Advancing Solar Hot Water in B.C. – Local Government Policy Scoping Report

FINAL REPORT

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Executive Summary

In 1999, the notion that a solar hot water (SHW) policy for Barcelona would form the basis for Spanish national policy was likely unimaginable. Yet by 2006, the Spanish city's Solar Hot Water Ordinance inspired a national building code requirement that requires 30 to 70% of domestic hot water demand be met with SHW or other renewable technologies. The Barcelona example is now heralded globally as an example of how municipal action on sustainable energy can have far-reaching effects.

SolarBC commissioned Compass Resource Management to conduct a local government policy scoping exercise. Compass consulted with industry, the Province, and a number of local governments in order to:

- Identify best global practices for advancing SHW systems and describing their applicability within the B.C. context,
- Identify policy instruments for advancing SHW in B.C.,
- Outline considerations for advancing SHW in civic buildings, and
- Summarize the issues associated with integrating SHW with district energy systems.

Around the globe, there are a number of innovative and effective examples of policies that can advance SHW systems. The application of some policies is limited due to the limited legislative authority local governments have over building practices in B.C; however, there are many that can be adopted using available powers over land use and development (Table 1). Requiring homes to be solar-ready is a good example of a policy that is not available to all municipalities, but could be. The City of Vancouver now requires solar readiness in new homes. Vancouver has unique powers that other local governments do not have as a result of the Vancouver Charter; however, the City of Dawson Creek recently submitted an application to the Building Policy Branch to allow it to require solar readiness in new homes. There may be opportunities for the Solar Communities to select policies from the Best Global Policies table and champion their development with the Province and other key stakeholders.

There are a number of policy instruments currently available to local governments under their current powers (Table 2). Key instruments include density bonusing, phased development agreements, revitalization tax exemption program, and developing a rezoning policy. In addition, we encourage local governments interested in advancing renewable energy to include appropriate objectives in their OCP. Examples of notable OCPs are covered in greater detail in section 3 (OCP Objectives).

Local government's zoning powers allow them to address other issues that can enhance solar feasibility or overcome barriers. Building height restrictions can help ensure solar access, the zoning bylaw can exclude solar collectors from height allowances, and the zoning bylaw can

exclude the required space for SHW mechanical equipment in floor area ratio calculations.

A number of Solar Communities are exploring SHW installations for civic buildings. While pursing a preferred alternative technology can have economic and environmental benefits we recommend assessing and selecting a technology within the context of a broader Civic "Green" Building Policy. The main benefit of the policy is that it insures criteria and expected outcomes are consistently applied to all decisions, regardless of the application and/or actors involved. The cornerstone of a good civic building policy is to require all investment decisions be based on a life cycle cost analysis of various options. Tools for evaluating green building investments are discussed Section 4. Four examples of civic green building policies are also included.

Local governments with district energy systems or considering such systems may want to consider solar hot water systems in individual buildings. The DES could permit better utilization of the SHW equipment by allowing sharing of excess thermal energy during peak months across sites within a district energy service area.

In summary, we encourage the Solar Communities to collaborate to:

- Review the Best Global Policies in this report and engage the Province in exploring ways to bring those policies to British Columbia,
- Review land use development policies available to local governments, and possibly pool resources to further define how those policies may apply to advance SHW,
- Pool resources to develop the basis of a civic building policy that can be adopted by each of the communities.

Lastly, SHW is not a well known technology among inspectors. There is a need for greater training. Northern Lights College in Dawson Creek developed the first provincially-recognized certified Solar Hot Water System Installer course in Canada. The college collaborated with B.C. Sustainable Energy Association, the Association of Canadian Community Colleges, and the Canadian Solar Industry (CanSIA) to develop the course. This course could be replicated elsewhere in B.C. where there is interest. The Solar Communities could help facilitate course development by raising awareness about the Northern Lights program and course curriculum.[1]

[1] Course link:
http://www.nlc.bc.ca/public.course.php?CourseActiveList=coursedetails&CourseID=1274

Table 1: Summary of Best Global Practices

Policy	Description	Directly Applicable in B.C.?	Available Policy Instruments in B.C.	Issues
Solar Thermal Ordinance – Barcelona, Spain	- Requires minimum amount of hot water needs from solar	No	- Density bonus - Phased development agreements - Revitalization Tax Exemption - Rezoning policy	- Cannot require additional building features that exceed Code - Can establish SHW as an "amenity" and exact amenities through land use / development policy instruments - Can "incent" developers with tax / density benefits
Solar Retrofit Program – Rizhao, China	- Municipal-wide retrofit program and requirement for all new buildings to install solar panels	No	- Municipalities only have control over municipally-owned buildings	- China example highlights importance of collaboration between various levels of gov't and industry
Density Bonus – Hailey, Idaho	- Offers additional density in exchange for alternative energy installations	Yes	- Density bonus policy (SFU / Burnaby example)	- Additional density and amenity must be clearly outlined in Zoning Bylaw - Requires understanding of development economics and effect additional density can have on existing services
Solar Access Requirement – San Diego, California	- Requires minimum solar access for surrounding buildings	Yes	- Development Permit Area guidelines (Richmond example)	- Requires update / revision to DPA guidelines
Energy Efficiency Housing Standard – Freiburg, Germany	- Requires minimum energy performance for all City-owned or leased properties	Yes	- Could place a restrictive covenant requiring energy performance on all dispossessed City properties	- Energy performance requirements may devalue the property if viewed by the purchaser as an incremental cost.
Performance-based Renewable Energy Policy – Merton, UK	- Requires minimum amount of renewable energy on new commercial developments	No	- Could negotiate / incent minimum renewable energy requirement through various land use planning policy instruments: - Density bonus - Phased development agreements	- Recommend keeping this a performance-based policy due to the range of climate, solar incidence and fuel prices in B.C.

			- Revitalization Tax Exemption - Rezoning policy	
Solar Permitting – Portland, Oregon	- Formalize permitting process and offer in-the-field permitting service for additional fee	Yes	- Municipalities have authority to charge fees for additional service	- Must justify and report on fees - Cannot charge fees greater than what the service costs - Cannot cross-subsidize, i.e. charge non-solar permit higher fees to cover the solar permitting fees
New Mexico, U.S. – Solar Collector Standards Act	- Requires new low rise residential buildings to be solar ready	No	- Rezoning Policy - Density bonussing - Phased development agreements	- Cannot require additional building features that exceed Code - Can request “amenities” as part of a rezoning negotiation package and/or can incent solar readiness through density bonusing
City of Vancouver – Solar Readiness Requirement	- Requires new homes to be pre-plumbed to accommodate future SHW installations	No, only City of Vancouver	None	- Dawson Creek recently submitted a request to Building Policy Branch seeking permission to require solar readiness. - Other local governments interested in this should communicate their interest to Dawson Creek and Building Policy Branch as soon as possible.

Table 2: Summary of Available Policy Instruments

Policy	Application	Type	Pros	Cons
Development Permit Area Guidelines	All building types	Non-voluntary	- Can create conditions to insure solar access - New legislation allows DPAs for all building types, including SFDs	- Expensive to develop / update - Effectiveness depends on Council's willingness to ensure guidelines are met in DPA process
Alternative Energy Rezoning Policy	All buildings in rezoning process	Incentive	- Flexible – if designed properly, allows developer flexibility to meet energy performance standard-	- Additional requirements for developers and administrative layer for staff
Revitalization Tax Exemption Bylaw	All building types	Incentive	- Carrot approach - Can apply to an entire neighbourhood	- Requires indirect subsidy to green buildings
Building Permit Rebate	All building types	Incentive	- Carrot approach, offers a financial incentive for developers pursing a specified action	- Requires indirect subsidy to green buildings - May not be viewed as bona fide incentive to developers not retaining ongoing ownership of building
Development Cost Charge Reduction / Exemption	All building types	Incentive	- Flexible opportunities for definition of eligible development - Can encourage energy equipment external to the buildnig	- Potential lost DCC revenue if eligible development does not lead to infrastructure capital savings
Density Bonusing	All building types	Incentive	- Carrot approach, offers developers additional density for amenity	Competes with other amenities, e.g. affordable housing, libraries, etc
Phased Development Agreements	All building types	Non-voluntary	- Flexible, offers certainty to both developer and LG	Each agreement requires a bylaw and public hearing to consider

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List of Acronyms

BCBC	British Columbia Building Code
CANSIA	Canadian Solar Industries Association
CRD	Capital Regional District
CSA	Canadian Standards Association
DHW	Domestic Hot Water
DPA	Development Permit Area
FAR	Floor Area Ratio
IRR	Internal Rate of Return
LEED	Leadership in Energy and Environmental Design
LCC	Life Cycle Cost
NPV	Net Present Value
OCP	Official Community Plan
SHW	Solar Hot Water
STACCS	Solar Thermal Action Committee on Codes and Standards
VBBL	Vancouver Building Bylaw

1.0 Introduction

In 1999, the notion that a SHW policy for Barcelona would form the basis for Spanish national policy was likely unimaginable. Yet by 2006, the Spanish city's Solar Hot Water Ordinance inspired a national building code requirement that requires 30 to 70% of domestic hot water demand be met with SHW or other renewable technologies. The Barcelona example is often heralded as an example of how municipal action on sustainable energy can have far-reaching effects.

SolarBC initiated the Solar Communities Pilot Program with assistance from the Province of British Columbia who invested $5 million to encourage the installation of SHW heaters in homes, municipal buildings, schools, social housing and First Nations communities. The program includes initiatives for individual homes, solar communities, government buildings, First Nations, social housing, and schools.

The Solar Communities program provides up to $20,000, plus assistance for marketing, training and solar policy development to seven communities: Saanich, Kelowna, Tofino, West Vancouver, Whistler, Dawson Creek and West Moberley First Nation. To assist these communities and others, SolarBC commissioned Compass Resource Management to conduct a local government policy scoping exercise.

The focus areas of this report include:

- Identifying best global practices for advancing SHW systems and describing their applicability within the B.C. context,
- Identifying community-wide policy instruments for advancing SHW in B.C.,
- Outlining key considerations for advancing SHW in civic buildings,
- Summarize the issues associated with integrating solar hot water with district energy systems.

The B.C. legislative context is constantly changing. This report is a snapshot of what is currently permissible within the B.C. context and what may require additional policy research and/or advocacy.

2.0 Global Policy Practices

2.1 Barcelona, Spain - Solar Thermal Ordinance

2.1.1 Overview

The Solar Ordinance applies to all residential and commercial buildings that are newly built, renovated and/or seeking a change of use to generate 60% of hot water requirements from solar. Buildings with covered swimming pools are required to generate 30% of demand from SHW and industrial processes that require hot water 20%.

The ordinance took effect in August 2000 and originally applied of a certain energy requirement. It was strengthened in 2006 by removing the minimum energy requirement and now applies to all buildings that require hot water.

The Ordinance is managed by the Barcelona Energy Agency (BEA), a collection of local agencies directly involved in sustainable energy and environmental management. The BEA monitors compliance by requiring approval of the building design simultaneously with approval of the construction permit. Building inspectors are then responsible for ensuring that construction meets the stipulated criteria. The BEA reports satisfactory levels of adherence.

As of 2005 the solar energy produced was equal to the domestic hot water demand of a population of 45,000 people.

The Clinton Climate Initiative (C40) conducted a case study of the ordinance and found the key to its success is rooted in educating people on the use and maintenance of the solar collectors. The BEA runs a successful education campaign — known as Porta Porta (Door to Door), work with neighbourhood associations and building owners to ensure that the installations are working properly, and operates an information centre.

The ordinance inspired the national legislation requiring minimum SHW and photovoltaic installations in new construction and renovations. A number of municipalities established regulations that exceed the national regulation for buildings within their jurisdictions.

Source:
Barcelona Energy Agency
http://www.barcelonaenergia.cat/homeeng.htm

2.1.2 Applicability

Local governments in B.C. do not currently have the legislative authority to implement a solar ordinance. The primary obstacle is the BCBC. Local

governments may not impose building standards that are additional to or different from the BCBC requirements, *unless* they receive the specific authority of the responsible Minister, or unless the Minister passes a special regulation under section 692(1)(e) of the Local Government Act that varies the standards.

Local governments do however have authority over land use planning and development and there are a number of policy instruments available to local governments to advance SHW installations through those mechanisms. Those policies are covered in detail in Section 3.2 of this report and include: Density bonusing, phased development agreements, revitalization tax exemption program, and developing a rezoning policy.

Local governments can also follow the Barcelona example and implement education programs to ensure that solar systems are working properly and that information is provided to the community about the systems.

2.2 Rizhao, China - Solar Retrofit Program

2.2.1 Overview

A municipal government retrofit program required all buildings in Rizhao, China (pop. 3 million) to install solar water heaters. The City also required all new buildings incorporate solar panels and oversaw the construction process to ensure proper installations. The Shandong provincial government provided subsidies and funded the research and development of the solar water heater industry to lower costs for building owners in Rizhao. The combination of subsidies, local government regulation and municipally driven education and installation assistance resulted in SHW installations in 99% of households in Rizhao.

Source: Clinton Climate Initiative (C40)
http://www.c40cities.org

2.2.2 Applicability

Local governments in B.C. do not have the authority to require SHW retrofits, or that new buildings install SHW equipment (for reasons similar to those outlined in the Barcelona description). However, a valuable lesson from the Rizhao example is the value for collaboration among local governments, industry and higher orders of government to advance renewable energy technologies.

2.3 Hailey, Idaho – Density Bonus Policy

2.3.1 Overview

Hailey's Zoning Ordinance (Article 10, Planned Development Units) includes an allowance for an additional 10% density bonus in exchange for an

alternative energy installation that satisfies 50% of the development's energy requirements.

Source:
Hailey Planning Ordinance
http://www.haileycityhall.org/planning/zoningOrd.asp

2.3.2 Applicability

B.C. local governments have the legislative authority to offer a density bonus in exchange for the installation of a renewable energy technology.[2] The details of the density bonus regime must be outlined in the Zoning Bylaw.

SFU UniverCity Community Trust developed a green building bonus (w/ City of Burnaby, which has regulatory jurisdiction) that allows an additional density for enhanced stormwater management, enhanced energy efficiency, and/or alternative energy systems. SFU requires verification by an approved green building consultant through a 3-phase verification process (preliminary permit approval, building permit and occupancy permit).

Due diligence is necessary to consider the impact greater density may have on services and the neighbourhood, and at what density developers will be enticed to provide an amenity in exchange for more floor space.

See Section 3.2 of this report for details of the density bonus policy instrument.

2.4 San Diego, California – Solar Access Requirement

2.4.1 Overview

Chapter 4 (major subdivisions) of the San Diego County Zoning Ordinance prohibits subdivision unless each lot has unobstructed solar access to an area not less than 100 ft^2 (9 m^2) on a horizontal plane 10 ft (3 m) above grade. The purpose of the requirement is to ensure adequate solar access for SHW systems. The State of California's Civil Code (714) ensures that solar easements may be created to ensure that proper sunlight is available to those who operate solar energy systems, including passive solar design. The Civil Code also states that no covenant or restriction pertaining to the sale of property can prohibit or restrict the installation or use of a solar energy system. The State's Solar Shade Control Act also prohibits shading of solar collectors that result from tree growth occurring after a solar collector is installed. Lastly, the State's Solar Rights Act prohibits local governments from restricting the installation of a solar energy systems based on aesthetics.

Source:

[2] S. 904 of the Local Government Act.

San Diego County Ordinance
http://www.sdcounty.ca.gov/dplu/docs/SubDivOrd.pdf

States Advancing Solar
http://www.statesadvancingsolar.org/

2.4.2 Applicability

B.C. municipalities can establish requirements to insure solar access through the use of development permit area (DPA) guidelines.[3] This policy instrument is covered in detail in Section 3.2.1 of this report. The City of Richmond includes solar access requirements in their DPA guidelines, establishing a requirement that 75% of dwellings and their private open spaces receive direct sunlight every day of the year and minimum north-south spacing between adjacent buildings.[4]

The Resort Municipality of Whistler developed Solar Access Guidelines for Whistler Village.[5] These guidelines are intended to ensure solar access for pedestrian enjoyment of the Village Area, however, many of the approaches and tools would apply to solar access for SHW installations.

The City of Vancouver and the City of Toronto also require solar access through the development permit process. Though both local governments operate under different legislative authorities than other B.C. local governments, the mechanisms used for insuring solar access are available to all B.C. municipalities (i.e., development permit guidelines).

There is no Provincial legislation that prevents local governments from prohibiting solar installation based on aesthetics. It would be up to individual local governments to develop a policy that achieves a similar outcome. Local governments can also insure the Zoning Bylaw does not include provisions that prevent or make it difficult to install SHW systems. Solar issues and zoning is covered in Section 3.3 of this report.

2.5 Freiburg, Germany - Energy Efficiency Housing Standard

2.5.1 Overview

Freiburg's Low-energy Housing Construction standard applies to all municipally controlled lands. The standard requires less than 65 kW.h/m2 of energy may be used for heating purposes in households.[6] The standard is not outlined in the building code, but a matter of civil law applying to municipally-

[3] s. 919.1, 920 of the Local Government Act.
[4] s. 9.3.2, Multi-family DPA guidelines: http://www.richmond.ca/shared/assets/93_multifamily540.pdf
[5] http://www.whistler.ca/images/stories/PDF/Bylaw/Schedule%20Y%20-%20Solar%20Access.pdf
[6] For context, a code-compliant multi unit residential (MURB) building in Lower Mainland, B.C. would require approximately 100 kW.h/m2 for space heat and DHW.

controlled land. Freiburg has also pursued a programme of retro-fitting old buildings with renovations and upgrades.

Council writes a low-energy standard into new lease and purchase contracts that obliges contractors to build to low-energy guidelines. Guidelines include: orient buildings to optimize passive solar gain and make roofing available for solar collectors.

Source:
Clinton Climate Initiative (C40)
http://www.c40cities.org/bestpractices/buildings/freiburg_housing.jsp

2.5.2 Applicability

B.C. local governments do not have the legislative authority to establish a low energy construction standard for buildings on private land. They would however be able to require an energy-related standard on City-owned properties that are leased or dispossessed to private developers. A good way to ensure all future development adheres to a low energy standard would be the use of a restrictive covenant on the parcel (authority under s. 219 of the Land Title Act). Details of the restrictive covenant instrument are provided in Section 3.2.2 within the description of the Rezoning Policy instrument.

B.C. local governments could also pursue a low energy standard for a private development that undergoes a rezoning. A Council rezoning policy sets the expectation that building types outlined in the policy will meet a minimum energy standard. Though this approach to exacting community benefits is often employed by local governments, there is no legislative basis for this policy. Council's rezoning requirements could be subject to challenge. The additional community amenities are often secured with a restrictive covenant.

2.6 Merton, England – Performance-based Renewable Policy

2.6.1 Overview

The London Borough of Merton, UK requires all new, non-residential development above 1,000 m2 to incorporate renewable energy production equipment to provide at least 10% of the development's predicted energy requirements. Merton expects to extend the policy to cover all development in Merton, including residential. Merton is also considering whether it is appropriate to increase the percentage of the policy up to a 20% requirement.

This performance-based policy allows developers the flexibility to choose a technology that suits the application, and has a built-in incentive to encourage energy efficiency: Reducing the overall energy requirements effectively reduces the amount of renewable energy capacity the development requires.

Merton developed the rule and adopted it in 2003. It was adopted by the Mayor of London and many other Councils, and become part of national

planning guidance in the UK. The Rule also influenced industry. Mitsubishi Electrical developed a new range of heating and ventilation equipment that would meet the Merton Rule requirements. As more local governments in the UK adopt the policy the increased demand will likely induce economies of learning that may lead to reduced unit costs.

Source:
Borough of Merton, UK
http://www.merton.gov.uk/living/planning/planningpolicy/mertonrule.htm

2.6.2 Applicability

B.C. local governments do not have the legislative authority to require a similar policy outright. There are however, several policy instruments available to local governments to negotiate and/or incent developers to pursue a performance-based target. The advantage of a performance based approach (versus a prescriptive requirement to install x capacity of y technology) is that it allows developers to select the appropriate technology based on the specific application instead of "shoe-horning" technologies into applications. Policy instruments available to B.C. local governments to advance performance based renewable energy targets include:

- Rezoning Policy
- Revitalization Tax Exemption Bylaw
- Density Bonusing
- Phased Development Agreements

Each policy is covered in detail in Section 3.2 of this report.

2.7 Portland, Oregon – Solar Permitting

2.7.1 Overview

The Portland Office of Sustainable Development (OSD) spearheaded a working group to clarify and formalize the solar permitting process for Portland residential and commercial installers. The Bureau of Development Services then developed a program guide that outlines the permitting process.

Results include:

- A prescriptive process for residential installations that will eliminate the need for structural engineering in most residential installations.

- A cap on fees for residential installations that meet prescriptive requirements.

- Expanding the City's Field Issuance Remodel (FIR) program to include solar. FIR is an existing program for residential remodelers that is

available to solar contractors. Contractors can avoid submitting permits in person and instead meet an inspector at the site (for a higher fee). Contractors register with the program and then a designated FIR inspector assists the contractor with the permitting process and any planning or zoning issues.

Source:
Portland Office of Sustainable Development
http://www.portlandonline.com/osd/index.cfm?c=47394&

2.7.2 Applicability

The Portland example has two components that could apply to B.C: 1) A formalized permitting process that includes a prescriptive process for residential applications and 2) A fee for service permitting option for contractors that would prefer permitting assistance in the field.

Formalizing the permitting process for SHW installations would make requirements clear to contractors and municipal permitting staff. Based on our informal survey of the six Solar Communities, it is evident that permitting is a major concern for many communities. Initiating an inter-departmental process that clarifies and possibly streamlines the permitting process would help advance solar technology while addressing safety and liability concerns.

Individual municipalities are responsible for inspections and permitting of building and related systems. It is possible that a number of municipalities could collaborate to develop a consistent permitting process.

It may be possible for a municipality to implement a field-based inspection program on a fee for service basis, similar to the Portland model. Section 194 of the Community Charter provides the authority for municipalities to set their fees for services. This would include application fees for building permits. The Charter also establishes local government's authority to "establish different rates or levels of fees in relation to different factors" (194(2)(b)). Thus a municipality could set a different fee for differing circumstances as long as the distinguishing factors are set out in the authorizing bylaw. However, the Courts have held that there must be a reasonable, demonstrable relationship between a fee and the service it applies to. If the fee exceeds the actual cost of providing the service it begins to take on the nature of a tax. Municipalities have very narrow taxing authority. Municipalities should be able to demonstrate the relationship between the fee and the service. This explains the inclusion of section 194(4) requiring municipalities to provide a report on how a fee is determined. The fee doesn't need to cover the total cost of the service, but it can't exceed it.

According to SolarBC, many of the Solar Communities are waiving permit fees in order to promote the solar program. Such a field inspection program could be included in the fee exemption.

2.8 New Mexico, U.S. – Solar Collector Standards Act

2.8.1 Overview

Environment New Mexico has set a goal of equipping 50,000 rooftops in the state with solar panels. Recent amendments to existing legislation requires New Mexico Energy, Minerals and Natural Resources Department, the Construction Industries Division (CID) and the Construction Industries Commission (CIC) to adopt rules, standards or codes for new construction to accommodate the installation of solar collectors, including roof orientation, roof strength, location of obstructions to sunlight, access to installation locations, built-in conduit, and wiring, piping and brackets for attaching solar collectors.

The Guam Energy Code also requires new low rise buildings to be pre-plumbed to enable the future installation of solar collectors.[7]

2.8.2 Applicability

Local governments in B.C. do not have the authority to require buildings to be made solar ready at the time of construction for the same reasons identified in the Barcelona Solar Ordinance section of this report (lack of legislative authority). Dawson Creek recently submitted an application to the Building Policy Branch to grant them the authority to require solar readiness (see Section 2.9 below). As well, Natural Resources Canada developed solar ready guidelines, included as Appendix A.

Local governments can require solar readiness though other land use policy instruments, including:

- Rezoning Policy
- Density Bonusing
- Phased Development Agreements

2.9 Vancouver, B.C. – Solar Readiness Requirement

2.9.1 Overview

The City of Vancouver recently launched its Green Homes Program. One of the requirements of the program is that all new homes be constructed to "solar ready" standards. The Program requires that every new house be equipped with two 50 mm (2 inch) pipes that run from the home's service room (where the water tank is, typically in the basement) to the attic. This will allow for the future installation of roof-mounted solar energy generating equipment.

Source:

[7] From: http://www.eley.com/guam/code/code_set.htm

City of Vancouver Green Homes Program:
http://vancouver.ca/commsvcs/cbofficial/greenbuildings/greenhomes/solarenergy.htm

2.9.2 Applicability

Vancouver was able to enact the solar readiness requirement through the Vancouver Building Bylaw (VBBL). The Bylaw is based on the BC Building Code but goes further than the BCBC in several areas concerning alternative energy and energy efficiency. The City of Vancouver has unique legislative authority that other municipalities in BC don't have as a result of the Vancouver Charter. The Vancouver Charter is a unique, provincially enacted piece of legislation that empowers and regulates the City of Vancouver and how it governs, provide services and holds elections.

It is our understanding that Dawson Creek submitted an application to the Building Policy Branch requesting a requirement for solar readiness in new homes. If enacted, developers would be required to pre-plumb new buildings to easily accommodate SHW systems should future owners want to install a system. The Province could approve Dawson Creek's request in two ways: 1) grant Dawson Ministerial authority to revise its building bylaw to include a requirement for solar readiness, or 2) amend the BCBC as it applies to all municipalities in BC. Building Policy Branch is currently considering Dawson Creek's submission.

Other local governments interested in this effort should communicate their interest to both Dawson Creek and the Building Policy Branch as soon as possible.

2.10 Summary of Global Solar Policies

Table 3 provides a summary of the best practices identified and options for advancing similar policies in B.C.

Table 3: Summary of Global Best Practices

Policy	Description	Directly Applicable in B.C.?	Available Policy Instruments in B.C.	Issues
Solar Thermal Ordinance – Barcelona, Spain	- Requires minimum amount of hot water needs from solar	No	- Density bonus - Phased development agreements - Revitalization Tax Exemption - Rezoning policy	- Cannot require additional building features that exceed Code - Can establish SHW as an "amenity" and exact amenities through land use / development policy instruments - Can "incent" developers with tax / density benefits
Solar Retrofit Program – Rizhao, China	- Municipal-wide retrofit program and requirement for all new buildings to install solar panels	No	- Municipalities only have control over municipally-owned buildings	- China example highlights importance of collaboration between various levels of gov't and industry
Density Bonus – Hailey, Idaho	- Offers additional density in exchange for alternative energy installations	Yes	- Density bonus policy (SFU / Burnaby example)	- Additional density and amenity must be clearly outlined in Zoning Bylaw - Requires understanding of development economics and effect additional density can have on existing services
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City of Vancouver – Solar Readiness Requirement	- Requires new homes to be pre-plumbed to accommodate future SHW installations	No, only City of Vancouver	None	- Dawson Creek recently submitted a request to Building Policy Branch seeking permission to require solar readiness. - Other local governments interested in this should communicate their interest to Dawson Creek and Building Policy Branch as soon as possible.

3.0 Advancing Solar Hot Water in British Columbia

3.1 OCP Objectives

Several of the Solar Communities are undergoing or are planning OCP updates. Including alternative energy objectives in the OCP gives important guidance for future bylaw and policy development and development-specific negotiations.

There are a range of approaches to structuring an OCP. Some local governments organize policies and objectives by specific issues (e.g. First Nations, Housing and Residential Lands), some by broad category (e.g. Social Well-being, Environmental Integrity, Economic Prospertiy), and others by specific strategies (e.g. Build a Health Inclusive Community, Make Better Connections). OCPs with a clear mandate for advancing alternative energy include a stand-alone section on energy and climate. There are four OCPs that stand out in this regard. Relevant policies and objectives are summarized in Table 4.

Legislation introduced in February 2008 requires local governments to establish greenhouse gas emission reduction targets in their OCPs and Regional Growth Strategies, as well as policies and actions proposed for achieving those targets, by May 31, 2010 and 2011 respectively.[8]

[8] Loval Government Act, s. 877 and 850(2).

Table 4: OCP Energy and Climate Policies

Local Government	OCP Structure	Summary of Relevant Energy and Climate Policies
District of Saanich	- Organized by Environment, Economy, Social Well-being - Stand-alone climate section within Environment section	- Support B.C. Climate Action Charter - Support Province to enact legislation to better address climate change and energy - Prepare and implement Saanich's "Community Climate Change and Energy Action Plan". - Incorporate climate change considerations when reviewing new development applications and undertaking long-term planning. - Implement "Saanich's Carbon Neutral Plan" - Engage the community in climate issues.
City of North Vancouver	- Organized by Community Interest Category, e.g. Parks and Leisure, Environment, Municipal Finance - Discrete energy and planning section in the Environment Chapter	- Implement heating-based Community Energy Systems - Encourage energy efficient neighbourhoods and buildings to minimize green house gas emissions. - Increase the use of renewable energy supply systems. - Encourage optimization of energy utilized during the full life-cycle use of public and private assets.
City of Surrey	- Organized by policy strategies, e.g. Build Complete Communities, Improve the Quality of Community - "Build Energy Efficiency Communities" a sub-section within Build Complete Communities	- Support energy conscious community planning and building design that … supports all efforts to promote energy conservation and alternative energy sources. - Includes specific guidelines to promote energy conscious planning and design and energy supply, distribution and storage.
District of Squamish	- Organized by Community Interest Category, e.g. First Nations, Natural Environment, etc. - Energy and Air Emissions discrete section	- Foster the conservation and efficient use of energy - Minimize the use of fossil fuels and foster increased use of renewable energy sources - minimize greenhouse gas emissions from District operations and community-wide - Attract and retain renewable and alternative energy companies to create jobs; - Demonstrate municipal leadership in energy conservation, energy efficiency, and reducing greenhouse gas emissions

Saanich OCP: http://www.gov.saanich.bc.ca/business/development/plan/ocp.html
North Vancouver OCP: http://www.cnv.org/server.aspx?c=2&i=107
Abbottsford OCP: http://www.surrey.ca/NR/rdonlyres/60DF2DDE-506D-4F2E-9037-5A96ADD72CBB/0/OCPBylawNo12900.pdf
Squamish OCP: http://www.squamish.ca/OCP/

3.2 Community-wide Policies

The Local Government Act, Community Charter and the Land Title Act are the main sources of local government authority over land development and buildings. These statutes create two categories of opportunities for local governments to advance sustainable energy in building construction: (1) direct authority over building construction standards and (2) land use planning authority that influences building energy efficiency.

The BCBC regulates building standards in the Province and applies to all local governments. Local governments enforce the BCBC but may not impose building standards that are additional to or different from the BCBC requirements unless they receive the specific authority of the responsible Minister. Because direct authority over buildings is constrained, local government authority over land use planning and development offers the most easily exercised tools for local governments to encourage or require alternative energy in new construction. Relevant policy instruments and their related legislative authority are summarized in the tables below. These tables are adapted from recent work done by Compass Resource Management and West Coast Environmental Law for the District of Squamish.

3.2.1 Development Permit Area (DPA) Guidelines

Description	The Local Government Act authorizes local governments to establish DPAs. If an OCP designates a DPA, a developer must obtain a development permit before the land within that DPA is subdivided or building commences. Following recent amendments to the LGA, local governments can establish DPAs for purposes that include establishment of objectives to promote energy / water conservation or GHG emissions reduction.
Relevant Legislation	Local Government Act, s. 919.1, 920[9]
Application	All buildings
Examples	• Former DPA purposes: City of Richmond and Resort Municipality of Whistler.[10] New DPA purposes: none yet implemented

Opportunities	New DPA purposes provide scope for innovation:
	• Can develop DPA guidelines for single detached homes (new addition under recent LGA amendment)
	• Guidelines may include:
	  o Measurable energy conservation target for a DPA
	  o % GHG emissions reduction target, with correlated % renewable energy to meet energy needs
	• Possible permit conditions (aligned with Guidelines):
	  o Conditions can include "systems and equipment…external to building" so could require alternative energy system *external* to building. It may be possible to include external solar collectors as a permit condition, however any mechanical systems required to transfer heat from the collectors to end users could not be required.
	  o Also landscaping, siting, form and exterior design of buildings or structures, specific features, restrict type/placement trees/vegetation in proximity to buildings: e.g., passive solar gain in winter, shade in summer, orientation to avoid wind
	• Guidelines could include siting and orientation requirements to ensure solar access (as per the Richmond example- See footnote).

Challenges	• This is new legislation, yet to be interpreted by courts • This tool cannot be used to establish building standards that are additional to or different from Building Code.[11]
Summary	• Useful for establishing energy savings targets in a broad area but not likely applicable to technologies integrated with the building (i.e. SHW). • Can be used for siting and orientation to ensure solar access.

[9] A backgrounder of the new legislation is available on the Ministry of Community Services website: http://www.cd.gov.bc.ca/lgd/intergov_relations/library/Bill27_Green_Communities_FAQs.pdf

[10] Richmond: http://www.richmond.ca/busdev/devzoning/permit.htm, Whistler: http://www.whistler.ca/images/stories/PDF/Bylaw/Schedule%20Y%20-%20Solar%20Access.pdf

[11] That requires concurrent authority approval of Minister per s. 8, 9, and 53 of Community Charter.

3.2.2 Alternative Energy Rezoning Policy

Description	Often a developer will approach a municipality with an application to rezone. Council is not required to grant a Zoning Bylaw amendment, yet is empowered to permit rezoning and exercise its discretion for what land use and density are permitted on the site. Sometimes municipalities agree to accept additional amenities or community benefits (e.g., energy efficient building features) in connection with rezoning. Local government staff are permitted to require the rezoning applicant to prepare a development plan. Often the staff will suggest that the voluntary grant of a covenant from the developer, in order to secure community benefits or amenities, will assist in obtaining staff's favourable recommendation to council to grant a Zoning Bylaw amendment. N.B. The bargaining conducted by staff cannot contractually bind council to provide the rezoning. Council must maintain its right to exercise its discretion (i.e., have and make a choice) on whether or not a Zoning Bylaw amendment will be allowed.
Relevant Legislation	• No legislative basis. A Council policy sets the expectation that building types outlined in the policy will meet a minimum alternative energy standard (e.g. 10% renewable energy). • Additional building features often secured with a restrictive covenant (authority under s. 219 of the Land Title Act).
Application	All building types.
Examples	Municipality of Bowen Island developed a Council rezoning policy that requests Built Green™ "Gold", and EnerGuide for New Houses 80 for new residential development. A similar policy could be developed for renewable energy.[12]
Opportunities	Sometimes municipalities agree to accept additional amenities or community benefits (e.g., energy efficient building features) in connection with rezoning.
Challenges	• Additional administrative burden on staff related to restrictive covenant. • Developers may challenge the District's authority in this area.
Summary	Effectiveness of this policy tool depends on Council's willingness to ensure it is adhered to.

[12] Available at: http://www.bimbc.ca/policies.

3.2.3 Revitalization Tax Exemption Bylaw

Description	A revitalization tax exemption (RTE) bylaw provides a financial incentive for developers to build in a specified area of the municipality and/or to a specified building standard. Green building improvements, including alternative energy, is considered within the intent of the legislation. Council must establish a revitalization program (with defined reasons for and objectives of the program), enter into agreements with property owners, and then exempt their property from taxation once all specified conditions of the program and the agreement have been met. Exemptions may apply to the value of land or improvements, or both.[13] Only the municipal portion of taxes may be exempted.
Relevant Legislation	s. 226 Community Charter provides the authority to exempt property from municipal property value taxes. Allows for exemptions for green building features and alternative energy technology.
Application	All newly constructed buildings.
Examples	• District of Maple Ridge offers up to a 4-year municipal tax exemption for high rise buildings that meet LEED silver or higher.[14]
Opportunities	Can be used to incent owners to install small scale renewable technologies.
Challenges	• Tax exemption is limited to the municipal portion of property taxes. • Requires municipal commitment to forego tax revenue. • May not be an incentive for developers not retaining ownership of the building, i.e. no tax saving benefit.
Qualitative Assessment	• Significant Council commitment required. • Should survey developers to gauge potential effectiveness before developing bylaw. • This is essentially amounts to a subsidy so should a municipality may want to evaluate this tool against other options to advance renewable energy technologies to ensure best use of resources.

[13] A RTE primer is available at http://www.cd.gov.bc.ca/lgd/gov_structure/library/community_charter_revital_tax_exemptions.pdf.
[14] District of Maple Ridge Revitalization Tax Exemption Bylaw No. 6412-2006.

3.2.4 Building Permit Rebates

Description	Local governments can offer rebates on building permit fees for "green" buildings.
Relevant Legislation	s. 194 Community Charter
Application	All building types
Examples	• District of Saanich offers priority permit processing, up to 30% rebate on building permit fees and a designated an employee as an energy adviser for developers pursuing Built Green Gold building rating and EnerGuide for New Houses 80. • Since Sept. 2007 about 70 builders have taken advantage of the free one hour energy advisor consultation and 20 homes are registered in the building rebate program. Most are going Built Green Gold.
Opportunities	A local government could offer a similar incentive for builders intending to install renewable energy technologies.
Challenges	• CAUTION on Cross-subsidization: cannot raise building permit fees for a "non-green" building to offset the discount offered to "green" buildings. This is a cross-subsidy and may be viewed by the courts as a tax on "non-green" building permit fee applicants. Municipalities do not have such taxing authority. • The municipality foregoes building permit fee revenue.
Qualitative Assessment	• Appears to have good uptake in Saanich example • Developer-friendly 'carrot' approach • This is essentially amounts to a subsidy so should a municipality may want to evaluate this tool against other options to advance renewable energy technologies to ensure best use of resources.

3.2.5 Development Cost Charges

Description	Local government may reduce or waive DCCs for "eligible developments" as defined by a local government bylaw or regulation.[15] Local governments can define "eligible developments" for categories of "subdivision of small lots designed to result in low GHG emissions" or "development that is designed to result in low environmental impact".
Relevant Legislation	s. 933 LGA
Application	All buildings, connection to district energy
Examples	None implemented yet.
Opportunities	This incentive rewards low impact development (LID) as defined by the local government. "Eligible developments" could be defined by bylaw to require, e.g.: • X percent of a development's energy needs to be met by renewable energy • Y energy efficiency standard • All buildings certified to a 3rd party green standard • Design guidelines re: solar /wind orientation • All buildings to have SHW system installed or solar-ready • Connected to a district energy system • Other alternative energy system, e.g. geo-exchange (*Because participation in a DCC incentive program is voluntary, it would not constitute regulation of building standards, therefore prescribing specific technologies or performance standards for building development would not violate the concurrent authority provisions of the CC with respect to building standards.*)
Challenges	• Foregone municipal revenue used to cover part of the capital burden imposed by new development. • Council willingness to lose a portion of DCC revenue in exchange for low impact development
Summary	• This is a flexible, incentive-based tool to advanced renewable energy technology. • Reducing DCCs would result in foregone municipal revenue. • This is essentially amounts to a subsidy so should a municipality may want to evaluate this tool against other options to advance renewable energy technologies to ensure best use of resources.

[15] Subject to any ministerial regulation establishing an eligible development, or establishing /restricting criteria on what may constitute an eligible development. No ministerial regulations yet establish or restrict what local governments can define as criteria.

3.2.6 Density Bonusing

Description	Municipality provides additional density where specified amenities are provided. This must be set out in a Zoning Bylaw.
Relevant Legislation	s. 904 LGA
Application	All building types
Examples	• SFU UniverCity developed a green building bonus (w/ City of Burnaby, which has regulatory jurisdiction) that allows an additional density for: o Enhanced stormwater management o Enhanced energy efficiency o Alternative energy systems • Verification by an approved green building consultant is required (through a three-phase verification procedure (preliminary permit approval, building permit and occupancy permit).
Opportunities	Can be used to advance energy efficiency and small scale renewable technology.
Challenges	• Due diligence is necessary to consider the impact greater density may have on services and the neighbourhood, and at what density developers will be enticed to provide an amenity in exchange for more floor space.
Summary	• Developer-friendly 'carrot' approach • Additional density should be considered within context of impact of additional density on community services.

3.2.7 Phased Development Agreements

Description	Municipality enters into a development agreement with developer that includes as key terms and conditions: • A freeze on zoning to benefit developer • Inclusion of amenities or specific features • Phasing or timing of development • Registration of covenants Agreements must be adopted by bylaw and there is a public hearing requirement. Max term 10 yrs unless 20 approved by inspector.
Relevant Legislation	ss. 905.1 to 905.5 LGA
Application	All building types, district energy, other features
Examples	None yet implemented. (Mission is currently considering a PDA bylaw.)
Opportunities	• Can be used to advance any desired “amenities” or “specific features”, including energy efficiency features, district energy, etc. • Should be popular with developers who receive zoning freeze as part of the agreement
Challenges	• Process entails passing a bylaw plus public consultation. • Only worthwhile for larger, more complex developments.
Summary	• A useful tool for local governments. • Recommend not giving PDA away “lightly”: the zoning freeze is a significant benefit for developers, so council should negotiate benefits and features with that value in mind, and avoid establishing a precedent of entering into a PDA that does not require valuable amenities.

3.2.8 Local Improvement Charges

A local improvement charge (LIC) is a financing mechanism that allows municipalities to cover the capital costs of specific improvements to a site or neighbourhood, then recover those costs by applying a levy through the property taxes of the owner(s) that benefit from the improvement. The LIC shows up as an additional line item on the property owner's municipal taxes.

The main advantage of the LIC is that it associates the repayment of the cost of improvements with the building property rather than with the current building owner. Owners who are unsure whether they will remain at the location long enough to enjoy the operational cost savings associated with the improvement may be resistant to upfront costs associated with most renewable energy technologies.

With the exception of the Yukon, LICs have not been used to finance energy improvements on private property anywhere in Canada to date. However, a 2007 legal opinion obtained by the District of Central Saanich suggests that BC local governments have the legislative authority to use LICs for such purposes.[16] To date, the Province has been reluctant to allow an interpretation that permits the use of LICs to finance onsite renewable energy technology.

Dawson Creek is actively pursuing this policy with the Province (Ministries of Energy, Mines and Petroleum Resources; Environment; Community Services; and the Building Policy Branch). We suggest municipalities wanting to pursue this policy instrument indicate their interest to Dawson Creek as soon as possible.

3.2.9 Summary of Policy Instruments

The policy instruments available to local governments under the land use planning authority outlined in the Local Government Act, Community Charter and Land Title Act are summarized in Table 5.

[16] N.B. A legal opinion does not have the same level of validity as a court decision.

Table 5: Summary of Available Policy Instruments

Policy	Application	Type	Pros	Cons
Development Permit Area Guidelines	All building types	Non-voluntary	- Can create conditions to insure solar access - New legislation allows DPAs for all building types, including SFDs	- Expensive to develop / update - Effectiveness depends on Council's willingness to ensure guidelines are met in DPA process
Alternative Energy Rezoning Policy	All buildings in rezoning process	Incentive	- Flexible – if designed properly, allows developer flexibility to meet energy performance standard-	- Additional requirements for developers and administrative layer for staff
Revitalization Tax Exemption Bylaw	All building types	Incentive	- Carrot approach - Can apply to an entire neighbourhood	- Requires indirect subsidy to green buildings
Building Permit Rebate	All building types	Incentive	- Carrot approach, offers a financial incentive for developers pursing a specified action	- Requires indirect subsidy to green buildings - May not be viewed as bona fide incentive to developers not retaining ongoing ownership of building
Development Cost Charge Reduction / Exemption	All building types	Incentive	- Flexible opportunities for definition of eligible development - Can encourage energy equipment external to the buildnig	- Potential lost DCC revenue if eligible development does not lead to infrastructure capital savings
Density Bonusing	All building types	Incentive	- Carrot approach, offers developers additional density for amenity	Competes with other amenities, e.g. affordable housing, libraries, etc
Phased Development Agreements	All building types	Non-voluntary	- Flexible, offers certainty to both developer and LG	Each agreement requires a bylaw and public hearing to consider

3.3 Solar Hot Water Systems and Zoning

Zoning determines land use and density for each parcel of land within a municipality. Zoning conditions are established in the Zoning Bylaw under the authority of the Local Government Act. There are two areas that SHW issues interface with zoning: 1) Building height restrictions and floor area ratio (FAR) and 2) Solar access.

3.3.1 Building Height Restrictions and FAR

Local governments wanting to support SHW installations should review the Zoning Bylaw to ascertain how roof-mounted solar collectors are addressed (if at all). Including the collectors in the maximum allowable building height reduces the allowable envelope height for the structure, which could be a disincentive for developers to install collectors.

The City of North Vancouver is currently developing a Green Building Policy that recommends revisions to the Zoning Bylaw, including:

- Up to a maximum 1.8 metre allowance for solar collectors in the building height calculation.
- A FAR exemption for the mechanical portion of the SHW system that is located inside the building up to a maximum of 0.01 FAR.

The additional FAR allowance allows for the DHW storage tank and pumping equipment. In most cases in B.C., there is likely not enough solar incidence to provide a customer's full DHW load so a SHW system augments rather than fully displaces the convention DHW system, thus additional floor space is required for the SHW equipment.

3.3.2 Solar Access

Solar access is the unimpeded exposure to sunlight in order to heat the fluid or water circulating through the solar collector. In our experience, the economic viability of SHW in parts of the Province with low solar incidence (e.g. the Lower Mainland) is very sensitive to "shading" and so care should be taken to insure adjacent buildings and vegetation do not restrict the solar resource. One tool for insuring solar access is Development Permit Area Guidelines, discussed in Section 3.2.1. However, the effectiveness of the DPA guideline tool depends on Council's willingness to insure developers adhere to the guidelines. Another way for local governments to insure solar access is to consider allowable building heights and density in its zoning bylaw. This would require "shading modelling" to show the shading effect proposed buildings would have on adjacent areas. Many local governments (e.g. City of Vancouver) already include shade effects screening in development approval processes.

4.0 Solar Hot Water for Civic Buildings

Several of the Solar Communities are pursuing SHW installations for civic buildings. Buildings with a single owner over the building's lifespan are often good applications for alternative energy systems because the incremental capital costs of alternative systems over conventional equipment can often be fully recovered through operating cost savings (e.g. avoided fuel costs). As well, avoided GHG emissions help local governments and institutions achieve policy commitments, such as those outlined in the Climate Action Charter and / or the Greenhouse Gas Reductions Target Act.

4.1 Civic Building Policy

While pursing a preferred alternative technology can have economic and environmental benefits we recommend assessing and selecting a technology within the context of a broader Civic Building Policy. A Civic Building Policy outlines a local government's commitment to construct new facilities to a certain energy or environmental standard. The main benefit of the policy is that it insures criteria and expected outcomes are consistently applied to all decisions, regardless of the application and/or actors involved. The policy need not be overly prescriptive. It should clearly state the necessary criteria for determining whether an energy efficiency or alternative energy investment should be made.

4.1.1 Evaluating Green Building Investments

We feel that the cornerstone of a good civic building policy is a requirement to evaluate energy-related investments on a life cycle cost (LCC) basis. A range of energy supply and/or efficiency options should be compared to determine the best investment.

There are a number of LCC analysis outputs that could be used to compare investments, including Net Present Value (NPV), Internal Rate of Return (IRR) and simple payback.

Net Present Value is a stream of future cash flows discounted to a present value. Because all costs over a projection period are reduced to a single value, NPV is a good way to compare investments with different life expectancies and replacement costs. The discount rate chosen can have a significant impact on the NPV of an energy investment. For a business or institution the discount rate is typically the organization's weighted average cost of capital (the cost of debt and equity).

The IRR is calculated by finding the discount rate at which the NPV equals zero. The organization can then compare the IRR to its required rate of return

to gauge a project's feasibility. The required return, or hurdle rate, is often an organization's cost of capital.

Simple payback is measured as the number of years it takes for the annual operating cost savings to equal the incremental capital cost of an energy investment. It is not a true LCC measure because it does not consider the full stream of costs and benefits, just those required to "payback" the incremental capital costs. Simple payback can be a good high level indicator of a project's feasibility but it should not be used for investment decisions for several reasons. First, it fails to account for the time-value of money (i.e., does not consider discounted values). Second, it ignores paybacks beyond the payback period. A technology could provide long term benefits that would go unnoticed using a simple payback method. Third, it ignores the scale of the investment. Two investments, one requiring $100,000 and one requiring $10,000 could have equal paybacks and thus be considered comparable investments yet are not. Requirements for a short payback period typically reflect two separate considerations. The first is that people prefer rewards earlier rather than later (time preferences). The second is that projects with shorter payback periods are less risky because the costs of those projects are recovered quickly (risk tolerance).

Besides LCC analysis, other criteria in the Civic Building Policy can include:

- Energy reductions,
- GHG emissions,
- Technology risk, i.e., dependability of the technology,
- Ability to service the equipment,
- First costs (useful for capital budgeting purposes),
- Resource input risk, i.e., does the technology require a resource or fuel input that could be at risk? E.g., Is the SHW application under consideration likely to be surrounded by high rise towers due to planned zoning?
- Educational value (e.g. demonstration project value)
- Local air quality issues.

In summary, we recommend developing a Civic Building Policy that requires staff to investigate a range of energy options for all civic facilities. The policy should include a requirement to evaluate a range of options on a LCC basis. Other environmental criteria can be applied at the municipality's discretion. The policy helps to insure consistent energy-related decisions with long term economic and environmental benefits to the community.

4.2 Examples of Civic Building Policies

There are currently a number of good examples of Civic Building Policies. Table 6 summarizes four them.

Table 6: Summary of Civic (Green) Building Policies

Local Government	Scope	Key Points
District of Saanich Green Building Policy[17]	• Applies to energy, water and materials consumption in all municipal facilities that are developed, owned or managed by the District. • Includes retrofits and ongoing assessment of existing buildings. • States the District's intention to provide leadership and guidance to encourage the application of green building practices in private sector development.	• Undertaking life-cycle costing analysis prior to tendering for all construction and retrofit projects larger than 500 square metres. • Providing opportunities for additional design and capital costs for green municipal projects provided life-cycle costing can demonstrate a minimum annual 10% return on the capital investment. • Meeting a requirement of LEED Silver or Gold (including full registration and certification under the Canada Green Building Council) for all new construction and additions larger than 500 square metres of civic buildings. • Continuing to undertake operational retrofits of existing facilities to improve energy and water efficiencies. • Considering LEED certification for major renovations of existing buildings under LEED–NC or the new category LEED–EB (existing building). • Working cooperatively with other jurisdictions to promote green building design and practices in a consistent way in the region. • Encouraging learning and awareness of green building activities both within the organization and throughout the wider community. • Considering the development of incentives to encourage the private sector to adopt green building practices. • Recognizing achievement and excellence in private sector green building initiatives.
City of Richmond Sustainable High Performance Building Policy[18]	• Applies to corporate facility management (new and retrofits). • Minimize energy, materials, water and land consumption; reduce landfill waste; reduce GHG emissions; minimize facilities maintenance costs.	• LEED Gold as the desired standard for new civic buildings > 2,000 m2 • LEED Silver as a minimum standard for major renovations to existing civic facilities and new buildings < 2,000 m2, without necessarily seeking formal accreditation. • Emphasizes the City's commitment to comprehensive financial evaluation of new building practices and renovations of existing civic facilities with the

[17] http://www.saanich.ca/municipal/clerks/bylaws/greenbuildpol.pdf
[18] http://www.richmond.ca/__shared/assets/011905_item210292.pdf

	• Note: This policy replaces a previous High Performance Building Policy that only focused on energy efficiency. The City wanted to broaden the scope to capture a broader range of social, environmental and economic factors.	aim of striking a balance between initial first costs and life cycle costs. • LEED standard is a benchmark only. Building investment decisions will continue to be made on a case by case basis based in accordance with available corporate budgets.
City of North Vancouver LEED Standards for City of North Vancouver Buildings[19]	• Established a LEED construction standard as a means to encourage the sustainable practices for City owned buildings. • Conserve water and materials, minimize waste, maximize air quality, protect surrounding areas and continue to provide environmental and community benefits over buildings' lifetimes. • Requires that all civic buildings that are owned, constructed, financed or utilized by the City of North Vancouver be constructed to performance standards comparable to that of LEED standards.	• Adopt LEED as the standard to assess building performance. • Aims to achieve LEED Gold as preferred standard for all newly constructed civic buildings greater than 900 sq.m. (10,000 sq.ft). • LEED Silver as the minimum standard for all newly constructed civic buildings greater than 900 sq. m. (10,000 sq, ft); and all such civic building projects that are classified as "Major Renovation" projects in the City Capital Plan. • Includes a provision for when a major renovation is undertaken of an existing facility which is also a Registered Heritage Property, priority is given to heritage conservation in the event that a conflict exists between heritage retention and the application of the LEED construction standard. • The input and involvement of Community Development, Engineering, Parks, and Finance Departments was sought in the creation of the policy.
City of Vancouver Green Building Strategy[20]	• Original (2004) policy included a goal for all new civic buildings > 500 m2 to meet a LEED Gold standard and all buildings in SEFC to meet LEED Silver and LEED Gold for all buildings in the Olympic Athletes Village.	• The GBS will parallel LEED, where possible, but diverge from LEED where advantageous to do so (i.e. it is a LEED equivalent performance target). • Will encompass provisions for GHG reduction, water management, landscape standards and open design, transportation, waste management, healthy interior environments.

[19] http://www.cnv.org/server.aspx?c=2&i=222
[20] http://www.city.vancouver.bc.ca/sustainability/documents/GreenBuildingStrategyPolicyReportMay172007.pdf

	• The City is developing a city-wide Green Building Strategy (GBS) for Part 3 buildings.	

4.3 Solar Hot Water and LEED

A number of local governments include a requirement to meet a LEED or LEED-equivalent standard as part of their green building policies. As indicated above, we recommend considering SHW within the context of a green building policy, as we feel it leads to more consistent decisions with long-term benefits. This section elaborates on the relationship between SHW and LEED certification.

LEED is a third party rating system regarded by many as a useful benchmark for the design, construction and operation of high performance sustainable buildings. There are four LEED categories for new construction: Certified, Silver, Gold, and Platinum. Different LEED versions have varied scoring systems based on a set of required prerequisites and a variety of credits that allow the building owner to accrue points towards the desired LEED category.

Under the LEED Canada new construction rating system, up to 3 points are available for onsite renewable energy that supplies 20% of the building's energy use (expressed as a fraction of total energy cost).

LEED also grants credits for installing low flow water fixtures. Building improvements that reduce water consumption can also reduce the required capacity (sizing) of the SHW equipment, thus reducing first costs. Up to 2 points are available for water efficiency measures that reduce water consumption by 30%.

LEED is administered by the Canada Green Building Council. More information is available at http://www.cagbc.org/index.htm.

4.4 Local Government Carbon Neutrality

Currently, 151 local governments have signed onto the B.C. Climate Action Charter. The Charter is a Provincial government initiative that entreats local governments to become carbon neutral by 2012. Achieving carbon neutrality can mean reducing GHG emissions to zero, or effectively reducing the overall carbon footprint by purchasing offset credits for the GHG emissions the local government is responsible for. The Province recently announced that it will offset the carbon tax for local governments who sign onto the Climate Action Charter and become carbon neutral by 2012. The Climate Action Revenue Incentive Program will provide grants based on the previous year's actual carbon tax costs.

The proposed boundaries for calculating carbon neutrality are based on traditional local government services and include emissions related to heating. SHW systems would typically displace the need for the heating equivalent amount of natural gas; thus, pursing SHW can help local governments achieve its carbon neutral goals.

4.5 New SolarBC Incentive for Local Governments

SolarBC is offering an incentive for local governments that install a SHW system on a civic building up to December 31, 2010. The SolarBC incentive matches the ecoENERGY for Renewable Heat incentive to a maximum of $40,000. To qualify, the installation must first qualify for a financial incentive for the installation of a solar water system under the federal ecoENERGY for Renewable Heat program.

Application details are on the SolarBC website: http://www.solarbc.ca/install/municipalities.

5.0 Integrating Solar Hot Water with District Energy Systems

South East False Creek and Lonsdale Energy Corporation district energy systems (DES) integrate SHW systems into their DESs. In B.C. there is a large imbalance in the solar resource between winter and summer, and the bulk of heating energy is required during winter. Seasonal storage is very costly. For these reasons, SHW systems are insufficient to meet a substantial portion of a neighbourhood's thermal energy needs. However, building-scale SHW systems could displace other on-site or off-site energy requirements. As well, the DES could permit better utilization of the SHW equipment by allowing sharing of excess thermal energy during peak months across sites within a district energy service areas (through net metering of district energy).

6.0 Summary

There are a number of innovative and effective examples of policies that can advance SHW systems. The application of many of the policies is limited due to the limited legislative authority local governments have over building practices. However, local governments do have authority over land use planning and development and there are a number of policy instruments available, including such policies as:

- Density bonusing,
- Phased development agreements,
- Revitalization tax exemption program, and
- Developing a rezoning policy.

Other policy instruments are available for ensuring solar access, excluding solar collectors from zoning height restrictions, and excluding the required space for additional mechanical equipment in floor area ratio calculations.

A number of Solar Communities are exploring SHW installations for civic buildings. While pursing a preferred alternative technology can have economic and environmental benefits we recommend assessing and selecting a technology within the context of a broader Civic “Green” Building Policy. A civic building policy outlines a local government’s commitment to construct new facilities to a certain energy or environmental standard. The main benefit of the policy is that it insures criteria and expected outcomes are consistently applied to all decisions, regardless of the application and/or actors involved. The cornerstone of a good civic building policy is to require all investment decisions be based on a life cycle cost analysis of various options. Tools for evaluating green building investments are discussed and 4 good examples of civic building policies in BC are summarized (Saanich, Richmond, City of North Vancouver, Vancouver).

We encourage the Solar Communities to collaborate to:

- Review the Best Global Policies in this report and engage the Province in exploring ways to import those policies to British Columbia,
- Review land use development policies available to local governments, and possibly pool resources to further define how those policies may apply to SHW,
- Pool resources to develop the basis of a civic building policy that can be adopted by each of the communities.

Appendix A – Solar Ready Guidelines

Natural Resources Canada | Ressources naturelles Canada

I'm SOLAR ready

ecoENERGY an ecoACTION initiative

Builder Specifications for Solar Ready Homes

This document specifies the essential elements required to make a new home ready for the future installation of roof-mounted solar domestic hot water and photovoltaic (PV) systems.

A Solar Ready new home is a home that is equipped for the future. A few simple considerations in the design and construction of a new home can result in significant savings in the future when the homeowner is ready to install a solar energy system.

Solar Ready is an initiative managed by Natural Resources Canada's Office of Energy Efficiency, New Housing Program.

Required Elements for Solar Ready	Builder Benefits of Solar Ready
1. A suitably sized, orientated and unobstructed location on the roof for future installation of solar panels. 2. A sealed conduit(s) or approved line set and conduit roughed in from the attic or roof to the mechanical room. 3. Pre-installed plumbing valves and fittings on the hot water heater to simplify the installation of a solar hot water tank. 4. An electrical outlet at the planned tank location and wall space for PV controls. 5. Identified locations of future components on construction plans and owner's diagram. 6. Solar Ready labels on the conduit(s) and hot water heater.	• Solar Ready is easy to do, easy to understand and easy to sell. • It is a great way to start a conversation about energy efficiency options with homebuyers. • It is an inexpensive and cost effective way to show a commitment to green building. • It provides market differentiation and access to the Solar Ready marketing materials. • It provides opportunities to educate consumers about solar energy systems and sell them as an option. • Homebuyers view it as part of your overall commitment to quality. • Additional information is available on the website: www.newhomes.nrcan.gc.ca

Consumer Benefits of Solar Ready

- Solar Ready is a cost effective way to be prepared for a future rise in energy costs.
- Future installations will be easier and energy savings will be optimized.
- Planning up front may eliminate the need for future building permits.

Solar Ready is a simple yet effective way for builders and homebuyers to build for the future.

1. Roof Location for Solar Panels

In most residential applications, roof-mounted equipment is the most cost effective way to install solar energy systems. The "ideal" location for much of Canada would be on a south facing roof with a 9/12 pitch. However, less than a 25% drop in performance from this ideal can be achieved with orientations between due west through to south-east and roof pitches between 5/12 and 12/12. Some panels may be installed on a rack to adjust the pitch. Shading of the designated area by dormers, adjacent houses or trees must be avoided.

Roof Plan: location options A&B

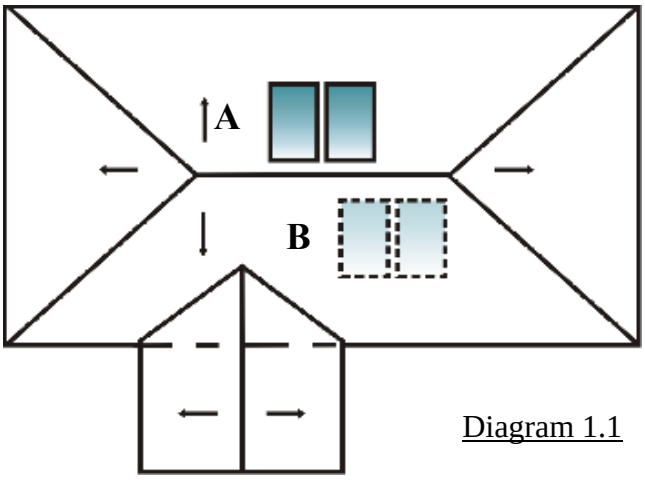
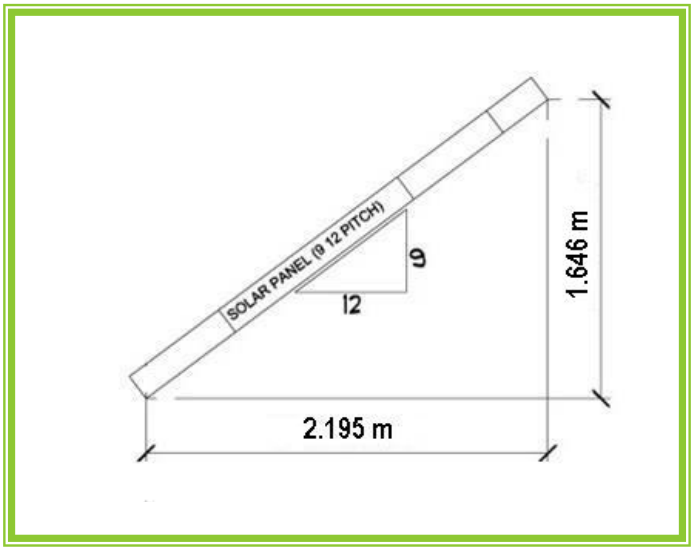


Diagram 1.1



1. Solar Ready Program Requirements – Roof Location:

1.1 For each house model, provide a minimum of 9.3 m^2 (100 sq. ft.), with no dimension less than 2.7 m (9'), of unobstructed roof;

1.2 Provide an orientation of the roof location anywhere from south-east to west;

Note: If the orientation of the model is not known then show 2 locations on opposite sides of the roof (180 degrees apart). This way, however the model is placed, one of the locations will be pointing between south-east and west. See diagram 1.1 as an example.

1.3 Provide a roof pitch in the designated location of no less than 5/12 and no more than 12/12.

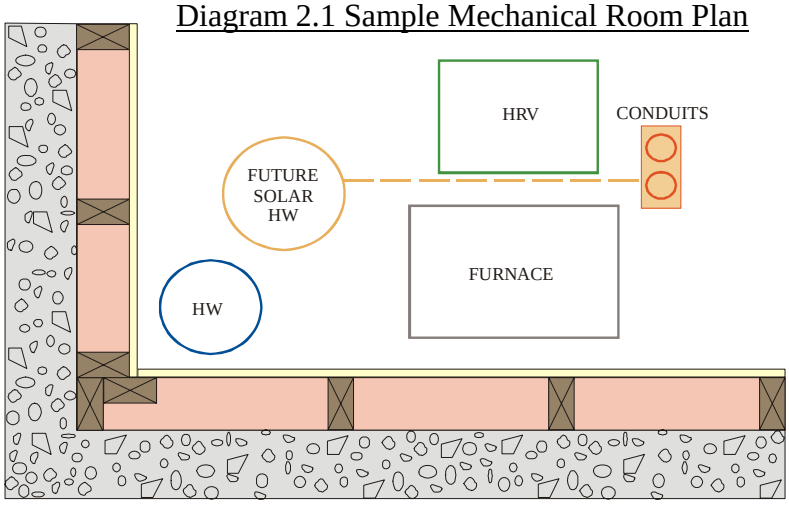
Helpful Hints for the Roof Location

- Vaulted or cathedral ceilings may mean the attic isn't accessible so you may need to exit the roof and flash, cap and seal the conduit(s).
- Any skylights that are located within the designated area will need to be relocated.
- The location of roof vents may need to be altered to accommodate the panels.
- Typical solar panels will not weigh enough to require truss changes, however, check with your truss manufacturer or local building official for point load requirements.

2. A Conduit or Approved Line Set from the Roof to a Mechanical Room:

The goal is to run a conduit or pair of conduits from an accessible attic space to an accessible location in the mechanical room to allow future installation of wires for photovoltaic systems and/or fluid and sensor lines for solar thermal systems. While wires are flexible, the current technology for solar thermal lines will require a nearly straight conduit, i.e. no elbows. Central vacuum tubing is suggested. Builders should consult their local building officials and electrical safety authority to ensure code compliance.

Diagram 2.1 Sample Mechanical Room Plan



2. Solar Ready Program Requirements – Conduit Provisions:

Provide two 5 cm (2”) diameter or one 10 cm (4”) diameter plastic pipe(s) that run from an accessible attic to a planned mechanical room or other accessible room. Additionally:

a. the pipes must be relatively straight;

b. the ends of the pipe(s) must be capped (not glued), with appropriate manufactured caps, the caps must be sealed in the attic and the space around the pipe(s) must be sealed to the vapour barrier to prevent air leakage;

c. in the attic, the pipe(s) must terminate above the top of the insulation with at least 0.9 m (3’) of vertical workspace above the pipes to allow for access;

d. if the attic is not accessible, the conduit(s) must exit the roof and be capped, sealed and flashed appropriately; and

e. in the basement, the pipe(s) must not terminate in an area where they will be obstructed by duct work, major plumbing pipes or room finishes, the pipes should extend below the floor joists and the pipes should be labeled. Consult your local building official for fire separation requirements.

Note: If you know the specific requirements of the solar system that will be installed it is acceptable to run the actual line sets needed rather than a simple conduit. An empty 5 cm (2”) conduit will be required to allow the option of installing a future PV system.

Helpful Hints for Conduit Provisions:

- In a two storey home, the provision of a wall that goes from the mechanical room to the attic will facilitate conduit runs. Many plans will need some redesign to get a common stacked wall location.
- Design the stacked wall location such that it does not fall directly below a truss.
- Two 5 cm (2") pipes provide greater installation flexibility than a single 10 cm (4") conduit. 5 cm is flexible enough to allow slight bends. Elbows are not acceptable.
- The plastic conduit is essentially a placeholder. Where required by code, a secondary approved conduit could be run inside it at the time of system installation.
- Running the actual line sets needed for specific solar systems is acceptable and would eliminate the need to ensure straight runs from the roof to the attic since the line sets can be installed with bends and turns. This may reduce costs now or in the future. With this option, at least one conduit must be run for a future photovoltaic (PV) system.
- The most common solar panels need either two 9.5 mm (3/8") dia. or two 19 mm (3/4") dia. insulated copper lines. However, choosing to install a specific line set may restrict homeowners' options for future solar thermal system installations.

3. Pre-installed Plumbing Connections for Future Solar Tank:

Typical solar thermal systems require the installation of a separate storage tank. Install valves and fittings to make future connections simple and affordable.

3. Solar Ready Program Requirements - Plumbing Connections:

(Refer to Diagram 3.1)

3.1 Provide two tees connections in the cold water inlet pipe that delivers cold water to the main (existing) water heater.

3.2 Provide shut-off valves on each of the tees and one on the main pipe between the two tees to allow for the quick connection of a future tank.

Sample installation with a solar hot water tank on the left connected to the regular hot water heater on the right.

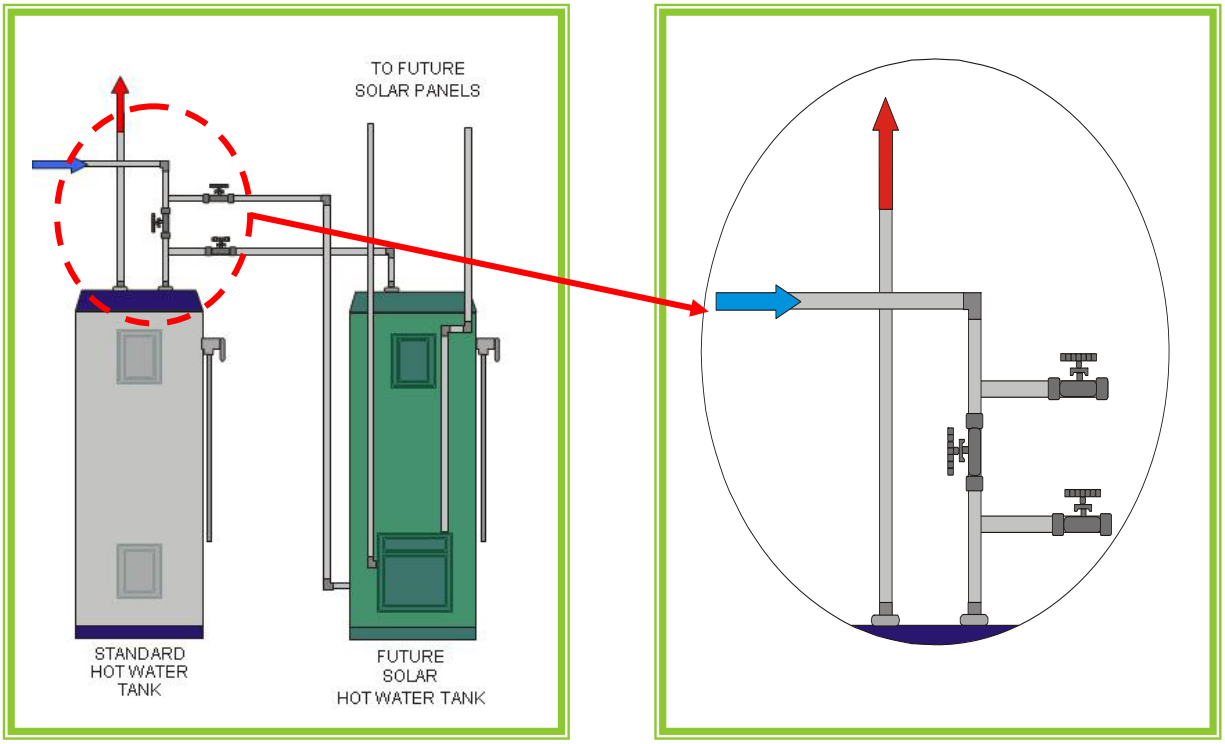


Diagram 3.1 Plumbing Connections

4. Provide an Electrical Outlet Near the Planned Water Tank Location:

Most solar thermal systems will require an electrical outlet for pump or control operation. Ensure a 110 volt plug is easily accessible. Space should also be left for the electrical panel or inverter needed for a future PV system. This could be in the mechanical room or near the main electrical service panel. Wall space of 1 m^2 (3' x 3') will be sufficient.

4. Solar Ready Program Requirements – Electrical Connections:

4.1 Provide one 110 volt outlet within 1.5 m (5') of the planned solar water tank location - the outlet can be on the same circuit as a power vented water heater;
4.2 Provide 1 m^2 (3' x 3') of wall space for a PV system connection or inverter.

5. Location of Components on the Construction Plans:

It is important that all of the elements needed for future installation of a solar system be identified on the construction plans for future reference. This will make it easier for homeowners and contractors to install the future system cost effectively. A simple diagram for the homeowner showing key component locations is desirable.

5. Solar Ready Program Requirements – Construction Plans Identification:

On the construction plans and homeowner's diagram clearly identify:
5.1 the roof location(s) for solar panel installation (Diagram 1.1 on page 2);
5.2 the location of the conduit(s) or line set and conduit (Diagram 2.1 on page 3);
5.3 a 1 m^2 (3' x 3') floor location that will accommodate a future solar storage tank in the mechanical room (Diagram 2.1 on page 3);
5.4 1 m^2 (3' x 3') of wall space for a photovoltaic system connection or inverter.

6. Label the Solar Ready Components:

Solar Ready components should be clearly identified for the future homeowners. This will assist both in marketing and in the future installation of solar energy systems. Labels are available for ordering through NRCan. Visit www.newhomes.nrcan.gc.ca for more information.

6.1 Solar Ready Program Requirements - Solar Ready Labels:

6.1 Provide small (5 cm x 7.5 cm) Solar Ready labels on the basement end(s) of the conduit(s) or the installed line set and conduit.

6.2 Provide a large (10 cm x 15 cm) Solar Ready label on the main hot water tank.

Sample Label

7. Typical Costs for Solar Ready:

• Plumbing	$ 60 - $100	Plumber to install shut off valves
• Electrical Outlet	$ 30 - $ 50	Electrician to add outlet
• 2-5cm Central Vac Conduits	$150 - $180	Contractor to place conduits
• Design Time (per plan-set)	$ 35 - $ 50	Designer to verify plans for roof layout & conduit placement
• Labels	$ 5	Contractor to order labels
●Total Estimated Cost	**$280 - $380**	

8. Solar Ready Marketing:

NRCan has developed a Solar Ready graphic which may be used in promotional materials. A brochure, *Are You Solar Ready?* explaining the benefits and features of a Solar Ready new home is available for distribution to interested home buyers. Builders may order large and small labels for hot water tank and conduit labeling. Additional information on Solar Ready new homes is available at **www.newhomes.nrcan.gc.ca**

9. What can you expect from your Solar Ready home?

The Solar Ready provisions in this specification will make it easier and more cost efficient for homeowners to install, within the 9.3 m^2 (100 sq. ft.) of roof area and based on current technologies, either:

- up to two panels for a roof-mounted solar domestic hot water system (which can provide up to 50%-60% of a typical families hot water needs) OR
- up to a 1.25 kilowatt (kW) photovoltaic system to generate electricity OR
- a combination of one solar domestic hot water panel and up to 0.65kW of photovoltaic panels to generate electricity.

This makes the homes you build today even better in the future. Solar ready is a cost effective way to empower homeowners to benefit from solar technologies.

Solar Ready Checklist	
Program Requirements	**Verified**
1. Roof Location: 1.1 at least 9.3 m^2 of unobstructed area (min. 2.9 m dimension), 1.2 orientation SE to W or 2 locations noted on plans, 1.3 roof pitch between 5/12 and 12/12.	☐
2. Conduit Provisions: 2.1 two 5cm diameter or one 10 cm diameter plastic pipe(s) that run from an accessible attic or roof to a planned mechanical room.	☐
3. Plumbing Connections: 3.1 two tee connections on the water heater's cold water inlet line; 3.2 shut off valves on both tees and on the main pipe between the tees.	☐
4. Electrical Connections: 4.1 a 110 volt outlet located near the hot water heater; 4.2 1m^2 available wall space for PV system connection or inverter.	☐
5. Construction Plan Identification/Homeowner's Diagram: 5.1 the roof location(s) for solar panel installation; 5.2 the location of the conduit(s) or line set; 5.3 the 1 m2 area for the future solar storage tank in the mechanical room; and 5.4 1 m^2 of wall space for a PV system connection or inverter.	☐
6. Solar Ready Labels: 6.1 small Solar Ready labels on the basement end(s) of the conduit(s) or the installed line set and conduit; 6.2 a large Solar Ready label on the main hot water heater.	☐