A Renewable Energy Requirement for B.C.

Executive Summary

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What is a Renewable Energy Requirement?

Just as buildings must meet minimum energy efficiency or safety requirements, many jurisdictions also require buildings to meet minimum renewable energy requirements.

With a renewable energy requirement (RER), new buildings, as well as buildings that are undergoing major renovations, would be required to meet a portion of their energy needs — for both power and heat — using on-site or community-based clean and sustainable sources.

Requirements such as these are in use around the world – from small rural communities to major urban centres. For example:

- In Merton, UK, new buildings, as well as buildings undertaking major renovations, must demonstrate that 10 per cent or more of the building's anticipated energy needs will be provided by renewable energy sources.
- In Barcelona, Spain, solar water heaters must be included on new buildings, and must be sized to meet a minimum of 60 per cent of domestic hot water requirements, and 20 per cent for industrial processes.

In general, a RER can lead to the following benefits:

- Reduced GHG emissions and energy use in communities throughout B.C.;
- Progress towards net-zero energy/emissions homes, buildings and communities;
- Potential to encourage further energy efficiency;
- Economic growth and job creation; and
- Adaptation to climate change (e.g. greater energy security).

The proposed RER for BC

Through a collaborative process involving developers, local governments, real estate agents, NGOs, and community members, Pembina is recommending the following RER for B.C.

All new residential and commercial buildings must meet 10 per cent of their estimated annual energy consumption with eligible on-site or community-based renewable energy. Compliance is mandatory in jurisdictions where the requirement has been adopted.

Should the regulation be performance-based or prescriptive?

The performance-based approach is favoured, because:

- It is more likely to be adopted by local governments;
- It provides necessary flexibility for developers and the building industry;
- It enables easier administration by implementing governments at local and provincial levels; and
- The prescriptive path adds complexity that may require differentiation between regions as resources and cost-efficiency vary.

One identified challenge of the performance-based approach was the need by developers for some initial guidance on how to meet the RER. Pembina is therefore proposing that the RER should be accompanied by a guide that provides guidance to developers.

What percentage of renewable energy should be required?

To determine a target for B.C., 10 per cent was used as a starting bar. The 10 per cent level was found to result in a decrease in GHG emissions (over "business as usual"), and be feasible to implement. It was also determined that most market-ready technologies would be able to generate at least 10 per cent of the average building's energy needs.

How should we adopt a RER in B.C.?

An opt-in requirement as part of the *Local Government Act* is the preferred approach for a RER in B.C. in the near term. This approach provides clear jurisdiction as well as the ability for communities to choose whether they want to join the requirement when it is first introduced, or possibly join later.

The recently implemented Solar Hot Water (SHW) Ready regulation provides an example of how provincial and local governments can work together to enact an opt-in regulation for renewable energy.

In the fall of 2010, the Province of B.C. proposed an opt-in requirement that would enable local governments to mandate that all new single-family dwellings within their communities be SHW ready. Local governments were provided with the option to state their desire to implement this requirement in their communities. On June 14th, 2011, the province announced the new Solar Hot Water Ready regulation and the 36 communities that had chosen to adopt it.

How should compliance be ensured?

Since compliance and enforcement will be required at the local government level, the options here must be relevant at that level and easily integrated into existing processes. The proposed compliance and enforcement procedure is therefore:

- At the building design stage, local governments can withhold development permits until such time that developers have demonstrated a plan for compliance with the RER.
- At the building occupancy stage, local governments can withhold occupancy permits if compliance with the RER is not met.

Treatment of energy efficiency

Three main pathways to encourage the development of energy efficiency and renewable energy in tandem towards a net-zero goal have been identified:

1. Set the RER as a per cent of the total energy used by a building.
2. Set the RER as a per cent of total energy used by a building, but vary the RER percentage based on energy performance.
3. Use energy performance to set requirements and allow a mix of renewable energy and energy efficiency to meet them.

This project focused on path 1 above. Evaluating the preferred option of these three was beyond the scope of this project.

As per pathway 1, increased energy efficiency is not a specific requirement of the proposed RER. However, builders and developers are encouraged to recognize that measures taken to lower energy requirements can be cost effective as they can reduce projected building energy consumption, and (subsequently) the amount of energy required for compliance with the RER. Builders and developers are strongly encouraged to maximize energy efficiency during the building design phase.

Cost and feasibility assessment of meeting the RER

Meeting the proposed 10% RER is possible given the technologies on the market today. This analysis looked at certain technologies, building types and regions, but was not a comprehensive overview of all possible compliance paths.

The main conclusions are summarized in the tables showing relative cost-effectiveness below.

- Cost effectiveness varies. Because of their affordability, the technologies with the best business cases are solar air heating (for commercial buildings), and pellet stoves (for residential buildings), with Internal Rates of Return (IRRs) over 10%.

- Solar PV for commercial buildings, and solar hot water (SDHW) and ground source heat pumps (GSHP) for electrically heated residential buildings are in the next IRR range, with IRRs between -3% and 3%. Given the many assumptions required for this analysis, and the uncertainty associated with these, we deem that these technologies could be profitable, in the right context.

Other factors beyond cost-effectiveness are also to be considered to assess worthiness of a project, including increased self reliance, air quality, protection from increase in energy costs, leadership, and a desire to reduce one's contribution to climate change.

Tables 1 and 2 summarize the ranges of IRRs for the various technologies and building types. They use the following scale:

****	10% or more
***	3% to 10%
**	-3% to 3%
*	-12% to -3%

Table 1 Range of IRRs for the three residential building types

	Row House Electric Heat	Single Family/Duplex Electric Heat	Single Family/Duplex Gas Heat
Pellet Stove	****	****	N/A[1]
Ground Source Heat Pump	**	**	*
Solar Domestic Hot Water	**	**	*
Solar PV	*	*	*

Table 2 Range of IRRs for the four commercial building types

	Hospital	Large Commercial	MURB	School
Solar Air Heating[2]	****	****	****	****
Ground Source Heat Pump[3,4]	* to ****	* to ****	* to ****	* to ****
Solar PV	**	**	**	**
Solar Hot Water Heating*[5]	*	not modeled	*	not modeled

[1] Because forecasted pellets prices are higher than forecasted natural gas prices for the mainland, there are no cost savings associated with these systems and the IRR cannot be calculated.

[2] These are assumed to displace natural gas as the energy source for space or water heating.

[3] These are assumed to displace natural gas as the energy source for space or water heating.

[4] The wide range of IRRs values for ground-source heat pumps (GSHP) in commercial building is due to the fact that the cost of these system varies highly for commercial buildings depending on the type of system and its size. Cash flows for a low, average, and high cost system were estimated.

[5] These are assumed to displace natural gas as the energy source for space or water heating.

Supporting the implementation of the RER

Some key barriers that may affect the successful implementation of a RER for local governments, developers, contractors, real estate agents and the public were identified. Key steps that will be necessary to enable the successful implementation of a RER include:

- Incentives and grants to help support the initial implementation of various renewable energy technologies;
- Educational, communication and marketing materials for local governments, developers, contractors, real estate agents and the public. It is critical that clear technical documents are developed for local governments, developers and contractors to ensure that the information is available to those parties implementing the RER. Communication, education, and marketing materials are also critical to provide to those entities who may be buying or selling the homes and buildings; and
- Education and training for local government staff, such as building inspectors, developers and contractors to ensure that those entities understand how to comply with the RER, and that they are aware of the tools and resources available.

Recommendations for next steps for adoption of the RER

The next steps for adopting the RER in B.C. include the following:

- Build support and awareness for the RER among additional local governments, developers, renewable energy industry and real estate agents;
- Provide briefings to relevant B.C. provincial government ministries on the findings of the project;
- Identify and undertake any areas of further research that are needed to answer any outstanding questions and move the RER forward;
- Develop supporting resources for local governments and developers to accompany the implementation of the RER;
- Develop higher energy efficiency standards in conjunction with the RER to ensure maximum effectiveness in its implementation; and
- Adopt the RER as soon as possible, taking these necessary steps into account.