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Canada

A STUDY OF THE STIMULATION OF ADOPTION OF
SOLAR ENERGY FOR HOME HEATING IN CANADA

Although the basic essentials for the harnessing of solar energy for home heating have been known for some time, the adoption of this technology has been relatively slow in Canada. With the aid of the federal government, I am undertaking a study to determine factors which tend to retard the adoption of solar energy, and to identify strategies which might stimulate its more widespread introduction.

The attached questionnaire seeks information on perceived barriers to the adoption of solar energy, approaches that are believed to offer a stimulus to more widespread use, and the role of various factors in influencing an individual's perceptions of and attitudes towards this form of energy. The information gathered will be treated with strict confidentiality, and opinions expressed will not be attributed to any individual.

Please return the questionnaire in the attached self-addressed envelope. Your co-operation will be greatly appreciated.



W.R.D. Sewell, Ph.D.

E

SOLAR ENERGY QUESTIONNAIRE

1. Name: _____

2. Address: _____

3. Occupation: _____

4. Do you work for: _____ Private industry
 _____ Government
 (1) local
 (2) provincial
 (3) federal
 _____ University
 _____ Self-employed

Please check (✓) relevant employer.

5. In your current occupation, are you in any way involved with the utilization of solar energy in home heating?

Yes _____ No _____

If yes, describe briefly _____

6. (a) Which of the following reflect your personal interest in solar heating? (Place a check next to all which apply.)

- _____ I have little or no personal interest in it.
_____ I am interested in the technological aspects of it.
_____ I am interested in solar heating as a way of dealing with environmental problems.
_____ I am interested in solar heating as a way of reducing fuel bills.
_____ I am interested in constructing and/or selling solar homes or products as a way of making a living.
_____ I have some other interest in solar heating (specify).

(b) Place a second check next to the item which most strongly reflects your interest in solar heating.

(c) How much interest do you personally have in the use of solar energy for home heating.

_____ Great _____ Moderate _____ Slight _____ None

7. In considering Canada's energy resources and needs, what time frame do you believe that we should be thinking in? That is, how many years into the future should we be planning our energy resources?

8. What type of innovation do you feel that solar energy for home heating represents? Check one of the following statements.
- _____ It is a minor technological innovation and it is not likely to be used widely in Canada for home heating in the next 25 years.
- _____ It is a minor technological innovation but it is likely to be adopted widely for home heating in Canada in the next 25 years.
- _____ It is a major technological innovation but it is not likely to be used very widely for home heating in Canada in the next 25 years.
- _____ It is a major technological innovation and it is likely to experience widespread use for home heating in Canada in the next 25 years.
9. Do you believe that the use of solar energy for home heating is at present economically feasible on a large scale in Canada?
- Yes _____ No _____
- If your answer is no, when do you believe that solar heating will become economically feasible on a large scale?
- | | |
|-----------------------|---------------------------|
| _____ Within 5 years | _____ Within 50 years |
| _____ Within 10 years | _____ Within 100 years |
| _____ Within 25 years | _____ More than 100 years |
| | _____ Never |
10. (a) At present, there are approximately 7 million dwellings in Canada. What number of these would you estimate employ solar heating systems?

- (b) Of all the dwellings in Canada in the future (both newly constructed and existing), what percentage do you expect will be solar heated?
- 10 years from now _____ per cent
- 25 years from now _____ per cent
- 50 years from now _____ per cent
- 100 years from now _____ per cent

11. (a) What do you believe are the primary reasons why solar energy is not currently used more widely for home heating in Canada? List as many reasons as you desire, continuing on the back of the page if necessary.

(i)

(ii)

(iii)

(iv)

- (b) Place the numbers 1, 2, and 3 next to the reasons which you feel rank first, second, and third in importance, respectively.

12. (a) What do you believe are the most effective ways in which the wider use of solar energy for home heating can be encouraged in Canada? List as many ways as you desire, continuing on the back of the page if necessary.

(i)

(ii)

(iii)

(iv)

- (b) Place the numbers 1, 2, and 3 next to what you feel are the first, second, and third most effective solutions, respectively.
- (c) What actions do you believe that people in your own occupation could or should be taking in order to encourage wider use of solar heating?

13. Below is a list of possible barriers to the wider acceptance of solar energy for home heating in Canada. Rate each one regarding how serious a problem you believe it to be at present, in your region, using the following numbers:

- 0 Not a problem
 - 1 A minor problem
 - 2 A moderate problem
 - 3 A major problem but soluble
 - 4 A major problem and not readily soluble
- _____ a) Insufficient energy provided by the sun in your region for viable home heating.
 - _____ b) The cost of purchasing and installing solar collectors and storage facilities.
 - _____ c) The cost of maintaining solar collectors.
 - _____ d) Social factors, such as how adopters of solar home heating are looked at by others.
 - _____ e) Legal factors, such as building codes and solar rights.
 - _____ f) Difficulty of operating solar units.
 - _____ g) Time required to operate and maintain solar units.
 - _____ h) The availability of materials and parts.
 - _____ i) The availability of information about solar home heating systems and other people's experiences with them.
 - _____ j) The compatibility of solar heating units with older building types.
 - _____ k) The compatibility of solar heating units with existing building techniques.
 - _____ l) The compatibility of solar energy use with existing life styles.
 - _____ m) The amount of support for solar energy development among scientists as compared to other forms of energy.
 - _____ n) The willingness of the building trade to adopt the new building designs and construction techniques required in solar homes.
 - _____ o) The willingness of financial agencies to provide mortgages for solar homes.

- _____ p) The willingness of the public to pay the higher initial cost of solar homes as compared to conventional homes.
- _____ q) Public apathy regarding environmental concerns such as conservation of resources.
- _____ r) The amount of inconvenience, time, and energy required to install solar heating as compared to more conventional heating systems.
- _____ s) The relative advantages or disadvantages of solar energy as compared to other energy sources such as oil, gas and electricity, considered in terms of cost, cleanliness and safety.
- _____ t) Threats to the existing system, such as the possibility that adoption of solar energy will put workers in gas and oil companies out of jobs.
- _____ u) Aesthetic considerations, such as the attractiveness and appearance of solar collectors.
- _____ v) The amount of difficulty involved in discontinuing dependence on solar energy and changing to another energy source if a solar energy system is adopted and proves to be ineffective.
- _____ w) The effect of adoption of solar heating on the ability to adopt other innovations such as coal or wood burning furnaces.
- _____ x) Possible negative environmental impacts of solar energy.
- _____ y) The credibility of advocates of solar energy.
- _____ z) Lack of construction skills required for building solar homes in the building trade.
- _____ aa) Lack of federal support for solar energy compared to its support for other energy sources.
- _____ bb) The possibility of increased property taxes following incorporation of solar heating systems.
- _____ cc) Other factors (specify) _____

14. Below is a list of approaches which might lead to a wider acceptance of solar energy for home heating. Rate how effective you feel each would be, using the following numbers:

0 Not at all effective
1 Slightly effective
2 Moderately effective
3 Very effective
4 Extremely effective

- ___ a) Make the initial cost of solar collectors cheaper through mass production.
- ___ b) Make materials and parts more readily available.
- ___ c) Make information about solar heating systems and other people's experiences with them more readily available.
- ___ d) Improve the efficiency and technical aspects of solar heating systems.
- ___ e) Increase the public's awareness of solar heating, through more media attention (TV, radio, newspapers, magazines, books, pamphlets).
- ___ f) Pass facilitating legislation dealing with building codes, solar rights, etc.
- ___ g) Design units more compatible with existing buildings and heating systems.
- ___ h) Make units more attractive.
- ___ i) Provide tax incentives to individuals, such as tax deductions for adoption of solar heating systems.
- ___ j) Provide tax incentives to industries producing solar heating systems.
- ___ k) Provide mortgage incentives, such as lower mortgage rates for buyers of solar homes.
- ___ l) Government subsidization of private housing projects employing solar heating.
- ___ m) Government building of solar housing for rental.
- ___ n) Increased government funding of basic research on solar energy.
- ___ o) Placing limits on the availability of other energy sources, such as oil and gas (e.g. through rationing).

- _____ p) Increasing the cost of other energy sources.
- _____ q) Increasing penalties for pollution from the use of other energy sources.
- _____ r) Educational and attitude change programs designed to persuade people to adopt solar heating systems.
- _____ s) Demonstrations of solar homes at provincial expositions, etc.
- _____ t) Increase the availability of prefabricated solar heated homes.
- _____ u) Other approaches (specify). _____

Please place a check mark against those which you could be personally involved in.

15. What words or phrases do you feel best describe the people who are most likely to be interested in employing solar energy for home heating? That is, what is your image of the potential solar home owner?

16. On each of the following scales, place a ✓ on the scale to indicate what kind of person you think is most likely to become an owner of a solar heated home within the next 10 years.

low income	_____	high income
little education	_____	highly educated
politically left wing	_____	politically right wing
non-technical orientation	_____	technical orientation
young	_____	old
ethnic minority	_____	ethnic majority
person-oriented	_____	thing-oriented
unwilling to take financial risks	_____	willing to take financial risks
does not go along with the crowd	_____	tends to go along with the crowd
sees self in con- trol of what happens to him	_____	sees other people or things in control of what happens to him
seeks out new experiences where- ever possible	_____	avoids new exper- iences wherever possible
ignores and does not face up to problems	_____	identifies problems and deals with them actively
sees home primarily in a personal, emotional manner, as a cherished possession	_____	sees home primarily in pragmatic, func- tional terms, as a place of shelter

17. (a) How have you obtained information about solar energy? Place a check next to all which apply.

- ☐ a) books
- ☐ b) magazine articles
- ☐ c) newspaper articles
- ☐ d) technical or professional journals
- ☐ e) government publications, pamphlets, etc.
- ☐ f) radio
- ☐ g) television
- ☐ h) conversations with friends, colleagues, etc.
- ☐ i) courses
- ☐ j) seminars
- ☐ k) lectures
- ☐ l) conferences
- ☐ m) advertisements in magazines or books
- ☐ n) literature from companies
- ☐ o) sales representatives
- ☐ p) trade fairs and exhibits (e.g. at conferences)
- ☐ q) speeches of politicians and government officials
- ☐ r) other (specify) _____

(b) Place numbers 1, 2, and 3 next to the sources which you have found to be first, second, and third most informative.

18. (a) Do you belong to or participate in any of the following solar energy groups? (Place a check next to all which apply.)

- ☐ Local or regional solar energy society
- ☐ National solar energy society
- ☐ International solar energy society

(b) What other groups do you belong to or participate in which are in some way related to or have had an effect on your interest in solar energy?

19. Please indicate the year when you FIRST took any of the actions listed below regarding the use of solar energy for heating.

YEAR

- _____ Given some thought to its possible use in my home.
- _____ Listened to a radio program about it.
- _____ Watched a TV program about solar energy.
- _____ Read a magazine article about solar energy.
- _____ Read a book about solar energy.
- _____ Attended a meeting or conference.
- _____ Talked with someone who has used or done research on solar energy.
- _____ Visited a solar heated home.
- _____ Studied in some detail the possible use of solar heating in a home which I own or am considering building.
- _____ Obtained plans, blueprints, or other detailed information regarding construction of a solar home.
- _____ Purchased material to be used for a solar heating system.
- _____ Bought or constructed a home employing solar heating.
- _____ Resided in a home employing solar heating.
- _____ Encouraged friends to consider the use of solar heating.
- _____ Given a talk about solar heating.
- _____ Written an article or book about solar heating.
- _____ Started a firm for developing solar heated houses.
- _____ Started a firm for marketing solar heating equipment.

20. Are you currently doing any of the following? (Place a check mark next to all which apply.)

- _____ Living in a solar heated home.
 - _____ Constructing a solar heated home.
 - _____ Constructing modifications in your current home to incorporate a solar heating system
 - _____ Designing a solar heated home.
 - _____ Designing modifications for your current home to incorporate a solar heating system.
 - _____ Seriously considering building a solar heated home.
 - _____ Seriously considering employing solar heating in your present home.
 - _____ Other (specify) _____
-

21. How much interest do you personally have in environmental issues and problems?
- _____ Great _____ Moderate _____ Slight _____ None
22. (a) Do you belong to or participate in any of the following environmental groups? (Place a check next to all which apply.)
- _____ SPEC (Society for Pollution and Environmental Control)
- _____ Sierra Club
- _____ Friends of the Earth
- _____ Other environmental groups (Name) _____
-
- (b) What other groups do you belong to or participate in which are in some way related to or have had an effect on your interest in environmental problems?
-
-
23. What are your personal feelings regarding the following statement—"If things continue on their present course, mankind will soon experience a major ecological catastrophe."
- _____ Strongly agree _____ Slightly disagree
- _____ Moderately agree _____ Moderately disagree
- _____ Slightly agree _____ Strongly disagree
- _____ Neutral
24. Place a check anywhere on the line to indicate which interval comes closest to your own opinion about how environmental problems should be dealt with:
- _____
- | | |
|---|--|
| Leave their solution
to the government | Leave their solution
to private individuals
and businesses |
|---|--|
25. Indicate which of the following best reflects your personal feelings regarding the solution of environmental problems.
- _____ Environmental problems can be solved within our present political-economic system if enough people become involved.
- _____ Environmental problems can be solved only if significant changes are made in our present political-economic system.
- _____ Environmental problems can be solved only if our present political-economic system is replaced by a radically different system.

26.

For each of the following statements, indicate whether you believe the statement to be primarily true (T) or false (F).

- ___ a) Technological change is occurring so fast that people are becoming second to machines.
- ___ b) In order to solve the problems of environmental pollution, mankind should stop using machines that pollute, rather than attempt to develop new machines that purportedly will be cleaner.
- ___ c) The greatest reason the dollar is worth so little today is that most goods are produced by machine.
- ___ d) Computers are so foreign to me that I have little understanding of them.
- ___ e) I have never had any desire to learn how a car engine operated.
- ___ f) I would prefer reading Popular Mechanics to Newsweek.
- ___ g) I prefer building models to reading books.
- ___ h) If I were in a recording studio, I would probably be more interested in the equipment used in making a record than in listening to the music.
- ___ i) A handmade gift is generally more appreciated than one which is mass produced.
- ___ j) The only real quality items on the market are handmade.
- ___ k) I feel I have no more meaning in society than a pack of computer cards.
- ___ l) Nowadays it is hard for one man to leave his mark in society.
- ___ m) A true machine age will enable man to achieve the promise of a rich and rewarding spiritual life.
- ___ n) Increased mechanization will free mankind to engage in lofty pursuits.
- ___ o) Halting technological change would be like confining ourselves to a permanent state of misery.
- ___ p) Computers will never be able to think as creatively as man.
- ___ q) Poets and composers can contribute more to understanding this world than high speech computers.
- ___ r) It takes a far greater talent to write good poetry or prose than to design a complicated machine.

27. (a) Below is a list of university courses. Please put a ✓ beside those specialities that you would enjoy studying. Do not concern yourself with whether you have the ability to do well in the area, but rather with whether the topics likely to be covered in the course are intrinsically interesting to you

✓	✓✓	*		✓	✓✓	*	
			Art				Geology
			Archaeology				Home Economics (Domestic Science)
			Anthropology				History
			Astronomy				Journalism
			Anatomy				Linguistics
			Animal Husbandry				Law
			Architecture				Librarianship
			Biochemistry				Mathematics
			Bacteriology				Medicine
			Biology				Minerology
			Botany				Mechanical Engineering
			Business Administration				Music
			Chemistry				Natural Resource Management
			Chemical Engineering				Nursing
			Civil Engineering				Oceanography
			Criminology				Political Science
			Classics				Public Health
			Comparative Literature				Physics
			Computing Science				Physiology
			Dramatic Arts				Philosophy
			Dentistry				Psychology
			Electrical Engineering				Recreational Studies
			Ecology				Soil Science
			Entomology				Statistics
			Energy Research				Sociology
			Education				Social Welfare
			Environmental Studies				Speech (Communication & Rhetoric)
			Economics				Theology
			English				Town Planning
			Forestry				Urban Studies
			Foreign Languages				Zoology
			Genetics				
			Geography				

- (b) After choosing, place two check marks (✓✓) beside those areas that would be of extreme interest to you.
- (c) Next, place an asterisk (*) beside those fields which you feel contribute most significantly to the solution of major problems currently facing Canadians.

28. (a) People differ in the extent to which they are interested in and attentive to other people, what they do, how they feel, etc. Would you estimate your degree and person-orientation relative to other people your age (and sex) and put a dash on the line corresponding to your estimate

Not at all interested
in other people

Strongly oriented
towards other people

- (b) People also differ in the extent to which they are interested in and attentive to physical objects in their environment, how they work, how they can be fixed, etc. Would you estimate your degree of thing-orientation relative to other people your age (and sex) and put a dash on the line corresponding.

Not at all oriented
towards things

Strongly oriented
towards things

29. On each of the following scales, place a check to indicate which position on the line best describes YOU at the present time.

low income	_____	high income
little education	_____	highly educated
politically left wing	_____	politically right wing
non-technical orientation	_____	technical orientation
young	_____	old
ethnic minority	_____	ethnic majority
person oriented	_____	thing oriented
unwilling to take financial risks	_____	willing to take financial risks
do not go along with the crowd	_____	tend. to go along with the crowd
see myself in control of what happens to me	_____	see other people or things in control of what happens to me

seek out new
experiences
wherever possible _____

avoid new
experiences
wherever possible _____

ignore and do
not face up to
problems _____

identify problems
and deal with
them actively _____

see home primarily
in a personal,
emotional manner,
as a cherished
possession _____

see home primarily
in pragmatic
functional terms,
as a place of
shelter _____

30.

10
9
8
7
6
5
4
3
2
1
0

To the left is the picture of a ladder. Let the top rung (10) of the ladder represent the best possible life for you—where your fondest hopes and wishes for the future have come true, and where you are perfectly happy. Let the bottom rung (0) represent the worst possible life for you—where your worst fears and worries about the future have come true, and where you are extremely unhappy.

(a) Now, consider your life at present. Where on the ladder do you stand at the present time? Please circle the appropriate number on the ladder and place an "N" beside it.

(b) Now, think of your life as it was five years ago. Indicate on the ladder to the left where you stood five years ago. Please circle the appropriate number and place a "P" beside it.

(c) Now, think of your life as you imagine it will be five years from now. Indicate on the ladder where you think you will stand five years from now. Please circle the appropriate number and place an "F" beside it.

31. Personal demographic information. The following information is for normative purposes only, and all information provided will remain confidential.

A. Sex: ☐ Male

☐ Female

B. Age: ☐ 0 — 21

☐ 22 - 35

☐ 35 - 48

☐ 48 and over

C. Marital status:

☐ single

☐ married

☐ divorced

☐ separated

☐ widowed

☐ other (please specify) _____

D. How many children do you have living with you?

Number _____

E. Check the highest level of education you have completed:

☐ 8th grade or less

☐ some high school

☐ high school graduate

☐ some undergraduate university

☐ university graduate

☐ some graduate university

☐ graduate degree (please specify)

☐ other including professional certification
(please specify) _____

F. Approximate Annual Family Income:

- _____ \$ 0 - \$4,999
 _____ 5,000 - 9,999
 _____ 10,000 - 14,999
 _____ 15,000 - 19,999
 _____ 20,000 - 24,999
 _____ 25,000 - 29,999
 _____ 30,000 - 34,999
 _____ 35,000 - 39,999
 _____ 40,000 or more

G. Is your present dwelling:

- _____ Owned or being bought by you (or a member of the household)
 _____ Rented (even if no cash rent is paid to the landlord)

H Is your present dwelling a:

- _____ a) Single house: a single dwelling not attached to any other structure and surrounded by open space on all sides.



- _____ b) Semi-detached or double house:



one of two dwellings, attached side by side but not attached to any other structure and surrounded on all sides by open space.

- _____ c) Duplex:



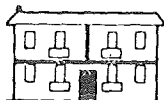
one of two dwellings, one above the other, not attached to any other structure and surrounded on all sides by open space.

- _____ d) Row house:



one of three or more dwellings joined side by side but not having any other dwellings either above or below.

_____ e) Apartment or multiple dwelling:



a dwelling unit in a duplex attached in a row, a triplex, quadruplex or apartment building or a dwelling in a non-residential structure or in a house that has been converted.

_____ f) House attached to a non-residential structure:



a dwelling unit attached to another structure at ground level (such as a store, etc.) but separated from it by a common wall running from ground to roof.

_____ g) Mobile home:

designed and constructed to be transported on its own chassis and capable of being moved on short notice.

_____ h) Other movable dwelling:

such as a tent, travel trailer, railroad car or houseboat.

32. What do you estimate your current annual home heating bill to be?

\$ _____

33. (a) It has been reported recently that a particular kind of solar furnace could be installed in new or older homes which would reduce fuel bills by some 70 per cent. Would you be willing personally to spend either \$3,000 to purchase such equipment or \$30 per month to rent it?

Yes _____ No _____

(b) If the answer to the above is NO, how much would you be willing to pay:

(i) to purchase the equipment? \$ _____

(ii) in monthly rentals for it? \$ _____

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