



Solar Thermal:

Ready to Save Energy

in New York

Ron Kamen - Presentation to Overview Forum July 20, 2007 Case 07-M-0548 – Energy Efficiency Portfolio Standard

Residential & Commercial Solar Heat & Hot Water
Working with you today to create a sustainable tomorrow...



- Team led the creation of the **voluntary wind power market** in NYS.
- Established programs with NYSEG, National Grid, RG&E, LIPA, NYSEG Solutions, Energetix, ECONergy, ConEd Solutions & other ESCOs
- Sold over **½ Billion Kwhs of wind power** from 2001 – 2006
to more than 20,000 residents, businesses, & institutions,
including 60+ municipalities.
- Over a year researching worldwide solar thermal products
- Secured NYS distribution rights **Canadian Hot Water & Space Pre-Heating Systems**
- With Wendel Engineers – selected for NYSERDA solar thermal PON 1085
- **Residential and commercial dealers and installer network throughout NYS**



Mission:

- Ignite*** **Consumer Demand for
Solar Thermal Energy Systems**
- Reduce*** **Energy Costs & Emissions**
- Build*** **Solar Thermal Manufacturing
in New York State**



Solar Thermal Energy
is used by virtually
every other civilized country
in the world to pre-heat
Hot Water & Space Heat
before using fossil fuels.

Solar Heat & Hot Water

Technologies are

Reliable, Low Maintenance,

Affordable & Cost-Effective

Solar Heat & Hot Water
is generally
80% Less Expensive
than Solar Electric
(Photovoltaics)

Solar Pre-heat technologies:

- **Integrate** with virtually **all existing systems**
- **Reduce** operating costs, carbon emissions & air pollution
- **Eligible for Tax Credits:**
 - **30% Federal** (*\$2k residential cap, no commercial limit*)
 - **25% NYS** (*residential only, \$5k cap*)

Solar Thermal in Europe



Annenberg
near Stockholm, Sweden, 2400 m², 90 homes

Solar Thermal in Europe



Solar Thermal in Europe



Groningen, the Netherlands

96 solar houses, central heat storage, space heating and domestic hot water with conventional energy back-up. In operation since 1984.

Large-Scale Solar Heating System



Medium-term storage, e.g. Gneis-Moos (Austria)



Solar Thermal in Europe



Neckarsulm, Germany

1300 apartments and houses, central heat storage for space heating and domestic hot water. Peak load covered by gas boiler. In operation since 1999. 5044 m² and growing.

Solar Thermal in Europe



German Solar Hot Water Market

2006

140,000 Installations

\$1.6 Billion Sales

6,300 MWs thermal =

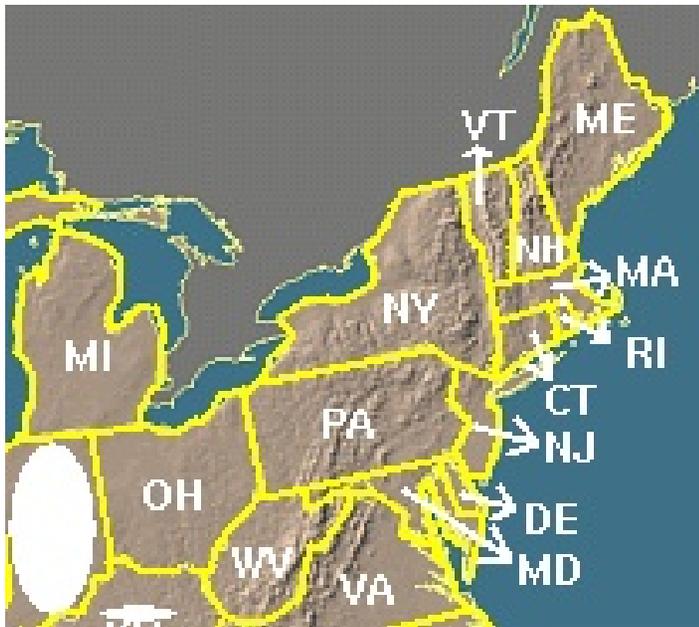
4.3 Million MegaWatt Hours per year

18,000 Jobs

Northeast Opportunity

German Population:
82,438,000

Population Within 500 Miles of NYS:
90+ million



US Census Bureau Year 2000

<http://quickfacts.census.gov/qfd/index.html>

New York	18,976,457	Maine	1,274,923
Pennsylvania	12,281,054	Ohio	11,353,140
New Jersey	8,414,350	Delaware	783,600
Connecticut	3,405,565	Maryland	5,296,486
Massachusetts	6,349,097	Virginia	7,078,515
Rhode Island	1,048,319	Michigan	9,938,444
Vermont	608,827	West Virginia	1,808,344
New Hampshire	1,235,786	Washington DC	572,059
		TOTAL:	90,424,966

Solar Thermal Appliances

- **Pre-Engineered, Mass-Produced & Integrate with most existing technologies**
- **Affordable, Cost Effective & Easy to install**
- **Reliable & Safe**
- **Long life** with **minimum maintenance** in **freezing conditions** and **high UV exposure.**
- **Opportunity to manufacture in NYS**

NYS Solar Hot Water Market

Table C-3 Water-Heating

	Households' (MM)	Average per Household	
		Consumption	Expenditure
Electricity	0.9	2,390 kWh	\$273
Natural Gas	4.4	17 Mcf	\$205
Fuel Oil	1.7	179 gallons	\$206

NYS Hot Water Systems

		ADJUSTED FOR 2006 PRICES		
		Average per Household		
	# Households	Consumption	2006 Avg Price	2006 Expenditure
Electricity	900,000	2390	\$ 0.14	\$ 335
Natural Gas	4,400,000	17	\$ 17.00	\$ 289
Fuel Oil	1,790,000	179	\$ 2.49	\$ 446
TOTAL HOUSEHOLDS:	7,090,000			

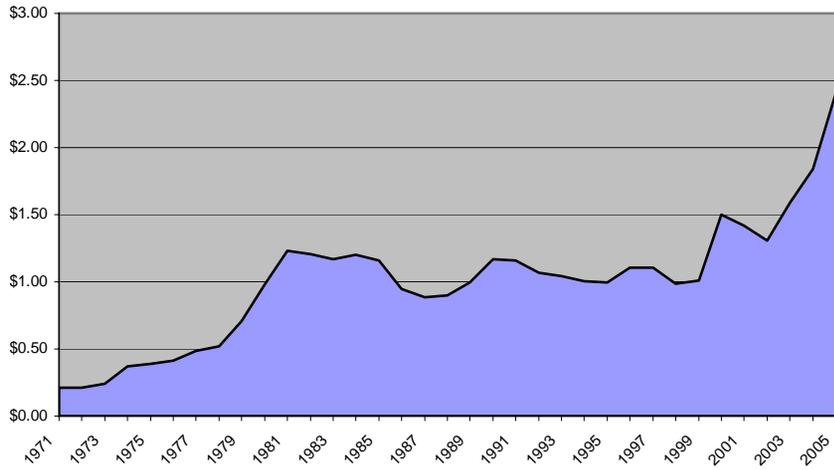
Actual Usage & Savings

More than 2x Higher

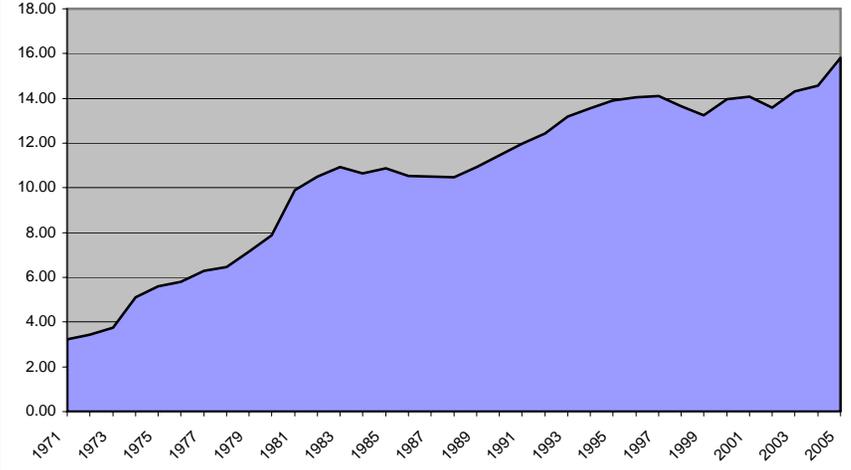
NYSERDA data is approximately 30 gallons per day per Household...

ASHRAE Table 2. National DHW Sizing Guidelines (Low-Medium-High)				
Hot Water Demands and Use for Multifamily Buildings				
	Maximum hour	Peak 15 minutes	Maximum day	Average day
Low	2.8 gal (10.5 l)/person	1 gal (4 l)/person	20 gal (76 l)/person	14 gal (53 l)/person
Med	4.8 gal (18 l)/person	1.7 gal (6.4 l)/person	49 gal (185 l)/person	30 gal (114 l)/person
High	8.5 gal (32.5 l)/person	3 gal (11.5 l)/person	90 gal (340 l)/person	54 gal (205 l)/person

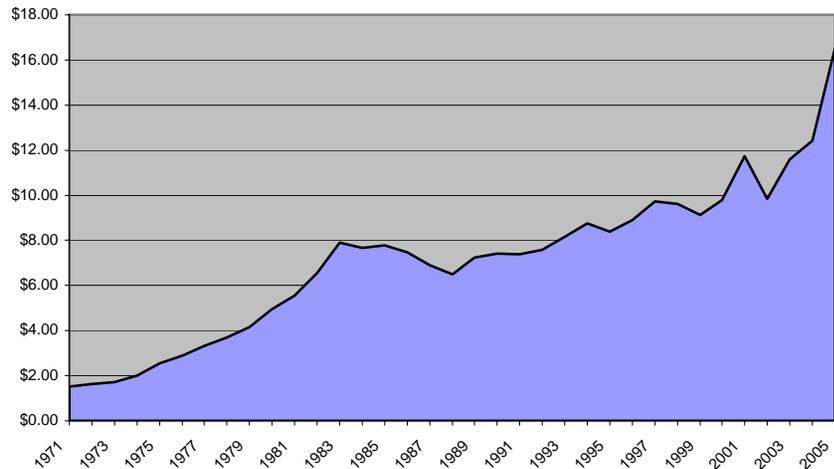
NYS Heating Oil Prices
(Dollars per Gallon)



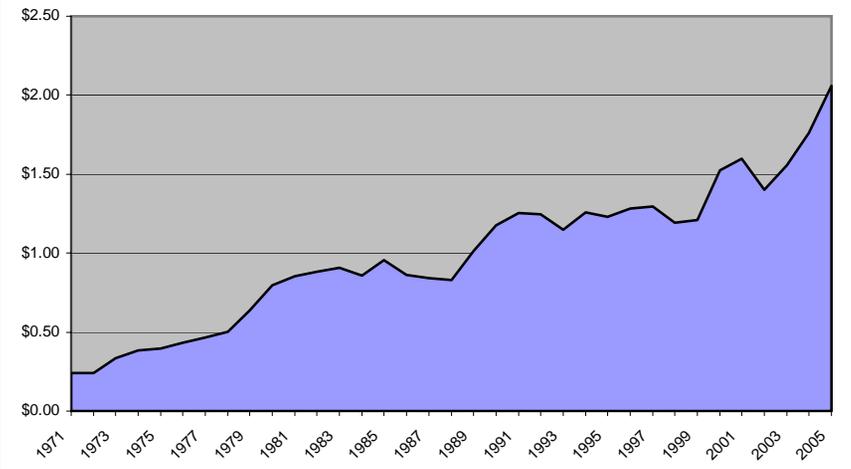
Electricity Prices
(Cents per kWh)



Natural Gas Prices
(Dollars per Mcf)



Propane Prices
(Dollars per Gallon)



Energy Price Increases

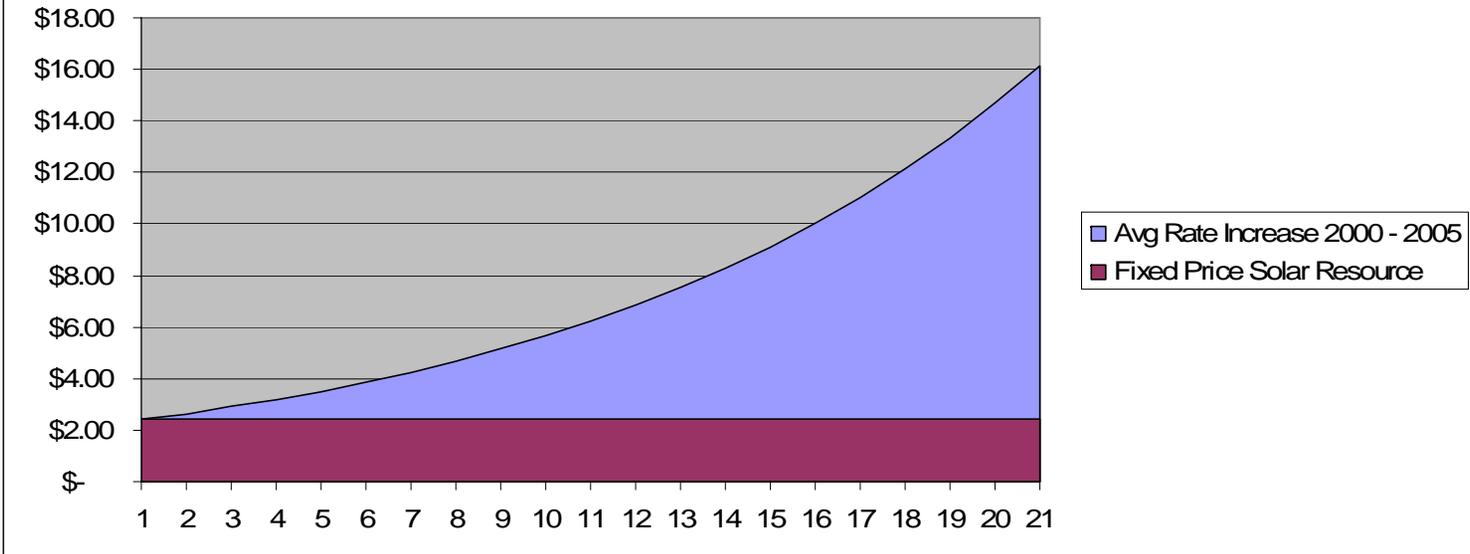
	Oil	Natural Gas	Propane	Electric
TOTAL % Increase 2000 - 2005:	60%	68%	35%	13%
TOTAL % Increase 1971 - 2005	1047%	992%	757%	388%
ANNUAL % Increase 2000 - 2005:	10%	11%	6%	2%
ANNUAL % Increase 1971 - 2005:	7%	7%	7%	5%

Solar Heat and Hot Water provides a

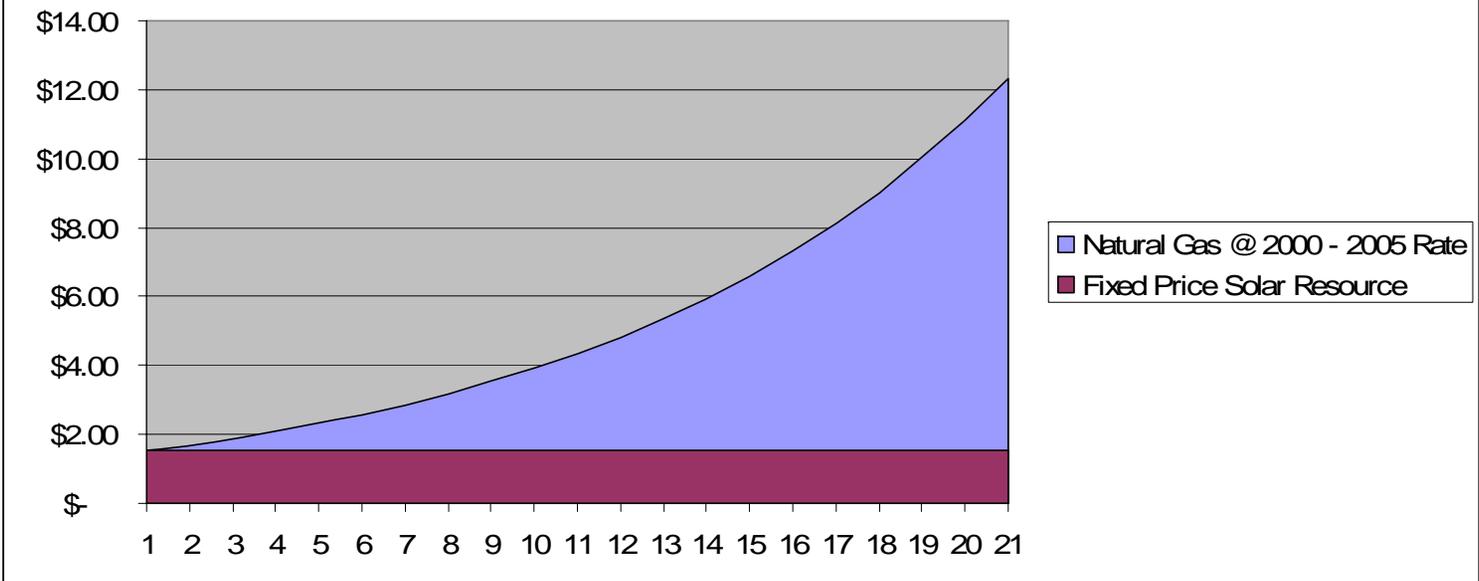
20+ Year Fixed Price Energy Source

that is immune to energy price increases and inflation

Oil Prices @ Avg Increase 2000 - 2005 Rate



Natural Gas @ Avg Increase 2000 - 2005 Rate



NYS RESIDENTIAL Solar Hot Water Market

1% Average Penetration Rate				TOTAL ANNUAL		
Fuel Type	Households	Market Conversions	Penetration Rate	Energy Savings	Energy Unit	\$ Cost Savings
Electric	900,000	18,000	2.0%	48,712,680	kWhrs	\$3,613,680
Natural Gas	4,400,000	17,600	0.4%	161,568	Mcf	\$3,051,840
Fuel Oil	1,790,000	35,800	2.0%	2,374,972	Gal	\$9,573,851
Total	7,090,000	71,400	1%	Total Annual \$:		\$16,239,371

20 Year Consumer Savings:

10% Annual Energy Cost Increases (2000 – 2005 Avg Rate Increase):

1% Penetration Rate: \$930 Million

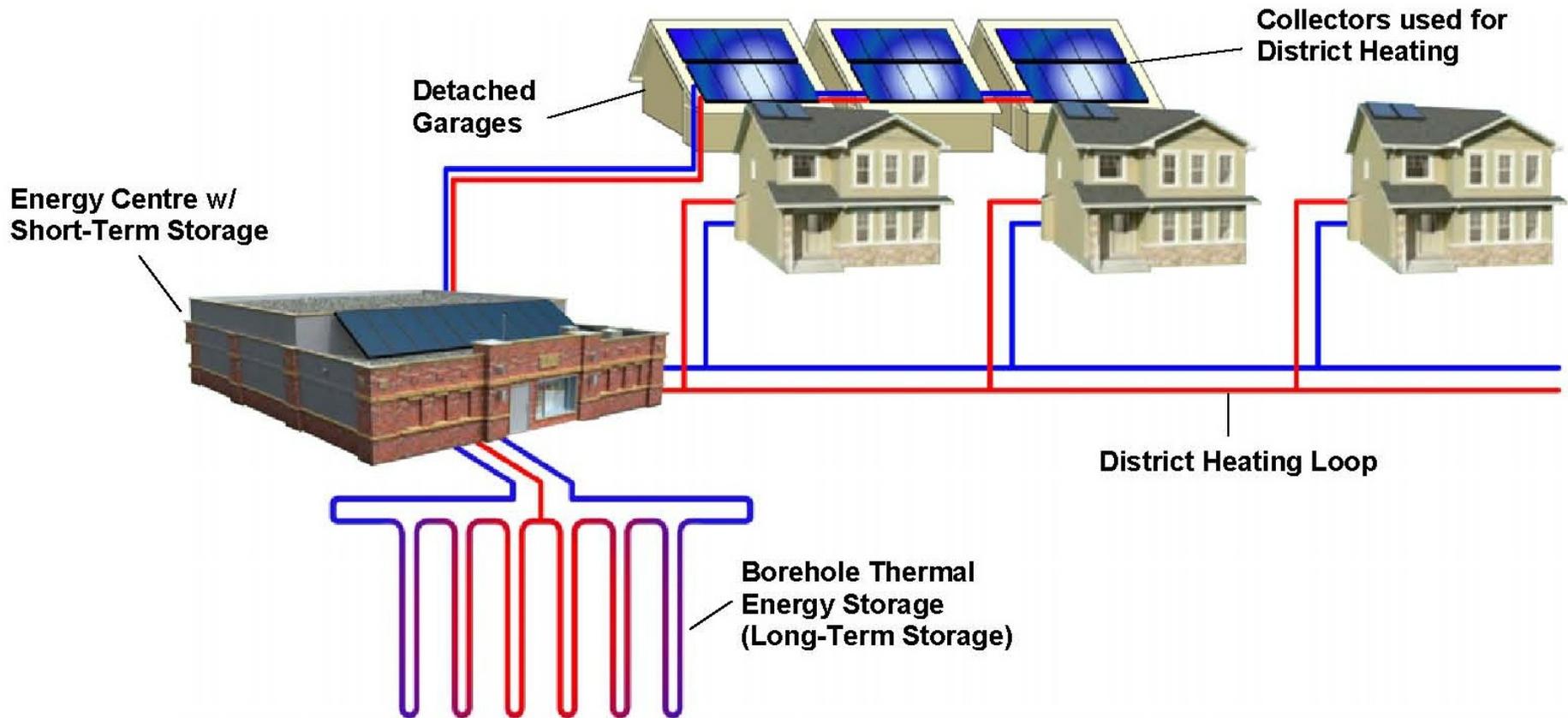
15% Penetration Rate: \$14 BILLION

Drake Landing, British Columbia



A Drake Landing Solar Community home collecting plenty of solar energy from the two EnerWorks solar collectors mounted on its roof.

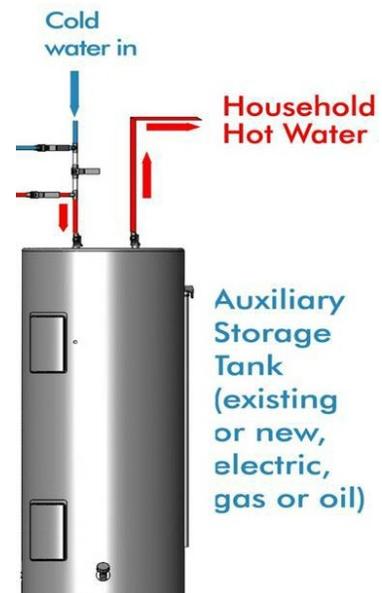
Drake Landing



Customer Sites

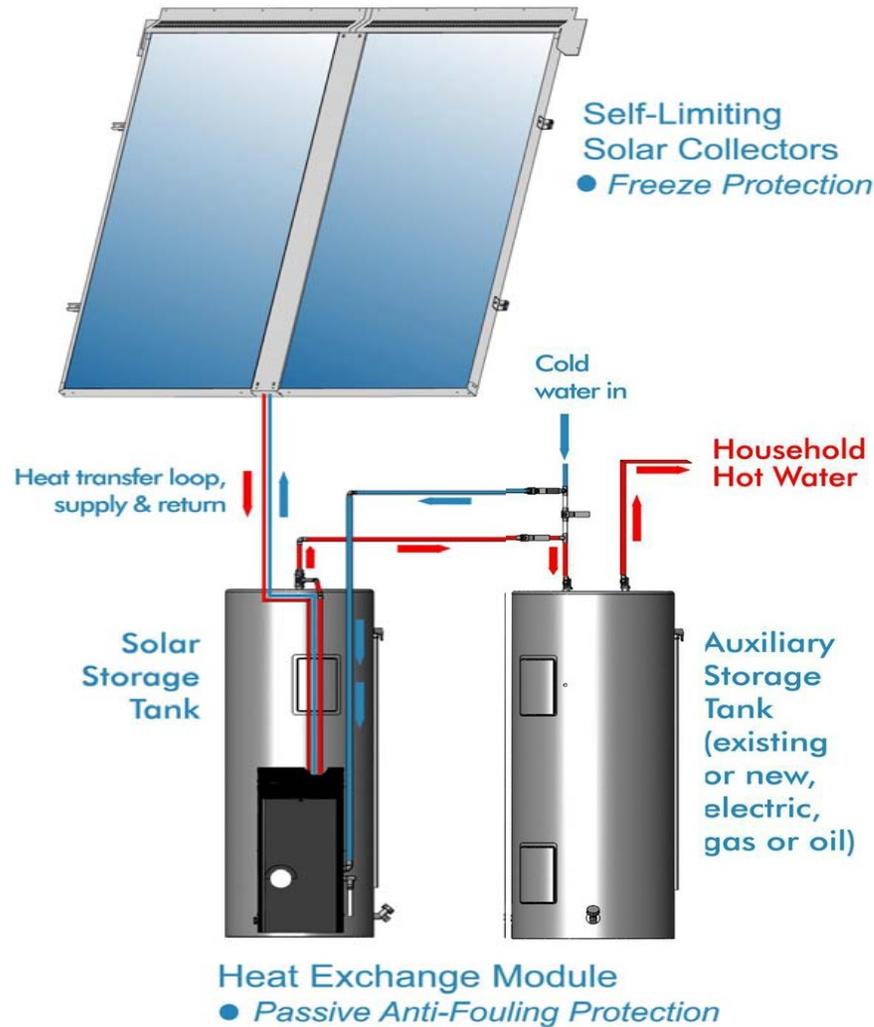


Hot Water



Enerworks Solar Hot Water

- *Collectors are heated by the sun*
- 15° Difference – Vegetable based glycol fluid pumped to collectors
- *Heat exchanger transfers heat to water in solar storage tank*
- Solar storage tank in series with auxiliary tank
- *When hot water is used, solar storage water flows into auxiliary tank*



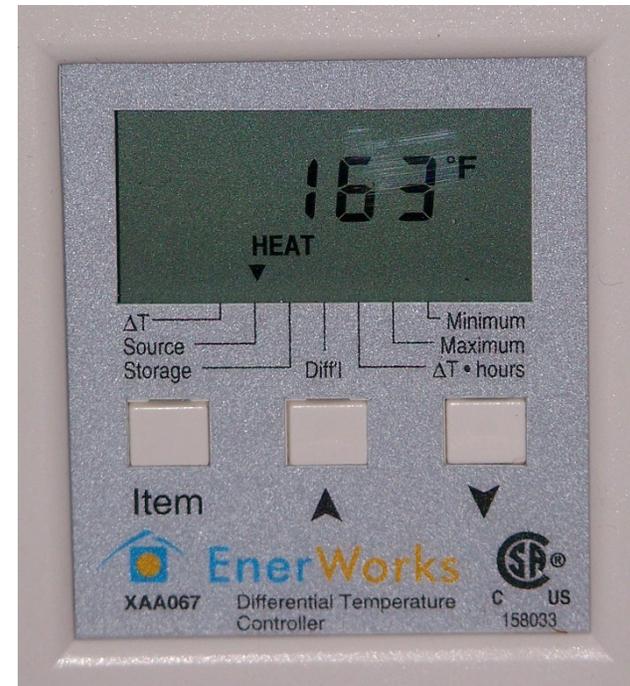
New York Solar Hot Water

On Feb 15th - the day after the
2007 Valentine's Day snow storm:

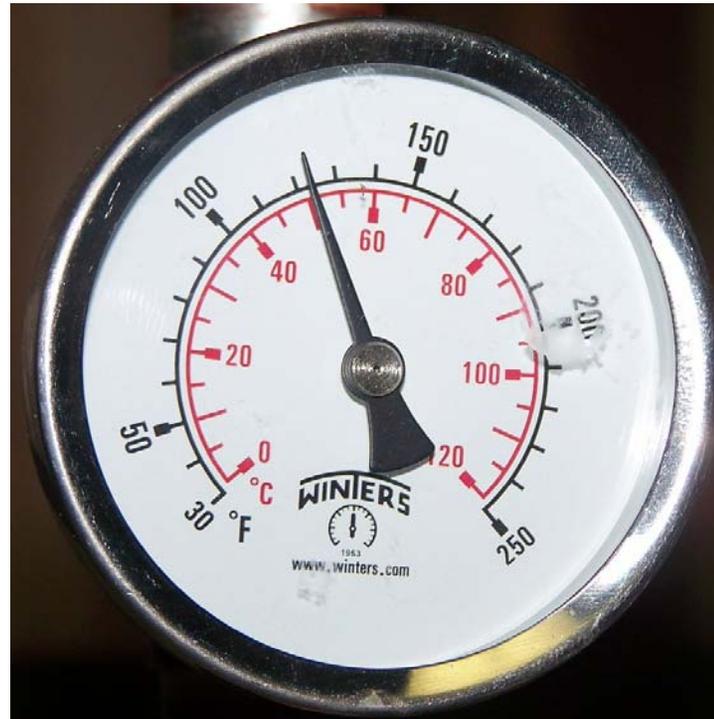
The temperature outside was 10 degrees.



The solar hot water collectors were pumping **163 degrees** into the system



*And the solar storage tank was
fully charged at 120 degrees*



How Much Does It Cost?

Standard 2 Panel System

Provides 50% - 75% of the
Hot Water Needs of an
Average Family of 4

Installed Cost:	~ \$6,500
NYS Tax Credit:	- \$1,625
Federal Tax Credit:	- \$1,950
<u>Net Total Cost:</u>	<u>\$2,925</u>

How Much Is the Savings?

Depends on Usage, Orientation, & Fossil Fuel

The First Year Savings from a Standard 2 Panel System

Saves a 4 Person Family who uses 30 gallons per person and heats Hot Water with:

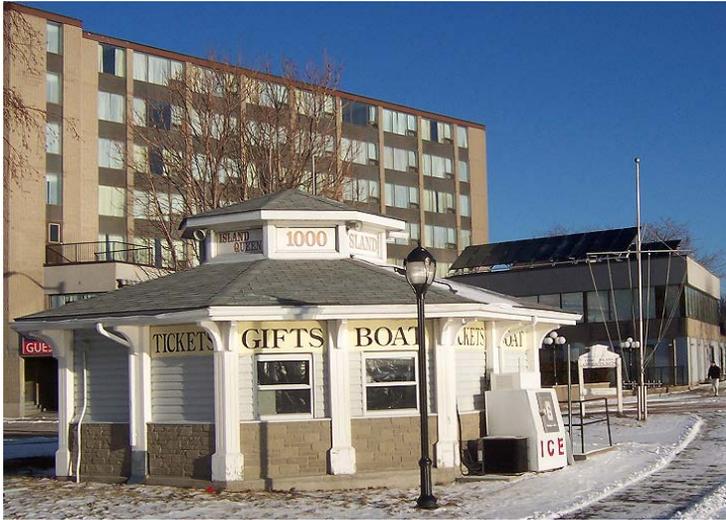
Oil: ~\$ 500 / year

Electric: ~\$ 700 / year

Natural Gas: ~\$ 440 / year

At CURRENT Energy Prices - Oil and Natural Gas
Prices have increased by over 60% since 2000!

Commercial – Federation Place Howard Johnson Hotel Kingston, ON



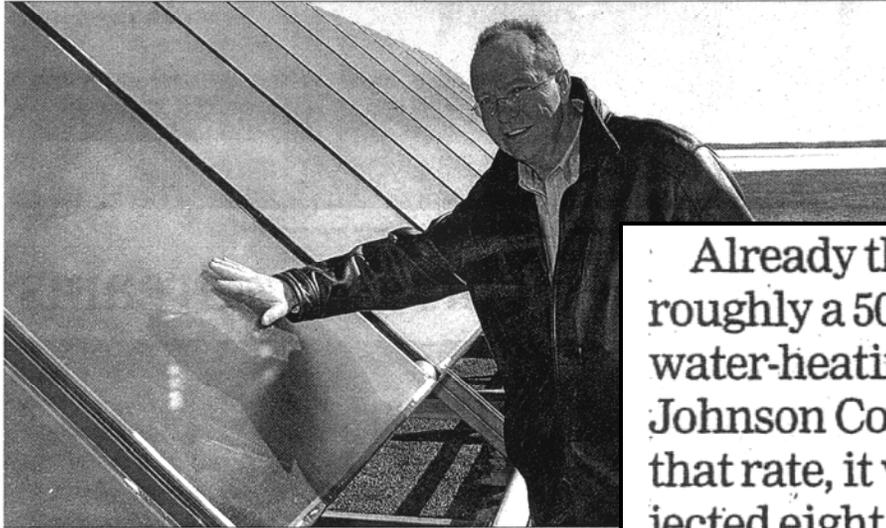
THE KINGSTON WHIG-STANDARD

PROUDLY SERVING THE KINGSTON COMMUNITY SINCE 1834



KINGSTON, ONTARIO • WEDNESDAY, MARCH 15, 2006 • 93¢+GST

POWER PLAY



"You just put your hand on [one of the panels] ... and you can feel the money saving," says Bill Allinson of the

Hard time for students

Already the businessman is seeing roughly a 50-per-cent reduction in water-heating costs at the Howard Johnson Confederation Place Hotel. At that rate, it will take less than the projected eight years to get his money back.

Exploring new solar systems

Hojo's decision to heat its water with the sun's energy is already paying dividends

The Whig-Standard

WHEN BILL ALLINSON SPENT thousands to install a solar water-heating system at his downtown Kingston hotel last fall, he thought it would take years to recoup the money.

Already the businessman is seeing roughly a 50-per-cent reduction in water-heating costs at the Howard Johnson Confederation Place Hotel. At that rate, it will take less than the projected eight years to get his money back.

"It's much better than we had originally anticipated," said Allinson. Just a month after the solar panels were installed, hot water energy costs at the 94-room hotel were reduced by 21 per cent. A month after that, costs were about 50 per cent lower.

Allinson, who owns the hotel with his two sisters, Barbara and Beverley Allinson, said the figures aren't yet available for January, but he expects them to be somewhere around 55 per cent, compared to the same period last year.

He expects to save roughly \$5,000 a year.

And so, now more than ever, he longs for bright, sunny days.

"You just put your hand on [one of the panels] on a day like today and you can feel the money saving," he told a *Whig-Standard* reporter and photographer as they stood on the roof near the panels on a recent sunny day.

Last October, the Allinsons spent \$32,000 on the new water heating system because they wanted to save on en-

ergy costs and to promote the hotel as a "greener" place to stay.

"It was the right time to do it," said Allinson.

A big part of the decision to go solar, he said, was the fact that the technology for the panels comes from Kingston.

The solar panels were manufactured in Ontario using technology developed at the Queen's University solar lab.

A Kingston company, Quantum Renewable Energy Inc., also installed the solar panels and takes care of their maintenance.

Allinson hopes to inspire other hoteliers to install similar energy-saving systems.

But, so far, the Howard Johnson is Kingston's first - and only - hotel to go solar and Allinson says it's the first one

in eastern Canada to use the sun to heat water.

Rick Rooney of Quantum Energy said that it would likely be only a matter of time before other hotels jump on the solar bandwagon.

"We've talked to virtually every hotel in town and every retirement home in town and so many of them are seriously considering it," he said. "Basically, the Howard Johnson paved the way for them to look at it. Now they can say 'OK, this is what a system looks like and this is how it's performing.'"

Please see KINGSTON, Page 5

The new police headquarters will make others 'green' with envy
- Please see Page 5

city on their lips. Lewis announced the rally's organizer, Simon Kiss, says the Ontario government has broken its promise to students by ending two-year tuition freeze effective this fall.

The move, which was announced last week by Minister of Training, Colleges and Universities Chris Bentley could see post-secondary students pay five per cent more in tuition fees come September.

Fees for graduate and professional faculties such as law, medicine and engineering could go up by eight per cent.

"They used students to get elected and now they're turning their backs on us," said Kiss, a political studies graduate student, before protesters began their march. "It's a shame."

Brophy points to Manitoba, where tuition fees have remained stagnant for six consecutive years under a popular tuition-freeze policy, as an example of how an extended tuition freeze can work.

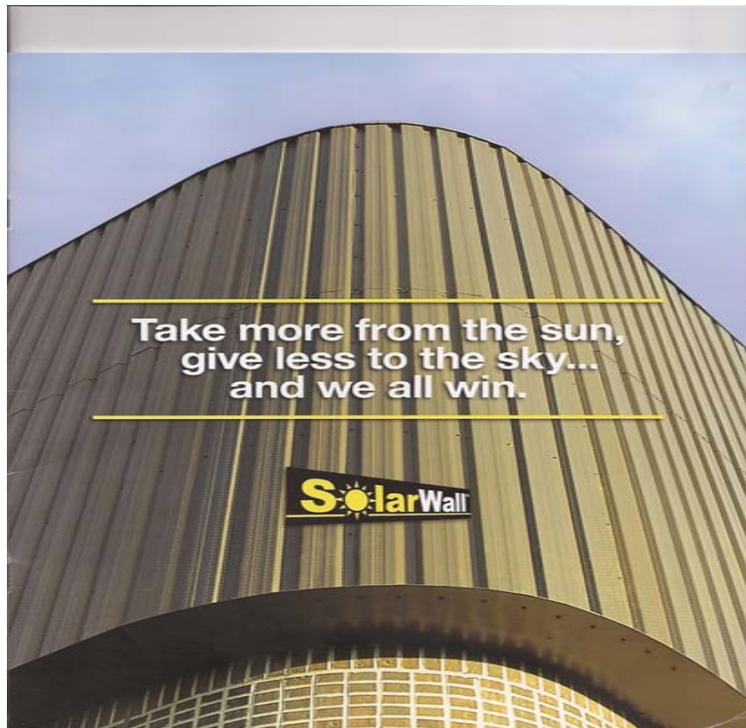
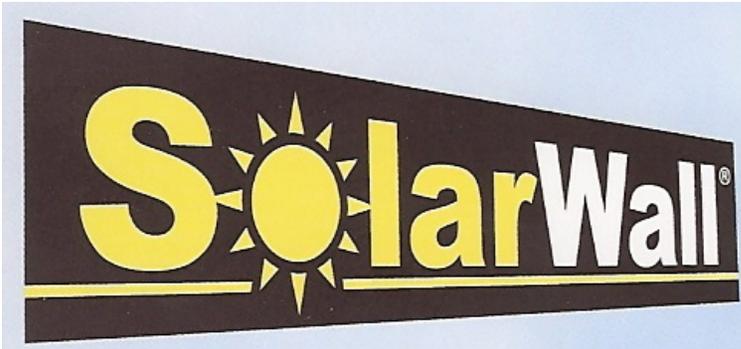
"And we're a richer province," Brophy said. "There's no reason why wouldn't work here."

First up on the protesters' list was

Commercial Solar Hot Water Opportunities

- Hotels
- Dorms
- Apartments /
Condos
- Nursing Homes
- Hospitals
- Military Barracks
- Jails
- Industrial Process
Pre-Heat
- Laundries
- Food Service
- Car Washes
- Farms
- Greenhouses
- Campgrounds

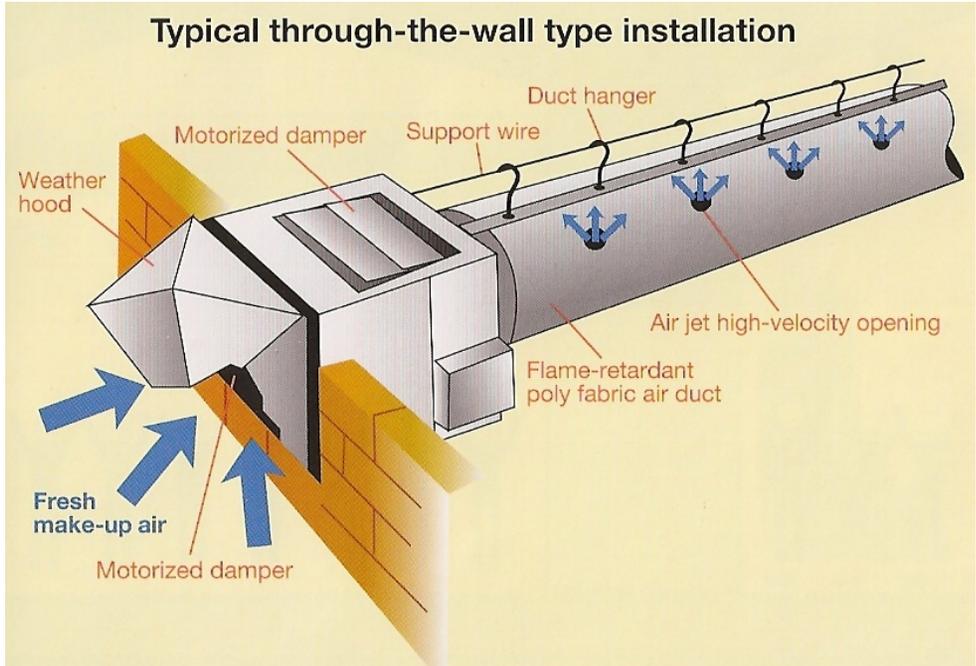
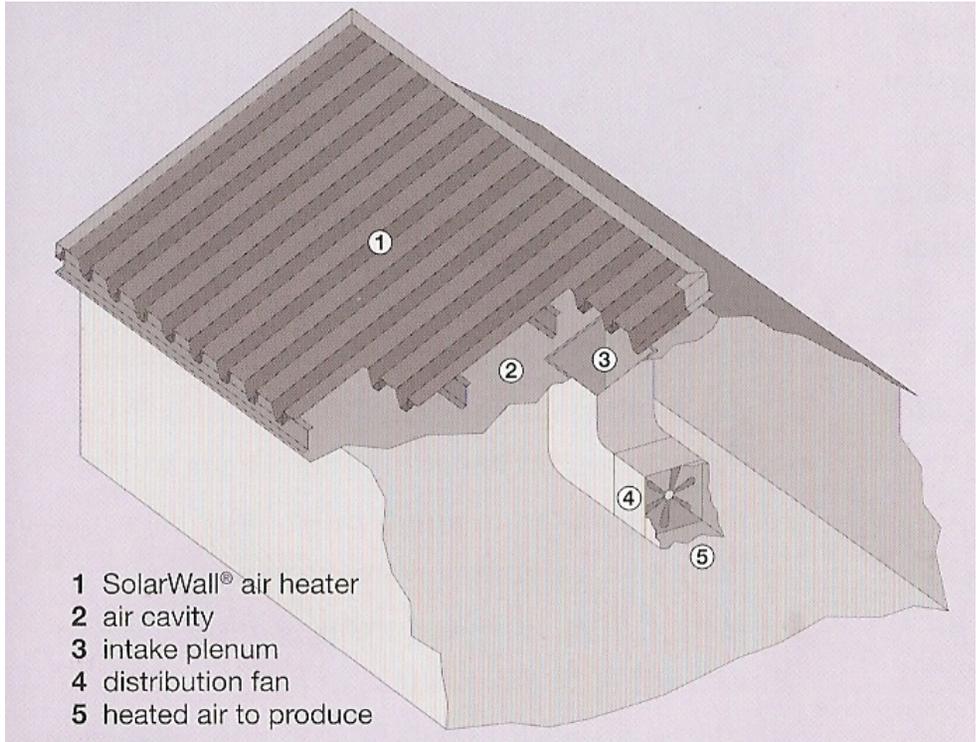
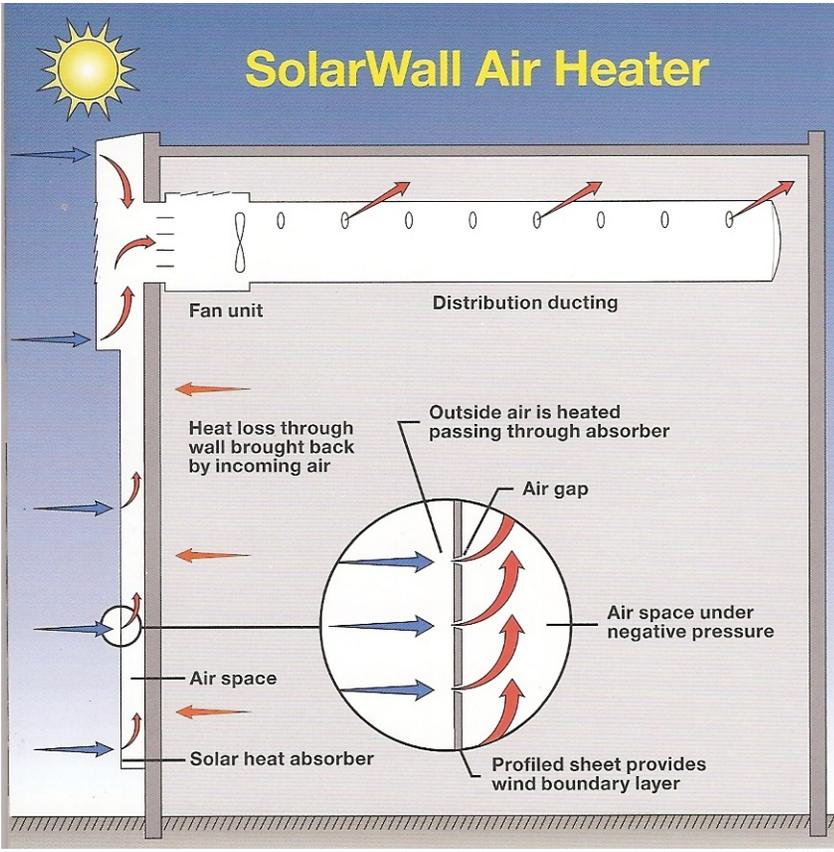
Solar Space Heating





Transpired Solar Collectors

NREL / Conserval late 1980s







Bombardier





Quebec School

*Rapid City, Iowa
Community Center*





Fort Drum

*Bus Garage
Calgary, Alberta*

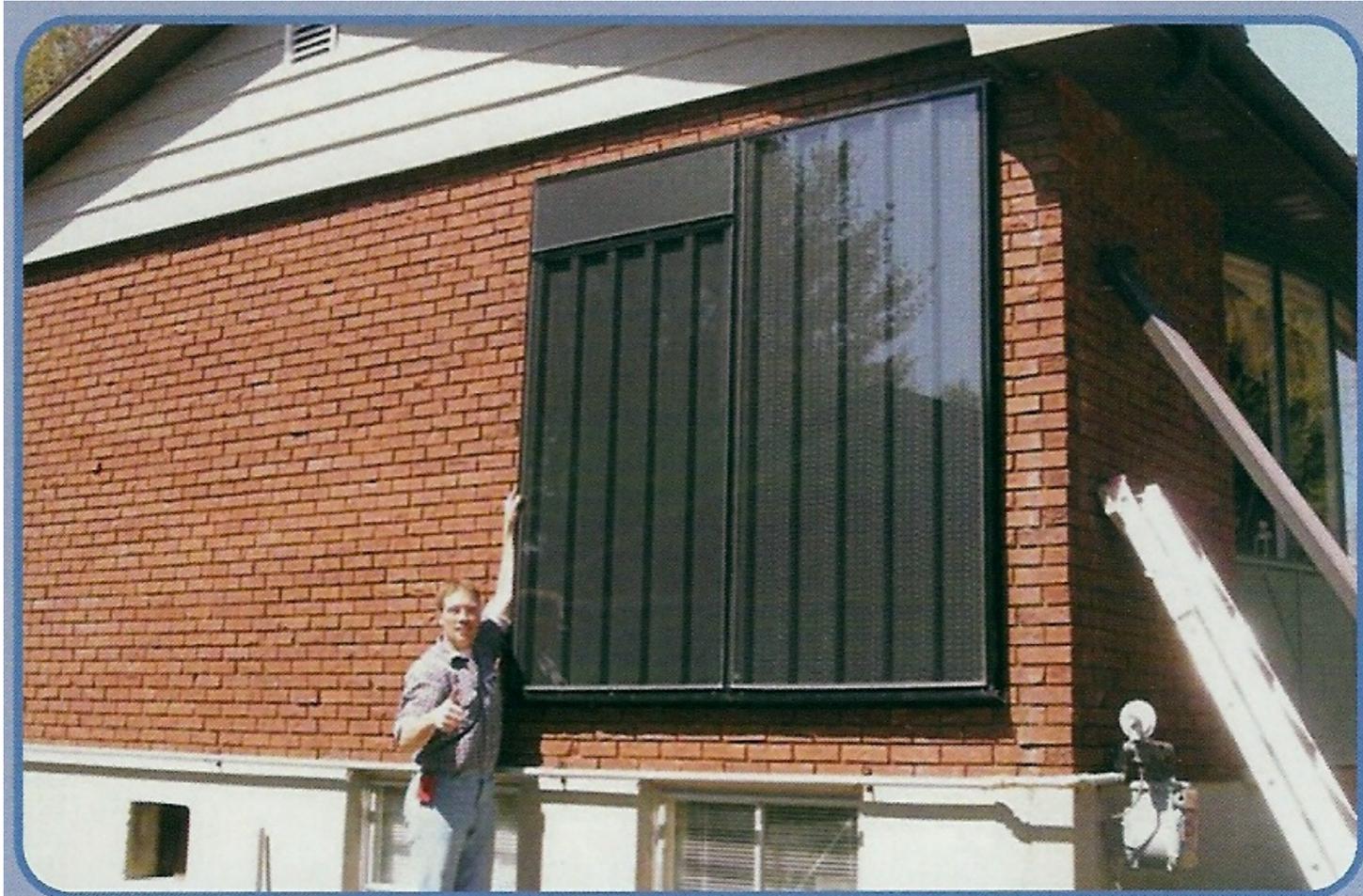


*Apartment Building,
Alberta Calgary*



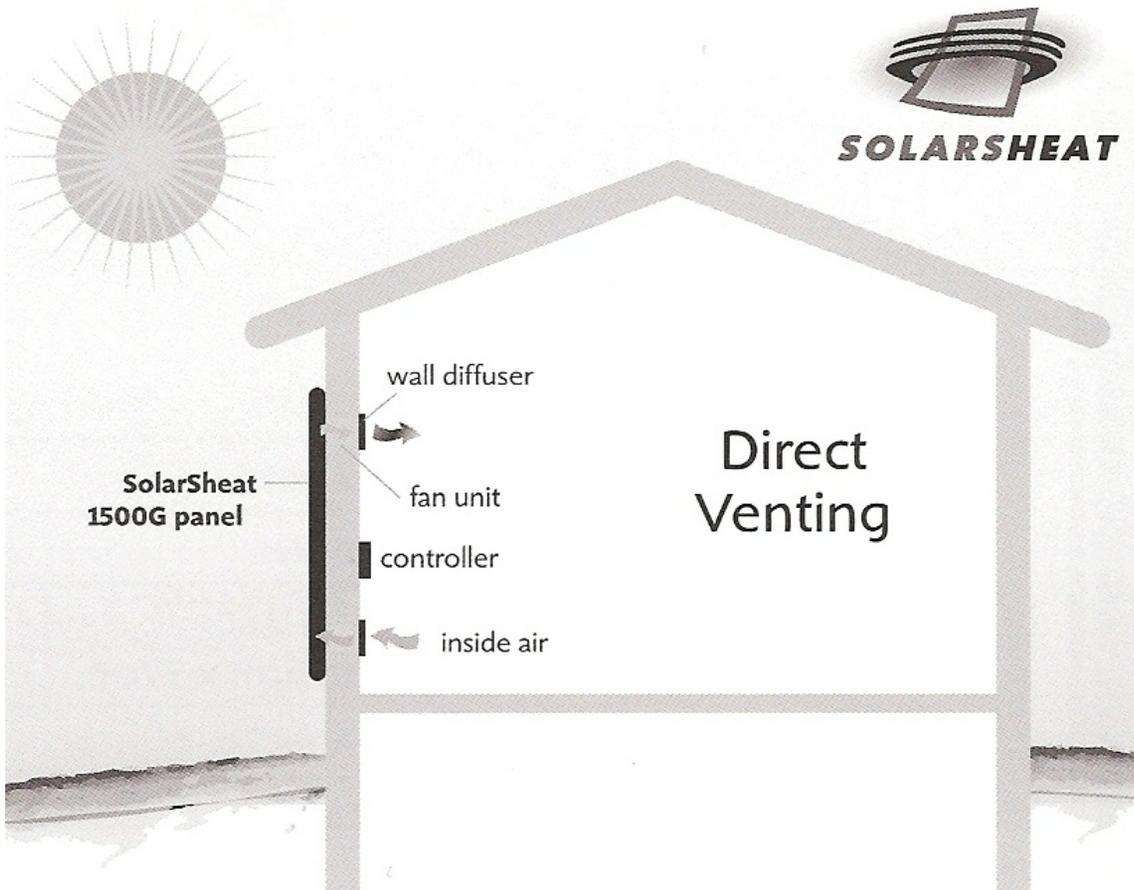


*Residential Affordable,
Solar Space Heating*





1 Panel = Supplemental Heat for ~1,000 sq ft
1.5 KW, 5,000+ BTUs / Hour



Creating a Self-Sustaining Solar Thermal Market in New York State

- **Executive Orders mandating that all new and retrofit government buildings** include solar thermal technologies in their heating and hot water systems.
- **A 5 year, \$10 million Public Education and Marketing Program** replicating Germany's successful solar thermal campaign and New York's wind energy program that kick-started the voluntary green power market.
- **An Incentive Program** that starts high (20%) and scales down over 7 years.
- **A Statewide Workforce Training and Education Program** to educate the trades.
- **Local & Statewide Codes** that mandate solar thermal technologies as standard pre-heat equipment in all new construction (with limited exceptions for buildings without access to the sun)



Residential & Commercial Solar Heat & Hot Water
Working with you today to create a sustainable tomorrow...

LOW INCOME PROGRAMS

- Low income residents are most in need of a low cost, fixed price renewable energy resource but **lack the up-front capital and can not use tax credits**
- Without tax credits, **solar thermal technologies payback is 10+ years.**
- NYS can create **a low-interest long-term (20 – 30 year) financing mechanism** that will allow low income residents to pay for the solar thermal energy as it is produced over time.
- An alternate mechanism would provide low-cost financing for **for-profit third parties to install the equipment**, take the federal tax credits, and allow low income residents to pay for the solar thermal energy as it is produced over time



Residential & Commercial Solar Heat & Hot Water
Working with you today to create a sustainable tomorrow...

Solar Thermal is Ready

- Integrate with virtually all existing heat & hot water systems
- Easy to Install
- Safe, Reliable, Low Maintenance
- Affordable & Cost Effective
- Long lasting, 20+ year energy savings
- Just needs an initial kick start to create a Self-Sustaining Market



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