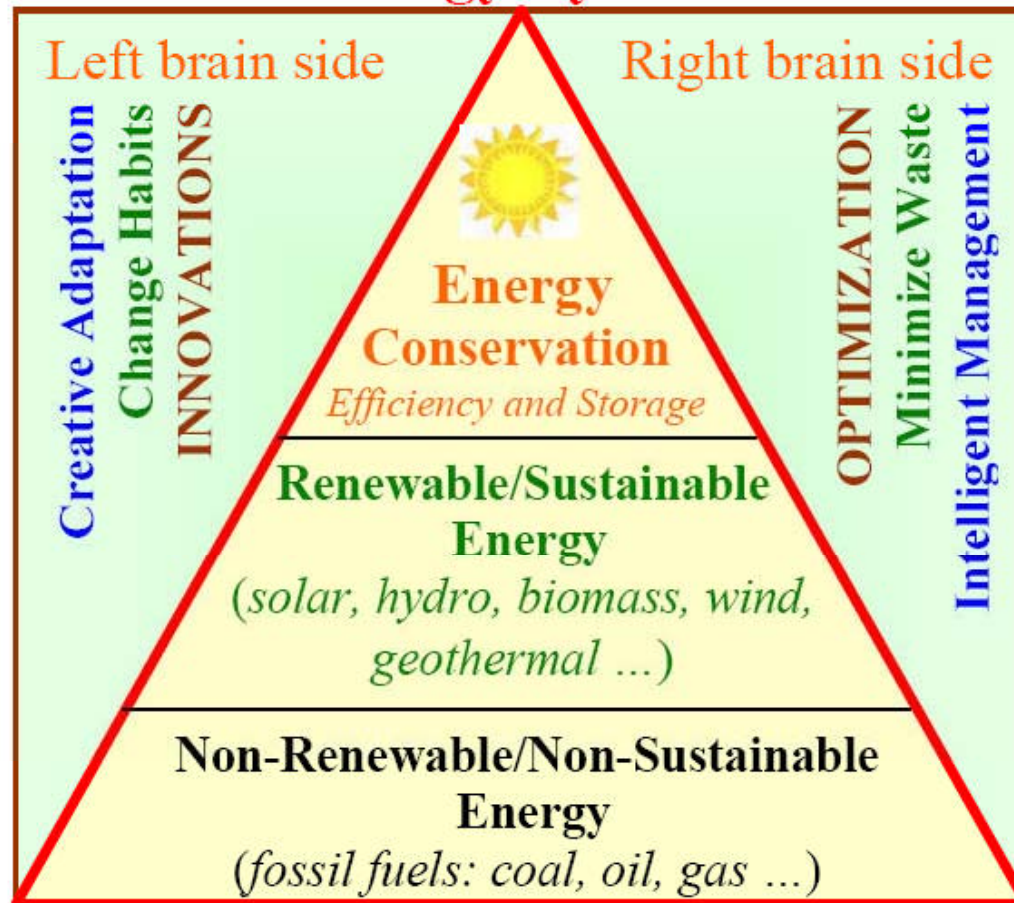


NIU Energy Initiative: Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Life May Be Happier After the Fossil-Fuel Era

Energy Pyramid



Humanity's Top Ten Problems

Efficient and Sustainable Energy
Energy/Economy/Environment Challenges and Opportunities
for next 50 years

1. ENERGY (critical for the rest nine)

2. Water
3. Food
4. Environment
5. Poverty
6. Terrorism & War
7. Disease
8. Education
9. Democracy
10. Population

2006: 6.5 Billion People

2050: 8-10 Billion (10^{10}) People



Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

- We are in 'energy transition era' from fossil fuels to alternative (including nuclear) and renewable energy sources (including solar, biomass, hydro, wind, and geothermal).

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

- In this transitional era, the energy CONSERVATION and EFFICIENCY (including energy storage) is the most “effective” and thus the most viable/profitable option in initial and mid-range period, until alternative and renewable energy infrastructure is developed and matured, and even more so beyond.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Global/National Urgency:

- Energy issue is among the highest global and national priority: (economical, ecological and security).
- Funding/Stimulus for education, research, development and applications.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

What is The Best NIU/CEET “Fit”?

- **Energy Education & Outreach**
(MS>MEST and NIU-Regional Outreach)
- **Efficient Energy Applications**
(Development, Optimization & Management)
(FFrE>NI Regional Energy Center)

Efficient and Sustainable Energy: *Ecology and Energy Chal*

Energy Efficient and Sustainable Buildings

Innovative and Integral Building Technologies

As “*Location, location, and location*” is the most important for Realtors, the “(Energy) *Efficiency, efficiency, and efficiency*” is the most important for en which ultimate results in “*Quality, quality, and quality*” environmental sus

**Energy Efficiency > Quality
> Employment > Prosperity**

“Win > Win > Win” for ALL!

**... we could start with
NIU/Regional BUILDINGS**

Energy Efficient and Sustainable Buildings

M. Kostic <www.kostic.niu.edu>

Innovative and Integral Building Technologies

Fall Semester 2010

As “Location, location, and location” is the most important for Realtors, the “(Energy) Efficiency, efficiency, and efficiency” is the most important for energy processes - thus our all activities, which ultimate results in “Quality, quality, and quality” i.e., environmental sustainability and life happiness!

YES! Thermodynamics, a science of energy, and the Mother of All Sciences will provide vision for the future energy solutions:

enabled by advances of NEW knowledge and technology

- **Conservation with Optimization and Storage** (to increase efficiency)
- **Cogeneration** (to minimize irreversibility and increase efficiency)
- **Insulation** (to minimize losses and increase efficiency)
- **Regeneration** (to recover losses and increase efficiency)

1. **Expertise in fundamentals and application of energy**
2. **Need for fundamental and global energy check-and-balance expertise** to provide for comprehensive and integral assessment and thus assist in critical energy decision making, development and application.
3. **Emphasis on integral and practical energy issues**
4. **Implementation of fundamental and comprehensive energy conservation**
5. **Adapt, enhance and optimize the existing technology P&R** to substantially improve energy conservation and efficiency

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Other Institutions and Existing Activities:

- Many educational and other institutions and industry have been positioning their strategic and development activities in energy related area
- Campus Green Sustainable Initiatives
- Energy-related Educational Programs
- Energy-related Research, Development and Application
- NIU is **not** in the forefront!



Master of Energy

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134 Million

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[Energy Masters](#) ☆ 🔍

Jun 16, 2010 ... AC, Air Conditioning, Air Conditioner Replacement, AC Repair, AC Replacement, AC Maintenance in Ahwatukee, AZ • Anthem, AZ • Cave Creek, ...

www.nrgmaster.com/ - Cached - Similar

[ETHZ - Master in Energy Welcome to the Master in Energy](#) ☆ 🔍 - 2 visits - Jan 26

The **Master in Energy** Science and Technology (MEST) is an unique opportunity to understand the production and use of **energy** in our society. ...

www.master-energy.ethz.ch/ - Cached - Similar

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

MASTER IN ENERGY SCIENCE AND TECHNOLOGY

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ETH Zurich - D-ITET/D-MAVT - Master-Energy

Past month

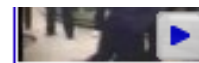
Past year

Custom range...

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Uploaded by BuddhaBoyVideos
youtube.com



5 min - Nov 2, 2000
Uploaded by therion616
youtube.com

[\[Master of Energy Systems Engineering \] \[Michigan Engineering ...](#) ☆ 🔍

Do you want to develop and apply clean and effective **energy** technologies that will change the world? This is a 30 credit hour **master's** degree program for ...

energysystemseng.engin.umich.edu/ - Cached - Similar

[Energy Masters | Solar Panels | Renewable Energy](#) ☆ 🔍

Our goal here at **Energy Masters** is to educate, serve, and ultimately power the next generation of green homes and businesses across the nation. ...

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Master

Energy Science and Technology

Master's Degree in Energy Science and Technology

A joint program of the Departments of

The Master's Degree in Energy Science and Technology of the ETH Zurich

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Energy Engineering

Admission Requirements

- [Master of Energy Engineering](#)

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Energy Efficiency

EERE Site

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 SI

The U.S. Department of Energy supports research, development, and deployment projects that increase energy efficiency nationwide.



HOMES ▶

Our homes can be more comfortable, livable and affordable with new, energy efficient technologies.



INDUSTRY ▶

Making our industrial plants more energy efficient keeps America productive.



BUILDINGS ▶

High- and low-tech solutions are making buildings new and old more efficient.



GOVERNMENT ▶

As the largest single energy consumer in the United States, the federal government strives to become more energy efficient, leading the way for all levels of government.



VEHICLES ▶

Efficient vehicles promise to reduce our dependence on imported oil.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

ENERGY EFFICIENCY ▾

RENEWABLE ENERGY ▾

RESEARCH & DEPLOYMENT ▾



DOE and Commerce Partner on Renewable Energy Modeling and Forecasting

Jan. 24, 2011 – DOE and the Department of Commerce today announced a new agreement to further collaboration between the agencies on renewable energy modeling and weather forecasting.

[View story.](#)

Buildings

EERE Site

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SHARE

The U.S. Department of Energy funds R&D to help commercial builders, businesses, and homeowners reduce energy use through energy efficiency and renewable energy technologies. Learn about DOE programs for buildings, how to use efficient and renewable energy in buildings, and access information resources and financial incentives. See also DOE programs and resources for [homes](#).




Energy-efficient buildings use less energy, cost less to operate, and improve comfort, saving money for homeowners and businesses.

PROGRAMS AND INITIATIVES

[Building Technologies Program](#)

Funds research and technology to reduce commercial and residential building energy use.

[Program Fact Sheet](#) 

[BetterBuildings](#) partners with states, local governments, and organizations who received funding to improve the energy efficiency of existing commercial and residential buildings in their communities.

[Building Energy Codes Program](#) provides information on national model energy codes and promotes stronger energy codes for commercial buildings.

[Commercial Building Energy Alliances](#) bring together industry representatives to find solutions that minimize the energy use and environmental impact of commercial buildings. The Alliances focus on [Retailers](#), [Hospitals](#), and [Commercial Real Estate](#).

[Commercial Building Initiative](#) works with commercial builders and owners to reduce energy use and optimize building performance, comfort, and savings.

[Solid-State Lighting](#) works with industry to advance the development and market introduction of solid-state lighting.

[Appliances and Commercial Equipment Standards](#) develops test procedures and minimum efficiency standards for residential appliances and commercial equipment.

USING EFFICIENT AND RENEWABLE ENERGY TECHNOLOGIES

[Building Design & Evaluation](#)

[Commercial Building Tax](#)

[Incentives](#)

[Tax Incentive Software](#)

[Incentives](#)

INFORMATION RESOURCES

[Home Energy Basics](#)

[Buildings Energy Consumption Data](#)

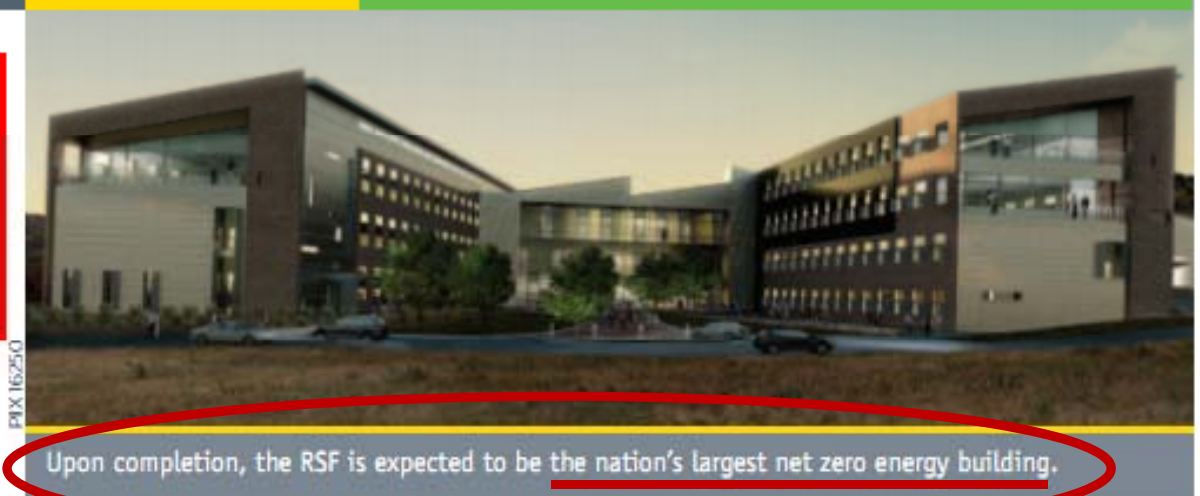
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Research Support Facility—Zero Energy Building Moves Closer to Reality

Imagine an office building so energy efficient that its 800 occupants consume only the amount of energy generated by renewable power on and near the building.

When employees of the U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory (NREL) move into the new Research Support Facility in Golden, Colorado, this summer, the idea of a net-zero energy workplace will come closer to reality. The building will use 50 percent less energy than if it were built to current commercial code and will achieve the U.S. Green Building



Design-Build Approach

To meet stringent time and performance goals—while mitigating costs and risks—the RSF project team developed an innovative approach that relied on an integrated design and construction approach, extensive up-front planning, a national design competition, energy modeling, and a firm fixed-price contract. DOE and NREL invited nearly a dozen design-build teams to submit proposals. Three teams were short-listed to develop concept designs and submit proposals. The Haselden Construction and RNL team won the design-build competition and began work in July 2008.

Renewable Energy and Energy Efficiency Features

The RSF building showcases ~~numerous high~~ performance design features, passive energy strategies, and renewable energy. It is a prototype for the future of large-scale net-zero energy buildings.

Investing in national priorities instead of bailing out un

... economically

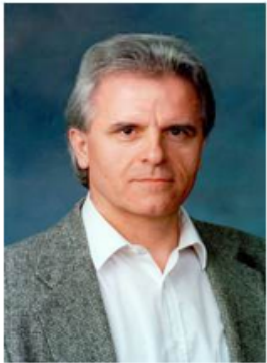
See also Energy Pyramid  SPEAKING Enquiry * Sabbatical 2010

Energy consumption could be halved now on global scale with existing technology:

I would like to state, as a *professor of energy*, www.kostic.niu.edu/energy, that *energy conservation* “with existing technology” has real immediate potential to SUBSTANTIALLY reduce our national energy dependence until new yet-to-be-invented technology is available long-run. For example, at present, the Toyota Prius, commercial hybrid car makes double mileage than classical comparable car (double efficiency, 46 mpg vs. 23 mpg), and commercial Combined-Cycle-Power-Plant (CCPP), combining gas-steam turbines cycles, is about two times more efficient than classical comparable power-plant (about 60% vs. 30%), all commercial products with existing technology - **thus it could be done for any car and any power plant – energy consumption could be halved on global scale – two times less energy and pollution than current.** *With energy conservation measures (insulation and regeneration, cogeneration and optimization with energy storage) it is even more straightforward to substantially reduce energy use in buildings and industry.* We just have to make it a priority: invest resources in existing and new infrastructures

Spring 2009, Our Nation Stimulus Year! [[PDF format](#)]*[Energy consumption could be halved](#): Investing in national priorities*[Hybrid Heater-Cooler/Chiller Integrator with Thermal Transformer: HHCCI-TT Patent-pending](#)**[Concrete Magazine article-PDF](#)*
www.tranearchitect.com/Sustainable-Design -Case Studies * [free ASHRAE Advanced Energy Design Guide](#)

TO Local, State, and National Government Officials and Decision Makers
TO Community Activist & Leaders, and Business Administrators
TO Whomever Is Concerned About Energy & Environment



Subject:

Promoting Energy Conservation Activities,
Important For Security and Future Economy
of Our Community, Our State, Our Nation, and Our World

... economically

Let us all be wise and responsible! Please review [Energy consumption could be halved](#) actions and utilizations. I have communicated my strong views on immediate potentials for substantial energy conservation to the President Obama's Team, also posted on Web:

http://www.kostic.niu.edu/energy/Energy_consumption_halved.htm

It is a very simple arithmetic: With existing technology and appropriate activities and investment (creating opportunities for many to work on national priorities) we can reduce energy consumption in HALF, which translates in proportional reduction of energy used and CO₂ environmental emission, thus substantially reducing energy imports and improving environment, national security and our economy.

NIU Energy Initiatives - Importance and Freedom Field Potentials

"We may only succeed by leading with ingenious educative activities and innovative application activities, and not only by following others in acquiring their existing technology." by M. Kostic

The Freedom Field initiative and activities up to now are invaluable and should be commended. However, since the reality of global energy landscape has changed (from hydrogen to energy conservation and alternative and renewable sources) and is always changing, NIU now could help in further strategic planning and development of major funding for continuation and expansion of this unprecedented initiative. In addition to technological experts involved, there is a need for visionary, comprehensive and integral assessment (and YES, *Thermodynamics, a science of energy, and the Mother of All Sciences!*), and thus assist in critical decision making and energy development of our region. We have a unique opportunity to rejuvenate the "ailing" Freedom Field energy project – it is a unique initiative and could be much more important than what it appears to be – as one-of-a-kind energy landmark of our region and our nation, it may have enormous potential for economic growth and new jobs in our region, our nation, and globally.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

NIU and Our (CEET) College

Challenges and Opportunities:

- Lack of synergistic campus-wide activities – pragmatic activities not integrated and without due vision, enthusiasm and rigor.
- CEET energy activities has been pragmatic and without due integration and focused long-term, sustainable future plans.

NIU is not in the forefront!

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

NIU and Our (CEET) College

Challenges and Opportunities (2):

- Considering global, national and regional challenges and potentials, we have a unique opportunity and responsibility to initiate, develop and sustain meaningful and profitable diverse energy activities

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Our CEET College Reality:

- With MS terminal degree and limited competitive external-research funding history, we have to focus on educational and application issues
- It IS our BEST and most “profitable FIT” !

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Proposed Energy Initiative:

- THIS Energy Initiative is not for pursuing any pragmatic research area, but to develop integrated activities and resources, with educational and outreach programs and a regional energy center for acquiring, optimizing and adapting advanced and innovative devices and processes for energy production, utilization, optimization and management in residential, commercial, industrial and transportation sectors ... and ...

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Proposed Energy Initiative (2):

- We should pro-actively collaborate and add values to **Freedom Field (Renewable) Energy** and complement and expend to a regional Northern Illinois Energy Center.
- It should be a mutually beneficial collaboration for the benefit of society and businesses of the Northern Illinois Region.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Energy Initiative Objectives:

- Initiate, promote, develop and support energy conservation and efficiency “new culture,” thus energy sustainability, economy and quality of life.
- Develop educational energy programs for professional development (outreach), undergraduate, and at Master level degree:
MS in Energy Science and Technology (MEST) or MS in Energy Efficiency and Sustainability (MSEES)
... and ...

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Energy Initiative Objectives (2):

- Initiate and develop a regional **Northern Illinois Energy Center** for acquisition, development and application of advanced devices and processes for better energy production, utilization, optimization and management (whole cycle), with **emphasis on efficiency (conservation)**, thus quality, improved economy and environmental sustainability, and ultimately quality of life.

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Development of Activities and Funding:

- Activities could be initiated within our existing programs including enthusiasts, activists and interest groups, to develop related proposals and funding for **future sustainable activities to develop new skilled labor force and new businesses**, to engage to the most challenging and thus most profitable energy issues
... and ...

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

Development of Activities and Funding (2):

- Due to nature of wider, at least regional activities and objectives, the funding has to be developed at institutional or regional level. I have learned during my Sabbatical activities that competitive research funding for individual or small-group is not available for this now. It has to be developed within national, state and/or regional “stimulus” funding programs and different investments sources over a period of time, **BUT we have to START NOW** (since we have not earlier).

Efficient and Sustainable Energy

Energy/Economy/Ecology Challenges and Opportunities

What is The Best NIU/CEET fit?

- **Energy Education**
(MS>MEST & Outreach)
- **Efficient Energy Development**
Application Optimization
(FFE>NI Regional Energy Center)

**THANK
YOU !**