

To charge ahead, GIR needs engines of real economies

Without conscious, focused efforts from governments, there can be no planned allocation of resources and hence no sustainable momentum.



p-Watch: A macro view of productivity trends



The Green Industrial Revolution (GIR) has begun as a global trend through a complete restructuring of the way energy and other major infrastructures such as water and waste management, transportation, and buildings are generated, supplied, and implemented. The GIR now marks an era of extraordinary opportunities, with remarkable innovations in science, technologies, economics, and especially energy, which can lead to sustainable, carbonless economies.

The GIR is more significant and life changing than the earlier industrial revolutions. It also turns out to be the planet's only real chance for survival. With an estimated nine billion inhabitants by 2050, there is much more at stake. Today, the world is rapidly running out of fossil fuel, particularly oil. This alone threatens to shake the very foundation of human existence. Adding a heightened sense of urgency are

environmental degradation and the collapse of various parts of our planet's ecosystem, such as the Brazilian watershed, Antarctica, and the Arctic, with rising sea levels threatening island nations around the earth.

The GIR is being led by the Asian economies of the Republic of Korea (ROK), Japan, Singapore, and PR China as well as some European economies such as the Nordic countries and Germany. The USA is lagging behind as a nation, although some of its states such as California, Oregon, and New York and the New England area are moving ahead.

Asia takes an early lead

The oil embargoes of the 1970s pushed Japan and the ROK toward economic and energy policies that eventually led to their development of the GIR. By the 1980s, many Asian and European countries had realized that their futures were not

rooted in the same carbon-intensive economies that had built the Western economies of the Second Industrial Revolution, as they now became dependent on oil imports and started environmentally damaging programs to obtain oil and natural gas. These Asian and European nations wanted more energy security and developed national policies and programs to reduce their growing dependency on foreign fuels.

PR China started the same thing, in association with Singapore, at the turn of the 21st century by creating the Tianjin Eco-city. All buildings in the Tianjin Eco-city comply with the Green Building Evaluation Standards, a unique benchmark that Singaporean and Chinese expert teams developed. The smart green city has a sound water management system that allows residents to drink directly from their taps, while sewage water is treated to provide a supplementary supply.

Clean, renewable energy sources such as solar water heaters and geothermal heating systems are used in the city to supplement traditional energy supplies. Also, a collective system of waste management and recycling is integrated with waste disposal and incineration processes to regenerate energy as well as minimize the strain on landfills.

Thailand, despite being toward the other end of the economic spectrum in Asia, is also taking significant concrete steps toward a smart green city. Its capital, Bangkok, has a population of over eight million people. Threatened by an increase in extreme weather and heat waves due to climate change, the city has introduced a number of ambitious environmental, local public health infrastructure, and health programs.

Europe's energy strides

In Europe, while Denmark and other Nordic countries shifted national resources toward renewable energy power by national consensus, Germany developed the innovative feed-in-tariff (FiT) financial process that started in the early 1990s under the national government that recombined East and West Germany into one nation.

Germany's FiT was part of the 2000 Energy Renewable Sources Act, formally called the Act of Granting Priority to Renewable Energy Sources. This remarkable policy was designed to encourage the adoption of renewable energy sources and to help accelerate the move toward "grid parity," making the price of renewable energy the same as that of the existing power from the grid. Under FiT, those generating eligible renewable energy, either homeowners or businesses, are paid a premium price for the renewable electricity that they produce. Different tariff rates were set for different renewable energy technologies, based on the development costs for each resource. By creating variable cost-based pricing, Germany was able to encourage the use of new energy technologies, such as wind power, biomass, hydropower,

geothermal power, and solar photovoltaic, as well as to support the development of new technologies.

Funding the GIR

Some market economists and others argued that there was no need for regulation; the government would act as "the invisible hand." Nothing could be further from reality. Without national and local policies in place, countries cannot address the issues, and there can be no action, no improvement, no resources, and certainly no response to environmental degradation. There is not, and never was, such a thing as the government being an "invisible hand" in capitalism. Governments have always been involved and need to be even more involved for a better future.

The key for local, state, provincial, and national govern-

ments is to have each of the major infrastructure components, i.e., energy, water, waste, telecommunications, and transportation, linked and integrated. That way, the overlapping costs for construction, operations, and maintenance can be contained and reduced. If these basic infrastructure components can be constructed, operated, and maintained on the local level and meet regional, state, and national goals for carbon reduction, they take on a different per-

spective, format, and cost structure.

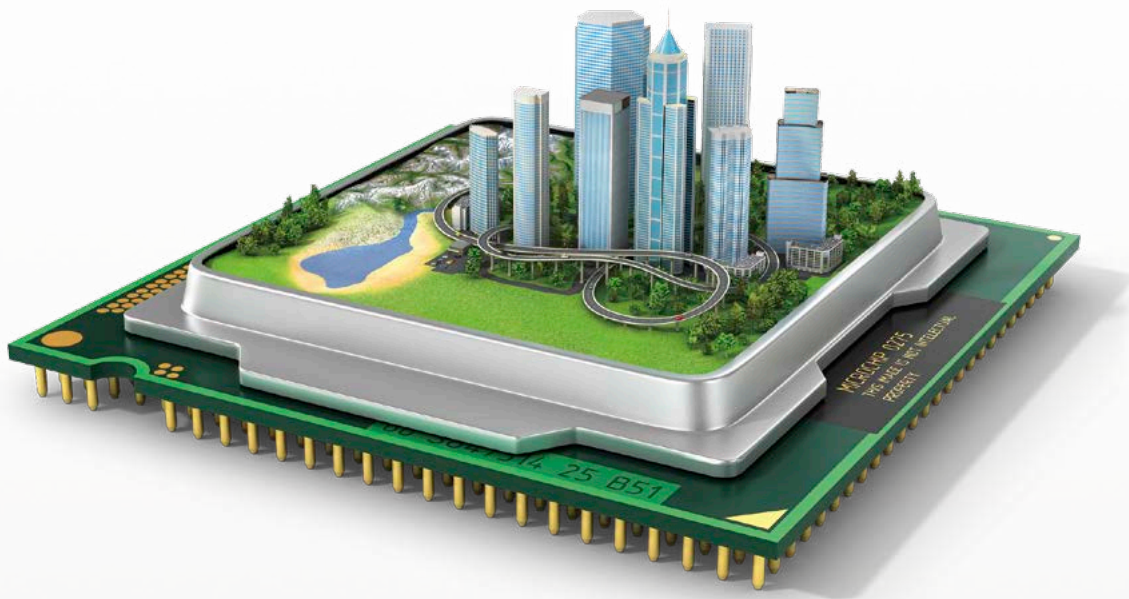
Plans need to have financing, and vice versa. For example, the most significant result of the German FiT was that it stabilized the renewable energy companies and reduced the financial risk of energy investment. By guaranteeing investors compensatory payments down to the last pfennig per kWh, the FiT program created a secure climate for investment. The program covered up to 20 years per plant, with the exception of hydroelectricity installations, which required longer amortization periods. The law also offered a means for altering the compensation rates for future installations, if necessary.

So the GIR is not all about costing money. The GIR is about climate change mitigation, renewable energy, smart grids, and environmental sensitivity. But achieving the benefits of the GIR, like a wave of new smart green technologies, business enterprises, and green jobs, will require substantial public and private financing. The GIR economy will be needed to accelerate the necessary changes and stop climate change.

Qualitative economics

Climate change is real; it impacts everyone around the world. Decades of failing to curb the world's dependency on fossil fuels has made the planet hotter and more polluted. It has killed people and stolen their livelihoods. The world's poorest nations are the most vulnerable as they face increased risk of droughts, water shortages, crop failures, poverty, and disease. The fossil fuel companies and nations continue to deny climate change and put political pressure on the public and

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governments to keep and expand fossil fuels. How can we account for these costs?

A hotter planet threatens to roll back decades of sustainable growth, and the science is clear on this. In 2007, the UN Intergovernmental Panel on Climate Change confirmed that humans are the cause of global warming and that the planet has been trending hotter since preindustrial times. Oceans are warming, sea levels rising, and the global mean temperature is higher.

That the costs for saving the environment and solving climate change are unknown is often given as an excuse to do nothing. There needs to be more extensive economic evidence of the impact of climate change through areas not in traditional economics such as “externality” costs for the loss of human lives, damage to communities, and costs for finding, drilling, and then shipping fossil fuels (e.g., ships, trains, and trucks). Furthermore, there needs to be a life-cycle economic analysis that is not just a business plan for companies with a return on investment of two to three years. The devastating environmental impact on the environment and people comes from coal, oil, gas, and nuclear power. The most common comment from the traditional neoclassical economic paradigm is that the “market” will find solutions. That is false.

The future is now

First, there needs to be a master plan for all integrated infrastructures that include energy, transportation, water, waste, and telecommunications, along with the traditional dimensions of research, curricula, outreach, and assessments. Second, an array of issues pertaining to the design, architecture, and setting of buildings and overall facility planning must be addressed from the perspectives of green energy and smart systems for energy conservation and efficiency. Third, while the “next economics” is a key part of the GIR and the new economic paradigm is already defined, they need to be placed and managed in every situation.

Today, most economic analyses are focused on one area or another, like energy, transportation, or water. Few economic analyses study overall integrated community infrastructure systems. Even more significant are the areas not usually considered in economics, like the environment, climate change, and health issues, which are all interrelated.

The place to start is with small, relatively self-contained communities or villages within larger cities and regions. The issue is to get communities off their dependency on central grid-connected energy, since most of these power generation sources come from fossil fuels like coal, natural gas, and nuclear power. Local on-site or distributed power can be more efficiently used and based on the region’s renewable energy resources such as wind, solar, and biomass, among others. This model is now being implemented in Denmark and Germany and is under consideration in Japan and PR China, where many communities are generating power with wind and biomass combined to provide a base load.

The central power grid is still needed but should be combined with on-site local power. They must be integrated so that nations and regions have both systems. This plan and economics are known as “agile energy systems” that have both, not one or the other. The government is really the major part of the solution for both central and on-site power systems. It needs to be present for the objective oversight of the economics, much like a physicist would be in and out of the laboratory. ⚙️



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