The 2007 New Jersey

Clean Energy Conference Agenda

Partnering for Climate Change Solutions

Bringing together clean energy organizations, businesses, and supporters to achieve New Jersey's clean energy goals of 20% by 2020.

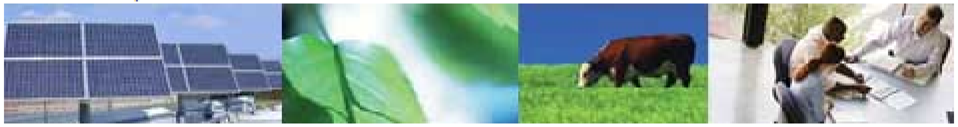
Hyatt Regency

2 Albany Street
New Brunswick, NJ

Clean Energy Strategies to Reduce Your Carbon Footprint

In 2005, New Jersey's Clean Energy Program helped avoid an estimated 317,000 metric tons of CO2 emissions through the installation of energy saving measures and technologies. This is the equivalent to taking over 60,000 cars off the road or planting 94,000 acres of trees. Over their lifetime, these clean energy measures will avoid 3,407,440 tons of CO2 emissions. Learn about the latest metrics to estimate your energy footprint and the climate benefits and savings of specific installed clean energy measures. Hear from business and municipal leaders about program partners, resources, tool kits, and strategic planning initiatives to reduce our energy footprint.

Moderator: Commissioner Christine Bator, NJ Board of Public Utilities
Speakers: Michael Mahoney, Assistant General Counsel, Pfizer, Inc.; Julio Rovi, Principal, The Cadmus Group for Energy Efficiency and Green Buildings; Edward Brzezowski, P.E., LEED AP, The Ferreira Group



Day 2

Conference Opening, Plenary Session, Exhibits, Breakout Panels, & Leadership Awards
September 28, 2007

12:00 pm **Lunch & Presentation of 2007 Clean Energy Leadership Awards**
Presented by Jeanne M. Fox, President, New Jersey Board of Public Utilities

2:00 pm **Breakout Panel Sessions I**

- New Jersey's Energy Master Plan
- Clean Energy Project Financing
- Combined Heat & Power and Demand Side Management
- Renewable Energy Technologies & Markets–Regulatory Update
- Green Building Design
- Clean Energy Strategies to Reduce Your Carbon Footprint

3:00 pm **Sponsored Networking & Exhibits Break II**

3:30 pm **Breakout Panel Sessions II**

- Clean Energy Project Financing
- Combined Heat & Power and Demand Side Management
- Renewable Energy Technologies and Markets – Solar Photovoltaics
- Green Building Design
- Clean Energy Strategies to Reduce Your Carbon Footprint

4:30 pm **Conference Closing**
Exhibits/Refreshments

Clean Energy Strategies to Reduce Your Carbon Footprint

Learn about the latest metrics to estimate your energy footprint and the climate benefits and savings of specific installed clean energy measures.

Hear from business and municipal leaders about program partners, resources, tool kits, and strategic planning initiatives to reduce our energy footprint.

[Q1] What's my buildings "Energy and Carbon Footprint"?

[Q2] What's the impact of my Energy Efficiency (EE) and Renewable Energy (RE) program on it?

Energy Footprint (1)

An energy footprint is a measure of land required to absorb the CO_2 emissions.

Carbon Footprint (2)

A measure of the exclusive total amount of carbon dioxide emissions that is directly or indirectly caused by an activity…

Presented by:

Edward H. Brzezowski, P.E., LEED AP
Director of Engineering

The Ferreira Group
31 Tannery Road
Branchburg, NJ 08876

908 534-8655
ebrzezowski@ferreiragroup.com
http://www.ferreiragroup.com

Notes:

(1) http://www.rprogress.org/energyfootprint/energy_footprint/

(2) http://www.isa-research.co.uk/docs/ISA-UK_Report_07-01_carbon_footprint.pdf

[Q1] What's my buildings "Energy and Carbon Footprint"?

Example:
Annual Energy Use
157,778 KWH
11,295 Therms

NJ Region 2
Electricity Lb-CO2 = KWH x 1.679
Natural Gas Lb-CO2 = Therms x 11.708
Lb-CO2 in Metric Tons = Lb-CO2/2,205

Annual Emissions CO2 (Electricity and Natural Gas)
= (157,778 KWH x 1.679 lb-CO2/kwh) + (11,295 Therm x 11.7 lb-CO2/therm)
= 397,061 lb-CO2, or 180.0 metric tons CO2

Carbon Footprint

Or 180.0 x 0.3 = 54.0 acres
of new trees to sequester
these CO2 emissions

Energy Footprint

Note: See Calculation Reference at end of slide set

[Q2] What's the impact of my Energy Efficiency (EE) and Renewable Energy (RE) program on it?

How does my buildings annual "Energy and Carbon Footprint" compare to say last year or my baseline?

Example:

Last Year	This Year	Savings	
157,778	-19,360	177,138	KWH
11,295	9,806	1,489	Therms

NJ Region 2

Electricity Lb-CO2 avoided = KWH x 1.679

Natural Gas Lb-CO2 avoided = Therms x 11.708

Lb-CO2 in Metric Tons = Lb-CO2/2,205

Annual Avoided Emissions CO2 (Electricity and Natural Gas)

= (177,138 KWH x 1.679 lb-CO2/kwh) + (1,489 Therm x 11.7 lb-CO2/therm)

= 314,836 lb-CO2, or 142.8 metric tons CO2

Or 142.8 x 0.3 = 42.8 acres of new trees to sequester these CO2 emissions

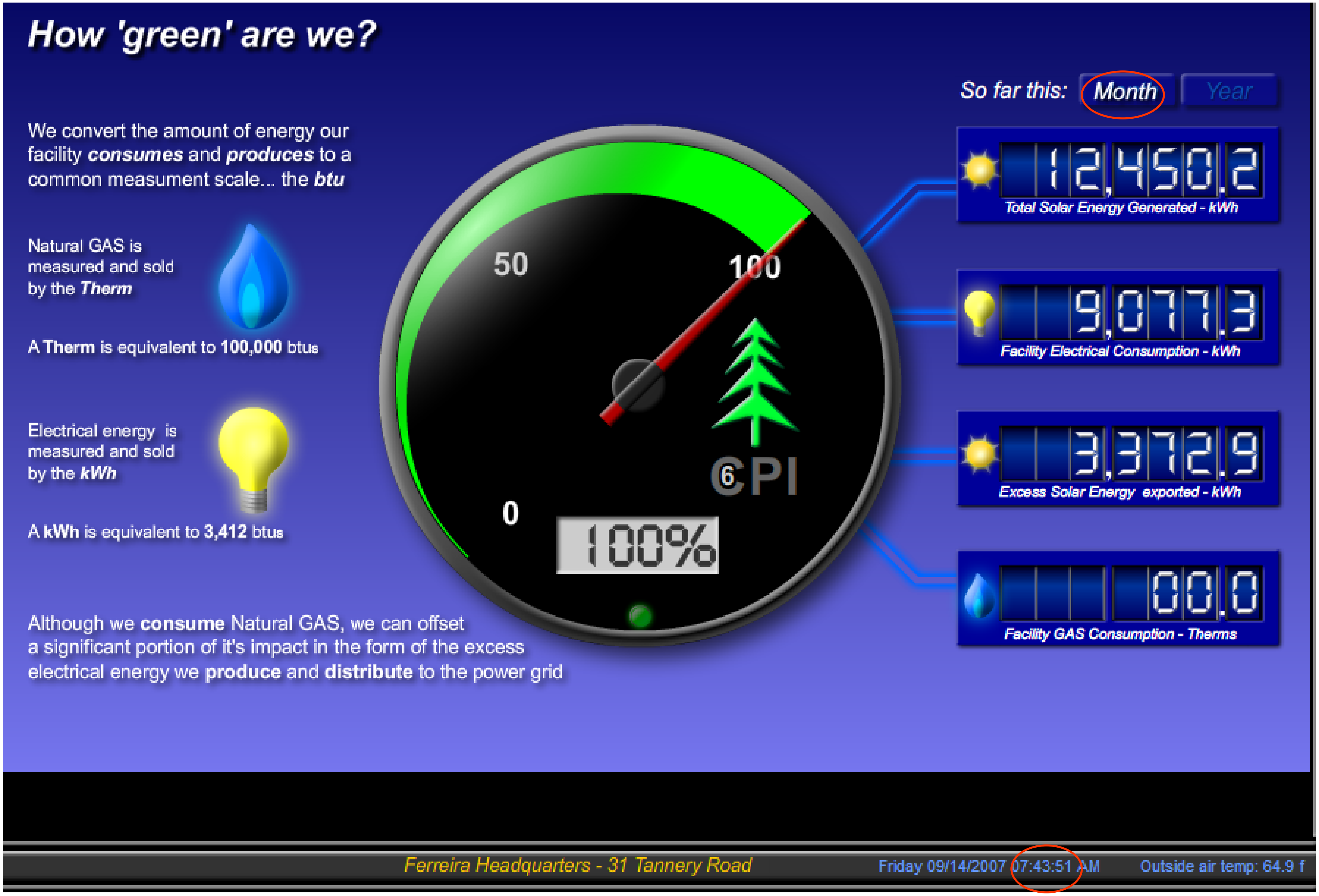
We reduced our

Carbon Footprint

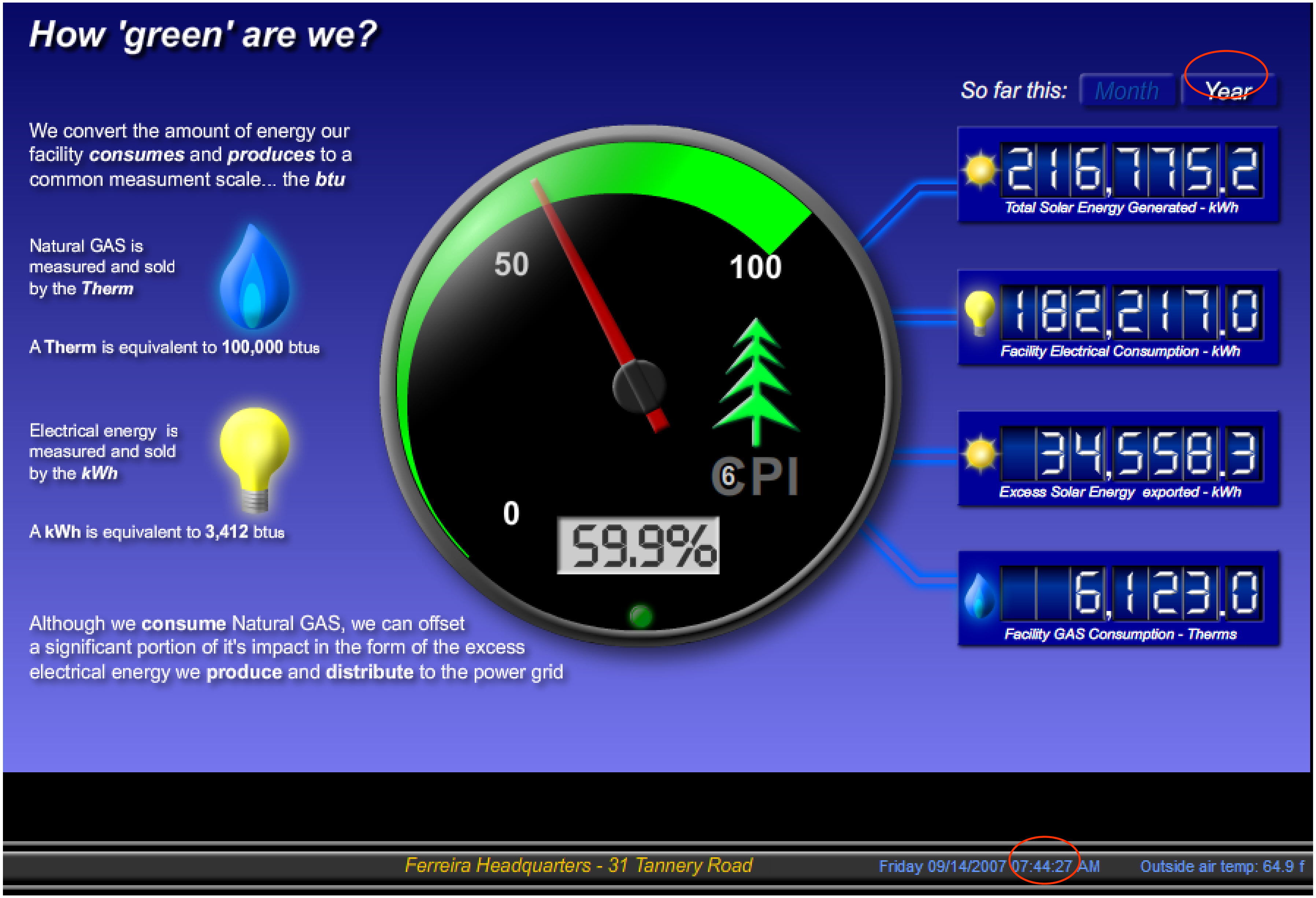
Energy Footprint

Note: See Calculation Reference at end of slide set

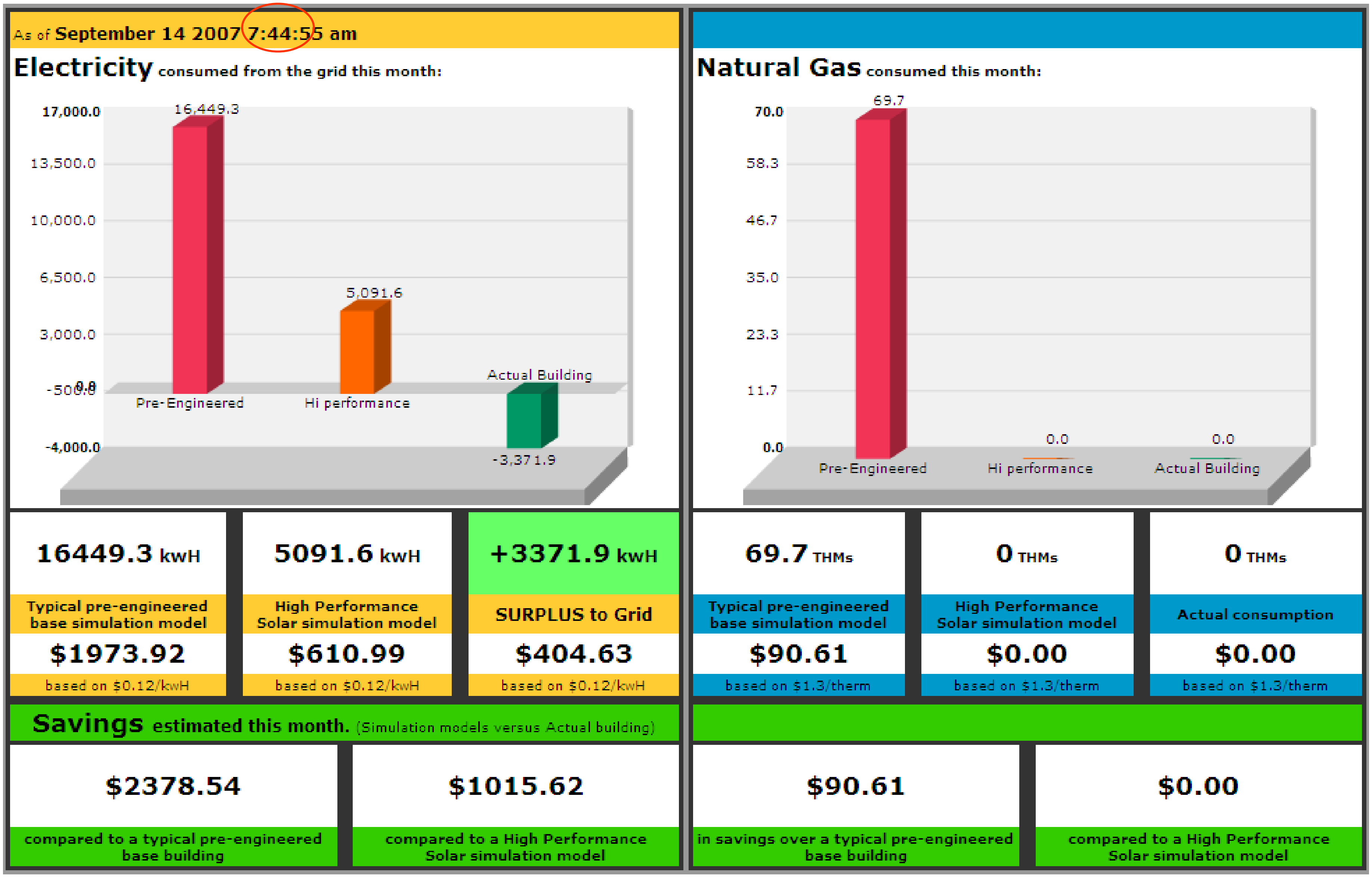
… How's my buildings "Energy and Carbon Footprint"…. RIGHT Now?



… and, so far this year?

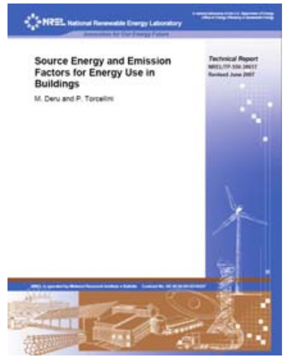


… How's my buildings "Energy and Carbon Footprint"…. RIGHT Now?



Calculation References:

http://www.nrel.gov/docs/fy07osti/38617.pdf



http://www.eia.doe.gov/oiaf/1605/factors.html
http://www.epa.gov/ttn/chief/eiinformation.html

Other Conversion Factors

Weight

1 kilogram = 2.205 pounds
1 short ton = 0.9072 metric tons
1 metric ton = 1.1023 short tons = 2,205 pounds

Volume

Liquid Fuels

	1 barrel	42 US gallons
	1 barrel	159 liters
	1 cubic meter	6.289 gallons

Gaseous Fuels

	1 cubic meter	35.315 cubic feet

Energy

Natural Gas

1 cubic foot (cf) = 1,030 Btu
1 therm = 100 cf = 103,000 Btu
1 Mcf = 1,000 cf = 1.03 million Btu

Fossil Fuel Conversion Factors -
(US Department of Energy, Energy Information Agency, http://www.eia.doe.gov/oiaf/1605/factors.html)

Fuel Type	CO_2 Content (Pounds CO_2 per Unit Volume or Mass)	CO_2 Coefficient (Pounds CO2 per Million Btu)
Natural Gas	120.593 lb/10^3cf	117.080
Gasoline (conventional)	19.564 lb/gal.	156.425
Distillate Oil/Diesel	22.384 lb/gal.	161.386
Residual Oil	26.033 lb/gal.	173.906
LPG/Propane**	12.669 lb/gal.	139.178
Kerosene/Jet fuel	21.537 lb/gal.	159.535
Anthracite Coal	3852.16 lb/short ton	227.4
Bituminous Coal	4,931.3 lb/short ton	205.3
Sub-bituminous Coal	3,715.9 lb/short ton	212.7
Lignite Coal	2,791.6 lb/short ton	215.4
1 pound of carbon in carbon dioxide = 3.6667 pounds carbon dioxide, measured at full molecular weight (CO_2)		

Electricity Carbon Dioxide Conversion Factors

CO_2 Intensity Factors for Marginal Electricity Generation for US Regions

EPA Region	Pounds of CO2 per kWh
Region 10: OR, WA, ID	1.202
Region 9: CA, AZ, NV	1.240
Region 8: CO, UT, MT, WY, ND, SD	1.244
Region 7: MO, IA, KS, NE	1.404
Region 6: TX, LA, OK, AR, NM	1.186
Region 5: OH, IL, MI, IN, WI, MN	1.988
Region 4: FL, NC, GA, TN, AL, SC, KY, MS	2.215
Region 3: PA, VA, MD, WV, DC, DE	2.096
Region 2: NY, NJ	1.679
Region 1: MA, CT, ME, NH, RI, VT	1.726

CO_2 Intensity Factor for New Natural Gas Fired Electricity Generation
Combined cycle combustion turbine: 0.81 Pounds of CO_2 per kWh

http://198.151.15.215/SanFrancisco_2002_WorkshopMaterials.pdf **<<See pages 214/215 of 258**

One metric ton of carbon dioxide has a footprint of 0.3 to 2.1 acres, the amount of land area required to plant new trees to sequester one metric ton of this greenhouse gas each year.

US EPA - Carbon Sequestration in Agriculture and Forestry: Representative sequestration rates a - Windows Internet Explorer

http://www.epa.gov/sequestration/rates.html

File Edit View Favorites Tools Help

US EPA - Carbon Sequestration in Agriculture and For...

Home Print

U.S. Environmental Protection Agency

Carbon Sequestration in Agriculture and Forestry

Contact Us | Print Version Search: GO

EPA Home > Climate Change > Carbon Sequestration > Practices > Rates

- Climate Change Home
- Carbon Sequestration Home
- Basic Information
- Frequent Questions
- Science
- Practices
- National Analysis
- Project Analysis
- International
- Co-Benefits
- Publications
- Links & Resources

Representative Carbon Sequestration Rates and Saturation Periods for Key Agricultural & Forestry Practices

Important Note: Any associated changes in emissions of methane (CH_4) nitrous oxide (N_2O) or fossil CO_2 not included.

Activity	**Representative carbon sequestration rate in U.S.** (Metric tons of C per acre per year)	**Time over which sequestration may occur before saturating** (Assuming no disturbance, harvest or interruption of practice)	**References**
Afforestation [a)]	0.6 – 2.6 [b)]	90 – 120+ years	Birdsey 1996
Reforestation [c)]	0.3 – 2.1 [d)]	90 – 120+ years	Birdsey 1996
Changes in forest management	0.6 – 0.8 [e)]	If wood products included in accounting, saturation does not necessarily occur if C continuously flows into products	Row 1996
	0.2 [f)]		IPCC 2000
Conservation or riparian buffers	0.1 – 0.3 [g)]	Not calculated	Lal et al. 1999
Conversion from conventional to reduced tillage	0.2 – 0.3 [h)]	15 – 20 years	West and Post 2002
	0.2 i)	25 – 50 years	Lal et al. 1999
Changes in grazing land management	0.02 – 0.5 [j)]	25 – 50 years	Follet et al. 2001
Biofuel substitutes for fossil fuels	1.3 – 1.5 [k)]	Saturation does not occur if fossil fuel emissions are continuously offset	Lal et al. 1999

a) Values are for average management of forest after being established on previous croplands or pasture.
b) Values calculated over 120-year period. Low value is for spruce-fir forest type in Lake States; high value for Douglas Fir on Pacific Coast. Soil carbon accumulation included in estimate.
c) Values are for average management of forest established after clearcut harvest.
d) Values calculated over 120-year period. Low value is for Douglas Fir in Rocky Mountains; high value for Douglas Fir in Pacific Coast. No accumulation in soil carbon is assumed.
e) Select examples, calculated over 100 years. Low value represents change from 25-year to 50-year rotation for loblolly pines in Southeast; high value is change in management regime for Douglas Fir in Pacific Northwest. Carbon in wood products included.
f) Forest management here encompasses regeneration, fertilization, choice of species and reduced forest degradation. Average estimate here is not specific to U.S., but averaged over developed countries.
g) Assumed that carbon sequestration rates are same as average rates for lands under USDA Conservation Reserve Program.
h) Estimates include only conversion from conventional to no-till for all cropping systems except for wheat-fallow systems, which may not produce net carbon gains. Estimates of changes in other greenhouse gases not included.
i) Assumed that average carbon sequestration rates are same for conversion from conventional till to no-till, mulch till or ridge till. Estimates of changes in other greenhouse gases not included.
j) See Improve/Intensify Management section in Table 16.1 of Follett et al. (2001). Low end is improvement of rangeland management; high end is changes in grazing management on pasture, where soil organic carbon is enhanced through manure additions. Estimates of flux changes in other greenhouse gases not included.
k) Assumes growth of short-rotation woody crops and herbaceous energy crops, and that burning this biomass offsets 65-75% of fossil fuel in CO_2 emissions. Estimates of changes in other greenhouse gases not included.

Full reference citations:

Birdsey, R.A. (1996) Regional Estimates of Timber Volume and Forest Carbon for Fully Stocked Timberland, Average Management After Final Clearcut Harvest. *In Forests and Global Change: Volume 2, Forest Management Opportunities for Mitigating Carbon Emissions*, eds. R.N. Sampson and D. Hair, American Forests, Washington, DC.

Lal, R., J.M. Kimble, R.F. Follett and C.V. Cole (1999) *The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect.* Lewis Publishers.

Follett, R.F., J.M. Kimble and R. Lal (2001) *The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect*, Lewis Publishers.

http://www.epa.gov/sequestration/rates.html

Bio: EDWARD H. BRZEZOWSKI, P.E., LEED A.P.

Mr. Brzezowski is a nationally recognized Professional Mechanical Engineer with 30 years of experience. He is currently the Director of Engineering for The Ferreira Group in Branchburg, NJ where he engineered the first Net Zero Electric Commercial Building in the United States. This project recently won a 2007 Award for Excellence from the New Jersey Business and Industry Association. He is the lead Commissioning Authority Engineer on the new World Trade Center Transportation Hub project in New York City.

Previously Mr. Brzezowski operated his own private engineering practice and was also a Facilities Director. His expertise is in Mechanical Engineering, Commissioning, Computer Technologies, and Building Management Systems. As an inventor, he holds a US Patent for Boiler Optimization and a Patent Pending for a Building Diagnostic and Commissioning Application.

Mr. Brzezowski has been the recipient of various state and national awards such as the National Award for Energy Innovation from the US Department of Energy, the National Award for Contract Engineering and the National Award for Demand Side Management from Energy User News, Power Sources Manufactures Association Education Award and the Big “E” Energy Award.

Mr. Brzezowski is a distinguished member of the Editorial Advisory Board for HPAC Engineering Magazine and is also a contributing author to this and other publications. Mr. Brzezowski is on the Advisory Board for the National Clearinghouse for Educational Facilities (NCEF). He is a graduate of the New Jersey Institute of Technology and holds professional engineering licenses in New York and New Jersey. He is also a LEED® Accredited Professional, a New Jersey Department of Energy, Technical Analyst, a member of the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and Building Commissioning Association (BCxA).

The Ferreira Group
31 Tannery Road
Branchburg, NJ 08876

908 534-8655
ebrzezowski@ferreiragroup.com
http://www.ferreiragroup.com