

Climate Change Initiatives

Impact on Air Monitoring Community



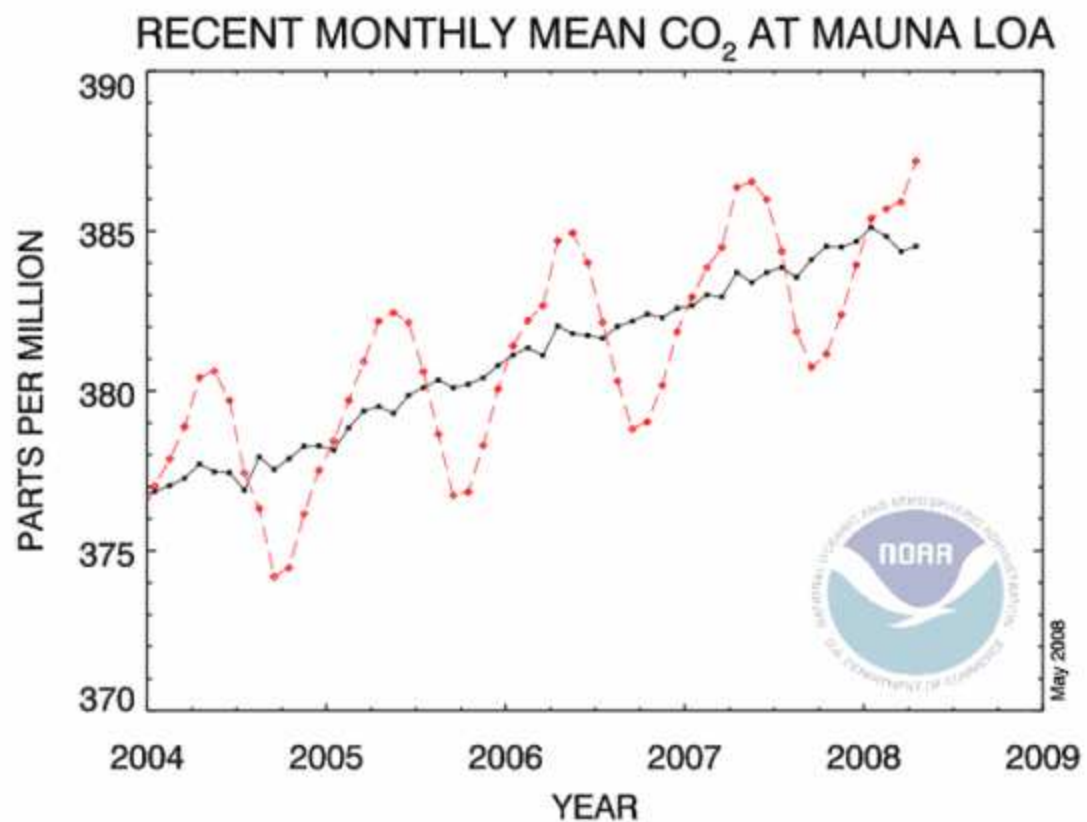
Climate Change Pollutants of Concern

- CO₂
- N₂O
- PM
- Ozone Precursors
- Ozone
- Halogenated Hydrocarbons
- Methane

NEG/ECP Regional Climate Change Initiatives

- Energy
- Transportation
- Efficiency
- Renewable Resources / Waste Management
- Green Building

Trends in Atmospheric Carbon Dioxide - Mauna Loa





Climate Change Action Plan

STATE OF VERMONT

Executive Department

EXECUTIVE ORDER

[Climate Change Action Plan for State Government Buildings and Operations]

WHEREAS, the scientific evidence, reviewed by the U.S. National Academy of Sciences, the Intergovernmental Panel on Climate Change, and an overwhelming majority of the world's climate scientists, indicates greenhouse gases are accumulating in the Earth's atmosphere as a result of human activities; and

WHEREAS, these scientists also contend that the increases in greenhouse gases are causing the global climate to change at a greater rate and magnitude than would otherwise be expected, projecting an increase in globally-averaged surface temperatures of 2.5 to 10.4 degrees Fahrenheit by the end of the century; and

WHEREAS, even small changes in surface temperatures are projected to cause significant changes in our regional climate and Vermont's environment; and

WHEREAS, the United States, with only 5 percent of the world's population produces 20 to 25 percent of all greenhouse gas emissions from human activities and is, therefore, a significant factor affecting the global climate; and

WHEREAS, Vermont, although it plays a small role, contributes to greenhouse gas emissions via car and truck traffic, with Vermonters driving more miles per person than the national average, and the burning of fossil fuels for home heating and power generation; and

WHEREAS, the federal government and numerous private sector businesses in the United States and abroad are discovering that it is a sound business decision, both financially and environmentally, to decrease their greenhouse gas emissions - simultaneously increasing productivity and employment; and

WHEREAS, ambitious energy efficiency and conservation efforts will not only reduce greenhouse gas emissions, but will also reduce a host of other pollutant emissions (including toxic chemicals) associated with fossil fuel combustion for electricity generation and transportation.

NOW, THEREFORE, BE IT RESOLVED THAT I, James H. Douglas, by virtue of the power vested in me as Governor of the State of Vermont, do hereby direct state government agencies and departments to reduce greenhouse gas emissions from state government buildings and operations. Vermont's goal is to reduce emissions by an amount consistent with the recommendations of The Conference of the New England Governors and Eastern Canadian Premiers Climate Change Action Plan. The goals established by the Conference are to reduce region-wide greenhouse gas emissions from the 1990 baseline by: twenty-five percent by 2012; fifty percent by 2028; and, if practicable using reasonable efforts, seventy-five percent by 2050.

Energy Sector Initiatives

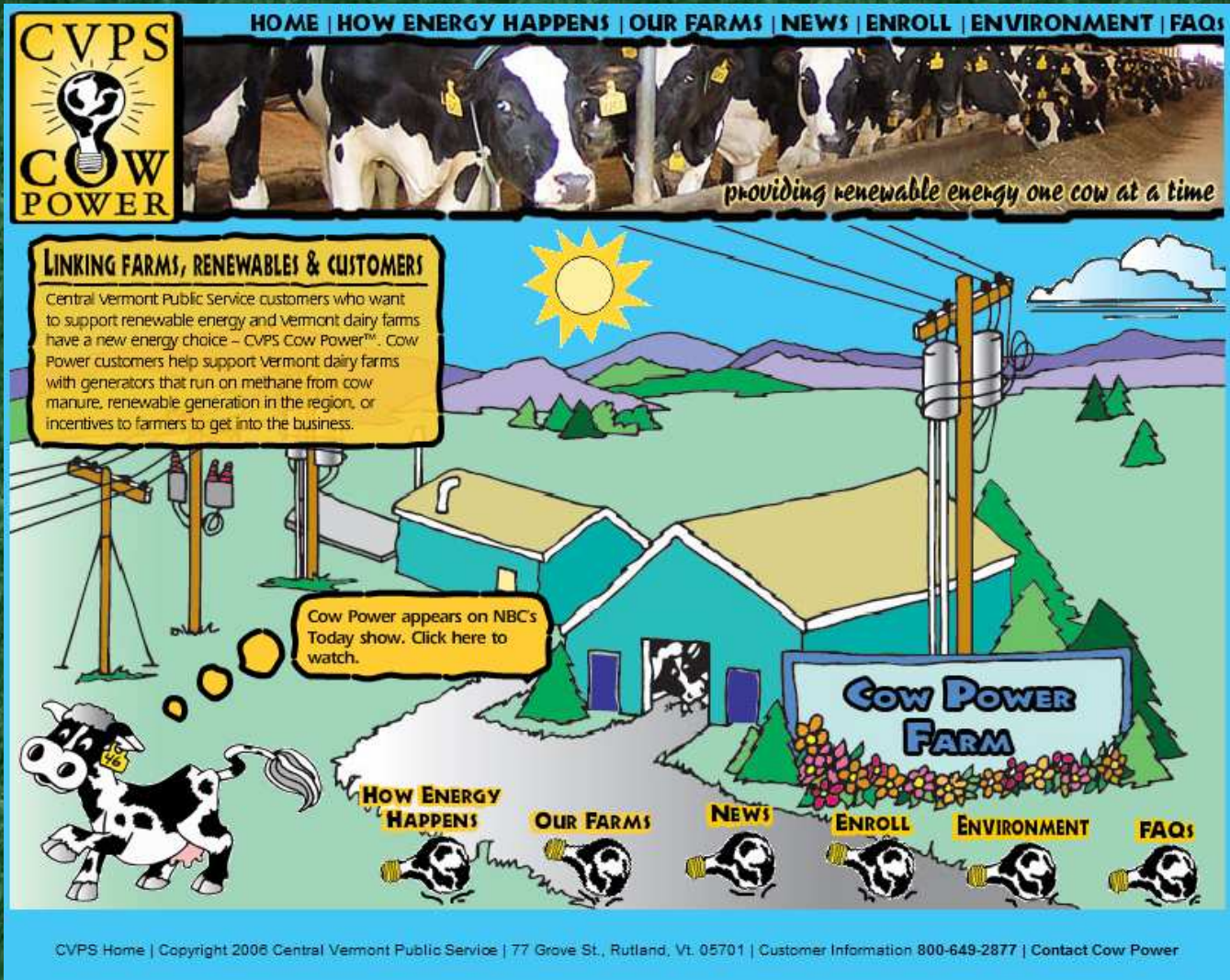
- Vermont Fuels for Schools



SUSTAINABLE RESOURCES
An environmentally sound energy choice—
HEALTHY LOCAL ECONOMY
saving money for Vermont Schools
CLEAN RENEWABLE FUTURE
and Vermont taxpayers.
COST-EFFECTIVE ENERGY



Another Initiative



The banner features a top navigation bar with links: HOME | HOW ENERGY HAPPENS | OUR FARMS | NEWS | ENROLL | ENVIRONMENT | FAQs. Below this is a photograph of a dairy barn with cows and the slogan "providing renewable energy one cow at a time". A central illustration shows a farm scene with a sun, mountains, trees, and a house. A sign in front of the house reads "Cow Power FARM". A text box on the left explains the program, and a callout bubble mentions its appearance on NBC's Today show. At the bottom, a row of icons labeled "HOW ENERGY HAPPENS", "OUR FARMS", "NEWS", "ENROLL", "ENVIRONMENT", and "FAQs" leads to the website.

CVPS
COW POWER

HOME | HOW ENERGY HAPPENS | OUR FARMS | NEWS | ENROLL | ENVIRONMENT | FAQs

providing renewable energy one cow at a time

LINKING FARMS, RENEWABLES & CUSTOMERS
Central Vermont Public Service customers who want to support renewable energy and Vermont dairy farms have a new energy choice – CVPS Cow Power™. Cow Power customers help support Vermont dairy farms with generators that run on methane from cow manure, renewable generation in the region, or incentives to farmers to get into the business.

Cow Power appears on NBC's Today show. Click here to watch.

Cow Power FARM

HOW ENERGY HAPPENS | OUR FARMS | NEWS | ENROLL | ENVIRONMENT | FAQs

CVPS Home | Copyright 2008 Central Vermont Public Service | 77 Grove St., Rutland, Vt. 05701 | Customer Information 800-649-2877 | Contact Cow Power

<http://www.cvps.com/cowpower/>

The Process

CVPS
COW
POWER

[HOME](#) | [HOW ENERGY HAPPENS](#) | [OUR FARMS](#) | [NEWS](#) | [ENROLL](#) | [ENVIRONMENT](#) | [FAQs](#)

providing renewable energy one cow at a time

How It Works

Click on the cow and then roll over each image to learn about the Cow Power process.

DRY SOLID WASTE

START

MRS. COW

THE ANAEROBIC DIGESTER

ELECTRICITY

THE GENERATOR

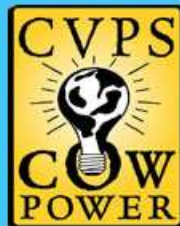
HOW ENERGY HAPPENS

- [How It Works](#)
- [VIDEO: the whole Cow Power story](#)
- [Why Farm Generation](#)
- [CV Renewable Energy](#)

BUY AN ENERGY HAPPENS T-SHIRT

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Methane



HOME | HOW ENERGY HAPPENS | OUR FARMS | NEWS | ENROLL | ENVIRONMENT | FAQs



providing renewable energy one cow at a time

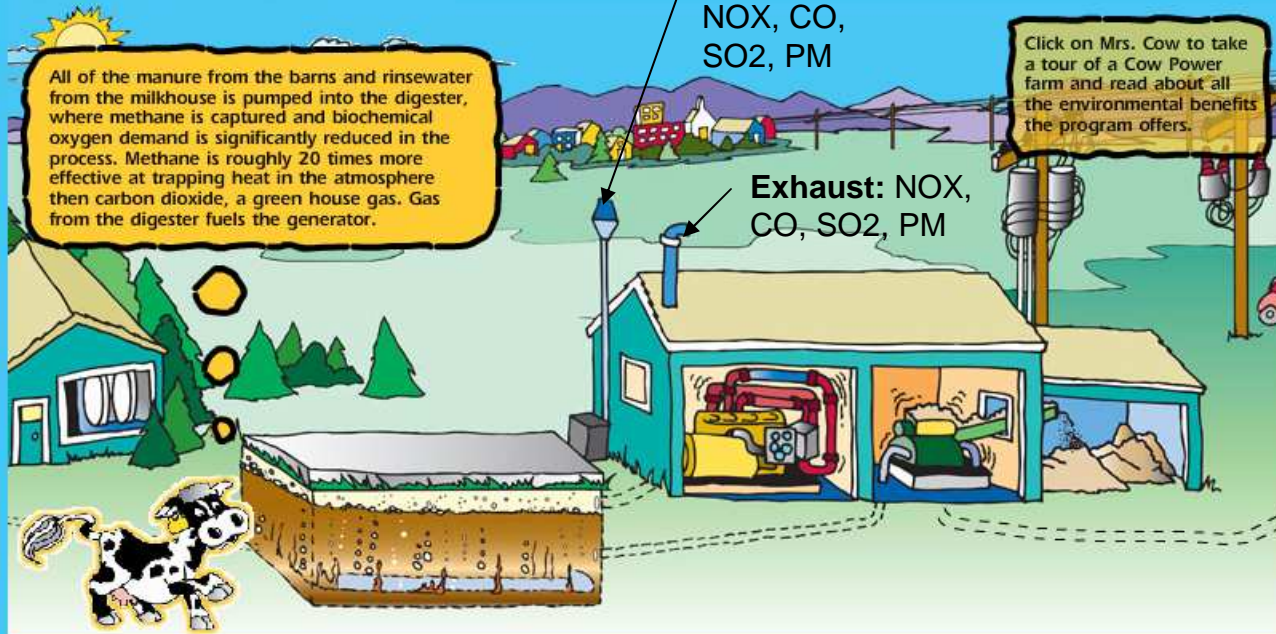
Environmental Benefits

All of the manure from the barns and rinsewater from the milking parlor is pumped into the digester, where methane is captured and biochemical oxygen demand is significantly reduced in the process. Methane is roughly 20 times more effective at trapping heat in the atmosphere than carbon dioxide, a green house gas. Gas from the digester fuels the generator.

The Flair:
NOX, CO,
SO2, PM

Exhaust: NOX,
CO, SO2, PM

Click on Mrs. Cow to take a tour of a Cow Power farm and read about all the environmental benefits the program offers.



Combustion of Methane

Equipment	NO _x (lbs/10 ⁶ scf Methane)	CO (lbs/10 ⁶ scf Methane)	PM (lbs/10 ⁶ scf Methane)
Flare	40	750	17
IC Engine	250	470	48
Gas Turbine	87	230	22
Steam Turbine	33	5.7	8.2

In VT We Have Methane Covered



And There Are OWB's



Outdoor Wood-Fired Boilers Facts & Information

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[Regulations](#)
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[VT Certified OWBS](#)



Welcome to the Vermont Department of Environmental Conservation website on Outdoor Wood Boilers (OWBs) or Outdoor Wood Hydronic Heaters (OWHH). With the rising cost of heating oil, more Vermonters are looking to wood as a source of heat and hot water. Not all wood heat is the same. While indoor wood stoves have been tested and certified by EPA for emissions since 1990, testing and certification of outdoor wood boilers has only recently begun. Old style OWBs cause dense smoke and many are equipped with very short smoke stacks so the smoke does not disperse well. This smoke endangers the health of you, your family and neighbors as well as the environment. The newer certified OWBs will be a great improvement.

OWB Certification



Outdoor Wood-Fired Boilers Facts & Information

- [Main Page](#)
- [About Outdoor Boilers](#)
- [Health/Environment Regulations](#)
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- [Informational Links](#)
- [Contact Us](#)
- [VT Certified OWBS](#)

Vermont Certified Outdoor Wood Boilers

The following table lists OWBs that are certified by Vermont to meet a particulate emissions standard of 0.44 lb/mmBTU of heat input. **After March 31, 2008, OWBs are not allowed to be sold in Vermont or for installation in Vermont unless Vermont has certified that the particular model has been tested and complies with this standard.**

Manufacturer	Model	8-hr. heat Output Rating (BTU/hr)	Average Emission Rate (grams/hr)	Average Emission Rate (lb/mmBTU heat input)	Vermont Emission Limit (lb/mmBTU heat input)	Average Emission Rate (lbs/mmBTU heat output)
Central Boiler	E-Classic 2300	160,001	6.4	0.20	0.44	0.31
Heatmor	200 SSR	71,923	20.3	0.35	0.44	0.76
Sequoyah Paradise	E3400	101,020	20.1	0.37	0.44	1.48

Note: The emission rates in this table are annual averages, unless the unit was approved based on heating season emissions only. Click on Manufacturer name above to view full certification letter.




Monitoring Community Be Aware

- Keep Track of New Alternative Energy Initiatives
- Determine if potential exists for new source of air pollutants
- Be aware of projects flying under the permitting radar.....example OWB, Cow Power, Fuels For Schools

Climate Change Monitoring?

U.S. Department of Commerce | National Oceanic & Atmospheric Administration | NOAA Research

 **Earth System Research Laboratory**
Global Monitoring Division

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Data Products

- Data Products Home
- Greenhouse Gas Index (AGGI)
- Ozone Depleting Gas Index (ODGI)
- GLOBALVIEW
- Current Trends in CO2
- CarbonTracker

Data Visualization

- Interactive Atmospheric Data Visualization (IADV)
- Greenhouse Gases
- Trace Gases
- South Pole Ozone Hole
- Solar Radiation
- US Surface Radiation
- Atmospheric Transport

Data Information

- Observation Sites

Data Access

- Anonymous FTP Data

Observation Sites >> Listing by Project

*' Indicates discontinued site.

Carbon Cycle Surface Flasks (ccg_surface)

Code	Name	Latitude	Longitude	Elevation (Meters)	Country
ABP	Arembepe, Bahia	-12.77	-38.17	1.0	Brazil
ALT	Alert, Nunavut	82.45	-62.52	200.0	Canada
AMS *	Amsterdam Island	-37.95	77.53	150.0	France
AMT	Argyle, Maine	45.03	-68.68	50.0	United States
ASC	Ascension Island	-7.92	-14.42	54.0	United Kingdom
ASK	Assekrem	23.18	5.42	2728.0	Algeria
AVI *	St. Croix, Virgin Islands	17.75	-64.75	3.0	United States
AZR	Terceira Island, Azores	38.77	-27.38	40.0	Portugal
BAL	Baltic Sea	55.35	17.22	3.0	Poland
BAO	Boulder Atmospheric Observatory	40.05	-105.01	1584.0	United States
BKT	Bukit Kototabang	-0.20	100.32	864.5	Indonesia
BME	St. Davids Head, Bermuda	32.37	-64.65	30.0	United Kingdom
BMW	Tudor Hill, Bermuda	32.27	-64.88	30.0	United Kingdom
BRW	Barrow, Alaska	71.32	-156.60	11.0	United States
BSC	Black Sea, Constanta	44.17	28.68	3.0	Romania
CBA	Cold Bay, Alaska	55.20	-162.72	25.0	United States
CGO	Cape Grim, Tasmania	-40.68	144.68	94.0	Australia

Argyle, ME

Carbon Cycle Surface Flasks

Parameter	Formula	First Sample Date	Most Recent Sample Date
Carbon Dioxide	CO ₂	2003-09-18	2007-12-04
Methane	CH ₄	2003-09-18	2007-12-04
Carbon Monoxide	CO	2003-09-18	2007-12-04
Molecular Hydrogen	H ₂	2003-09-18	2007-12-04
Nitrous Oxide	N ₂ O	2003-09-18	2007-12-04
Sulfur Hexafluoride	SF ₆	2003-09-18	2007-12-04
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	2003-09-18	2007-12-04
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	2003-11-04	2007-12-04
methyl chloride	CH ₃ Cl	2004-02-25	2006-11-06
ethane	C ₂ H ₆	2004-02-25	2006-11-06
ethene	C ₂ H ₄	2005-11-22	2006-11-06
propane	C ₃ H ₈	2004-02-25	2006-11-06
propene	C ₃ H ₆	2005-11-22	2006-10-31
i-butane	i-C ₄ H ₁₀	2004-02-25	2006-11-06
n-butane	n-C ₄ H ₁₀	2004-02-25	2006-11-06
i-pentane	i-C ₅ H ₁₂	2004-02-25	2006-11-06
n-pentane	n-C ₅ H ₁₂	2004-02-25	2006-11-06
n-hexane	n-C ₆ H ₁₄	2005-11-22	2006-11-06
wind speed		2003-09-24	2007-12-18
wind direction		2003-09-24	2007-12-18
ambient temperature		2003-10-07	2004-09-20
relative humidity		2003-10-07	2003-10-07

Conclusion

- No Immediate Need to Enhance Monitoring Network
- With present toxics network some climate change target compounds being monitored
- Expensive startup and analysis cost for CO₂
- NOAA Global Monitoring Division fairly extensive