Sierra Club Three Lakes Group
Fall 2012 Newsletter

Three Lakes Group Officers: Roger Blanchard, Chair; Annemarie Askwith, Treasurer; Cathy Akre, Secretary; Carol Ward, Forestry Chair; Diane Meyer, Conservation Chair.

Fall Program Schedule

Fall programs will be held at Bayliss Public Library in Sault Ste. Marie. Cookies and drinks will be supplied at the programs.

Thursday Sept. 13, 6:30 pm: We've Been Fracked: My Experience and What I've Learned Living in the Heart of the Pennsylvania Fracking District by Elizabeth Shaffer

Elizabeth will share an overview of fracking in the Marcellus shale of Bradford County PA, ground zero of fracking, as well as impacts on the local economy, land, recreation, jobs, air and water quality. What fracking means to Bradford County will be brought to life with visual references.

Thursday Oct. 11, 6:30 pm: Climate change and its impacts in the Great Lakes region by Dr. Derek Wright (LSSU)

This presentation will feature an overview of climate change science with an emphasis on the Great Lakes region. Trends in temperature and precipitation will be discussed, as well as the effects of these changes and their potential impacts on regional biodiversity and Great Lakes hydrology.

Thursday Nov 8, 6:30 pm, Solar Power in the EUP by Teri Foust

Teri, who has designed and installed her own Photovoltaic system, will highlight local systems and people who have working solar projects, both photovoltaic and solar hot water, covering why they chose solar and how they planned and installed their systems.

Where to find information about classes, reference materials (both written and on-line), and steps for planning and installing PV and SHW will be included and questions addressed.

Discussion will include possibilities for helping others plan and install their systems, as well as forming groups for purchasing to receive discounts on equipment and installing the solar system.

THREE LAKES GROUP CELEBRATES 20TH ANNIVERSARY

Two Special Events are planned for our 20th Anniversary:

Saturday, October 6th, 6:00 pm: Harvest Dinner featuring Local Food and guest speaker Natasha Lanz presenting "Mindful Eating: Eating Healthy for Ourselves and the Planet". Entrance by donation. Reservations must be made by Tuesday, October 2nd. Contact Diane Meyer at: dhobmeyer@gmail.com or 906 635-1003. Location: Presbyterian Church, 555 Bingham, Sault Ste. Marie next to the Power Canal.

Help is needed from our members on the afternoon of this event. Call Diane (see above) to find out how you can help or if you are able to donate locally grown produce for the dinner.

Thursday, October 18th, 6:30 pm: Film presentation of "Getting Real about Food and the Future", a 30-minute film by Michigan documentary film maker, Chris Bedford. The film was designed to help communities and neighborhoods take the first steps toward food security and a thriving economic future in the Post-Petroleum era, focusing on promoting local and regional

food in communities. Betty Noland of the Building Healthy Communities Coalition will lead a discussion. Location: Bayliss Public Library.

Three Lakes Group Meetings

Three Lakes Group meetings will be held on the second Tuesday of the month at 5:30 pm for the months in which we don't have programs: January, May, June, July, August and December. The meetings are held in one of the meeting rooms at Studebakers Restaurant on the I-75 Spur in Sault Ste. Marie. Notices will be sent out prior to meetings with the location included.

Sierra Club Calendars

The sale of Sierra Club calendars provides funds for the Three Lakes Group. If you would like a calendar or calendars, they can be ordered from Annemarie Askwith at:

askwitha@lighthouse.net

Price: $12 for wall; $13 for engagement.

A Little Climate Science

Most people have a limited knowledge of the science behind global warming. Below I've written a short summary of some climate science.

It's been know for at least 150 years that CO_2 and other gases, such as water and methane, trap heat in the atmosphere, absorb infrared radiation. There are simple demonstrations that can be found on the Internet to illustrate CO_2 absorption of IR radiation. It's well recognized that the global atmospheric temperature is about 30^{o}C warmer with greenhouse gases in the atmosphere than if they were not present.

An extreme Greenhouse Effect is illustrated with Venus which has an atmosphere that is 96% CO_2 and an average temperature of ~870^{o}F.

The Greenhouse Effect can be easily observed. If there is a clear night followed by a cloudy night, particularly in the cooler months, the cloudy night can easily be 10-15^{o}F warmer than the clear night. That is because on the clear night, the IR radiation from the heated earth escapes out to space. On the cloudy night, the water molecules in the clouds absorb the IR radiation and prevent the IR radiation from escaping to space. I assume that was the basis by which Jean Bapiste Fourier, in 1802, hypothesized that atmospheric gases trap heat.

Scientists monitor the amount of IR radiation that escapes the atmosphere with satellites. What the satellites show is that a decreasing flux of IR radiation is escaping over time. IR radiation is a form of energy so if less energy is escaping the atmosphere, more is being held in. Also, the vertical temperature profile of the atmosphere is changing with time in a way that's expected with an increase in atmospheric IR absorbers.

Multiple lines of evidence place the climate sensitivity of CO_2 at ~3^{o}C/doubling.

Most of the trapped energy actually gets transferred to the oceans (~90 %). Water has a specific heat that's about 4 times that of dry air so it takes about 4 times more energy to raise 1 gram of water 1^{o}C compared to dry air. That is the basis for the idea of thermal inertia. It will take decades to feel the

full effects of the CO_2 concentration that is presently in the atmosphere because it takes a long time for the system to reach thermal equilibrium.

Of course, decades from now the CO_2 concentration will be a lot higher because we continue to add CO_2 to the atmosphere. The atmospheric CO_2 concentration is increasing at roughly 2.2 ppm/year at present.

The expectation is that the largest temperature deviations will occur at far northern latitudes, known as Arctic Amplification. It's clear that in general, temperatures are rising rapidly in far northern North America, particularly in Nunuvut, where the average temperatures for 2010-2011 were typically 6-8^{o}F above averages of the 1970s. That has implications in terms of positive feedback of methane release from the East Siberian Shelf and the Arctic in general.

A major concern about global warming is the impact of higher temperatures on agricultural production. In 2010, Russia lost a significant percentage of its grain crop due to a heat wave/drought. In 2011, Texas and Oklahoma lost a significant percentage of their agricultural production due to a heat wave/drought. This year, there is concern about corn production in the Midwest due to the present heat wave/drought.

Roger

First Half Temperature Data for Northern North America

It was a warm first half of 2012 over most of northern North America as the data in Table I illustrates. The exception was in Alaska where the months of January and March were particularly cool relative to 1971-2000 averages. I expect Prudhoe Bay to be above average for the year but Nome is likely to be below average for the year due to cooler than average water temperatures in the Pacific Ocean by Nome for most of the year. Through July, Prudhoe Bay was only 0.36^{o}F below average for the year so an expectation of the yearly average being above the long term average is easy to make.

The warmth of the first half was particularly concentrated in Saskatchewan, Manitoba and Ontario. In Sault Ste. Marie, MI, we broke the previous high temperature record for the first half by 0.64^{o}F. The previous first half record was set in 2010 at 40.12^{o}F. In 2012, the first half average temperature was 40.76^{o}F.

The warmest year on record in Sault Ste. Marie was 1998. In 2010, the first half temperature was higher than in 1998 but in the second half a La Nina formed in the Pacific Ocean which led to cooling over North America and Sault Ste. Marie so we didn't break the 1998 record. Through July 2012, Sault Ste. Marie was 1.54^{o}F higher than the same period in 1998 (45.30^{o}F versus 43.76^{o}F) with no La Nina in site so we should easily break the 1998 high temperature record.

Temperature Anomaly Data for Northern North America

Location	**First Half of 2012 Temperature Anomaly Data Relative to 1971-2000 Averages (^{o}F)***
Resolute, Nunnuvut	+3.2
Eureka, Nunnuvut	+2.9
Cambridge Bay, Nunnuvut	+3.2
Coral Harbour, Nunnuvut	+3.0
Norman Wells, Northwest Territories	+1.9
Yellowknife, Northwest Territories	+4.7
Fort Nelson, British Columbia	+2.0
Terrace, British Columbia	-1.8
Cranbrook, British Columbia	+0.5
High Level, Alberta	+3.0
Red Deer, Alberta	+2.8
Grand Prairre, Alberta	+2.2
La Ronge, Saskatchewan	+4.4

Estavan, Saskatchewan	+5.2
Thompson, Manitoba	+4.2
Churchill, Manitoba	+4.6
Brandon, Manitoba	+6.7
Timmins, Ontario	+6.5
Sioux Lookout, Ontario	+7.3
Windsor, Ontario	+6.3
Sault Ste. Marie, MI	+6.9
Montreal, Quebec	+5.2
Moncton, New Brunswick	-
Goose Bay, Newfoundland	+2.1
Prudhoe Bay, Alaska	-1.5
Nome, Alaska	-4.9
Average	**+3.2**

Table I

***Data are from Environment Canada except for Churchill (Weather Channel), Sault Ste. Marie (U.S. Weather Bureau), Prudhoe Bay (Weather Channel) and Nome (Weather Channel). There is one missing day of data for Terrace Bay and Brandon in June. There are two missing days of data for June in Resolute. Moncton data is missing for most of June.**

Roger

A Closer Look at Energy Consumption

(This is something I wrote for my website, http://climateandenergynews.zparking.net/ which I think has some important data)

Table I below contains energy consumption data for 2010 of five countries as well as the world total. There are several points of interest in the data.

Energy Consumption in 2010 (Quadrillion BTU)

Country/Fuel	Denmark**	Germany	United States	China	India	World
Coal	0.17	3.2	20.8	73.5	12.6	151.5
Oil	0.35	5.2	36.0	19.2	6.3	175.0
Natural Gas	0.2	3.4	24.7	3.9	2.4	116.8
Total Fossil Fuel Consumption	0.72	11.8	81.5	96.6	21.3	443.3
Total Country Energy Consumption*	0.84	13.1	89.3	98.9	27.5	510.0

*						
% Fossil Fuel Consumption	85.7	90.1	91.3	97.7	77.5	86.9

Table I*

*Data is from the U.S. Department of Energy/Energy Information Administration, the most recent available as of March 25, 2012. The U.S. DOE/EIA updates data occasionally so these

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Table III contains data for per capita CO_2 emissions of 5 countries and the world total. The data begs some interesting questions.

Per Capita CO_2 Emissions in 2009*

Country	Per Capita CO2 Emissions (metric tons/person/year)
Denmark	8.71
Germany	9.35
United States	17.32
China	5.72
India	1.31
World	0.86

Table III

*CO_2 emissions are from the U.S. DOE/EIA and population data are from Wikipedia. The latest available data is for 2009 from the U.S. DOE/EIA

Should the per capita CO_2 emissions for European countries be the goal of countries throughout the world? If so, there is a significant percentage of Americans who would probably be violently opposed to such a goal. At best it would be difficult for the U.S. per capita CO_2 emission rate to rival that of European countries because the infrastructure in the U.S. was developed with the idea that energy would be cheap forever. In Europe, a high percentage of the population lives in urban centers where population densities are much higher than in the U.S., mass transit is much better, houses are smaller, etc.

On the other side of the ledger, if developing countries increased their fossil fuel consumption so that per capita CO_2 emissions were as high as the European average, global fossil fuel consumption would have to rise significantly. People in developing countries want to live like Americans, if possible, so there is a lot of pressure to increase fossil fuel consumption in developing countries (see Table IV).

CO_2 Emissions (Million metric tons/year)

Country/Year	1990	2000	2009
Denmark	57.1	54.5	49.5
Germany	929	854	765
United States	5041	5862	5424
China	2269	2850	7708
India	578	1003	1591
World	21616	23803	30314

Table IV

*CO_2 emissions are from the U.S. DOE/EIA. The latest available data is for 2009 from the U.S. DOE/EIA

Some time ago, I think it was 2008 or earlier but I can't find a reference to it, the climatologist James Hansen stated that we had at most 10 years to start to significantly cut CO_2 emissions or suffer some significant consequences in the future. Since he made that statement, global CO_2 emissions have risen significantly. Global CO_2 emissions rose 5.9% in 2010 which would put total emissions for 2010 at ~32,100 million metric tons, about 35% over the 2000 average. CO2 emissions grew another 3.2% in 2011 to raise emission to approximately 33,130 million metric tons, about 39% above the 2000 average. Short of a global depression, I don't see global CO_2 emissions declining even if they decline in Europe and the United States, which they have been doing in recent years.

Roger
