


 <b>SOLAR HYBRID</b>		
Reference:	05	
Name:	Solar Hybrid Home	
Climates:	<a href="#">Humid Middle Latitude Climates</a> <a href="#">Continental Climates</a> <a href="#">Cold Climates</a>	
Occupants:	 expandable by 	
Living area:	2002.48 ft2 186.04 m2	

**Description:**

Solar energy is a clean and abundant energy resource that can be used to supplement many of your energy needs. Solar energy can be utilised as a form of heat, such as solar water heating, and as electricity, such as solar photovoltaics. Solar water heating systems are commonly referred to in the industry as Solar Domestic Hot Water (SDHW) systems.

Consumers often ask if there is enough sunlight in northern climates to support solar applications such as water heating. Basically, there is enough solar energy to deliver an average of 2500 kWh of energy per year in cold climates, such as that of Canada or Scandinavia. This means that a solar water heater can provide enough solar energy to meet about one half of the water heating energy needs for a family of four. Water heating is one of the most cost-effective uses of solar energy, providing hot water for showers, dishwashers and clothes washers, as well as heating. Consumers can now buy "off-the-shelf" solar water heaters that meet industry-wide standards, providing a clean alternative to gas, electric, oil or propane water heaters.

A solar water heater reduces the amount of fuel you need to heat water because it captures the sun's renewable energy. Many solar water heaters use a small solar electric (photovoltaic) module to power the pump needed to circulate the heat transfer fluid through the collectors. The use of such module allows the solar water heater to operate even during a power outage.

As a matter of fact, what makes this EcoHouse design **hybrid**, is the sheer fact that both active and passive solar systems were employed, i.e:

**1) Passive systems:**

- favourable building orientation on site, with the greenhouse facing south, whereby its heat flows into the EcoHouse interior simply by opening the sliding doors;
- a compact, double-storied plan, that can be further subdivided into separate temperature zones, and heat storage, a large utility room, and garage in the basement, thus reducing the energy requirement significantly in northern climates;
- a fireplace, used in conjunction with other solar heating solutions, located on an interior wall near the centre of the EcoHouse;
- all windows are double-glazed, with the possibilities of the beadwall system inclusion;
- increased wall and roof insulation, in order to reduce heat loss in typical construction; "breathing walls", naturally diffuse air and water between the interior and exterior, thus acting as the "third skin", were employed; they are constructed of concrete form made from mineralised wood chips and portland cement, making walls that are healthy, environmental, durable, easy to construct, and cost effective; roof tiles are earth-friendly, made of recycled materials and feature a Class 4 Impact Resistance and a Class A and Class C Fire Rating;
- air infiltration losses have been reduced by using air locks at points of entry, whereas the northern roof, pitched at 30°, was designed to retain snow build-up, that acts as insulation during the winter season;
- water-saving toilet seats and other water-saving sanitary equipment has been used throughout the project;
- all installations between the lower and upper floors run through a vertical service duct, which is also fully accessible for inspection and maintenance;
- the greenhouse makes use of the "greenhouse effect" principle to trap sunrays and build up hot air, that is further transferred to the living room and - using a system of open double storey spaces - further into bedrooms. The greenhouse also serves the purpose of a socialising space, and can be used for growing vegetables, breeding pets, etc;
- sunscreening is envisaged as an option, provided that your local latitude and climate so require;
- the southern roof has the optimum pitch of 45°, making it ideal for solar heat collection for latitudes from 30 to 60 degrees North;

**2) Active systems:**

- Solar Domestic Hot Water (SDHW) System has been used in the form of The Solar Boiler™ state-of-the-art solar water heating appliances, manufactured by Thermo Dynamics Ltd; being environment-friendly and very affordable, 8 systems, amounting to 50% of the overall heated area in the EcoHouse were deployed across the southern roof, to supply domestic hot water and the entire quantities of water required to heat the premises; the heat pump used with the system is powered by the sun, and does not pollute;
- ventilation, Indoor Air Quality and heat recovery from within the EcoHouse has been achieved using the brilliant Lifebreath Clean Air Furnace®, manufactured by Nutech Brands Inc. that uses a domestic water heater as its heat source; the Heat Recovery Ventilator removes stale, contaminated air from inside the EcoHouse to the outdoors and at the same time, draws fresh, oxygen-laden air from outside and distributes it throughout your home; the hot, stale air from the greenhouse and the EcoHouse's interior is converted to fresh air, which is then distributed as fresh air and heating through the registers throughout the home;
- the water heated by the solar collectors is, in turn, used in the System Wall Heating, providing optimum heat transmission and operativity with lowest possible water heating temperature; having heating within the walls is cost-efficient, helps save heating costs, can be used reversibly during the summer season for cooling, and is completely ecological;
- Central Vacuum System has been used to remove 100% of contacted dust, dirt, mites, pollen and other allergens, then carry them to a central canister located away from living areas (in the Utility room) — helping improve indoor air quality.

Experience shows that by combining these **passive** ecodesign planning and construction techniques **alone**, the effect of reducing the total heating energy requirement by about 40% when compared to standard house construction can be achieved!

In a well-insulated EcoHouse by the likes of Solar Hybrid, the size of the heating system can be smaller than that required in a conventional house, thus reducing heating equipment costs to offset the cost of increased insulation. It is an organised, well-zoned EcoHouse, energy-efficient in its planning and design.

**Areas:**

Ground Floor Plan		ft2	m2	First Floor Plan		ft2	m2
Living		173.75	16.1419032	Master Bedroom		173.75	16.1419
Family Hall		237.7777	22.09027246	Bathroom		57.91667	5.380634
Kitchen		106.1805	9.864493491	Gallery		66.4986	6.177922
Dining		92	8.54707968	Bedroom		190.9999	17.74447
Restroom		57.91667	5.3806344	Sundeck		45	4.180637
Greenhouse		178.6666	16.598674				
Entry		6.263887	0.5819341				
Storage		12.29167	1.141933045				
<b>Total:</b>		<b>864.8471</b>	<b>80.34692438</b>	<b>Total:</b>		<b>534.1652</b>	<b>49.62557</b>

Basement Plan				ft2	m2
Heat Storage				173.75	16.1419032
Utility & Storage				234.8055	21.81414841
Garage				137	12.72771641
Laundry				57.91667	5.3806344
<b>Total:</b>				<b>603.4722</b>	<b>56.06440242</b>

FURNITURE AND EQUIPMENT							
GROUND FLOOR PLAN				FIRST FLOOR PLAN			
ID	ITEM	DESCRIPTION	QTY.	ID	ITEM	DESCRIPTION	QTY.
C1	CBS3636	kit. crnr base cab	1	C1	UDR2484	util cab	5
C2	BDR2436	kit. base cab	2	C2	UDR2484	util cab	1
C3	BDR2436	kit. base cab	1	C3	CUD3084	crnr util cab	1
C4	CW2430	kit. crnr wall cab	1	C4	UDR2484	util cab	1
C5	WR2430	kit. wall cab	5	C5	UDR2484	util cab	1
C6	WR2430	kit. wall cab	1	C6	UDR2484	util cab	1
C7	WR2430	kit. wall cab	2	FX1	54W32D	54"R Showertub	1
C7	WR2430	kit. wall cab	1	FX2	32W19D	Oval Free Standing	1
C8	PWR1230	kit. wall cab	1	FX3	30W28D	Standard Toilet	1
C9	WR2430	kit. wall cab	1	FU1	48W24D	48x24 Contemporary	1
C10	WR2430	kit. wall cab	1	FU2	20W18D	2 Drawer	1
C11	WR1230	kit. wall cab	1	FU3	64W84D	Queen Bed Contemp.	1
C12	29x12 in	shelf & rod	1	FU4	20W18D	2 Drawer	1
C13	PUD3084x28	util cab	1	FU5	17W17D	17" Floor Lamp	1
C14	24x12 in	shelf & rod	3	FU6	32W20D	Small Chest	1
C15	24x12 in	shelf & rod	1	FU7	26W26D	Swivel Chair	1
C16	24x12 in	shelf & rod	1	FU8	29W17D	Ent. Center 18" TV	1
FX1	33W33D	Corner Kit. Sink	1	FU9	18W18D	Dressing Table Chair	1
FX2	30W28D	Standard Toilet	1	FU10	24W20D	Roller Stand	1
FX3	32W19D	Oval Free Standing	1	FU11	32W20D	Small Chest	1
FX4	17W26D	Bidet	1	FU12	64W84D	Queen Bed Contemp.	1
FX5	32W19D	36x23" Corner Frplc.	1	FU13	18W18D	Dressing Table Chair	1
FX6	24W5D	Full Length Mirror	1	FU14	20W18D	2 Drawer	1
FX7	24W5D	Full Length Mirror	1	FU15	20W18D	2 Drawer	1
FX8	14W14D	Outdoor Post Lamp	1	FU16	48W17D	Ent. Center 15" TV	1
A1	21W24D	Dishwasher	1	FU17	48W24D	48x24 Contemporary	1
A2	11W24D	Trash Compactor	1	FU18	26W26D	Swivel Chair	1
A3	25W26D	24" Elec. Range	1	FU20	17W17D	17" Floor Lamp	1
A4	30W29D	30"L Ref/ Freezer	1				
FU1	72W28D	Wet Bar	1				
FU2	19W19D	Bar Stool	1				
FU3	19W19D	Bar Stool	1				
FU4	44W80D	30x66 Seat 4-6	1				
FU5	34W34D	Corner	1				
FU6	34W34D	Center Section	1				
FU7	34W34D	Center Section	1				
FU8	34W34D	Right End	1				
FU9	34W34D	Left End	1				
FU10	20W20D	20x20 End Table	1				
FU11	20W20D	20x20 End Table	1				
FU12	36W36D	36x36 Contemporary	1				
FU13	36W36D	36x36 Contemporary	1				
FU14	72W24D	Ent. Center 27" TV	1				
FU15	36W17D	Swinger Floor Lamp	1				
FU16	26W18D	Ottoman	1				
FU18	60W35D	Slatted Wood Table	1				
FU19	62W23D	Slatted Wood Bench	1				
FU20	62W23D	Slatted Wood Bench	1				
FU21	24W22D	Slatted Wood Chair	1				
FU22	24W22D	Slatted Wood Chair	1				
FU23	24W24D	Corner Cupboard	1				
FU24	7W3D	Wall Phone	1				
FU25	55W55D	Rock Pond	1				
FU26	60W13D	Curio Cabinet	1				
FU27	60W24D	Upright Piano	1				
FU28	13W9D	Ornate Mailbox	1				
FU30	26W64D	Chaise Lounge	1				
FU31	44W57D	Dog House	1				
FU32	25W21D	Outdoor Chair	1				
FU33	25W21D	Outdoor Chair	1				
FU34	36W14D	Piano Bench (60)	1				
FU35	20W20D	20 Round End Table	1				
FU36	29W17D	Serving Cart	1				
FU37	24W10D	Wall Shelf	1				
LS1	2'11 Small Flower	Begonia	1				
LS2	2'9 Small Statuary	Rdwdpl01	1				
LS3	2'11 Small Shrub	Aglaroeb	2				
LS4	2'11 Small Shrub	Ficusel	2				
LS5	3' Small Shrub	Hoyavarg	3				
LS6	3' Small Shrub	Peperosn	2				
LS7	2'11 Small Shrub	Philoxyc	2				
LS8	2'11 Small Shrub	Polybal	3				

BASEMENT PLAN			
ID	ITEM	DESCRIPTION	QTY.
C1	UDR2484	gar. util cab	2
C2	UDR2484	gar. util cab	1
FX1	22W24D	Single Laundry Sink	1
A1	27W28D	Washer	1
FU2	24W12D	Clothes Hamper	1
FU3	72W24D	Workbench	1
FU4	49W33D	Snow Blower	1
FU5	24W24D	Corner Cupboard	1

Working Drawings Contents:					
Type of Drawing:				Number of Sheets per Drawing:	
Site Plan					1
Foundation Plan					1
Floor Plans					3
Roof Plan					1
Section					1
Exterior Elevations					2
Vertical Circulation Details					1
Joinery Details					4
Rainwater treatment Details					1
Structural calculations					12
Specifications of Eco-building materials and products					Complete set
Materials List:					Complete set
Specifications of HVAC and IAQ (Indoor Air Quality)					Complete set
Roofing Details					2
Wall details					1
Floor Construction Plans					2
Heating, Ventilation and Indoor air Quality Plans (HVAC & IAQ Plans)					2
Shading devices Details					1
Plumbing Plans					3
Water supply & Drainage Details:					1
Landscaping details					1
<b>Price (USD):</b>					<b>\$ 587.00</b>
<b>Complete set of printed plans + CAD files on business-card CD (USD):</b>				<b>\$</b>	<b>620.72</b>



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