

Energy

Rising energy prices in recent years have brought energy issues to the forefront of thinking and planning, from our choice of automobiles and appliances, to the impact energy costs have on our local taxes, and how energy decisions can impact our local landscape. Newfield is unique in that not only will its residents feel the pressures of increased energy costs in their own homes and local buildings, but the town, with its abundant resources such as wood, wind, natural gas, and sunlight, will see its own pressures as these alternative energy sources are developed.

The town of Newfield is blessed with an abundance of natural resources. It has plentiful precipitation levels and abundant water reserves. Much of the open land is forested with maturing 75 to 100 year-old second-growth forests. There is still a fair amount of open tillable farmland. At an average elevation of over 1000 feet and hilltops topping out at around 2000 feet, it has a potentially usable wind resource. The town is also sitting on the northeast edge of the Marcellus shale gas reserve, one of the largest natural gas formations found in recent years.¹

All of Newfield's energy resources will get increased attention in coming years as fossil fuels are depleted and alternative energy sources become mainstream. Oil production in the U.S. peaked in 1970 at 9.4 million barrels per day. By 2005 production had dropped to 4.7 million bpd. It has also been predicted that world oil production will reach its peak of about 100 million bpd within the next 5-10 years, if it hasn't already.² As of 2005 world oil production was 84 million bpd, and it is questionable whether the capacity exists to make it to the theoretical 100 million bpd mark. There may be plenty of oil in the upcoming years, but there won't be plenty of cheap oil as it becomes harder to extract the last half of the peak. At least one prediction is for \$7.00 /gal. gasoline by 2010 and a mass exodus of vehicles off of American highways by 2012 (some 10 million fewer than there are today) as vehicles become less affordable to drive for people of lower incomes.³ This prediction was before the current recession and the resulting cheaper fuel prices, so the time frame will be shifted outward, but the fact remains that the era of cheap fuel is over.

Since our economy is directly connected to the price and availability of oil⁴, affecting everything from driving habits to the price of fertilizer and the end products in the supermarkets and department stores, higher fuel prices will have profound effects on our lives. The first of these changes will be the most noticeable as energy production will move from a more distant, impersonal level to a more local and locally visible level. Some of the energy resources available locally and how they concern town planning will be explained further.

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- 1 "The U.S. currently produces roughly 30 trillion cubic feet of gas a year, and these numbers are dropping. According to Engelder, the technology exists to recover 50 trillion cubic feet of gas from the Marcellus, thus keeping the U.S. production up. If this recovery is realized, the Marcellus reservoir would be considered a Super Giant gas field." Unconventional natural gas reservoir could boost U.S. supply, Penn State Live, <http://live.psu.edu/story/28116>
 - 2 Crude Awakening by Kevin Drum, Washington Monthly June 2005, <http://www.washingtonmonthly.com/features/2005/0506.drum.html>
 - 3 Heading for the Exit Lane by Jeff Rubin, CIBC World Markets StrategEcon June 26, 2008, http://research.cibcwm.com/economic_public/download/sjun08.pdf
 - 4 "Our industrial societies and our financial systems were built on the assumption of continual growth – growth based on ever more readily available cheap fossil fuels. Oil in particular is the most convenient and multi-purposed of these fossil fuels. Oil currently accounts for about [43% of the world's total fuel consumption](#) [PDF], and [95% of global energy used for transportation](#) [PDF]. Oil and gas are feedstocks for plastics, paints, pharmaceuticals, fertilizers, electronic components, tires and much more. Oil is so important that the peak will have vast implications across the realms of war and geopolitics, medicine, culture, transport and trade, economic stability and food production. Significantly, for every one joule of food consumed in the US, around [10 joules of fossil fuel energy](#) have been used to produce it."

Energy Bulletin: Peak Oil Primer, <http://www.energybulletin.net/primer>

Solar energy has enjoyed technological advances in recent years. Solar {spell out} (pv) panels for electrical generation once had the reputation of using more energy for their manufacture than they could pay back in their operating life. That has changed; now the energy payback period for solar pv is 2-4 years with a life expectancy of about 25 years.⁵ A more efficient use of solar energy can be realized, in our area, by converting solar energy to heat instead of electricity. Construction utilizing passive solar gain, solar water heating, and hot water radiant heat using evacuated tube solar collectors are all examples of this. Solar energy may not impact town planning much, other than possible discussions of using solar energy in the town's public buildings, but it will be an increasing source of local power as installation costs drop and panels become more efficient.

Wind energy is a hot topic these days. Newfield recently made the news with its 6-month moratorium on new wind turbine installations. The town has more recently formulated a local windmill law, as has its neighbor Enfield. All of our hilltop areas in Newfield are above the 10.1 m/hr average annual wind speed (at 30 meters height) considered the threshold to be considered for NYSERDA's small wind system's initiative.⁶ The typical residential wind mill is 80 to 121 feet in height and may not create a major visual impact, but doubtlessly be a topic of town discussion as more people become interested in power generation from residential windmills. One person's monument to energy independence will be another person's eyesore. The typical commercial windmill tower stands 213-262 ft. and is 300-400 ft to the highest tip of the blade. Most wind turbines in NY State are rated at 1.5 megawatts, and produce enough energy to supply 740 homes. The proposed wind farm in Enfield called for 10-15 windmills of this size. Besides the visual impact and the generation of clean power, wind energy will have an economic impact on a town. A commercial wind project will increase the tax base. Wind projects have lower impacts on existing services such as water, sewer, and road wear than do other types of developments (such as real estate) and can therefore directly contribute money to the town. For example, the 30 megawatt wind energy project in Fenner, NY, provides the town approximately \$150,000 per year from payments in lieu of tax revenue, and the 11.6 megawatt Madison wind energy project is provides approximately \$30,000 per year for both the Town of Madison and the Madison Central School District.⁷ However, windmills would forever change the looks of our hilltops, and those living near the windmills may have noise concerns.

Geothermal is another source of home heating and cooling energy that will be used more in the future, as energy costs rise. A geothermal heat pump, just as an air source heat pump, extracts heat from outside your home, and brings it inside for heat in the winter. The reverse is done in the summer, extracting heat from inside the house.⁸ Efficiencies of geothermal heating systems can approach 300-600% when the weather is coldest, as compared to air source heat pumps, which have efficiencies in the 175-250% range when the outside weather is cool⁹ Though these systems are somewhat expensive to install, current tax incentives are making them more and more popular, and they are an especially attractive option for new construction. As with solar energy, geothermal energy will not have much impact on town planning, other than the possible discussion of using geothermal energy to heat public buildings.

Biomass is getting a lot of press these days, but has been a fuel source in the Newfield area as long as people have been on the scene. Many people in the town heat at least partially with wood, wood pellets, or corn.

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- 5 PV FAQ's: What is the energy payback for PV?, U.S. Dept. of Energy, www.nrel.gov/docs/fy04osti/35489.pdf
(Note that this is energy payback, not the payback for an installed system including installation costs. In our area it is still hard to justify, on cost savings alone, a solar pv system installed without government subsidies if it is installed where there is easy access to grid power.)
- 6 See http://www.renovusenergy.com/wind_overview.html and the wind map here:
<http://windexplorer.awstruwind.com/NewYork/NewYork.htm>
- 7 The NYSERDA web site has many informative documents concerning wind energy and town planning here:
<http://www.powernaturally.org/programs/wind/toolkit.asp>
- 8 <http://www.nyserda.org/programs/geothermal/default.asp>
- 9 http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640

“Wood is still the largest biomass energy resource today, but other sources of biomass can also be used. These include food crops, grassy and woody plants, residues from agriculture or forestry, and the organic component of municipal and industrial wastes. Even the fumes from landfills (which are methane, a natural gas) can be used as a biomass energy source.”¹⁰ Much of what we hear in the news lately concerns converting biomass to fuels such as ethanol. There is still an argument as to whether ethanol is a “green” energy source that has more energy than is used to produce it.¹¹ A recent EPA study has suggested that an unintended byproduct of ethanol production is deforestation in places such as Brazil as farmers try to cash in on higher corn prices. “Dan Kammen at the Univ. of California Berkeley...says, for starters, it might make sense to rethink the best way to get energy out of green plants. A study in the latest *Science* magazine, for instance, suggests that liquid fuels like ethanol aren't the best way to go. Better to burn the material to make electricity.”¹² Locally, as fuel prices rise we will probably see much more interest in converting biomass to heat. The “Fuels For Schools” program in the western U.S. Is a good example of a way to decrease school district heating costs through the use of biofuel burners.¹³ If there becomes a local interest in electricity generation using biomass, there will be the potential of a much greater impact on our town. Power plants would use a huge amount of forest products to run. This would provide a market for trees that have little value as lumber trees. While this would provide jobs and a financial gain from our local forests, it will also put more stress on our local forest resources. If done sustainably, we would have a cheap power and heat source forever. If done for short-term gain, the resource will disappear as it did in the 1800's when the forests were cut down for farmland. Locally, the most noticeable negative impact of biomass burning is the smoke from wood stoves and furnaces. Many towns now are regulating installations of outdoor wood boilers. Montreal, Quebec made the news recently as it is looking to ban wood stoves and fireplaces entirely.¹⁴ In the U.S., the EPA regulates emissions on new wood stoves and is in the process of regulating (currently with a voluntary program) emissions of outdoor wood boilers.¹⁵ The New York, DEC is also drafting legislation to regulate outdoor wood boilers.¹⁶ Growth and harvest of biomass for fuel in Newfield is a very likely topic for the planning board.

The impact of the recently discovered natural gas reserves in our area will be mostly on an industrial level as gas companies compete for land leases and space to drill wells. This is another controversial topic. On one hand, gas exploration may mean an economic boon to the area. “In 2008, Penn State University estimated the economic value of the formation at \$1 trillion and that, for every \$1 billion in royalties paid to Pennsylvania residents, nearly 8,000 jobs would be created. In mid-2008, in northeastern Pennsylvania, gas operators were offering landowners as much as \$3,000 per acre and 15 percent royalty over the period of the lease. A landowner with a well on his property could expect to make \$800,000 in royalties during the first year of production.”¹⁷ On the other hand, the drilling process could be an ecological nightmare for years to come for some people. “...state regulators in New Mexico have compiled hundreds of instances of groundwater

10 http://www.nrel.gov/learning/re_biomass.htm, an excellent source for more information on biofuels.

11 For contrasting views see: http://www1.eere.energy.gov/biomass/biomass_basics_faqs.html, and <http://www.news.cornell.edu/stories/july05/ethanol.toocostly.ssl.html>

12 EPA's New Biofuel Regs Could Curtail Industry, by Richard Harris, NPR News May 10, 2009, <http://www.npr.org/templates/story/story.php?storyId=103893530&ft=1&f=1007>

13 A project of the USDA forest service and other parties. See their web site, <http://www.fuelsforschools.info/>

14 Montreal Moves to Snuff Out Wood Stoves, CBS news Feb. 4, 2009, <http://www.cbc.ca/health/story/2009/02/04/mtl-wood-stove-ban-0204.html>

15 <http://www.epa.gov/NE/communities/woodcombustion.html>

16 See DEC's web page on outdoor wood boilers, <http://www.dec.ny.gov/chemical/51986.html> A draft copy of the legislation can be seen here: <http://www.altheating.com/NYCRR247OutdoorWood%20BoilerRegulationsDraft.pdf>

17 Background: Marcellus Shale in Northeastern Pennsylvania, PBS, <http://www.pbs.org/wnet/blueprintamerica/reports/in-the-hills/background-marcellus-shale-in-northeastern-pennsylvania/333/>

contamination resulting from gas and oil drilling. In Colorado, an industry watchdog group has gathered evidence of contamination in 300 cases. And in the Barnett Shale in Texas - the formation geologists consider most similar to the Marcellus Shale - the state has overseen the cleanup of radioactive material dredged up at hundreds of gas drill sites.”¹⁸ New York's DEC recently released its environmental impact statement concerning oil and gas drilling¹⁹ to much controversy. At the heart of the controversy, is the practice of hydraulic fracturing, where up to 3 million gallons of water combined with a proprietary mix of chemicals are injected into each well in order to fracture the shale where the gas is trapped, thereby releasing the gas. The fact that the gas industry has no oversight from the EPA through the Safe Drinking Water Act, and the NYSDEC has only 19 inspectors in place to oversee the more than 13,000 current drilling sites in the state²⁰, has many people concerned with the possible effects the drilling industry may have on water quality in the state. The EPA has recently launched a new study on hydraulic fracturing²¹, and also recommended that NY State do a broader study of the potential environmental impact that drilling will cause before reviewing more permits to drill in the Marcellus Shale.²² With two town wells serving residents in the town, and town roads that stand to be affected by heavy drilling equipment, Newfield would be well advised to take an active interest in the well drilling process in the future. Residents with questions concerning drilling can get some local information concerning gas exploration and concerns from the DEC web site²³. Cornell Cooperative Extension also has very comprehensive site dealing with all aspects of natural gas exploration and drilling²⁴.

Any future energy policy will include conservation, recycling, and reuse. As long as energy is relatively cheap, we in the US are poor at energy conservation. We currently have per capita energy use that is more than 2 times that of Europe, more than 6 times that of Central and South America, and more than 4 times the per capita average of the world.²⁵ Higher energy prices will drive conservation measures, so we will, no doubt, be forced to be better at energy conservation in the future. One way to conserve energy is through the use of recycled and reused products. Recycled aluminum saves 95% energy over virgin aluminum, recycled glass 50% over virgin glass, and recycled paper 60% over virgin paper.²⁶ For example, the use of aluminum shingles instead of asphalt to re-roof a residential building can make a difference. The aluminum shingles themselves save energy if they are made of a high recycled content. They may have a high reflective value on the finish color, making them eligible for “Energy Star” rating²⁷ which can give the building owner a \$1500 tax credit in 2009-2010. The reflective finish will save on the building's cooling costs, and with an expected use life of 50+ yrs., the shingles will save energy by avoiding another roof tear-off and replacement in 15-25 years, the typical life of an asphalt roof. In Newfield, even our annual garage sale is a way to encourage reuse and recycling.

Transportation issues will be another area affected by energy availability and cost. Obviously, it will influence the types of cars we drive, and how much driving we do. On a town level, there may be an increased need for more bus service. This may, in turn, increase the need for more park and ride lots. Tompkins County's comprehensive plan²⁸ calls for the increased use of bicycles to save energy and reduce greenhouse gases. While

18 Natural Gas Drilling: Is New York Ready?, by Llya Marritz, WNYC News, July 22, 2008,

<http://www.wnyc.org/news/articles/104157>

19 <http://www.dec.ny.gov/energy/47554.html>

20 http://www.syracuse.com/news/index.ssf/2009/12/a_fortune_in_natural_gas_lies.html

21 <http://www.propublica.org/feature/epa-launches-national-study-of-hydraulic-fracturing>

22 <http://www.nytimes.com/2009/12/31/science/earth/31drill.html>

23 Landowners Guide to Gas and Oil Leasing, <http://www.dec.ny.gov/energy/1553.html>

24 Natural Gas Development Resource Center, <http://gasleasing.cce.cornell.edu/>

25 Data from Energy Information Administration website, <http://www.eia.doe.gov/emeu/international/energyconsumption.html>, see chart, <http://www.eia.doe.gov/pub/international/iealf/tablee1c.xls>

26 <http://earth911.com/reduce/energy-costs-and-conservation-facts/>

27 See U.S. Dept. of Energy web site for details, http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products

28 <http://www.tompkins-co.org/planning/compplan/index.htm>

it's unlikely that one will ever see a daily rush hour exodus of bicycles heading to and from Ithaca, there will be an increase of bikes, scooters, and motorcycles on the road. If the school system also encourages the use of bicycles with the newer generations of children as a way to promote a healthier and more energy independent lifestyle, there may be town planning issues involved. Local speed limits, bicycle safety, motorist awareness, and bike lanes near the school are all potential topics of discussion.

Man induced climate change due to the burning of fossil fuels and deforestation is a generally accepted fact, these days²⁹. Future energy policy will include incentives to reduce greenhouse gas emissions. Locally, this may include opportunities for owners of forested land to take advantage of carbon credit programs³⁰. This, in turn, may affect town planning as there may be more incentive to retain open forested land rather than clear and fragment it for development.

Increased costs of energy and the need to conserve energy and decrease carbon emissions will make local sources of products and food more cost efficient. Newfield has an excellent source of local hardwood lumber and forest products. Pasture raised local beef uses much less energy and fossil fuel to produce than feedlot finished beef grown halfway across the country³¹. Also, it may no longer make sense to ship a product such as iceberg lettuce, which is 95% water, from water-strapped California to water-rich Newfield when there are so many more nutritious local lettuce choices. These things all have an effect on town planning as the town looks at open spaces, forests, existing farmland use, farm co-ops, and farmers' markets. Encouraging production of local food and products will make Newfield more self-sufficient when energy costs increase in the future.

The energy picture is going to change drastically in the future as the world is forced to move away from fossil fuel dependence toward other energy sources. Newfield is uniquely blessed with an abundance of natural resources that can be tapped for local energy, and the ability to produce much of its own food and building products. If its resources are managed properly, there will be a supply of energy and resources indefinitely. The town will want to carefully consider the balance of long-term planning versus more immediate short-term gains in the whirl of energy production and use.

29 See the US EPA Climate Change web site, <http://www.epa.gov/climatechange/>

30 See the University of Minnesota extension website, http://www.myminnestawoods.umn.edu/legal/lega_carbon.html

31 "even given the lowest estimates for fossil fuel inputs to feedlot beef production, grass-fed beef would appear to be the superior energy bargain, requiring a lifetime total expenditure of some 134 fewer gallons of crude oil per cow." (calculations in this article for the amount of crude oil used to grow a grass fed steer from conception to slaughter is 74 gallons, for a feed lot grain finished steer, 208 gallons.), <http://www.whiteoakpastures.com/article-mideastoil.html>