# STRATEGY

## AND BACKGROUND

## INCLUDING A BRIEF HISTORY OF ENERGY-EFFICIENT BUILDINGS

***David Olivier***

# The Saskatchewan Conservation House

Regina, Saskatchewan, Canada (1976)

Response to 1973 oil crisis by Saskatchewan Research Council.

Heavily-insulated, draught-proof house (1 ac/h @ 50 Pa), triple glazing with shutters and MVHR.

Latitude 52 deg N, January mean temperature -18 degC, design temperature 35 degC.

Active solar system for space and water heat. Without solar, cost of gas for space heating = $(Can.)30/yr.

Picture courtesy Dr Rob Dumont

# The Philips Research Experimental House

## Aachen, Germany, 1977

Aimed to explore new building techniques and respond to 1973 oil crisis.

Heavily-insulated, draught-proof house (1 ac/h @ 50 Pa), low-e double glazing with shutters and MVHR.

January mean temperature +1 degC, July temp. +18 degC, design temperature -7 degC.

Active solar Designed to provide space and water heat.

# The Rocky Mountain Institute Headquarters

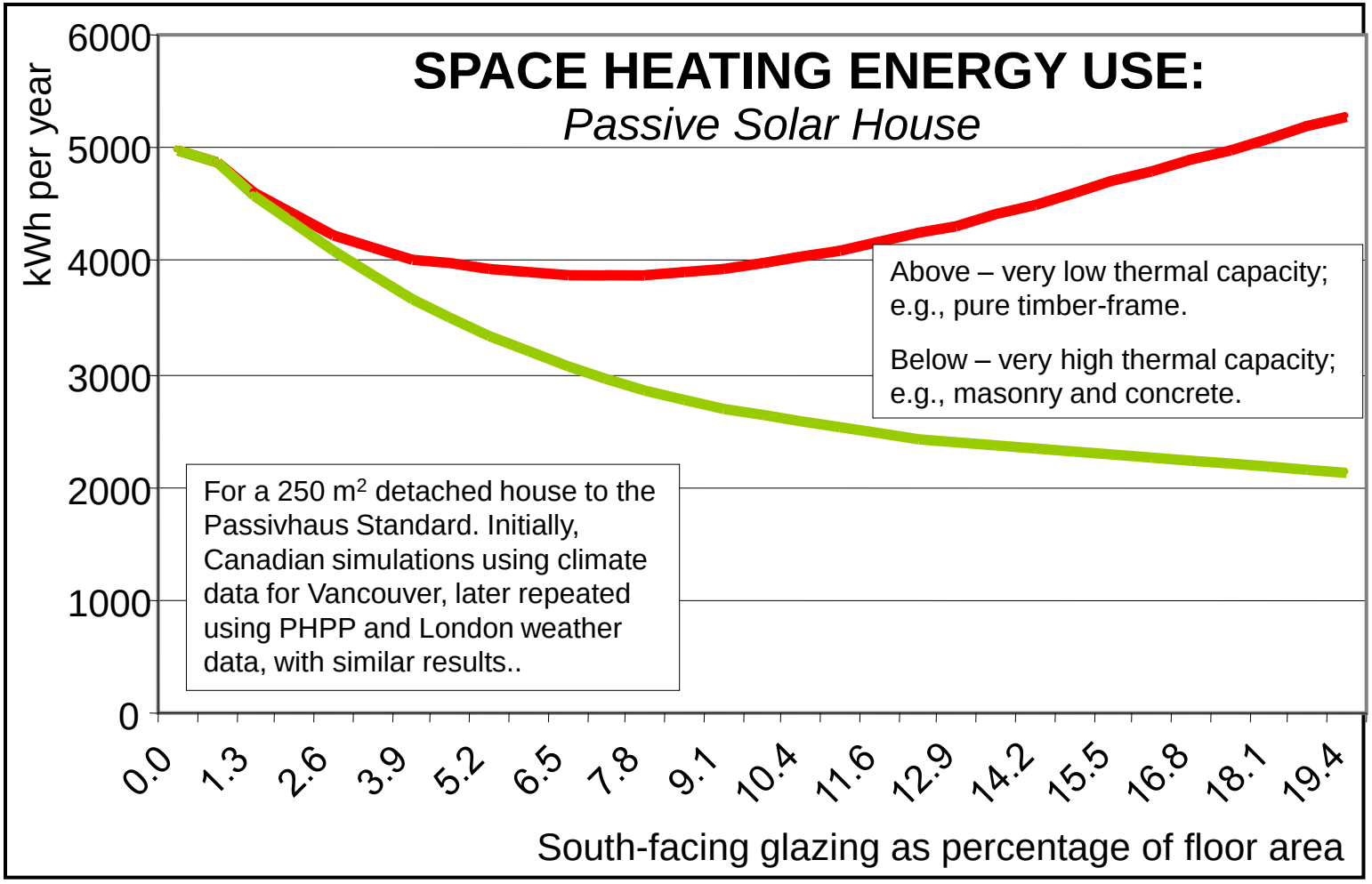
Old Snowmass, Colorado, USA (1982-83)

Single-storey 400 $m^2$ passive solar house and office building. Superinsulated roof, walls, floor and windows. No backup space heat; a little LPG used as backup to solar water heating and for cooking. Most energy usage is electricity for office equipment. “”Zero net energy” since 1992.

Picture courtesy RMI.

# UK Passive Solar Potential

Passive solar gains are a cheap renewable, if added at design stage. Greater scope in UK or Ireland than on the continent, given the long heating season and cool summers. Care over available thermal capacity and *in extremis* provide summer solar shading.

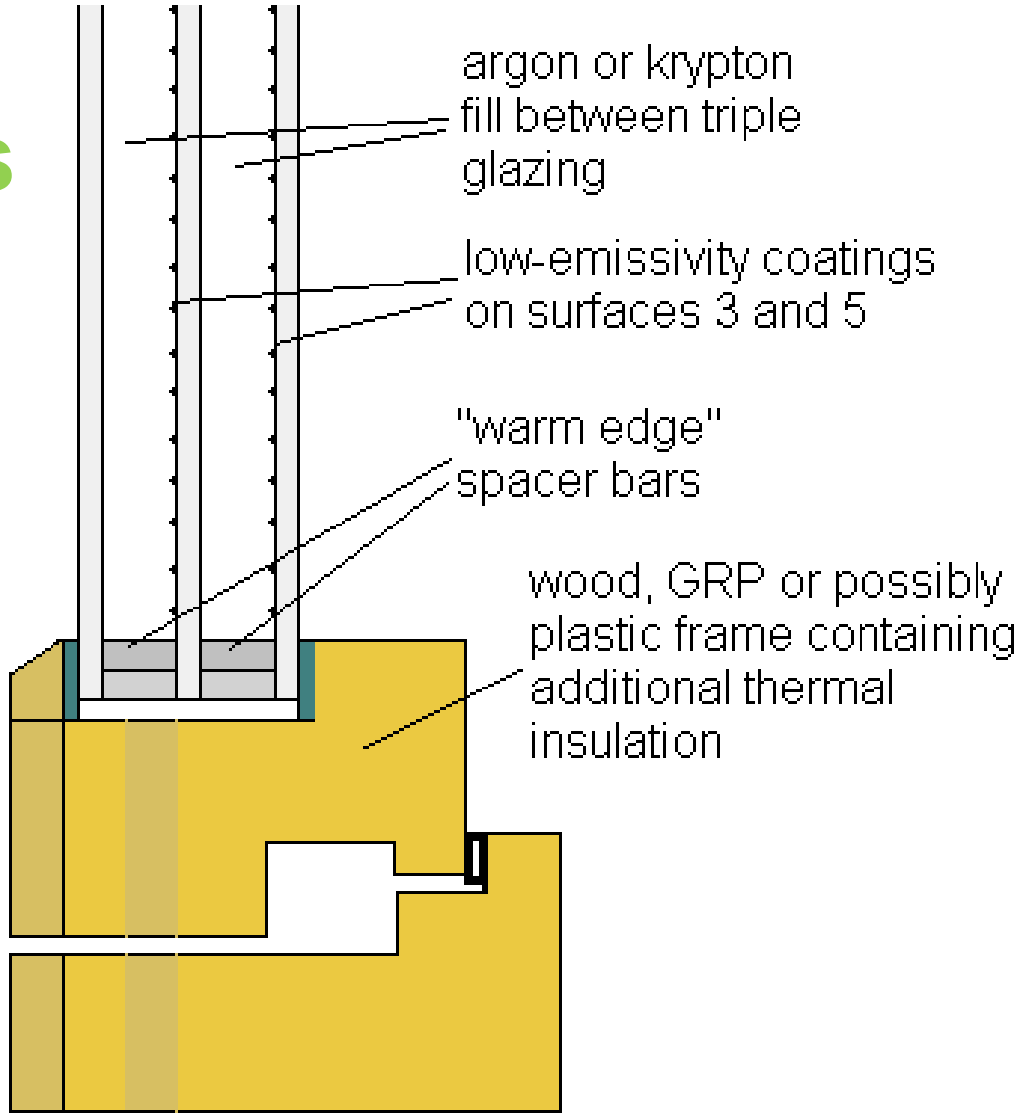


# Typical Window, Ultra-Low Energy Buildings

U-value = 0.7-0.8 W/m$^2$K, whole window (refers to size 1250 x 1500 mm)

g-value = ~0.52 to 0.62 for glass only

Especially at the higher g-values, such windows on the south facade can help to heat a building in the southern UK.



# Energy Showcase Project

Rural house with no mains services except electricity, Herefordshire

Nearing completion. Aims to produce most energy from solar, comprising passive gains, an experimental solar water heating system and PV. *In situ* concrete with mainly cellulose fibre insulation.

# The Aim Here

A house which stays reasonably comfortable over an average English winter without employing a backup heating system.

Modelled with PHPP using interpolated local weather data from Meteorological Office site. Informed by earlier modelling of a new house in Herefordshire, using SERI-RES and hourly temperature data.

A conventional building, with low insulation and high air leakage, using standard design temperatures, will fall below internal comfort levels for a small proportion of the time. (Heating systems can fail too.)

# The Means

High levels of insulation and draughtproofing.

Mechanical ventilation and heat recovery.

High levels of thermal capacity more comparable to normal levels in central Europe. UK construction insufficient in this respect.

Glazing with low U-values everywhere and very high g-values on the south facade.