
REPORT

DATE: November 15, 2015
TO: Tom Bushey – C.O.O, International Solar Solutions Inc.
FROM: Gord Cooke
CC: Peter Budd – Executive Vice President
RE: **Report on Depressurization Potential of the ISSI Solar Attic Fan in New and Existing Homes**

This brief report outlines my opinion of the potential of the ISSI Solar Attic Fan system to create a significant depressurization or negative pressure in the typical Canadian homes for which it is intended to be applied – in both existing and new homes. Negative pressure in homes can be a health and safety concern for two reasons:

- Negative pressure can impede the safe venting of natural draft combustion appliance such as low efficiency gas or oil furnaces, oil or gas fired water heaters or wood fired fireplaces.
- A sustained negative pressure over a very long period of time in houses where radon gas is present in soils could increase the infiltration of radon gas into the house.

In developing the opinions stated below, the following was considered:

- The airflow capacity and specifications of the fan used in the ISSI Solar Attic Fan system.
- A report by the Canadian Center for Housing Technology (CCHT) that measured the installed airflow capacity of the fan.
- A series of pressure measurements made in 3 houses by a qualified Certified Energy Evaluator and Home Inspector. These measurements showed the level of depressurization in both the interior of the sample homes and the attics with at least one solar fan running. Measurements were also taken when bathroom fans, kitchen fans and clothes dryers were turned on.
- The standards referenced in the Ontario and National Building Codes that refer to depressurization, combustion safety, attic ventilation and ventilation requirements such as the HRAI Digest, the Ontario Gas Utilization Standard, the CSA F326 Residential Mechanical Ventilation Standard and the new CSA F300 Residential Depressurization Standard.
- The 30 years experience I have had measuring the air tightness and depressurization potential in thousands of existing and new homes in Canada.
- The air tightness and attic ventilation characteristics of typical Canadian homes.

In my opinion,

- It is **extremely unlikely** that the installation of the ISSI Solar Attic Fan system would disrupt the operation or safe venting of any properly installed natural draft combustion appliance.

- It is **extremely unlikely** that the operation of the ISSI Solar Attic Fan system would contribute to higher average levels of radon gas in any Canadian home.
- The potential for either combustion spillage or higher radon levels is even lower in new homes. Given requirements for air sealing and high efficiency, direct or power vented heating and domestic hot water heating equipment in new homes means any potential risk in new homes is very small.

These opinions are based on the following facts, calculations and observations:

- The fan specifications and CCHT testing indicate that the Solar powered fan system will, at peak sun power, exhaust less than 250 cubic feet per minute (CFM) when installed as intended under a standard roof vent. In most conditions the fan will exhaust less than 160 CFM.
- It has been a code requirement for at least 40 years that attics have a free opening area of 1 sq. ft. of ventilation for every 300 sq. ft. of attic floor area. This free opening area reduces the potential for any significant negative pressure in an attic when a fan is operating. For example, a 1 sq. ft. opening is capable of passing over 250 CFM of air at a pressure drop of just 3 Pascal (Pa).
- In order for an attic fan to create a negative pressure in the interior of a home, there would have to be a substantially larger “hole” between the house and the attic than the 1:300 free area of the code required attic ventilation free area. That is, if a solar fan creates a 3 Pa in the attic, then the pressure induced in the house can only be greater than 3 Pa if the leakage between the house and the attic is larger than the ventilation free area in the attic.
- A typical clothes dryer in Canada has an exhaust capacity of 100 -160 CFM and these appliances have not been considered to be a health or safety threat in typical Canadian homes.
- A typical range hood in Canada has an exhaust capacity of 150-400 CFM and it has been only recently that large capacity range hoods – over 400 CFM – have been identified as a safety risk in tightly built new homes, since the fan is inside the air barrier of the assembly and the Solar Attic fan would be installed outside of the air barrier assembly. There are currently no regulations on the installation of large capacity range hoods in existing homes. Large range hoods are a much greater risk to the safe operation of a combustion appliance than the ISSI Solar Attic Fan system.
- Depressurization limits for natural draft appliances are listed in Canadian codes and standards are 5 Pa.
- Depressurization limits for radon concerns and other soil gases is listed in the CSA F329 Residential Mechanical Ventilation Standard as a sustained negative pressure of 10 Pa.
- The pressure measured in the attics of the 3 sample homes was always less than 3 Pa when the attic fan was operating.

Again, in summary, the Solar Attic Fan system is unlikely to cause a negative pressure of 3-5 Pa in the attic of a home – new or existing. It is even less likely that it could create a negative pressure of 3 Pa. in the interior of a home. Properly constructed venting systems can reliably overcome negative pressures of up to 5 Pa. In new homes, power vented and direct vented combustion appliances can overcome 50 Pa of negative pressure or more. Radon and soil gas concerns are exacerbated when there is a sustained negative pressure of 10 Pa. Thus in my opinion, the ISSI Solar Attic Fan system is not a threat to the safety or health of Canadian home occupants.

Please feel free to contact me directly at 519.651.7077 if you wish to discuss this report further.

Sincerely,

A handwritten signature in cursive script that reads "Gord Cooke".

Gord Cooke P.Eng.