



Green Ideas®

The Sustainability Imperative for the International Concrete Industry

2010 International Concrete Sustainability Conference, Dubai, UAE

Sponsored by NRMCA and Grey Matters Consultancy

December 13-14, 2010

Mark Wilhelm – Principal – Green Ideas Sustainability Consultants



October 1973 - OPEC Oil Embargo



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Other countries have implemented change: **Brazil**



- 50% of all cars can run on 100% ethanol biofuel
- 70% of electricity is produced by hydropower

Source: <http://www.worldculturepictorial.com/blog/category/tags/alternative-energy>



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Other countries have implemented change: **France**



- 80% of electricity is produced by nuclear power
- GHG emission per unit of GDP is half that of the U.S.

Source: <http://www.treehugger.com/nuclear-power-renaissance.jpg>



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Other countries have implemented change: **Sweden**



- 2020: 40% GHG reduction, 50% renewables & 20% more efficient
- 2050: sustainable energy supply with no net GHG emissions

Source: <http://www.sweden.gov.se/content/1/c6/12/34/66/1a1aa683.pdf>



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Other countries have implemented change: **Costa Rica**



- 2007: first country to pledge to become carbon neutral; target is 2021
- 46% of primary energy and 96% of electricity generation is renewable
- Budgeting , laws, incentives and carbon tax will be used to change behavior

Source: <http://www.worldwatch.org/node/4958>



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One BIG country is implementing change: **China**



“China was asleep during the Industrial Revolution. She was just waking during the Information Technology Revolution. She intends to participate fully in the Green Revolution.”

C. H. Tung, as told to Thomas Friedman, New York Times, 1/6/2010, *“Who’s Sleeping Now?”*



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EVERY U.S. President Since Richard Nixon has Pledged to Reduce U.S. Dependence Upon Foreign Oil

- *“We believe that part of the answer (to our energy problem) lies in pricing energy on the basis of its full costs to society. One reason we use energy so lavishly today is that the price of energy does not include all of the social costs of producing it. The costs incurred in protecting the environment and the health and safety of workers, for example, are part of the real costs of producing energy—but they are not now all included in the price of the product.”*

» **President Richard Nixon, 1971**



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Global CO₂ Emissions by Sector

1. Buildings

2. Transportation

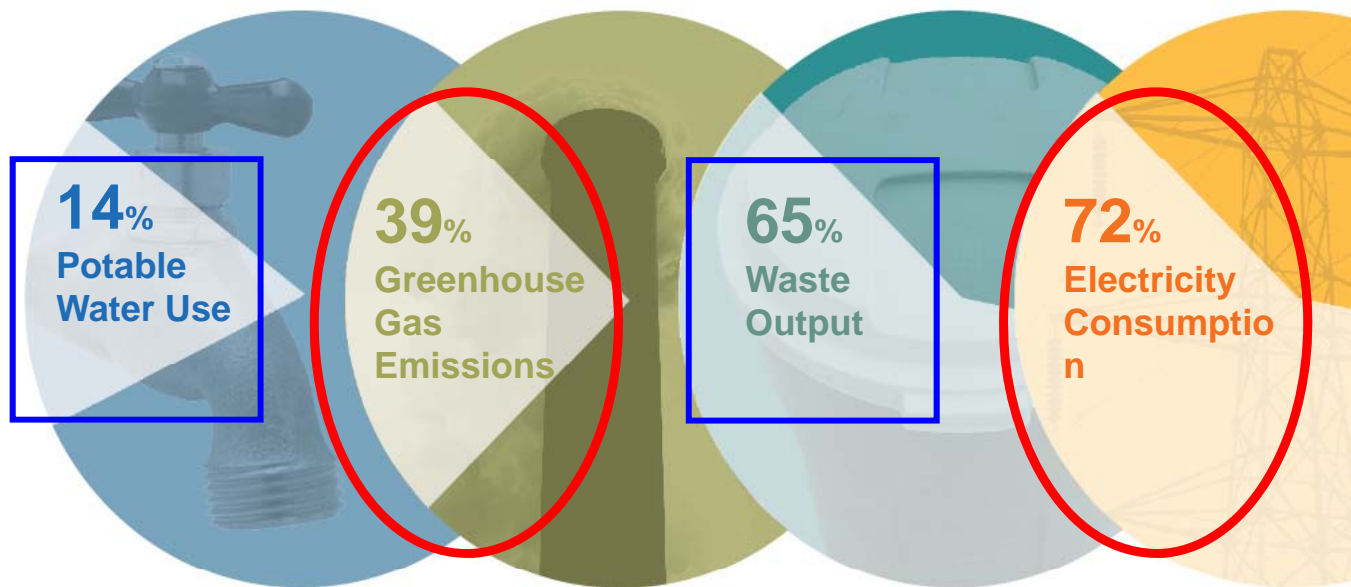
3. Industry

Source: U.S. Department of Energy, Energy Information Administration



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Building Impacts in the U.S. are Huge:



Source: Energy Information Administration; EPA; USGBC

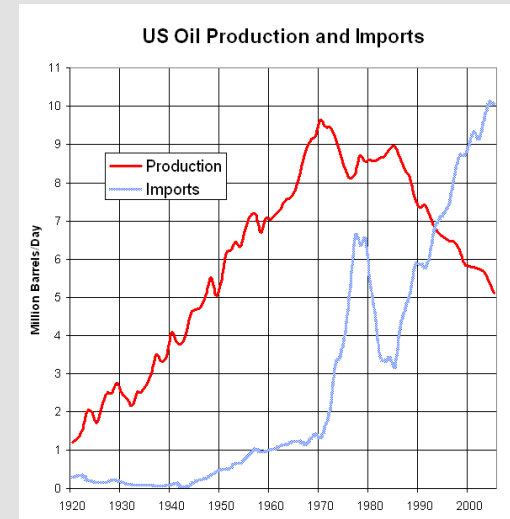


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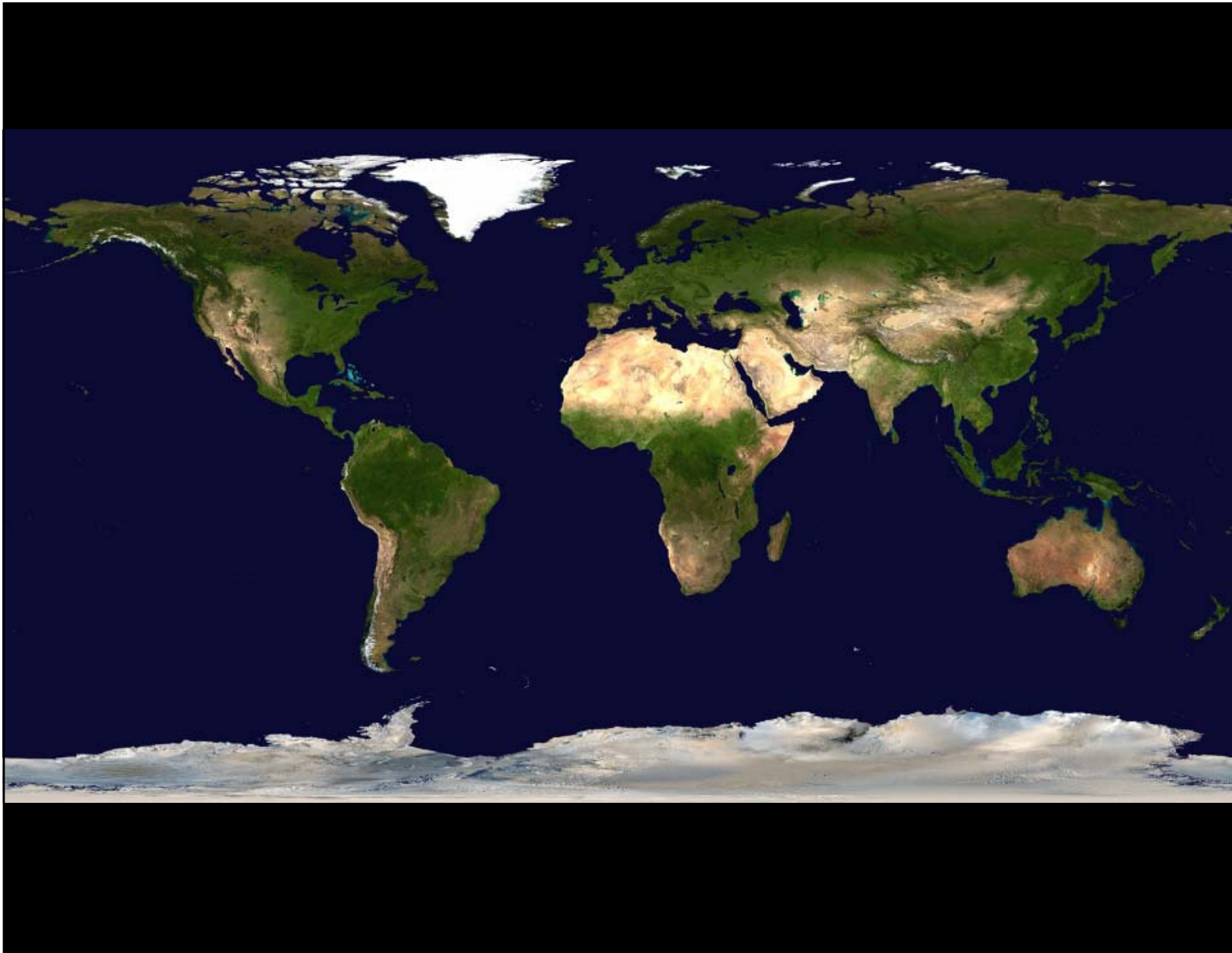
So what has happened in the United States since the 1973 Oil Embargo?

- **U.S. net oil imports**
 - 28% in 1972
 - **48% in 1997**
 - **65% in 2007**
- **U.S. energy consumption**
 - 20 quadrillion Btu in 1972
 - **84 quadrillion Btu in 1997**
 - **102 quadrillion Btu in 2007**
- **U.S. renewable energy consumption**
 - 8.4% of total U.S. energy demand in 1972
 - **7.6% of total U.S. energy demand in 1997**
 - **7.0% of total U.S. energy demand in 2007**

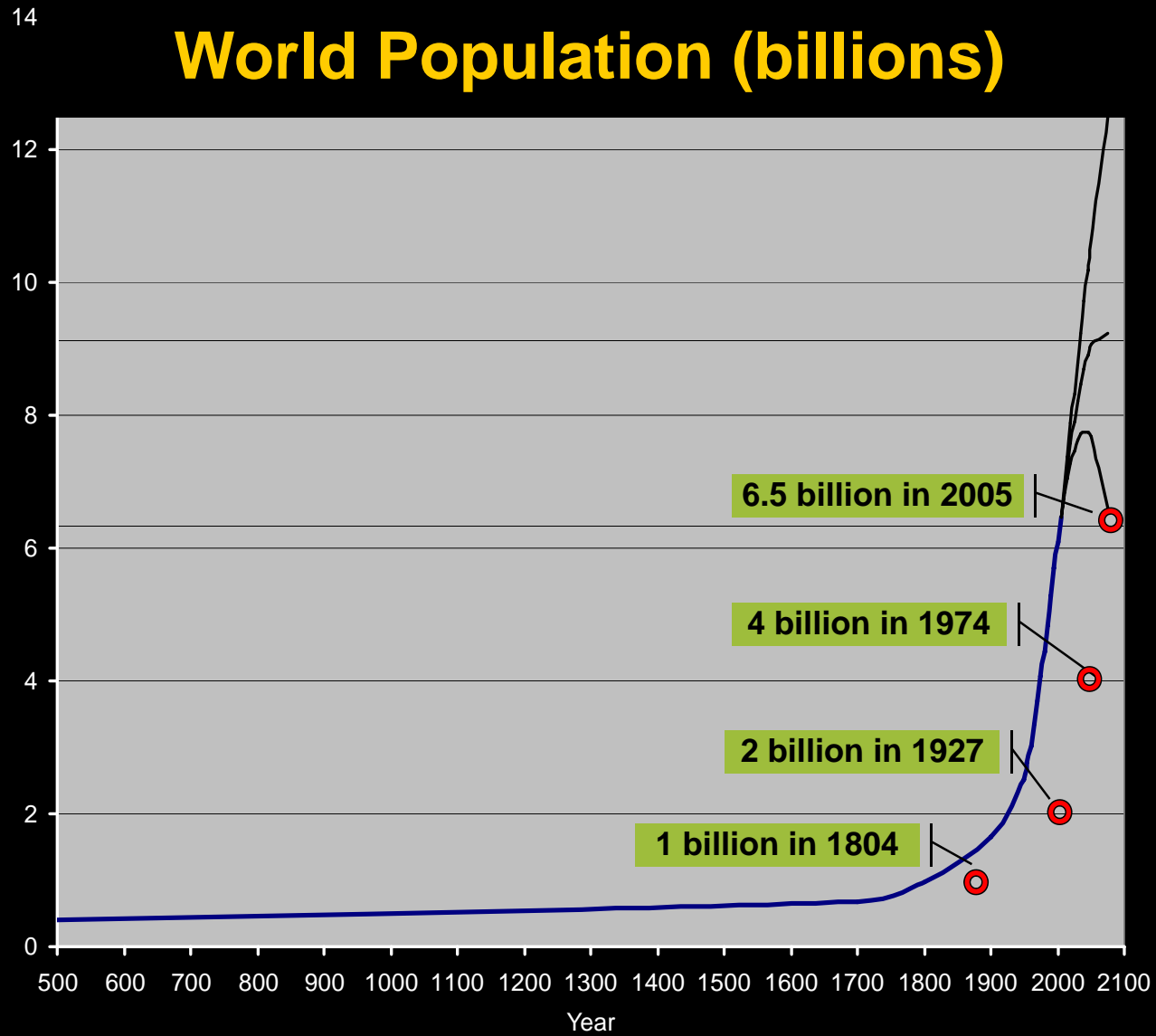
Source: Energy Information Administration



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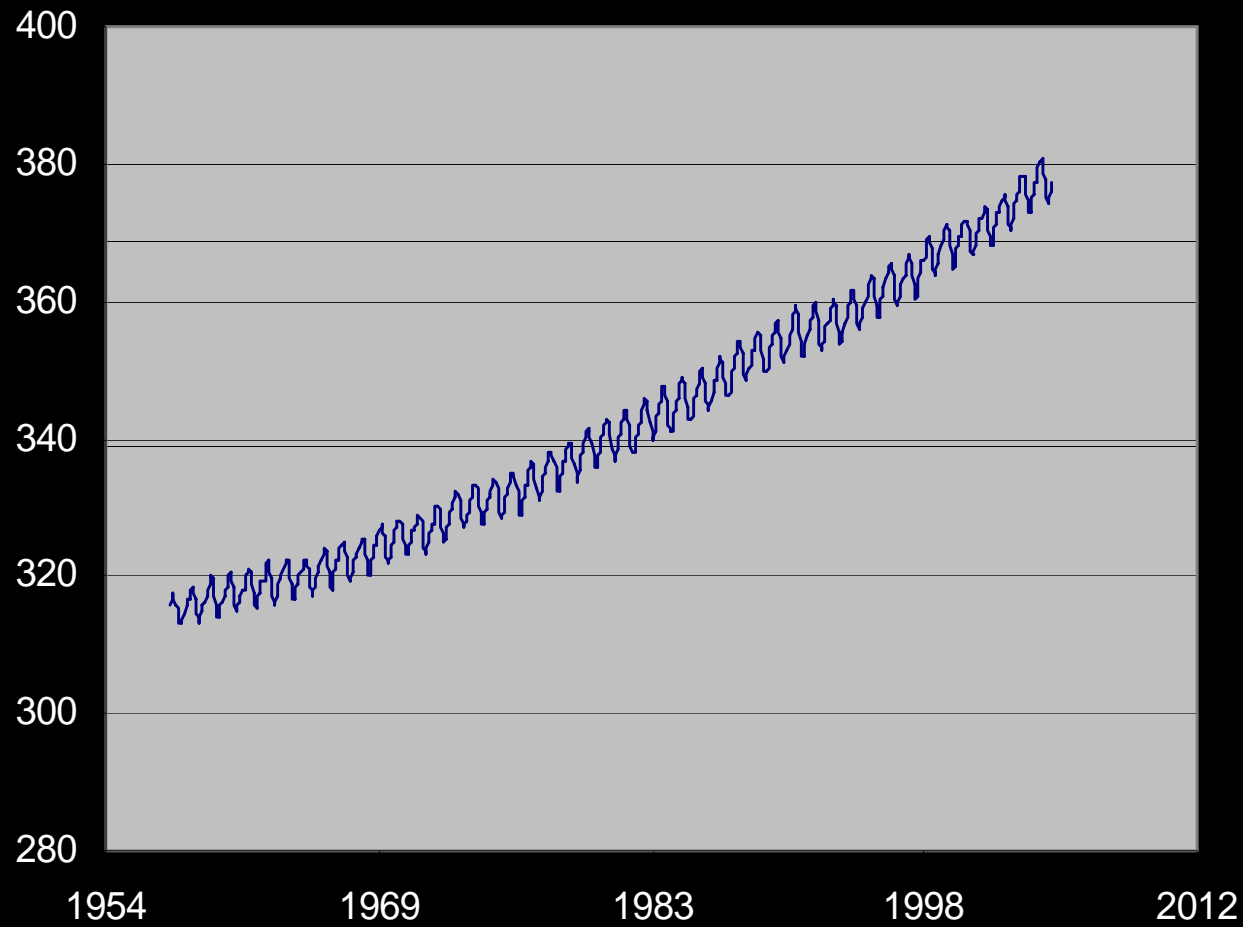


World Population (billions)



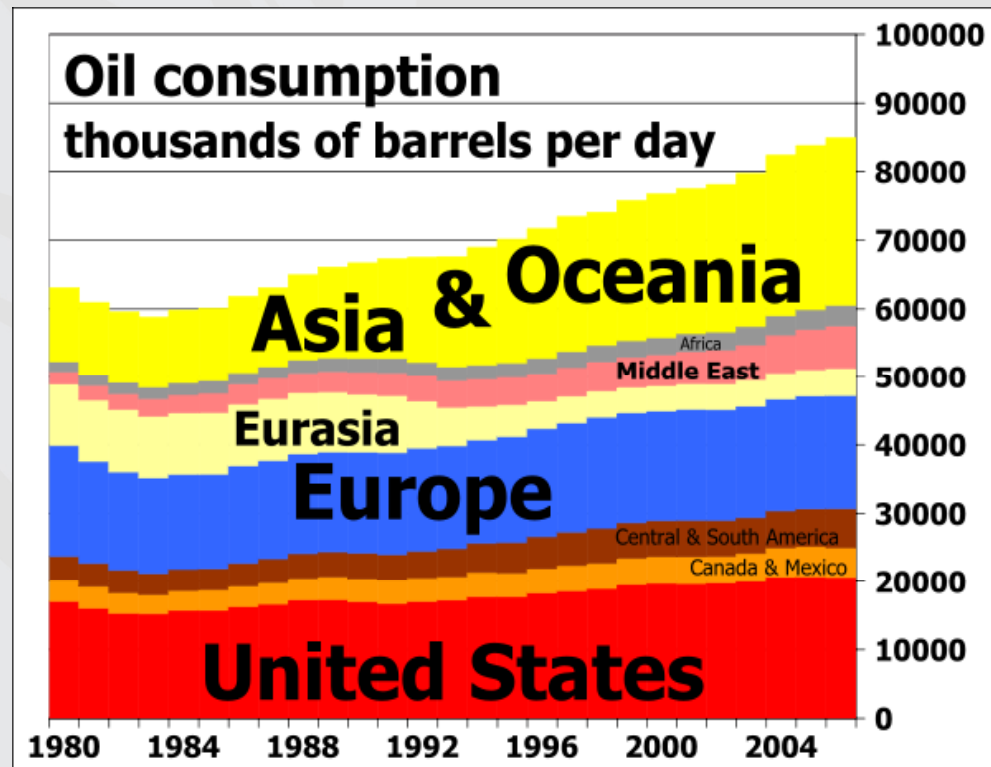
Source: UN Population Division 2004; Lee, 2003; Population Reference Bureau

CO₂ Concentration (ppm)



Source: Keeling and Whorf, 2005; NOAA – http://www.esrl.noaa.gov/gmd/ccgg/trends/#mlo_full.

Current worldwide production of oil is 85 million barrels per day...equal to demand...whereas before the worldwide recession demand was firm at 87 million barrels of oil per day



Source: Wikimedia and EIA -
http://tonto.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm



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The total value of Crude Oil Imported into the U.S. from
1973-2009 (in chained 2005 U.S. dollars): **\$3.3**
trillion

U.S. EIA Annual Energy Review, 2009



The U.S. ADDICTION to oil negatively affects the nation's **ECONOMY, ENVIRONMENT, HEALTH and WELL-BEING, and NATIONAL SECURITY**



Coal Consumption

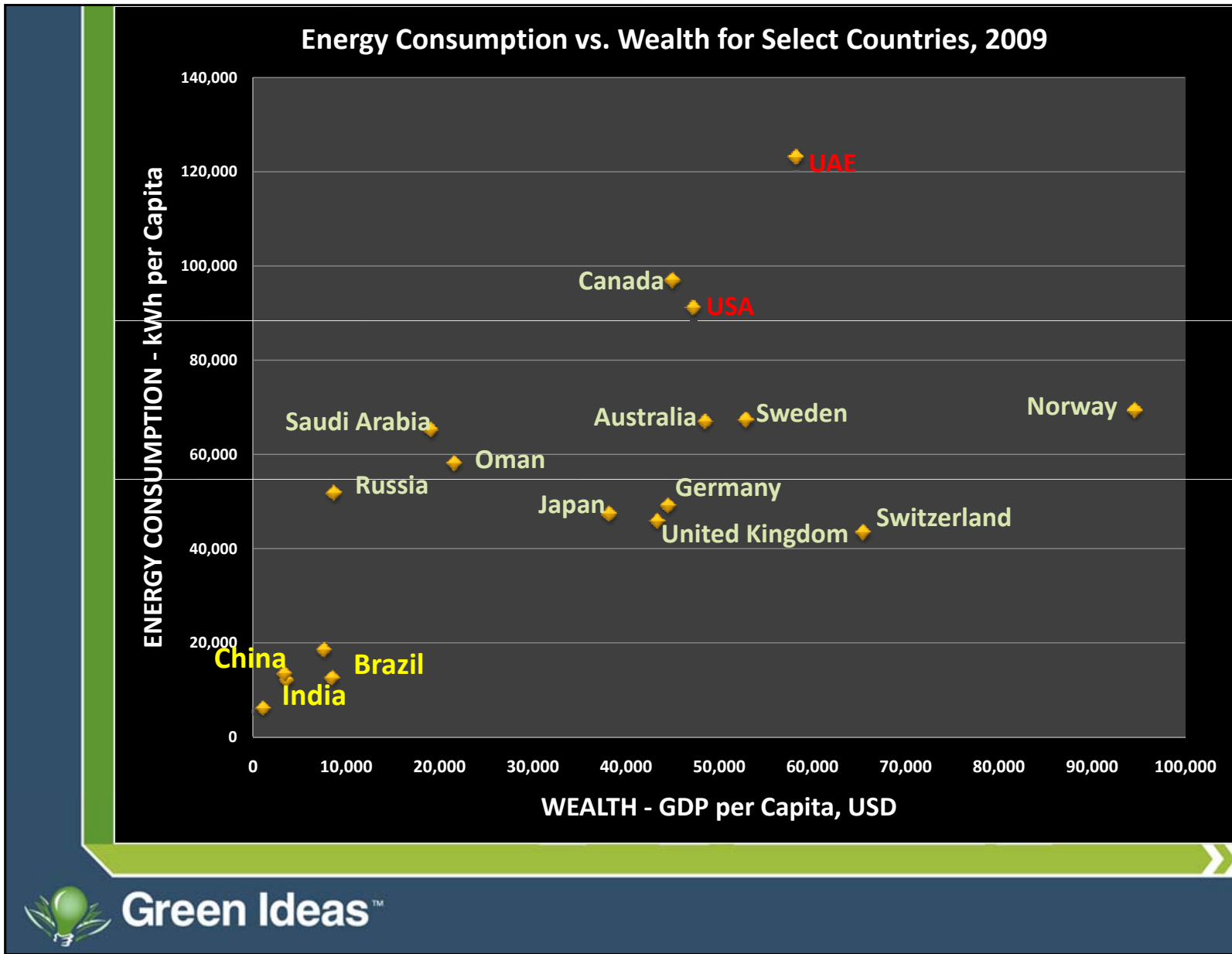
- There are 600 coal-fired power plants in the US
 - Each plant burns a mile-long coal train **EACH DAY**
 - The US burns a 219,000 mile-long coal train each year...
 - **Would wrap around earth 8 times**
 - The World burns a 1.5 million mile-long each year...
 - **Would wrap around earth 60 times**



Total Annual Energy Consumption: US as Compared to Select Countries

- The US consumes **25%** of the world's energy production with **4.5%** of the world's population
- The US energy consumption rate:
 - **0.73 times** the consumption rate of the UAE
 - **Twice** that of many industrialized nations
 - **7 times** the consumption rate of China
 - **8 times** the consumption rate of Jordan
 - **18 times** the consumption rate of India





The Role of Water

- **Water is man's most precious resource: there are no substitutes!**
- **The struggle to control water resources has shaped the political and economic history of many nations – and it will continue to do so in the future...**



The Role of Water

- **Population growth and economic development drive a steadily increasing demand for new clean water supplies in all parts of the world.**
- **Water is increasingly recognized as a key environmental issue of the 21st century and the key to poverty reduction.**



The Water-Energy Nexus

- Water security issues surround our efforts to extract, transport, manage, treat and desalinate water resources.
- Water is also absolutely critical to the needs for power production in most of the world.
- Water and energy issues are inextricably linked.



Water and Conflict

- **Water is not distributed uniformly around the globe, and has been a source of tension wherever water resources are shared by neighboring peoples.**
- **Globally, there are more than 250 water bodies shared by more than one country.**



Perspectives on the Importance of Water

- “The only matter that could take Egypt to war again is water.”
 - **Anwar Sadat, President of Egypt, 1979**
- “Water is the one issue that could drive nations of the region to war.”
 - **King Hussein, Jordan, 1982**
- “The next war in the Middle East will be over water, not politics.”
 - **Boutros Boutros-Ghali, Secretary General, United Nations, 1985**
- “Many of the wars in this century were about oil, but wars of the next century will be about water.”
 - **Ismail Serageldin, Vice President, World Bank, 2000**



**These domestic and global problems
are nearly incomprehensible ... and that
is a barrier to transforming the market**

**We must understand the psychology
that serves as the basis for our actions
and our inactions**



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Psychological Obstacles to Sustainable Environments

Edward K. Sadalla, Department Of Psychology
Susan E. Ledlow, Global Institute of Sustainability
Arizona State University

Sadalla, Greenbuild, 2009

Source – select slides delivered by Dr. Ed Sadalla at Greenbuild 2009



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Premises

- Aspects of human nature, produced by evolutionary pressures, constitute obstacles to sustainable human-environment systems.
- Knowledge of such elements of human nature is an essential component of sustainability science.
 - Technological solutions are of little utility if people will not employ them.

Sadalla & Ledlow

Greenbuild Conference 2009

Source – select slides delivered by Dr. Ed Sadalla at Greenbuild 2009



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Human Nature

- There is a human nature consisting of evolved abilities, behavioral tendencies, preferences, desires, and fears.
 - Opposite of “The blank slate”
- The human brain and mind evolved over millions of years

Sadalla & Ledlow

Greenbuild Conference 2009

Source – select slides delivered by Dr. Ed Sadalla at Greenbuild 2009



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Relevant Evolved Tendencies

1. A human tendency to employ a short term time perspective
2. A basic desire for increased status in hierarchical social systems
3. A tendency to identify with one's local group and local environment (tribalism–territoriality)
4. Innumeracy

Sadalla & Ledlow

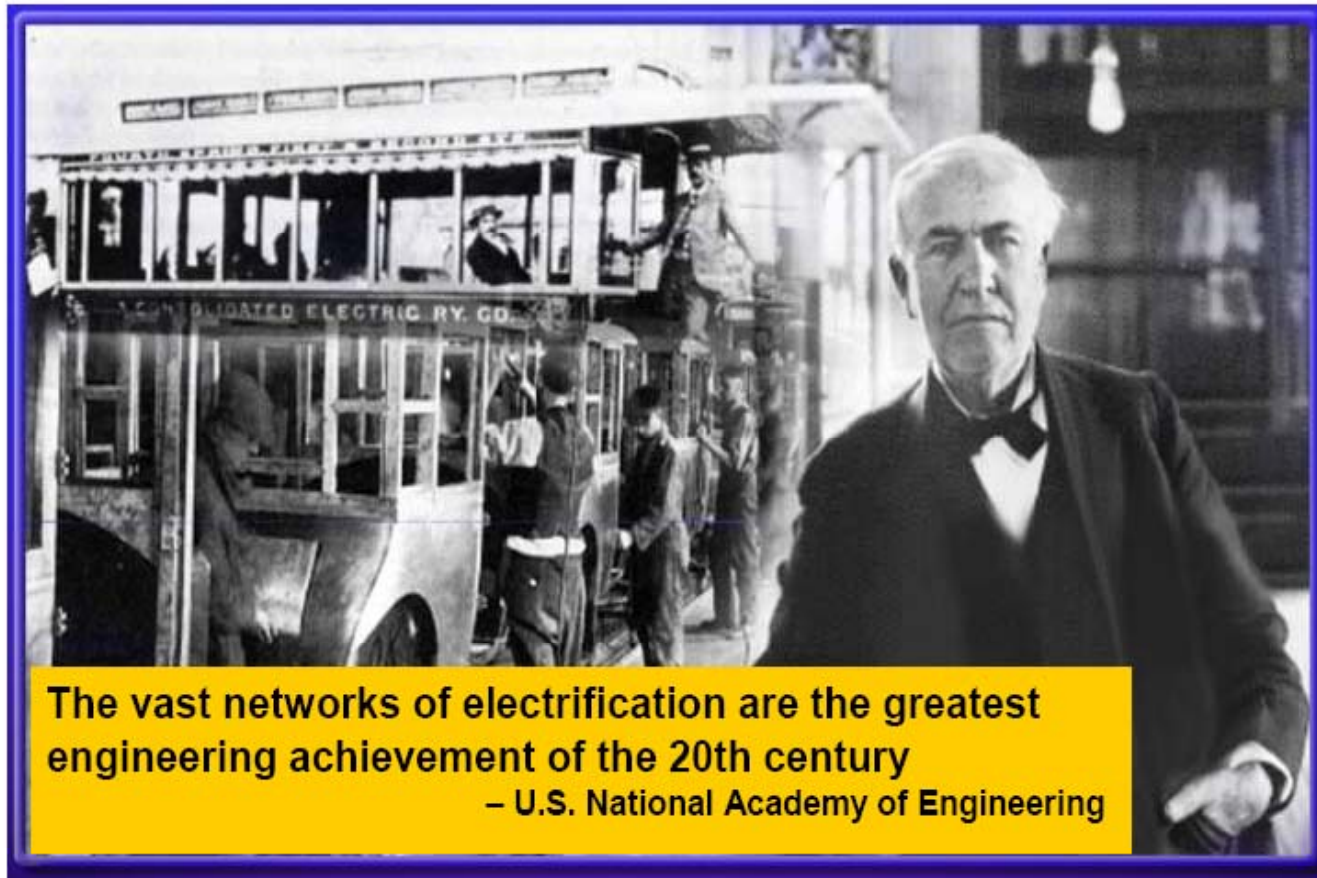
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Transforming Society

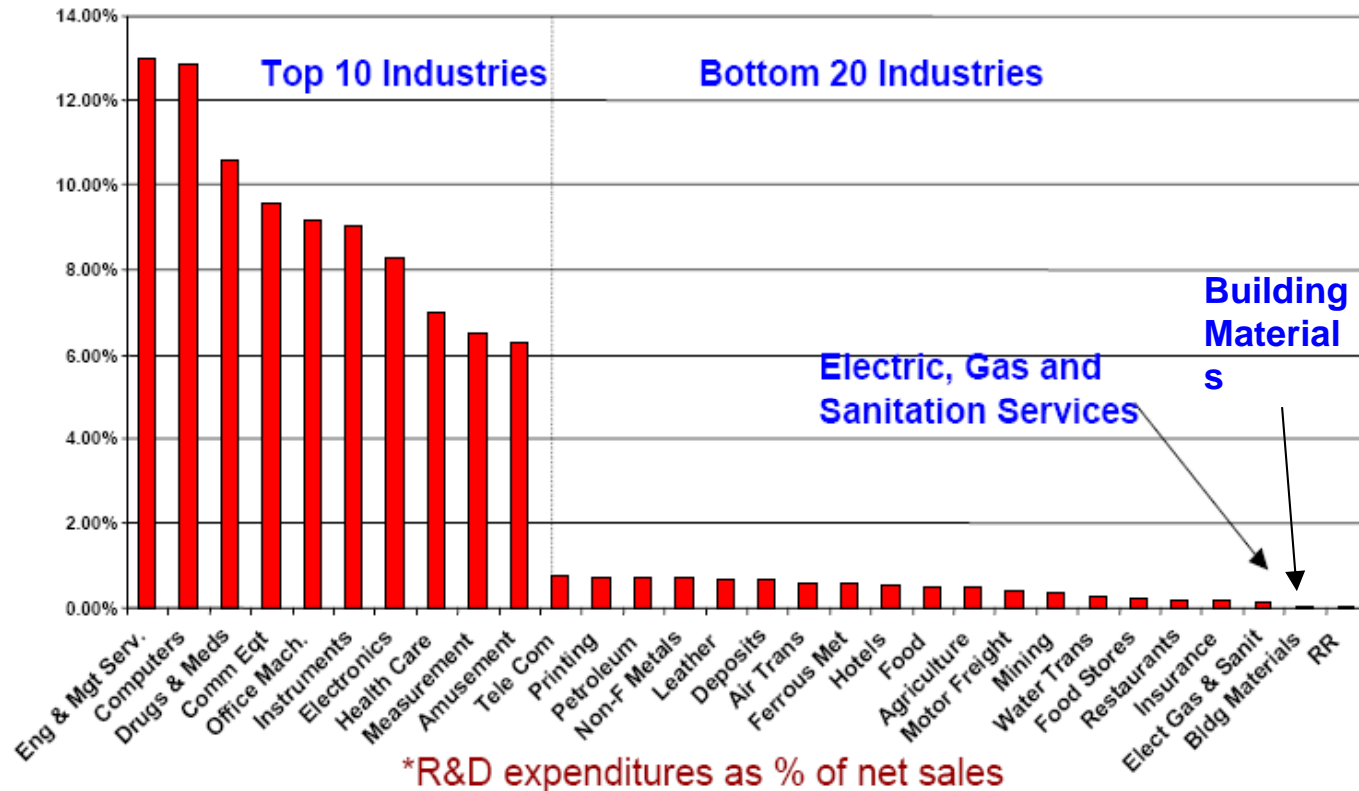


**The vast networks of electrification are the greatest
engineering achievement of the 20th century
– U.S. National Academy of Engineering**



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Context: R&D Expenditures*



Dr. Massoud Amin, EPRI 2001, 1995-2000 data; University of Minnesota, umn.edu/~amin



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Are Concrete Industry RD&D Initiatives significant? Are they following the path of the Energy Industry?



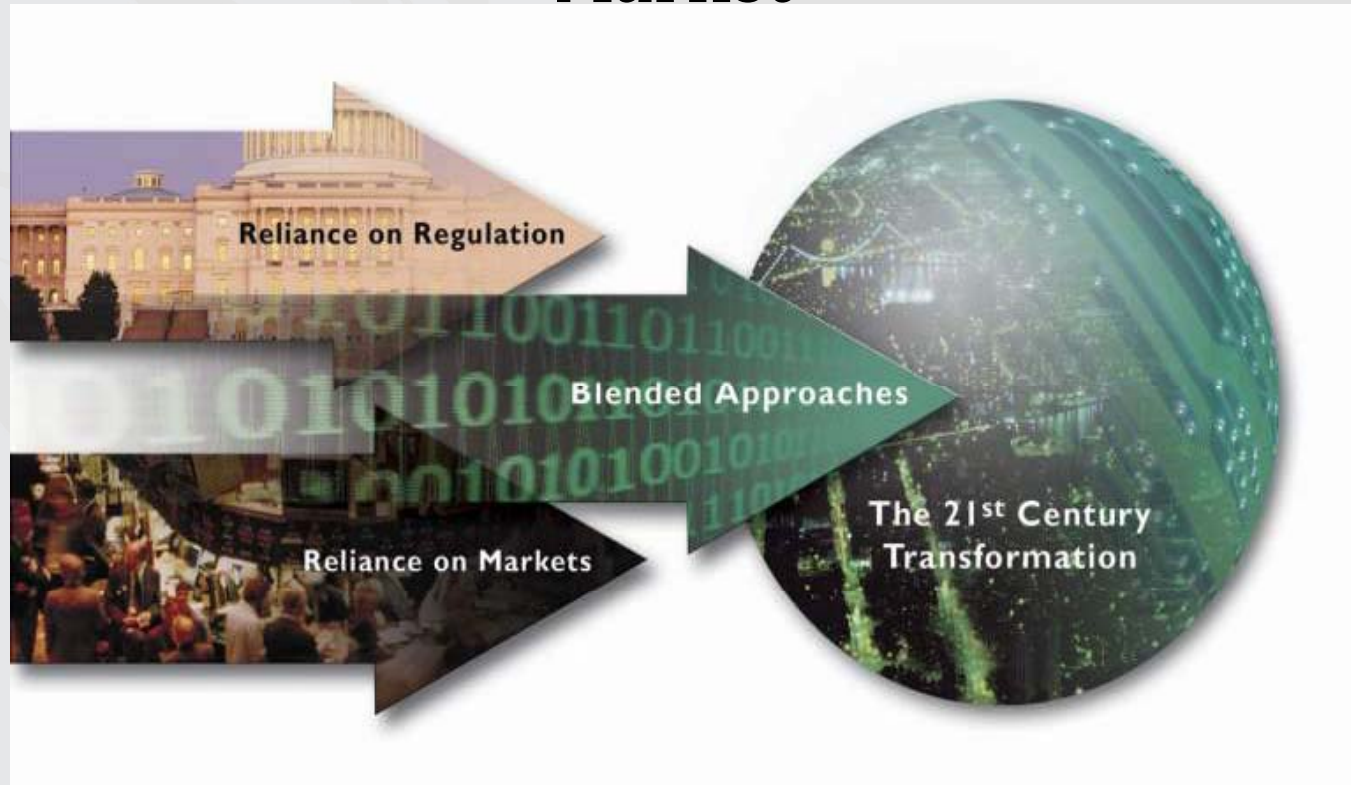
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So what can we do, given these trends and psychological realities? We can focus on **leadership** and **market transformation** to anchor sustainability.



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Regulation, Policy and Market Action must all be Leveraged to Transform the Market



Source: EPRI



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This is an issue of MARKET TRANSFORMATION



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How is Market Transformation Implemented? Consider: Green Building

- Three key strategies:

1. Create awareness

Green building is a better way to design and construct buildings

2. Educate

- The benefits to owners, occupants, the environment, and the economy are significant

3. Build demand

- Create push-pull demand in the market place for sustainable development





Many governmental entities are offering incentives to promote green building

- Density bonuses
- Expedited permitting
- Fee reductions/waivers
- Tax breaks and credits
- Grants
- Free green building consultation
- Promotional services
- Free technical assistance

ASHRAE Standard 189.1P – High Performance Green Building Standard

ASHRAE

USGBC

Standard 189.1P has been approved and can now be adopted by municipalities across the U.S.

AIA

IESNA



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International Green Construction Code

The International Code Council recently took public comments on Public Version 1.0 of the International Green Construction Code (IGCC)



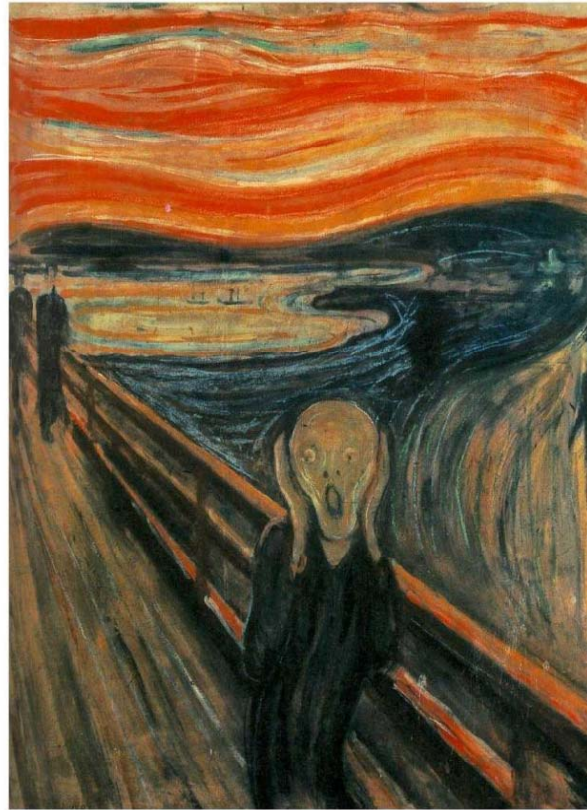
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So all of the trends are clear...but what should concrete industry leaders do now to leverage the situation?

First of all, don't fear the future!



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**Instead: embrace sustainability,
innovate, and forge a new business
model to thrive in the 21st Century**



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Be effective leaders: establish a logical and comprehensive approach to sustainability



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Harvard Business Review, September 2009

- “Sustainability isn’t the burden on bottom lines that many executives believe it to be...that’s why sustainability should be a touchstone for all innovation.”
- “In the future, only companies that make sustainability a goal will achieve competitive advantage. That means rethinking business models as well as products, technologies, and processes.”



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MITIGATE RISK

The next few years will determine who survives

“Business-as-usual” is just digging a deeper hole



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Implement robust sustainability initiatives in your companies and in the industry

- Focus on energy and water conservation
- Drive down the embodied energy of concrete
- Develop green alternatives like geopolymers cement materials
- Leverage durability, maintenance, improved IAQ
- Improve SRI of concrete materials for lower UHI effect
- Stormwater prevention and aquifer recharge
- Thermal mass, ICFs, novel envelope systems to save energy
- Partner for research, life cycle cost assessment
- Implement integrated sustainability programs
- Benchmark and improve the sustainability of your plants



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Thank You!

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