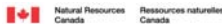




Solar Buildings: Success through integration

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VISION

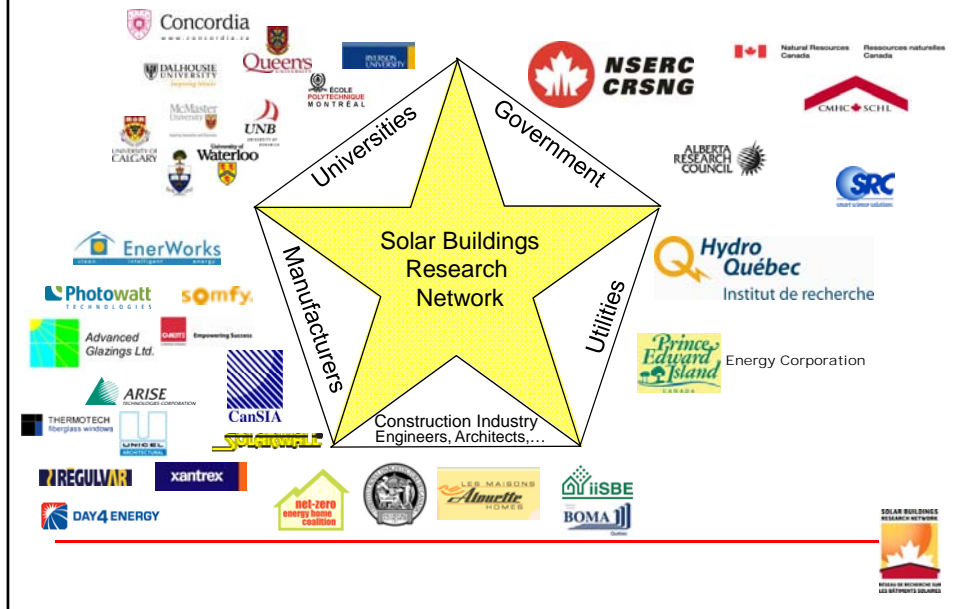
Development of the **solar-optimized** building as an **integrated advanced technological system** that will approach on average the zero-energy target and be cost effective.

Advanced does not mean complex; it brings together “**low-tech**” **passive solar** technologies that appear simple but generally require careful design with “**high-tech**” **active envelope elements** such as motorized blinds and airflow windows with photovoltaics and smart predictive control systems.

Solar-optimization requires that the solar technologies are optimally integrated into the design and operation of the building.



Partners and linkages...



Projects and Linkages

THEME 1 Integration

- 1.1 Integration of photovoltaic-thermal systems with facades roofs and HVAC systems.
- 1.2 Solar optimization of perimeter zones and double façades
- 1.3 Integrated modelling design and control of direct gain systems with floor heating and BIPV.
- 1.4 Integrated modelling simulation and design of sunspaces/atria.
- 1.5 Load and demand management in solar-optimized buildings.

THEME 2 Thermal

- 2.1 Solar Combi.systems - Space Heating and Cooling and Water Heating.
- 2.2 Thermal Storage and DSM.
- 2.3 PV/T combined photovoltaic-thermal systems.
- 2.4 Development of window shading models

THEME 3 Solar Electricity

- 3.1 Development of innovative power conversion systems for Buildings.
- 3.2 Development of advanced controls for PV systems in buildings
- 3.3 System integration of PV systems for residential and commercial buildings

THEME 4 Simulation/Design

- 4.1 Integration of building component models into whole-building simulation.
- 4.2 Increasing Solar Energy Utilization through Modelling the Building Stock and Investigation of Market Forces
- 4.3 Prototype solar building design synthesis analysis and optimization tool.

Demonstration projects

Workshops



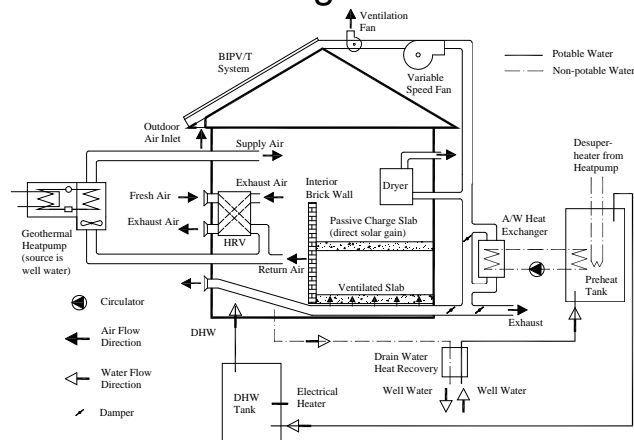
EcoTerra - Alouette Homes

- Pre-fabricated house
 - 4-person family house
 - 140 m² for two floors + 90 m² basement
 - 13 m² ground south facing window
 - 30° two-slope attic/gable roof



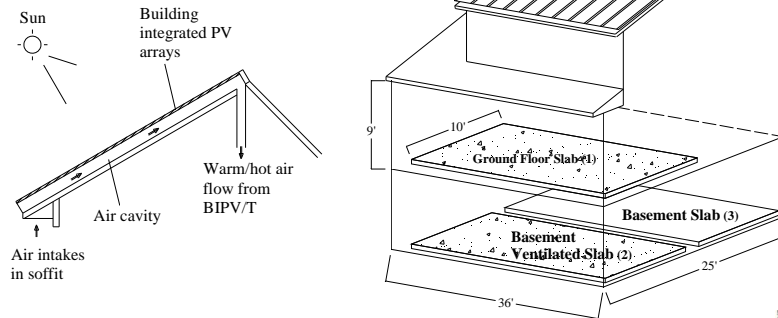
Design of House's Components

- Passive Solar Heating + PV + Geothermal



Design of House's Components

■ BIPV/T + Ventilated Slab + Passive Charge Slab



Integration is the key

- Integration of solar systems provides more than the sum of the individual contributions:
 - Photovoltaic (PV) panels mounted on the roof and façade typically convert 6-18% of the sun's energy into electricity,
 - 50-70% of the rest can be extracted as heated air from the PV panels while
 - 10-30% can be utilized for daylighting with semitransparent systems.
- Combined solar energy utilization efficiencies of up to about 80% can be achieved if proper integration strategies are implemented. Indeed, there is the potential for a building to achieve, on average, zero energy consumption.



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