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**GREEN COMMUNITIES: OPPORTUNITIES AND CHALLENGES FOR
SUSTAINABILITY IN NORTHEAST OHIO**

Prepared Text

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I want to explore how strategically addressing energy will be crucial to the fundamental rebirth of Cleveland's competitiveness and help build the Green City by the Blue Lake. The possible corollary is that a failure to address energy could be instrumental in a continuing, or even accelerating decline of the region.

For the entire history of the USA, energy has been readily available, in seemingly unlimited quantities, at extremely low costs and acceptable environmental impact. All these comfortable assumptions are now being challenged. Let's take a few minutes to look at today's energy basics.

Worldwide, we spend about \$4 to \$5 Trillion dollars on energy every year, a quarter of which is spent in the USA, a number big enough to be worth examining in a little more detail.

Prices of natural gas, electricity and oil are close to historic highs, and even the most optimistic forecasts expect sustained increases, many predicting a further doubling in the next decade.

The world market for fuels of all types has become just that - a world market with global pricing. This has all but closed the gap between the prices the US consumer pays for natural gas and electricity relative to consumers in Europe and elsewhere. The obvious exception is gasoline, where, despite the recent increases, the US still enjoys prices one half those of Europe....however, don't hold your breath...

In today's reality, the average US energy use per head is almost exactly twice that of the European Union, and that the US economy as a whole spends 30 to 40% more on energy to generate each dollar of GDP - a significant competitive disadvantage, and gap that is likely to widen for a variety of structural and policy reasons.

The US imports nearly 60 % of all its oil and for the first time in history has become a net importer of natural gas over the last few years. Net imports, though still relatively small, are roughly doubling every year. An additional point is that many of our sources of gas and oil can hardly be described as havens of stability.

Yet another new factor is the rapidly rising demand for energy in China and India. Within about three years, China will use as much energy as Western Europe and as the USA within the decade. India's demand is accelerating at similar rates, tracking China

with a few years' delay. This puts sustained impacts on pricing, foreign policy tensions, and the global environment.

Last but not least; climate change is accepted by the bulk of scientific opinion to be underway, generally recognized as being caused by the greenhouse gases arising mostly from our use of coal, gas and oil since the start of the industrial revolution at the start of the 19th Century. Rising concentrations of greenhouse gases in the atmosphere give rise to increasing average temperatures, melting ice caps, raising ocean levels and causing more intense unpredictable weather events.

As the USA debates its policy approach to climate change, many countries around the world are regulating the creation of greenhouse gas emissions, the most common of which is carbon dioxide. In the EU, where the Kyoto Treaty went into force last year, carbon dioxide emission reduction allowances are already trading at about \$36 per metric ton, changing the economics of electricity generation and much of industry both positively and negatively.

Global warming presents both risks and new opportunities for communities around the world as they develop new approaches, technologies and businesses to meet the challenge.

We are facing a new energy reality and the answers that worked in the past are no longer sufficient.

Given this backdrop of rising energy costs, constrained supplies of oil and natural gas, and the almost inevitable future restrictions on greenhouse gas emissions, the competitiveness of cities will largely hinge on how well they are able to manage their energy and related water systems for the coming decades.

Cleveland and the surrounding area is also faced with the challenge of redefining itself as its proud, exciting and successful industrial past fades into history, and it seeks to create a reinvented future. Can Cleveland become the *Green City by the Blue Lake*; recognized around the world as a role model as a community able to live with a past that has gone, and face into a reinvented and reinvigorated future built on a rational and sustainable use of resources?

In the USA about a third of all energy goes to industry; a quarter to transportation of all types, mostly in the form of gasoline. The remaining 40% is divided almost equally between the homes we live in and the offices, shops, theaters and other buildings we use every day - in other words the very fabric of the cities we live in.

When we compare the effectiveness of energy use on a worldwide scale, our industrial use stacks up well against global best practice, and global market forces are keeping pressure on reducing this.

Our transportation in energy use per passenger mile is about 40% above the European practice, a significant difference caused largely by average vehicle weight and the mix of mass and individual transit. However, it is a difference that could be relatively easily closed by a globalization of the vehicle offerings and technologies. Rapidly rising gasoline and diesel fuel prices are likely to be the triggering event to see this happen.

However, our average home and buildings use more than two times the energy of their European counterparts per square foot, adjusted for equivalent comfort and climate. With the notable exception of California, whose sustained focus on energy efficient building codes has resulted in a building stock at least 30 to 40% more efficient than the rest of the USA, there is remarkably little national systematic focus on addressing this vast and immediately available, pollution free source of energy?

Europe meanwhile continues to keep pressure on reducing energy use in buildings, soon to be supported by a legally binding energy performance certification that will form part of required financing documents.

Before we leave the “dirty little secret” of our high levels of ineffective energy use in homes and buildings, there a final, often overlooked, point I want to touch. Seven out of ten of every kilowatts of electricity in the USA is used in homes and buildings. When we make electricity, at least 60% of the coal or gas used is wasted in heat at the power station. No effort is being made is made to use the wasted heat in any meaningful way. Further losses of between 5% and 10% occur in transmission and distribution of the electricity to the buildings.

To summarise, our home and buildings use at least twice as much energy as they need to, they use 70% of all electricity, which in turn is made by wasting more than half of the coal or gas used. This is hardly a model of an economically or environmentally efficient chain.

A simple way to think of this is with an example. I lecture to students and cold beer is often a product that gets their attention! If we assign one hundred tons of coal to create the electricity to cool the beer in an average refrigerator, less than 9 tons of the coal shows up as useful chilling! The remaining 91 tons got lost on the way. We would not tolerate this low level of productivity in other processes – why do we accept it in energy.

In addition to the impact of inefficient construction and energy supply, we have also spent the last 50 years designing our cities with larger and larger suburban homes further and further away from where we work and play, exacerbating the overall energy footprint of the city as we drive tens or hundreds of miles a day just to do the day’s tasks.

The impact of this expensive and energy-intensive inventory of homes bears most heavily on the lower income resident. I recently estimated that a worker earning 25% above official poverty levels, living in new 1500 sq ft manufactured home in NW Ohio could be spending as much as 25% of gross income on utilities, a ratio that is bound to get worse unless we make some fundamental changes in the way we design and energize our cities. As an aside, I understand that Cleveland is evaluating its affordable housing, and I would strongly recommend a very aggressive stance around efficiency and energy supply approaches.

This, then, is the energy burden that cities like Cleveland have inherited, and in the face of rising energy prices, energy supply risks, clean air challenges and climate change, it is a burden that could threaten the viability of the City, the entire Cuyahoga Valley and NE Ohio. How can Cleveland not only address this burden, but turn the challenge into the start of a journey to national competitiveness and build entirely new growth businesses

serving the city, the country and the maybe even entire world? In effect, can Cleveland regain its place as a city influencing the way the world does business?

Let's look at a couple of cities for clues as to what this transformation might look like.

Thirty years ago, Denmark was shocked into a new reality by the 73 oil crisis when it realized its highly centralized, oil-fired electrical system was totally dependent on vulnerable imports. As the largest city in Denmark, Copenhagen and its suburbs made some fundamental decisions to ensure this would never happen again. With much public debate between many stakeholders including utilities, city authorities, academia, banks, industry, construction companies and many citizens groups, a systematic long-term approach was established that tackled a number of basic principles.

Firstly, building efficiency standards were steadily tightened to the extent that Danish standards effectively became the role model for Europe and today are a global benchmark. This tightening process continues 30 years later, such that the latest generation of Danish homes and buildings will use about one fifth of the energy of their American counterparts.

Secondly, electricity generation was distributed to be much less centralized, and municipalities were encouraged to find ways to use the associated heat distributed as heating and hot water services for homes and buildings. Like Cleveland, Copenhagen had an old steam heating system in its older core, and this has been modernized and extended. In addition, completely new, much more efficient district heating systems have been developed. Now, thirty years later, over 60% of Danish homes and most non-residential buildings get their heat and hot water from so-called waste heat from electricity generation.

An advantage of encouraging this model of energy use was that it also encouraged higher density urban villages, a model we call "Smart Growth" or "New Urbanism" over here. These clusters are inherently more efficient, socially attractive to many people and require much less vehicle use. They are also more conducive to competitive mass transit, further reducing the energy footprint.

Next, a wide range of alternative fuels were encouraged, and today the electric and heat utilities are fuelled by a mix of natural gas, oil, coal, domestic waste, wood and other biomass, and the world's largest percentage of wind energy. Wind alone accounts for 20% of the entire national electrical demand.

In the relatively short space of thirty years, Greater Copenhagen has one of the lowest energy, greenhouse gas and other emissions' footprints in the world, has highly livable new and refurbished neighborhoods, and has an energy system that is flexible enough to adapt to different fuel mixes as world market forces and availability changes, and to easily incorporate new technologies.

Over the same period of time, this local policy encouraged a wide range of completely new, globally competitive industries, the most famous of which is wind energy. There is a great example of how policy transformed local industry; one of the largest manufacturers of wind turbine blades in the world, a Danish company, was making fibreglass fishing boats before these policies were put in place. This transformation also had a ripple effect all the way to Ohio; one of Owens Corning's fastest growing, most

profitable businesses is supplying the advanced fibreglass materials to make the world's windmill blades.

Copenhagen is by no means an isolated example of a city that has over time redefined its energy paradigm. Mannheim, a heavily industrialized city of about half a million people in southern Germany, has a similar city wide combination of highly efficient buildings and wide use of heat recovered from the electrical generation system and from some industries within the city. This system uses a range of fuels – coal, natural gas, domestic waste and demolition timber. An interesting aside is that the city utility actually makes more profit selling “waste” heat than selling electricity!

Mannheim has also become a global centre of excellence for municipal utility planning, engineering and services, with the former publicly owned utility now doing business in 120 countries.

The list of cities and regions taking this systematic approach is long one, with many Scandinavian, German, and Austrian cities and even includes some Chinese cities as they rebuild their infrastructure to face the rapidly growing energy challenges of their booming economy.

In fact this approach even has a name. In Europe it has been dubbed the “Trias Energetica” and in California, the “California Loading Order”:

First - Maximise efficiency – the cheapest cleanest source of energy is usually the energy we don't need.

Second - Maximise viable use renewable energy and combined heat and power – the obvious ways to minimise depletion of non-renewable fossil fuels

Third - “Top up” from existing electric and gas grids – teaming, not fighting, with the traditional grids will ultimately improve overall returns for the entire system

As cities in the USA struggle to develop an integrated approach to energy productivity, we are beginning to see a small but growing number of commercial property developers recognize that the market may be changing. The attractions of living in a 4000 sq ft home in distant suburbs with today's energy and gasoline prices and the sense of isolation that many people feel, is beginning to create a new kind of customer – reasonably affluent looking for the social interactions of a more traditional village or town centre, with acceptable energy and water costs.

I am advising one such developer in Nashville, Tennessee, on a 1000 acre green field development a few miles from the city. Instead of building mansions on 2 acre plots, effectively destroying a wonderful rolling landscape, the development will cluster different kinds of buildings around two or three village centres and leave over 60% of the site available as public parkland with some organic farming in perpetuity.

In this planned development, more people will be housed with less resource impact and more social attractiveness for both the residents and the greater community. It will also tread more lightly on the planet. The energy and water demands will be less than 50% of US average, and the greenhouse gas creation 70% less. The entire energy approach will be benchmarked against global best practice, and may even have Danish-style performance certification.

There is nothing that Copenhagen, Mannheim or the property developer in Nashville are doing around energy that Cleveland and the Cuyahoga Valley could not do if there were the political and community will to do so. Such an approach would blow away the current Clean Air Attainment challenges, revitalize entire neighbourhoods, and make the city a magnet for new energy businesses of many types.

The local region and Ohio as a whole is blessed with companies that are committed within their own operations to achieve breakthroughs in energy productivity and greenhouse gas reduction, and they have the potential to bring some leadership and expertise to the community. A list of these would include Alcoa, Mittal Steel, Owens Corning and Wal-Mart among others. Some may even have energy assets that could play a role in an integrated approach.

In other conversations I have been positively impressed by the passion of a number of groups in Cleveland and NE Ohio to deliver a more sustainable region.

Unfortunately, sustainability can mean many things to many people, and all too often I have seen a powerful vision become so fragmented or caught up in debates between various factions as to which flavour of sustainability is the “right” one, that the process grinds to a halt, passion goes away and the status quo rules again.

For every Copenhagen that reinvents its energy system in the space of a generation, or every Glasgow or Charleston that successfully reinvents itself from past industrial glory, there are far more failures. The common threads we see in these successes are the ability to focus on one or two critical elements and consistently pursue them year after year. Most importantly, the community as a whole owned the vision, and it didn't get rewritten every time the political leadership changes with the electoral cycles.

I guess my challenge to you would be to embrace the challenge of developing an integrated energy, water, and climate change master plan for Cleveland and the Cuyahoga Valley that embraces a multi-decade view with clear overall goals on energy efficiency and supply, energy security and quality, energy economics, and clean air and other environmental impacts. The plan should be robust enough in its stakeholder support to survive the political swings inevitable over a twenty or thirty year period. This could be completed within a year or two.

The pressure to reconfigure urban energy use is rapidly becoming a major pressure for all US and Canadian cities. By embracing rather than fighting this challenge, Cleveland and NE Ohio could become a focus for an American cluster of businesses serving the needs of urban energy sustainability. It won't be an easy journey, but the alternatives could be far worse.

A consistent approach by the region would attract the brightest and best energy solution and technology companies from around the world and stimulate new home-grown businesses.

By 2015, sixty percent of all the people on the planet will live in urban environments. For better or for worse, the development of contemporary societies will depend largely on understanding and managing the growth of cities. I would like to close with two comments one from each side of the Atlantic that should remind us of the importance of what we do as we influence the design of cities:

The US Supreme Court Justice, Oliver Wendell Holmes: “A Hundred years after we are gone and forgotten, those who have never heard of us will be living with what we have done”

The former UK Prime Minister and enthusiastic amateur architect, Winston Churchill:
“We shape our buildings and afterwards our buildings shape us”

Thank you