember the 1970s? The estimate of 27 billion barrels per year is based on current demand; this does not include the rising demands of the emerging industrial giants, China and India, or the ever-increasing demands of developed nations. Their initial demands have already sent prices higher and they are only starting to develop. China's oil imports doubled from 1999 to 2004 and surged a further 40 percent in 2004 alone. Both China and India already have frequent brownouts because of short supply and priorities given to industrial use. The irony in China is that workers can afford air-conditioners for the first time, but power is often not available to run them.

3. Why doesn't the U.S. increase its energy production? When President Bush says that the United States must increase its energy production, he does not mean that more should be pumped out of U.S. soil, since this oil source has been dwindling for years. What he means is there should be more refineries to process oil from "Somewhere Else." Limited new oil and gas finds will occur, but on a small scale; there has not been a major oil find since the 1960s. U.S. production peaked in 1970 and has been declining ever since. The world has been carefully mapped and explored for fossil fuel for some time. Canada has already passed its peak natural gas supply point, while the United States passed its back in 1973. Supplies are being depleted and costs are steadily rising. Under Free Trade, Canada exports two thirds of its gas stocks to the U.S. annually. To make matters worse, 95 percent of nitrogenous fertilizer is made from natural gas. The effects of declining fossil fuel supplies mean that the cost of food will rise due to increased production, transportation and plastic packaging costs.

4. Why not just increase production and open the taps? Oil pumping facilities worldwide are already working at maximum capacity to keep up with demand. Saudi Arabia, the world's largest producer, is working flat out to pump as much oil out of the ground as it can in order to meet its U.S. commitments and the increasing demands of emerging economies. In addition, increased use of fossil fuels will generate more climate-altering carbon dioxide. As energy scientist Dan Kammen states, "We're running out of atmosphere faster than we're running out of fossil fuels. The more we diversify the better" (National Geographic, August 2005, p. 19).

5. Why can't alternative energy sources replace current oil supplies? Fossil fuels have met the growing demand for energy because they concentrate millions of years of the sun's energy in the growing of plants that became fossilized into a compact form. We will not find this type of source again on this planet. The replacement of fossil fuels by alternatives such as solar, wind, geothermal, biomass (wood, corn, alcohol), hydrogen and nuclear fission is not yet a viable alternative. Even if we were to use all of these sources combined, with present-day technologies they do not even come close to providing the energy we derive from oil. To vastly expand solar, wind, and nuclear sources, not counting planning and political delays, it would take at least 40 years to match our present-day consumption of oil. We must also anticipate that there are days when the sun does not shine and the wind does not blow. And with nuclear waste already a serious storage problem, this problem will only get worse. Estimated current supplies of uranium will only last for another 50 years, so nuclear fission is far from renewable. It should also be noted that free and clean energy from hydrogen is a misconception. Hydrogen is not a source of energy; it has to be freed through the use of electricity and at present it takes more energy than it gives back to do this. While BMW is planning to launch a

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top-of-the-line 7 Series dual-fuel vehicle (gasoline/hydrogen) in 2008, hydrogen filling stations have yet to appear. The efficient hydrogen-powered car is still to be produced, although some fuel cell buses are running in Europe on hydrogen from renewable sources. We must also keep in mind that the electricity to create hydrogen must be produced by hydroelectric, coal-burning or nuclear plants and that significant safety issues regarding the explosive nature of hydrogen storage need to be addressed—remember the Hindenburg?

It has been projected that if we were to implement radical change tomorrow with energy-efficient vehicles, buildings and systems oil dependency in the U.S. could drop to zero by 2050. The catch here is that current oil supplies are forecast to last only 30 to 40 more years and this is at today's current consumption rates without factoring in rapidly increasing demand from China and India.

Do we really get it? Energy is topical now because of increased oil prices due to hurricanes: supply-side economics has made the front pages. The cost of oil has been news before and then gone away—remember the 1970s? Sport utility vehicles are still a dominant factor in the automotive industry in spite of rising costs; and the list of conveniences such as wine fridges and power-wash systems in the weekend flyers testifies to our complete, mistaken, belief that cheap energy will be there to run them. Let's not kid ourselves; when Chevron, one of the world's largest oil refiners, runs a two-page advertisement at the beginning of the September 2005 issue of Scientific American saying, "It took us 125 years to use the first trillion barrels of oil. We'll use the next trillion in 30 years," we know the word is definitely out.

Why, when given all of the facts, do we react only when the problem is upon us? One answer would be that the problem is so enormous. Without clear solutions, there is a form of mass denial. No politician will risk being the doomsayer. A second answer is that until people actually experience the cost of energy increase in their wallet, they won't take it seriously. Witness the the significant downward sales drop post-Katrina and Rita. And yet the cost of oil was already rising steadily with these facts on the table long before these two hurricanes struck.

While this may sound like the harbinger of a new Dark Age, there are things we can and must do to ameliorate the coming problems. We need to understand that the next 25 years for planning will be very different from the last. Planners are in a unique position to help mobilize ideas and resources to start addressing the scope of such enormous change. Planners are supposed to see the big picture and understand ways of protecting the "public good." It is not enough to simply defer to other specialists in the hope that they will find the solution. No one has a solution at present. For example, planners in the past were often focused on policy documents and the creation of land-use diagrams to guide future development. Newly built communities frequently fell well short of everybody's expectations. The details of built form were left to other specialists who had other interests and lacked the broader context of societal needs. More recently, where planners play key roles in the design and development of new communities by direct participation and through the organization of multidisciplinary teams which transfer essential design ideas into enforcement policies, we have seen a marked improvement.

As planners we have already heard about the importance and need for designing our living areas in compact and diverse ways so that we can reduce energy demand, support transit and provide employment opportunities close to mixed-use communities. While much of the energy issue is tied to international dynamics, many of the solutions lie in changing our habits at home. Some municipalities have tentatively started to implement these ideas while many others are still debating the very need to make changes. City areas are going to have their share of problems, but it is lower-density, postwar suburbs that are going to shoulder the burden of these changes. If municipalities have not already started to address these basic steps, it means that the chances of success are diminished and a reactive response can only try to catch up to the problem. The implications of running out of cheap energy, coinciding with major public health issues and an aging population go well beyond our previous expectations of responding to societal change and needs. Planners must start thinking and planning for new imperatives.

The Urban Land Institute in conjunction with Pricewaterhouse Coopers has just published its 2006 Emerging Trends in Real Estate for the U.S. market. This annual publication is the gold standard in real estate predictions. It is written primarily for bankers, investors and financiers as well as developers and builders. Seven key trends for the next four years are:

Focus on Infill: sprawl and traffic reach a crisis stage; places without mass transit struggle; transit-oriented development gains momentum to expand light rail and reduce car dependence; boomers and echo boomers will continue to dictate trends toward more infill.

More Suburban Mixed Use: urban town centres will be the rage; big-lot housing becomes a thing of the past; people want to live in places where they can shop, work and play.

Greater Energy Efficiency: an extended period of sticker shock at the pump and jaw-dropping utility bills would change behaviours and demand for both home and commercial owners, reinforcing move-back-in and town centre trends; developers will need to stress more "green" development and rehab as tenants resist higher electricity and heating tabs.

These items are all new to the top seven list.

The depletion of cheap energy is giving rise to ideas of how to reduce demand, encourage alternative energy sources, rank the success of innovative approaches and educate the public so that they can make more informed choices and ask for appropriate action. Planners are probably aware of the recent initiative in energy conservation through "Leadership in Energy and Environmental Design" (LEED) as a ranking system of efficiencies for buildings. While this is an important step, it should go beyond the building and be applied to entire community areas. Performance is rated in terms of smart growth, urbanism and green building. The energy savings in a well-designed community can promote efficiencies in the following:

\* Energy: reducing need and improving alternatives. Use the full range of alternatives and reintroduce smaller power generators such as the hydro facilities that used to operate

throughout Ontario.

\* Building Design: go beyond R-2000 to incorporate new efficiencies through orientation, solar gain and landscape design.

\* Water: conservation measures, greywater reuse, building and landscaping options, including xeriscaping.

\* Transportation: improve live/work relationships, reduce distance demand, support transit, pedestrian networks, compact multi-use streets and reduce impervious pavement areas.

\* Storm Water Management: capture roof runoff, maximize on-site infiltration, increase parkland natural elements, create storm water corridors, preserve natural topography and integrate storm water facilities in open space areas.

\* Urban Design: build upon smart growth initiatives, integrate mixed uses through higher density with greater urban character, better utilize natural systems, improve live-work relationships, improve and support transit as alternatives to auto use, increase community uses within a 5-minute walk, provide options and packages in buildings and landscaping that promote energy conservation and biodiversity, enhance natural traffic calming and define neighbourhoods with clear centres and edges.

Only through a holistic approach of sustainable practices can longer-term savings be realized while at the same time creating livable and environmentally responsible places that are cherished and cared for by their residents.

A community-based LEED review would be judged on four categories:

1. Location efficiency
2. Environmental preservation
3. Compact, complete and connected neighbourhoods (urban design)
4. Resource efficiency.

The broader approach of testing the efficiencies of energy-smart communities gives planners and community builders the information they need to make wise choices and set the new standards and policies that will become more necessary as the increasing cost of energy continues to change the needs of society. With education about the facts, homeowners may one day opt for the \$5,000 upgrade to install solar panels instead of granite counter tops.

Some would say that the solutions to energy shortages lie in today's proven technologies such as "clean coal" and nuclear sources. While these technologies may help to address the needs, significant challenges remain.

It may be that smaller steps using alternative sources such as solar, wind, geothermal and biomass are necessary; each has significant planning impacts. For example, passive solar collection will require specific alignment of all new street and block configurations, as well as a return to more traditional forms of energy saving designs. Wind generators in Europe produce 35,000 megawatts of power, but those in North America produce only 7,000 megawatts. Locations for wind turbines are already hotly contested in Ontario, even though it is one of the cheapest alternative energy sources. Geothermal can add up to \$10,000 per unit on a multistorey building. Biomass production, such as wood and corn, means increasing farm production well beyond today's current levels. It has been estimated that if ethanol from biomass were used instead of oil to power the vehicles in the world today, it would require doubling the amount of land for farming.

Reducing the demand for energy is one of the best means of saving fossil fuels. It is a fact that 5 percent of electrical power is wasted just on keeping electrical devices like computers on standby. It is also a fact that only 10 percent of original fuel energy (coal) consumed by a power plant reaches the end-user because of mechanical and electrical delivery loss. The savings which could be generated by shutting off unnecessary equipment when not in use actually means a significant reduction in fuel consumption back at the production source.

It has taken 150 years of cheap energy to fuel the world's economy to its present level. In that time the world's population has multiplied to 6 billion with 75 percent of its population living in urban areas. Our dependence on cheap energy from oil is four times greater than all alternative sources put together and we only have 30 or so years of it left. There is no question that we need to start seeking new solutions now. There is no silver bullet and miracles are rare. We need to accept the facts as they are and think long and hard now about our choices in the, very near, future.

Dan Leeming, MCIP, RPP, is a partner with the Planning Partnership. Dan is a frequent contributor to the Ontario Planning Journal. This is the first of three articles.

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