

Incorporating Energy Consumption in Traditional Planning Processes

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Introduction

Across the nation, energy consumption is rising despite the fact that energy costs, in general, have continued to rise and are expected to do so for the foreseeable future. Associated economic, environmental and security concerns have emerged as Americans are beginning to understand and experience the true cost of our rising energy consumption. An immediate concern is that consumption of electricity and natural gas in buildings is the greatest contributor to greenhouse gas emissions in the nation.¹ In the Chicago metropolitan region, energy use in buildings accounts for nearly two thirds of all emissions across the seven counties.² Traditionally, energy use has been addressed at the user-end level among consumers in individual households and businesses, but “big picture” energy impact issues like the economy, environment and national security point to the need to re-frame the discussion and begin assessing energy at a larger scale. In this short paper, we look at reasons for incorporating energy into traditional planning processes, how it can be done, and several examples of communities that have integrated energy with traditional planning efforts.

Incorporating Energy into Traditional Planning

Planning is a broad discipline that covers many areas of community-scale assessments and the integration of layered issues, including land use, transportation, housing, water resources, health and human safety, and quality of life. Recently more professional planners have brought energy and climate into the planning realm, as seen in the rise of community sustainability plans, energy plans and baselines, and in some cases, subsections of a traditional comprehensive plan. A comprehensive plan is a standard municipal planning document that highlights long-range community goals through the lens of land use and related topics. These plans serve as policy guides for growth and development decisions, so beginning to include energy within that long-range planning framework is groundbreaking. While a handful of communities in the Northwest, west coast, New England and a few other places have addressed these issues for years, for many communities the impetus to plan for energy came as a result of the Energy Efficiency Conservation Block Grant funding from the American Recovery and Reinvestment Act of 2009, which required a planning process that documented potential energy or emissions savings as a result of proposed activities.

¹ United States Environmental Protection Agency. 2012. U.S. Greenhouse Gas Emissions and Sinks: 1990-2010.

² Chicago Metropolitan Agency for Planning “Chicago Region Baseline Emissions Inventory and Forecast.” 2009

Is Energy a Planning Issue?

Energy issues connect directly to land use and transportation, building codes and infrastructure siting. Addressing energy along with other traditional aspects of planning can reduce energy consumption and long-term energy costs while ensuring energy security. The graphic below illustrates how land use and zoning decisions intersect with energy issues in just one capacity.

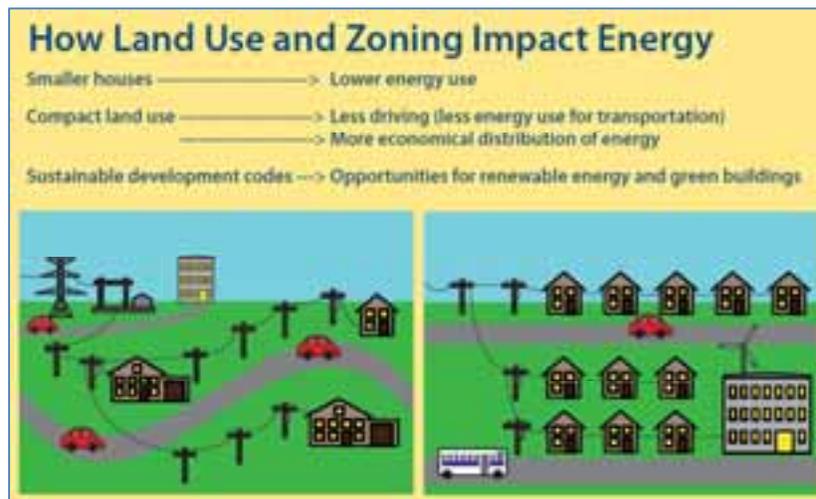


Figure 1: Kane County 2040 Energy Plan/CNT Energy. 2011.

Smaller, more compact mixed-use development is generally more efficient than its counterpart. Communities that allow and/or plan for renewable energy and other “green code” development are best equipped for new trends in infrastructure including smart grid technology and on-site renewable development. Land use and zoning decisions made today will effect energy consumption (site level and through transportation), infrastructure siting/needs, reliability and accessibility for many years to come in our communities.

Our Changing Appetite for Energy

Understanding these connections to planning may be more important than ever before. Many different regions across the country are experiencing significant growth and development, and the impact on energy consumption is only increasing. In 2005, the U.S. Energy Information Administration reported that despite our gains in energy efficiency, average total household consumption hadn’t changed between 1978 and 2005. Why? Our appliances and homes may have become more efficient, but we’ve added multiple laptops and computers, multiple televisions, DVRs, and cable boxes, and a host of other gadgets and appliances into our homes. Figure 2 shows this impact on our energy consumption.

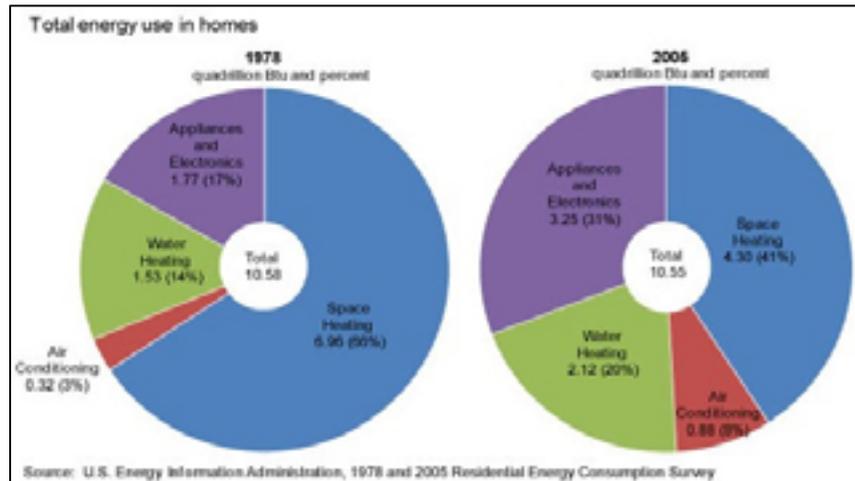


Figure 2: 1978 to 2005, changing energy habits

In addition to our penchant for consumerism and its resulting energy consumption, alarming, too, is the upward trend of home sizes in this same timeframe. In 1978, the average square footage of homes was 1,755ft², and in 2005, 2,434ft². While this may vary slightly by region, in general, homes built today are nearly 40% larger than those built thirty years ago.³ They have the propensity to use more energy depending on the circumstances, including but not limited to building code requirements, selection of appliances, human behavior and more. For fast growing communities, this trend can have a big impact on energy demand and infrastructure needs.

An Example: Mapping Energy in Kane County

In 2004, fast-growing Kane County, situated on the western edge of the Chicago metropolitan region, faced the reality of its growth. With all the accoutrements of traditional planning, county officials had identified three distinct planning areas from east to west in the county: the urban corridor, the more urbanized and populated area of the county that dated back over 175 years; the critical growth corridor in the center of the county, where land use changes and population was expected to grow immensely; and the protected rural western edge of the county, expected to maintain its character through the protection of these land uses.



When the electric utility announced plans to site “power towers” along a major north/south thoroughfare in this central area of the county there was an immediate uproar from the community and

³ United States Census Bureau. <http://www.census.gov/const/C25Ann/sfttotalmedavgsqft.pdf>

local government officials. With NIMBYism⁴ in full effect, the utility backed off, but the message was clear: the county's growth was impacting energy. This issue wasn't going to go away, according to all projections.

The 2005 Kane County Energy Plan examined the impact that changing land use and population projects had on energy. Combining land use data from the county, and both premise and feeder level data from the utility, CNT Energy (then the Community Energy Cooperative) examined what existing conditions could tell us about energy consumption projections in the future. Figure 3 depicts the electricity infrastructure that coincides with historic land use patterns and the concentration of population at the eastern edge of the county. In Figure 4, we see the anticipated land use changes from the County's 2030 Plan, with the projected growth primarily occurring in the yellow "Critical Growth Corridor."

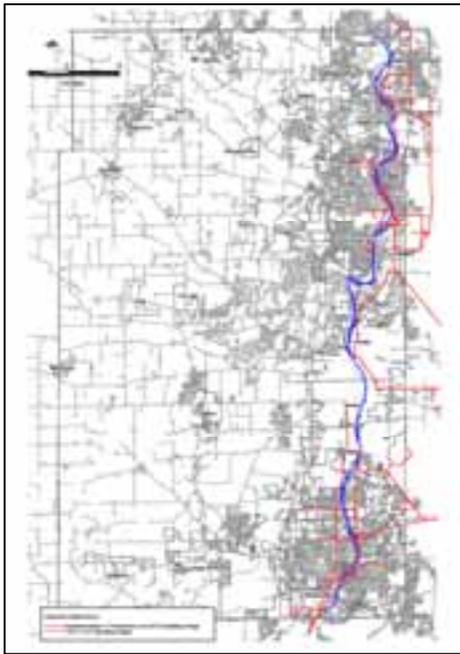


Figure 3: Electricity infrastructure reflects its historic land use patterns



Figure 4: Three planning corridors. Yellow is where most anticipated growth is expected.

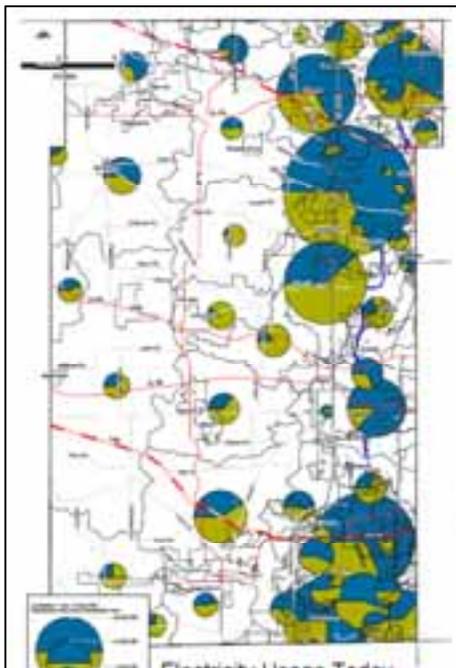


Figure 5: Electricity use by substation.

When looking at energy use as an existing condition, we found that it also reflected current land use patterns. (Figure 5.) This substation map shows more consumption on the eastern edge of the county, largely residential (blue), while in the central area, again where most of the population

that describes the common "Not in my backyard" responses when context/situation as opposed to the potential larger community benefits

growth is expected to occur through 2030, lower consumption that is predominantly commercial uses.

In 2004, the County cited growth expectations that as of the 2010 Census, are already on pace to be surpassed—even during the economic downturn experienced over the last several years. The project 2010 county population of 466,000 was actually documented at 515,269 in the 2010 Census.

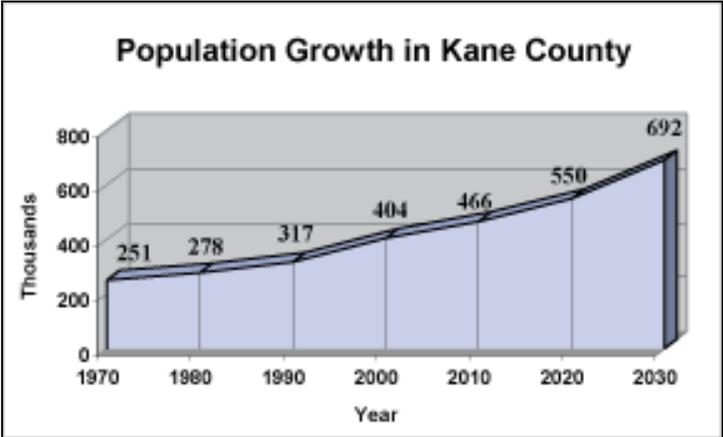
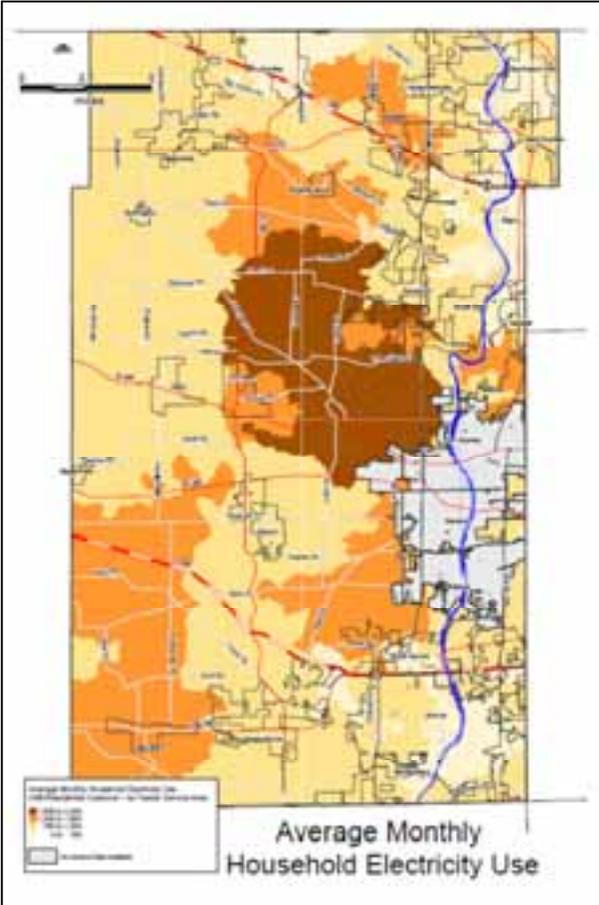


Figure 6: Kane County Energy Plan. (2004)

Next we looked at what energy consumption looked like across the county in the residential sector that is projected to grow heavily. Figure 7 examines average monthly household consumption. The eastern edge of the county in the lighter areas shows lower consumption that is likely a result of smaller housing stock.



However, the central corridor shows higher average consumption per household. This is likely a result of the increasing size of homes that were built within the last 30-40 years, as opposed to those built in the 1800s and early 1900s in the older areas of the county.

Figure 7: Average household electricity consumption.

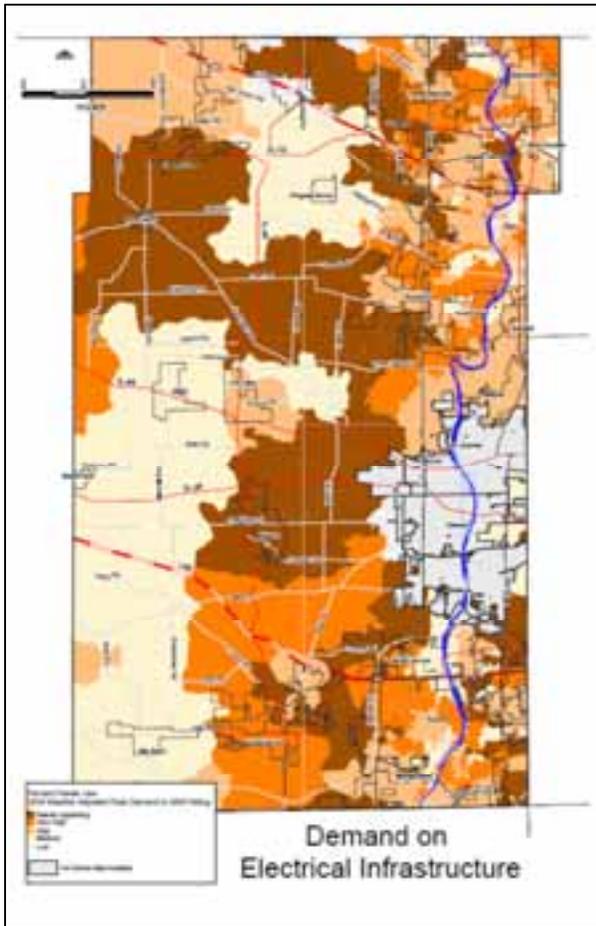


Figure 8: Demand on electrical infrastructure.

What brought us to this study in the first place was the electric utility’s desire to add new infrastructure in the county, resulting in an outcry by concerned citizens across the county. However, we found that the truth of the matter was that the current infrastructure in place was simply not equipped to handle that growth. (Figure 8.)

By mapping electricity demand we see that the central corridor where the most growth is expected is already reaching the upper limits of its capacity, as are areas on the eastern edge and even in the agricultural corridor.

The remaining focus of the Kane County Energy Plan was to identify community-scale strategies that would help reduce energy consumption and demand over the long term. Figure 9 shows that depending on the implementation and penetration rates of strategies, peak demand could be lowered significantly over the next 25 years.

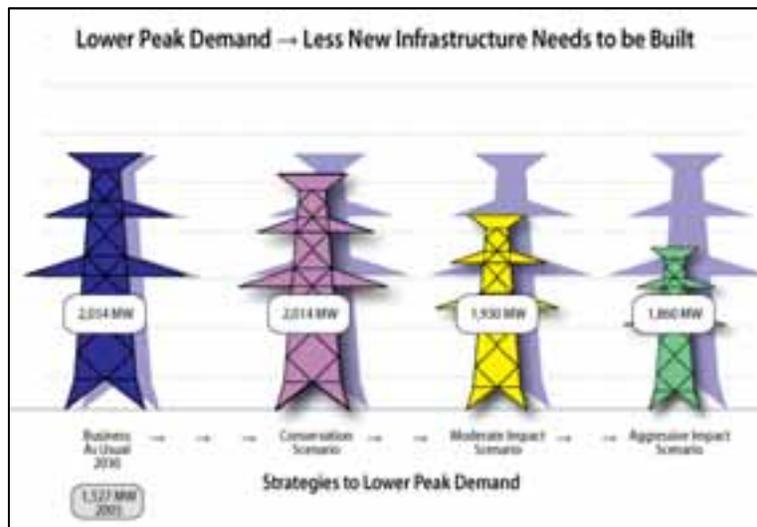


Figure 9: Potential for demand reduction

Over this same duration, the potential for cost and energy savings countywide, among existing and new (projected) homes and businesses were also calculated. (Figure 10.)

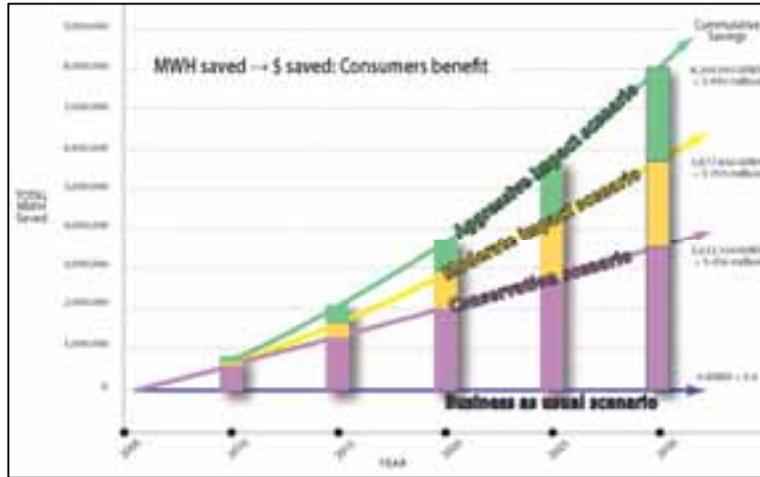


Figure 10: Potential for energy and cost savings.

Conclusion

The Kane County Energy Plan is just one example of incorporating energy into planning by using traditional planning tools and methods of analysis. In addition to energy plans/baselines and sustainability plans, communities have begun to address energy as a component of the comprehensive plan, and there have been a few places that consider the impact of energy (or climate) during the site plan/development review process.

In the Chicago region, the Chicago Metropolitan Agency Planning developed the GO TO 2040 Plan⁵, the first regional plan in decades. Among many topics, the plan highlighted the important role that every municipality in the region has in reducing energy consumption and emissions. Addressing this call to action, the Municipal Energy Profile Project (MEPP) provided each municipality in the region with a customized snapshot of communitywide energy consumption and emissions. MEPP sought to level the playing field by providing baseline information that might not otherwise be obtained by communities, in particular those that lacked technical expertise or faced tighter budgets during the touch economy.

It is these kinds of comprehensive, integrated planning analyses coupled with on-the-ground, community-scale implementation that offer the best results at understanding energy consumption and making sound decisions that result in desired outcomes and impacts, and further, at the scale needed to fully address the energy, sustainability and climate issues that we face today.

⁵ <http://www.cmap.illinois.gov/2040/main>