	Town of Cochrane Policy
Policy No.:	**2003-01**
Policy Title:	**Renewable Energy Framework**
Approval Date:	**April 27, 2015**
Revision Date:	
Department:	**Development Services**

Purpose

The Renewable Energy Framework is intended to:

- Raise awareness about renewable technologies and opportunities;
- Identify which renewable energy options are feasible for Cochrane;
- Suggest a clear process to manage the development of renewable energy in the community;
- Encourage the uptake of renewable energy;
- Identify opportunities for the Town to install and operate renewable energy projects;
- Guide the Town in becoming a municipal leader in renewable energy policy and projects.

Policy

The Framework sets the stage for action toward incorporating renewable energy technologies within the Town's corporate operations as well as within the wider community.

1. Reason for Policy

1.1 The Town of Cochrane will support and enable solar energy projects in the community. In certain applications, projects will be subject to specific guidelines and approval processes.

1.2 The Town of Cochrane will support and enable community district energy projects within urban areas. This will be done by working closely with applicants and implementing

strategies that will enhance the community's suitability for district energy projects.

1.3 The Town of Cochrane will support and enable closed loop geoexchange energy projects in the community. All applications will be subject to specific guidelines and approval process. The Town will not consider permitting open looped geoexchange systems in any land use districts.

1.4 The Town of Cochrane will support small wind power projects under specific conditions and circumstances where concerns and impacts associated with a specific proposal are minimized.

1.5 The Town of Cochrane will ensure that all renewable energy infrastructure installed on public land is maintained and operated effectively, especially considering the health and safety of the public and the financial cost/benefits for the Town.

1.6 Related Cochrane Sustainability Plan pathways include:

- Pathway 3, We use energy responsibly and innovatively.
- Pathway 4, We contribute to the solution on climate change.
- Pathway 6, Our local economy is healthy and diverse.
- Pathway 7, Everyone has an opportunity to pursue their potential in Cochrane.
- Pathway 10, There's enough room for everything a community should have.

2. Related Information

2.1 Cochrane Sustainability Plan, 2009

2.2 Land Use Bylaw 01/2004

2.3 Municipal Development Plan Bylaw 07/2008

3. Responsibilities

3.1 Town Council to:

3.1.1 Approve by resolution this policy and any amendments.

3.1.2 Be guided by the policy when required prior to making a decision.

3.1.3 Recognize the benefits of renewable energy.

3.1.4 Serve as an advocate for renewable energy.

3.2 Chief Administrative Officer to:

3.2.1 Implement this policy and approve procedures.

3.2.2 Ensure policy and procedure reviews occur and verify the implementation of policies and procedures.

3.3 Senior Manager of the Department to:

3.3.1 Ensure implementation of this policy and procedure.

3.3.2 Ensure that this policy and procedure is reviewed every three years.

3.3.3 Make recommendations to the Chief Administrative Officer of necessary policy or procedure amendments.

3.3.4 Recognize the benefits of renewable energy.

3.3.5 Serve as an advocate of renewable energy.

3.3.6 Ensure employees receive training to implement the policy and procedure.

3.4 Supervisor to:

3.4.1 Understand, and adhere to this policy and procedure.

3.4.2 Ensure employees are aware of this policy and procedure.

3.4.3 Ensure that ongoing monitoring of the effectiveness of the procedure occurs.

3.5 All Employees to:

3.5.1 Understand and adhere to this policy and procedure.

4. End of Policy

cochrane HOW THE WEST IS NOW	**Town of Cochrane Procedure**
Policy No.:	**2003-01**
Policy Title:	**Renewable Energy Framework Development and**
Department:	**Infrastructure Services**

1. Renewable Energy Framework

1.1 The Renewable Energy Framework will be used by Administration to raise awareness about renewable technologies and opportunities.

2. Appendix - Attached – Renewable Energy Framework

3. End of Procedure

Approval

Julian deCocq, C.A.O.

April 28/2015
Date

cochrane
HOW THE WEST IS NOW

Renewable Energy Framework

March 2015

URBAN systems

Renewable Energy Framework

PREPARED FOR:

Town of Cochrane
101 Ranchehouse Road
Cochrane, AB T4C 2K8

PREPARED BY:

Urban Systems Ltd.
#101, 2716 Sunridge Way NE
Calgary, AB T1Y 0A5

T: 403.291.1193

www.urbansystems.ca

Urban Systems File No.
1728.0217.01

March 2015

Table of Contents

Appendix


SIGN
STOKE

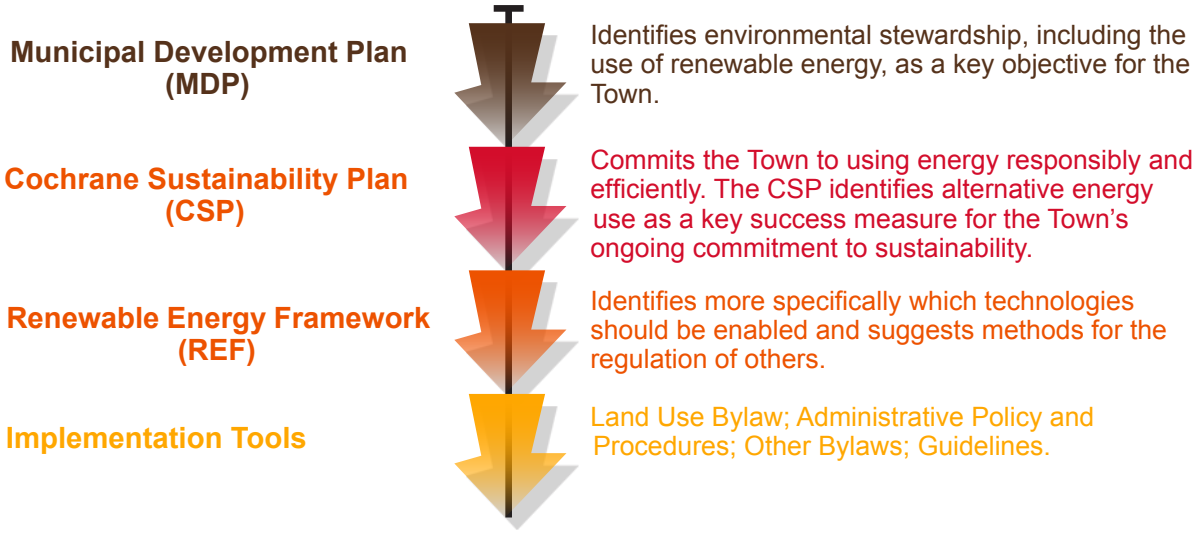
Renewable Energy Framework

This Renewable Energy Framework is intended to:

- Raise awareness about renewable energy technologies and opportunities in the Town of Cochrane;
- Identify which renewable energy options are feasible for Cochrane (for both the community and the Town's corporate operations);
- Suggest a clear process to manage the development of renewable energy in the community (to provide clarity for project applicants and Town Administration);
- Encourage the uptake of renewable energy;
- Identify opportunities for the Town to install and operate renewable energy projects;
- Guide the Town in becoming a municipal leader in renewable energy policy and projects.

Renewable Energy is Part of the Town's Vision:

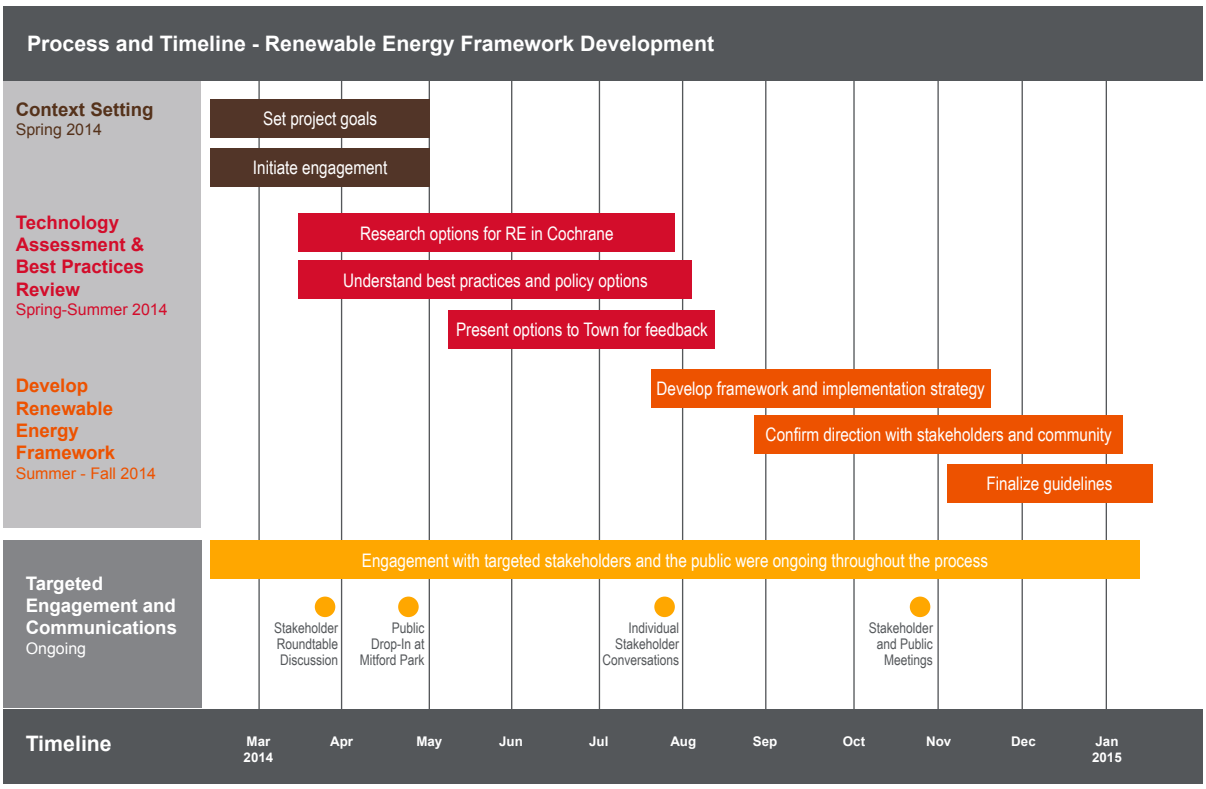
Pursuing renewable energy is consistent with the Town's vision for the future. The following graphic depicts key policies to support and set the stage for renewable energy, and identifies where the Renewable Energy Framework and subsequent Implementation Tools fit within the Town's overall policy framework:



Approach to Developing the Framework

The Framework was developed using input from a variety of activities:

- Conversations with key stakeholders and the public, renewable energy experts, and Town administration;
- Renewable Energy Options Analysis that assesses energy generation potential, value of investment and the socio-economic impacts of various different renewable energy technologies;
- Review of Canadian and American municipal best practices in the regulation and promotion of renewable energy technologies to identify policy and project examples feasible for Cochrane.



Renewable Energy Options Analysis

In order to understand which renewable energy options were best suited for the Cochrane, five technologies were comprehensively and contextually researched:

- Solar
- Geo-exchange
- Small wind
- Biomass district energy
- Micro-hydropower

The options analysis took into consideration the energy generation potential of the technology in Cochrane, as well as financial factors, including capital costs, value of energy produced, simple payback period and an internal rate of return. Also, socio-economic and environmental variables which might impact a technology's social license or level of acceptability within the community were considered.

A summary of the Renewable Energy Options Analysis can be found in Appendix A.

Stakeholder and Public Engagement

One of the key goals for the project was to raise awareness about the opportunities for renewable energy in Cochrane. To that end, and in order to generate input on which actions were preferred and why, public and stakeholder engagement took place over three separate events:

Topic	Event
Education and Project Context	Stakeholder Roundtable - (end March 2014) Public Drop-In at Mitford Park - (end April 2014)
Summary of Options Analysis & Draft Policy Guidelines	Stakeholder & Public Follow Up - (October 2014)

In addition, the project team gathered feedback from targeted stakeholders outside of the events outlined above including:

- Presentations at liaison meetings between the Town and local area developers;
- Rocky View School Division;
- Key individuals representing the No Wind Turbines in Cochrane group of stakeholders;
- Cochrane Environmental Committee;
- Cochrane Planning Committee.

Key themes emerged over the course of the stakeholder and community conversations:

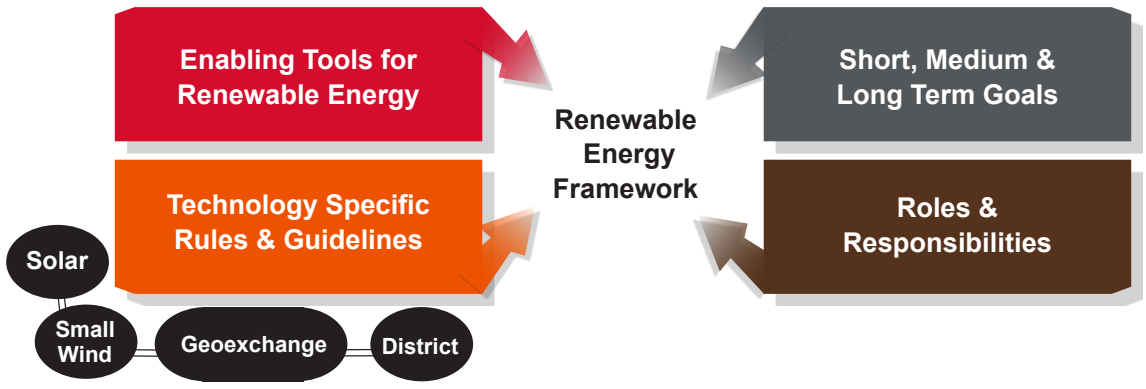
- Generally strong support for most technologies;
- Polarized support for wind technology;
- Request for careful consideration of potential health, noise, safety and view impacts associated with the technologies;
- Discussion in regard to incentives to offset costs associated with renewable energy;
- Strong support for Town pursuing renewable energy projects and enabling private projects.

A more detailed summary of the engagement conducted for this project can be found in Appendix B.

Framework Contents

The Renewable Energy Framework provides a clear process for development of renewable energy by establishing short, medium and long-term goals for the Town as well as identifying roles and responsibilities. Policy recommendations and associated guidelines for all technologies offer guidance to manage expectations from stakeholders and the public about different renewable energy technologies.

If implemented, the Framework can position the Town to capitalize on renewable energy technologies in the future. As well, the implementation of the Framework will support the Town of Cochrane in becoming a municipal leader in energy sustainability in Canada.



Short, Medium & Long Term Goals

for Renewable Energy in Cochrane

The Town of Cochrane will promote the awareness, use and uptake of renewable energy technologies. This framework proposes the following short, medium and long term goals*:

Short Term Goals (1-3 years)

- **Prioritize** and begin to implement the programs and guidelines outlined in this Framework.
- **Work to install** approximately $50,000 worth of renewable energy capital infrastructure (i.e. solar panels) within municipally owned buildings and assets.
- **Work to establish** a Renewable Energy Fund and/or establish a recurring budget item for municipal investment in a renewable energy project that is located in the Town. *See Appendix C for further details about a proposed Renewable Energy Fund model.*
- **Work towards** implementing a Solar Ready bylaw.
- **Undertake** a comprehensive feasibility study to explore the potential for a district energy system(s) in the downtown core, and existing/future high density development areas.
- Evaluate the potential for energy efficiency and conservation programs and projects in the community and the municipality. Prioritize and begin to implement the identified programs and projects.**

Medium Term Goals (3-10 years)

- **Update** options analysis to understand changes in renewable energy technologies, economics, and energy prices, and how these factors may impact investments in renewable energy. Continue to refine and update the Renewable Energy Framework.
- **Evaluate** all new subdivisions, buildings, and public facilities for their renewable energy potential.
- **Work to implement** a policy and procedure document that guides how the Town of Cochrane makes decisions about renewable energy investments. For example, this procedure would set out the extra investment over and above a business as usual case that would be permitted if it utilized a renewable energy source or technology.
- **Work to ensure** that ten per-cent of energy used in all new buildings (municipal and privately developed) will be generated by renewable energy.
- **Update** the Town's Greenhouse Gas Reduction Plan.**
- **Prepare** a Climate Change Adaptation Plan.**

Long Term (10+ years)

- **Work towards** the Cochrane Sustainability Plan target of 30 per cent of all energy used in the Town comes from renewable energy sources.
- **Work to ensure** that a Renewable Energy Fund has a re-occurring budget of at least $100,000 to spend annually on the implementation of renewable energy.

** The proposed goals are subject to annual Council budgetary approvals.*

*** Energy efficiency, conservation and climate change adaptation are not part of the scope of the Renewable Energy Framework. However, each was identified throughout the process as key initiatives for the Town to pursue to contribute to achieving the Town's overarching energy and sustainability targets.*

Roles & Responsibilities

The roles and responsibilities of the Town of Cochrane include:

Leader:

Means that the Town will explore options to become a municipal leader in renewable energy policy and projects. For example, the Town will encourage the update of, and ongoing education, about renewable energy, and pursue opportunities within its own operations to install and operate renewable energy projects.

Enabler:

Means that the Town will endeavour to create favourable conditions for the uptake of renewable energy technologies (i.e. establishing a simple/streamlined application process), and start to implement the goals included in this Framework.

Regulator:

Means that the Town is one of several regulators, and works within the provincial and federal legislative frameworks that govern renewable energy technologies. This will ensure that if private applicants wish to implement a renewable energy technology, a set of rules and regulations will be applied. These regulations are intended to ensure the safety and wellbeing of the residents and businesses in the Town.

Managing Renewable Energy Infrastructure

Context:

Renewable energy infrastructure installed on public land or buildings must be maintained and operated effectively over its entire life cycle. Like other types of infrastructure, in some cases a private entity or developer will install renewable energy technologies on land or buildings for which the Town will eventually assume ownership. Especially for new types of utilities and infrastructure, the Town needs to build its capacity with greater staff knowledge and understanding of long term safety procedures, data monitoring and operating/maintenance costs and procedures.

Desired Policy Outcome:

The Town will ensure that all renewable energy infrastructure installed on public land is maintained and operated effectively, especially considering the health and safety of the public and the financial cost/benefits for the Town.

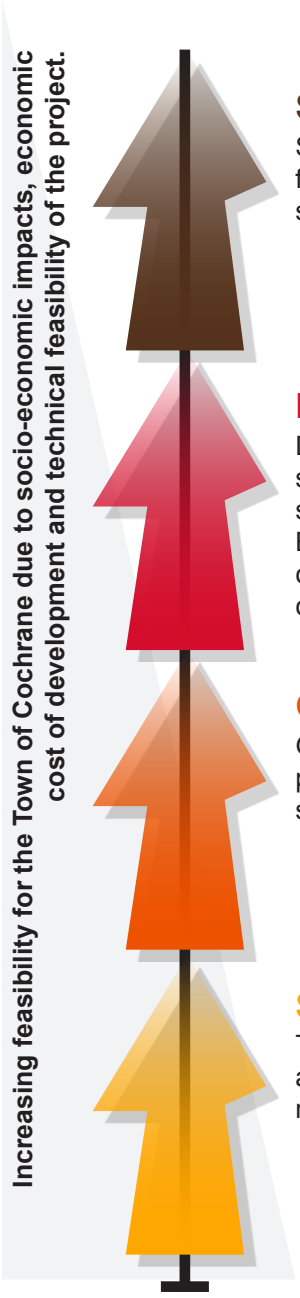
Potential Implementation Tools:

In cases where the Town will eventually assume ownership of renewable energy technology:

- The Town should, where possible, facilitate and encourage collaboration with a potential renewable energy developer/applicant to ensure the proposed technology makes sense in the context of the Town's existing policies and procedures;
- The Town should enter into an Agreement/Memorandum of Understanding with a renewable energy developer/applicant to outline transitional elements, including but not limited to:
    - Phased ownership;
    - Long term maintenance costs and procedures;
    - Insurance and Workers Compensation Board requirements;
    - Site servicing;
    - Safety procedures;
    - Decommissioning plan requirements; and
    - Data monitoring.

Renewable Energy Technologies

Summary of Policy:



Solar

Solar energy is a proven technology that can be easily implemented with few drawbacks. The Town will endeavour to promote, enable and implement solar projects in the community.

District Energy

District energy works well in higher density urban areas where there is a supply of renewable source (i.e. biomass) in close proximity. The Town will support and enable community district energy projects within urban areas. Because this technology is often applied to multiple sites the Town will work closely with applicants and will implement strategies that will enhance the community's suitability for district energy projects.

Geoexchange

Geoexchange systems are one of the most environmentally benign ways to provide heating and cooling solutions to a home or building. The Town will support and enable closed looped geoexchange energy projects.

Small Wind

The Town will permit small wind power projects under specific conditions and circumstances that will be assessed according to a series of rules and regulations (see detailed policy).

Solar Energy (PV and Thermal)

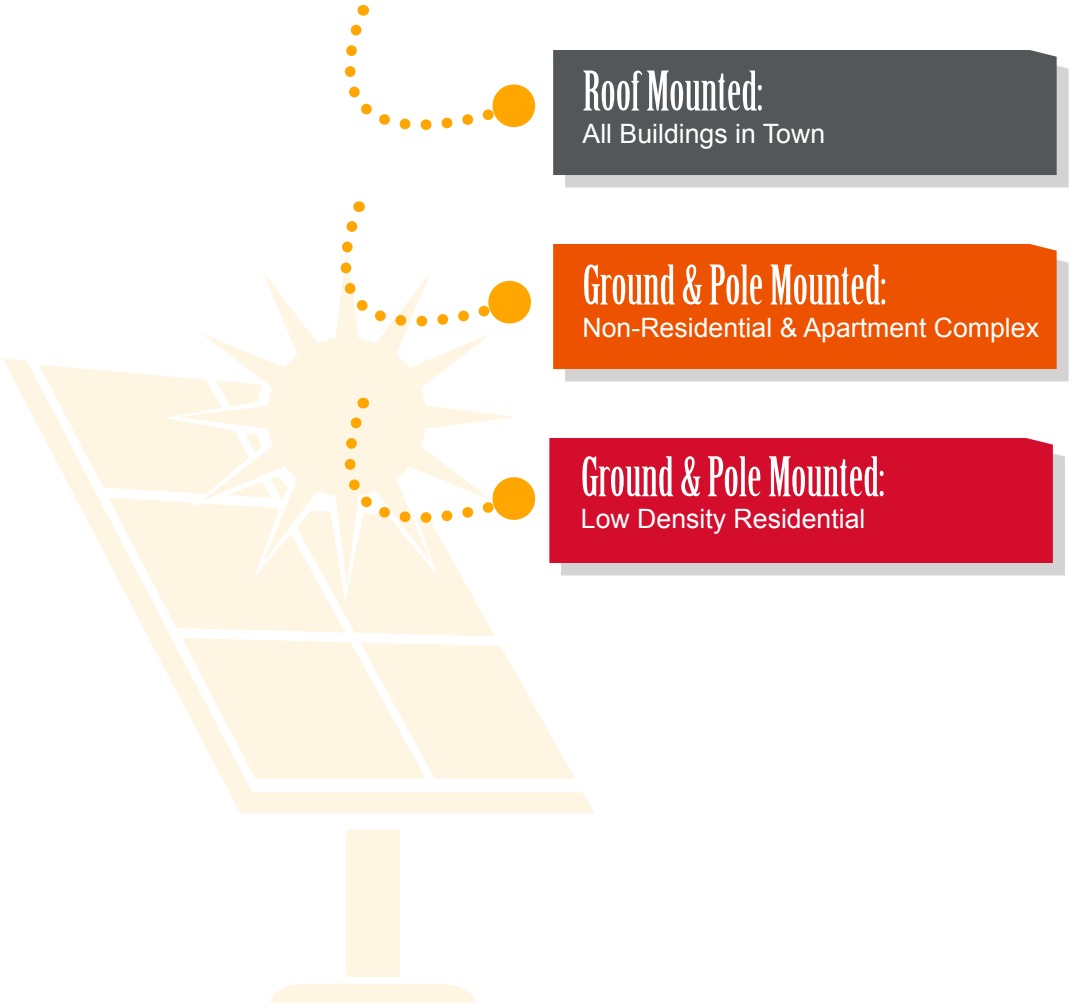
Context:

Solar energy is a proven technology that can be easily implemented within the Town. Solar energy systems do not produce greenhouse gas emissions and have minimal environmental and socio-economic impacts. Additionally, the price of solar equipment has reduced significantly over the past decade and will likely continue to do so in the future. At current electricity rates, solar PV can represent an attractive investment for residents and local businesses.

Desired Policy Outcome:

The Town of Cochrane will support and enable solar energy projects in the community. In certain applications, projects will be subject to specific guidelines and approval processes.

Types of Systems to be Enabled:



Solar Energy (PV and Thermal) - Continued

Roof Mounted:
All Buildings in Town

The Town will permit roof mounted solar energy systems under the following conditions:

- ✓ The system's equipment must be certified by the Canadian Standards Association (CSA);
- ✓ The system must meet all electrical and building permit requirements;
- ✓ The systems must not extend by more than two metres above the top of the roof;
- ✓ All studies must be prepared by a qualified professional.

Ground & Pole Mounted:
Non-Residential & Apartment Complex

The Town will permit ground and pole mounted solar energy systems in all land use districts except R-1, R-2 and R-3, under the following conditions:

- ✓ The system's equipment must be CSA certified;
- ✓ The system must meet all electrical and building permit requirements;
- ✓ The system must not exceed the building height on site, or the height regulations of the applicable Land Use District;
- ✓ All studies must be prepared by a qualified professional.

Ground & Pole Mounted:
Low Density Residential

The Town will consider permitting ground and pole mounted solar energy systems in low density residential areas (R-1, R-2 and R-3) with a Development Permit under the following conditions:

Community Engagement Requirements:
- As per standard Development Permit requirements.

Required Project Studies:
- Engineering study to ensure project is structurally sound and does not pose undue risk to the community;
- Site plan;
- All studies must be prepared by a qualified professional.

Height:
No greater than 3 metres.

Setback:
3 metres from rear and side lots. Not permitted in front yards.

CSA:
All project equipment must be CSA certified.

Approving Authority:
DP approval by a Development Officer.

Solar Energy (PV and Thermal) - Continued

Solar Ready Bylaw:

The Town of Cochrane will consider adopting a solar ready bylaw for new residential and commercial buildings.

The benefits of a solar ready building include, but are not necessarily limited to:

- Save on installation costs of future solar energy systems;
- Provide a low cost “upgrade” to new buildings;
- Encourage the uptake of solar energy technologies in Cochrane.

Cochrane is well situated to access some of the best solar resources in the country.

A Solar Ready building would be required to meet at least six basic requirements to support the installation of solar energy systems. These include:

- A roof location which is suitable for the installation of solar panels;
- Labeled conduits (thermal and/or PV) from the mechanical room to the attic/roof;
- Extra plumbing valves and fittings on the water heater and an electrical outlet at the planned solar tank location and/or;
- Extra capacity and space within the electrical panel to enable a PV system;
- Construction plans that indicate the future component locations; and,
- Other technical requirements to ensure the newly constructed building has the required features to make it possible to install a solar energy system at a later date. These requirements will be developed via input from the building industry and other technical experts.

District Energy

Context:

District energy systems refer to an energy distribution system that links multiple buildings to a central plant. The fuel source for these systems can be natural gas or renewable sources such as biomass or biogas. In some cases, the infrastructure is installed and the plant is operated with natural gas or renewable fuels. The feasibility of these systems are more attractive in dense areas. These types of systems require additional research and detailed feasibility to determine if there is a suitable application in the Town of Cochrane.

Desired Policy Outcome:

The Town of Cochrane will support and enable community district energy projects within urban areas. This will be done by working closely with applicants and implementing strategies that will enhance the community's suitability for district energy projects.

Potential Implementation Tools:

- The Town will undertake a comprehensive feasibility study that explores the potential for a district energy system(s) in the downtown core, other high density areas within the community and future development areas.
- The Town will identify opportunities to evolve policies and plans to foster land-use decisions that create favourable conditions for district energy systems. This includes investigating the applicability of zoning and density bonuses.
- The Town will establish standardized guidelines and technical standards to encourage the implementation of a district energy system.
- The Town will revise the building permit system by expediting and charging a more favourable fee for developments that are connected to a district heating system or that incorporate renewable heating technologies.
- The Town will explore and consider the costs and benefits of implementing a district energy ready building bylaw.
- The Town will develop a series of triggers that requires all new large-scale commercial, institutional and industrial developments to give consideration to the applicability of a district energy system.
- Where it has been determined that a district energy system is achievable, the Town shall require a development to incorporate the necessary infrastructure for district energy in the detailed engineering design stage, including hydronic systems and pre-servicing with insulated pipes within a dedicated trench in the public right-of-way. Where such pre-servicing is required on private lands, the owner shall provide the necessary easements or rights-of-way to the satisfaction of the Town.
- The Town will work with the retail gas and electric utilities to ensure that the maximum economic, technical and environmental synergies are captured as district energy is deployed.

District Energy - Continued

Conditions:

The Town will work to support and permit district energy systems under the following conditions:

- The project does not result in an increased usage of fossil fuels and greenhouse gas emissions relative to business as usual.
- The proponent accepts its fair share of costs associated with required infrastructure upgrades or impacts.
- All district energy system equipment will be CSA approved.
- The facility must meet all local, provincial and federal air quality standards and regulations.
- The fuel used to support a system must not be toxic, nor result in toxic emissions as defined by provincial and federal legislation.

Geoexchange

Context:

Geoexchange systems are seen as one of most environmentally benign ways to provide heating and cooling solutions to a home or building. At the time of writing this report, the economics of these systems are poor due to low natural gas prices, which are subject to change.

Desired Policy Outcome:

The Town of Cochrane will support and enable closed looped geoexchange energy projects in the community. All applications will be subject to specific guidelines and approval processes.

At this time, the Town will not consider permitting open looped geoexchange systems in any land use districts.

Potential Implementation Tools:

The Town of Cochrane will support closed looped geoexchange systems in all land use districts by streamlining the permitting approvals processes.

Conditions:

- Building and Electrical Permits approved by the Town of Cochrane.
- Geoexchange system is contained within the property.
- Project equipment is CSA certified.

Required Project Studies

- Site plan showing geoexchange bore field and tubing field, along with existing and proposed underground services and prepared by a qualified professional.

Geoexchange technologies can significantly increase the efficiency of heating and cooling systems within buildings.

For geoexchange systems that service multiple buildings or units the Town will work closely with the project proponent to ensure the necessary information is collected and made available to the Town for evaluation.

Small Wind

Context:

Small wind projects can be costly to install and operate, and in some cases these systems can present environmental, social or community challenges. At the same time, small wind systems that are appropriate for an urban setting can be incorporated unobtrusively and can offer benefits to a development.

Desired Policy Outcome:

The Town of Cochrane will support small wind power projects under specific conditions and circumstances where concerns and impacts associated with a specific project proposal are minimized.

Potential Implementation Tools:

Options to implement draft approval guidelines include:

- Developing a Wind Turbine Project Bylaw.
- Amending Land Use Bylaw.
  - Expected that wind turbines would be defined uses, and listed as discretionary in all cases.

Capacity and Height of Systems to be Regulated:

The Town will not permit any wind turbine projects within Town limits that are greater than 100 kilowatts or exceed a total height greater than 30 metres.

The Town will consider permitting small wind systems that have a total height of:

Greater than 12 metres but less than 30 metres

Less than 12 metres

Appendix D - Small Wind Turbine Decision Framework provides an overview of how the Town will make decisions about proposed small wind turbine projects based on the guidelines and standards outlined on the following page.

Small Wind - Continued

Greater than 12 metres but less than 30 metres

Figure 1 illustrates the areas of Town that are deemed potentially suitable for future small wind turbine development at heights between 12 and 30 metres and a rated capacity of 100 kW or less. These areas have been chosen based on their distance from expected future development and input collected from the community.

Community Engagement Requirements:

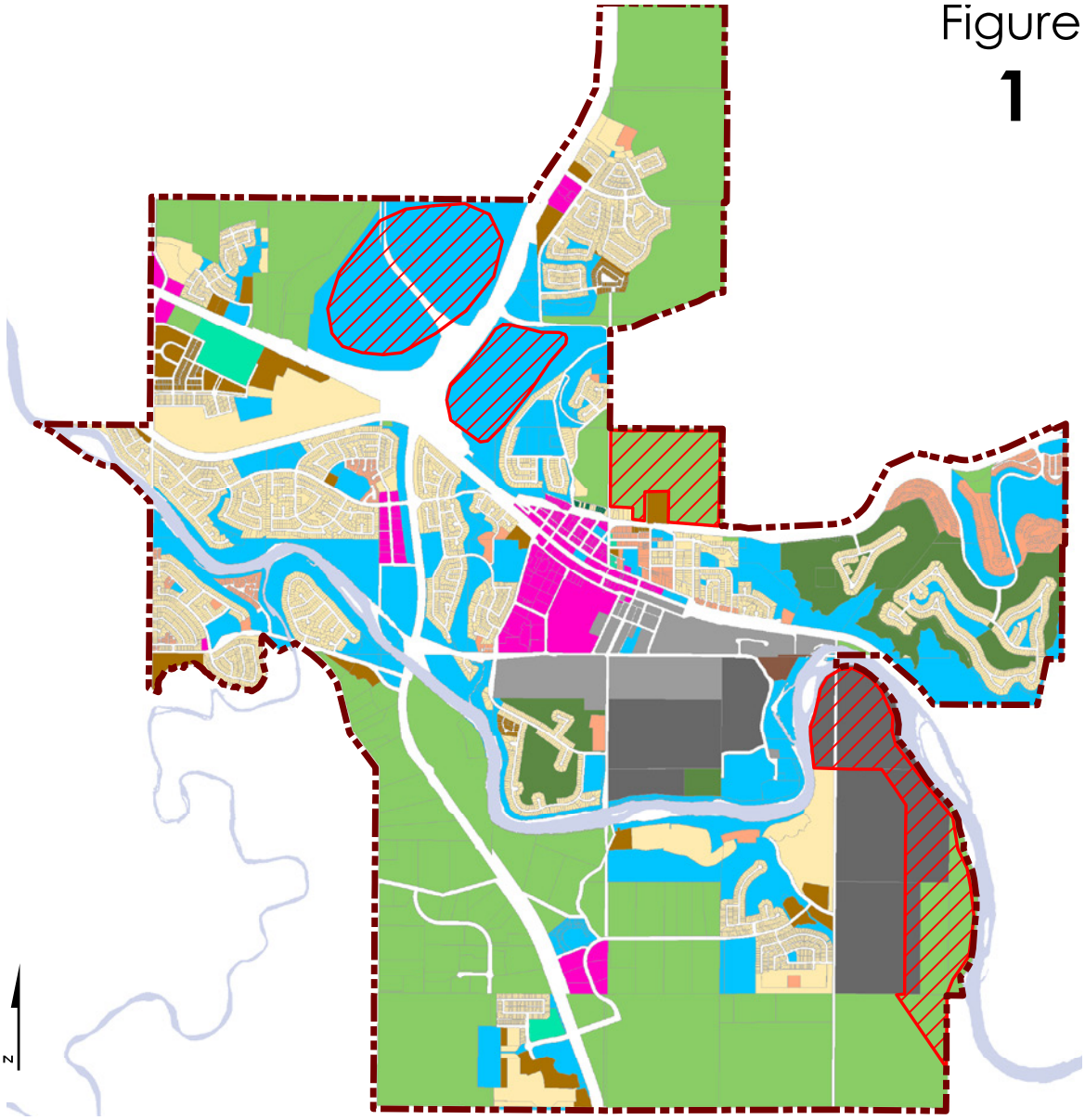
The proponent must:

- Notify and provide written project detail information to all landowners within a 550 metre radius.
- Provide two open houses to provide opportunity for community education and input.

Required Project Studies and Reports:

- Environmental review to characterize potential impacts to the natural environment.
- Noise Impact Assessment to determine that the turbine meets the Town's noise guidelines for wind turbines less than 10 kW. If the wind turbine has a rated capacity greater than 10 kW it must meet the requirements of the Alberta Utilities Commission's Rule 012.
- Shadow/Flicker Assessment to determine that no resident is negatively impacted from a project's shadowing and flickering.
- Written confirmation that the project will not require approvals from NAV Canada, Transport Canada and other Federal and Provincial agencies. If authorizations are required, these must be submitted prior to an application being made to the Town.
- Engineering study to ensure turbine and associated equipment is structurally sound and does not pose undue risk to the community.
- Site plan.
- All studies and reports must be prepared by qualified professionals.
- Open house report that summarizes the information collected and provides solutions to mitigate identified challenges.

Figure
1



Key

Potentially Suitable Areas for Future Wind Turbine Development (total height 12-30 metres)

Land Use (2012)

- Business Park
- Commercial
- Gravel Extraction
- Industrial
- Mixed Use - Commercial Residential
- Mixed Use - Heritage
- Public Service
- Recreational
- Residential - Low Density
- Residential - Medium Density
- Residential - High Density
- Urban Reserve

Renewable Energy Framework

Potentially Suitable Areas for Future Wind Turbine Development (total height 12-30 metres)

Date
2014.11.17

Project No.
1728.0217.01

Coordinate System
NAD 1983 3TM 114

Disclaimer
This map is prepared for the sole use of the Town of Cochrane. No representations of any kind are made by Urban Systems Ltd. or its employees to any party with whom Urban Systems Ltd. does not have a contract.

Small Wind - Continued

Greater than 12 metres but less than 30 metres

Conditions:

Height:

The wind turbine height (including rotor blade) is greater than 12 metres but will not exceed 30 metres.

Project capacity:

The maximum capacity of a small wind project shall not exceed 100 kilowatts (kW). The number of wind turbines erected per property parcel shall be a the discretion of the Approving Authority. However, the cumulative impact of the wind turbine project must meet all of the guidelines (capacity, setback, and noise).

Setback:

- The wind turbine must be setback 150 metres from the nearest residential property.
- Setback from wetland or water body is at the discretion of the Approving Authority and based on the results of the environmental review.

Noise:

- If the wind turbine has a rated capacity of less than 10 kW, the wind turbine must not exceed a nighttime noise greater than 35[1] decibels (dBA) as measured at the closest residential dwelling.
- If the wind turbine has a rated capacity of 10 kW or more, the wind turbine must meet the noise control requirements as outlined in Alberta Utilities Commission's Rule 012.[2]

Safety:

- The turbine project must include provisions to prevent unauthorized climbing of the structure.
- All wind power generating equipment must be CSA certified.

Approving Authority:

The Town will determine the appropriate decision making authority during the development and implementation of the Bylaw.

---

1 A Health Canada study found that at 46 db there are no direct health effects. 35 db was found to be the noise level in which wind turbines can cause annoyances to local residents. See Appendix E for more information.

2 The noise generated from a small wind turbine is clearly regulated by the Alberta Utilities Commission through their Rule 012 Noise Control. Noise evaluation is part of the AUC application process. Within the parameters of the MGA Section 619 (2), the Municipality is therefore strictly limited in its authority to regulate on the issue of noise through the development permit process. However, the AUC may take into consideration the regulations of the municipality when evaluating wind turbine applications.

Small Wind - Continued

Less than 12 metres

The Town will consider permitting small wind projects that are less than 12 metres high under the following conditions:

Community Engagement Requirements:

The proponent must:

- Notify and provide written project detail information to all landowners within a 100 metre radius.
- Provide a minimum of one open house to provide opportunity for community education and input.

Required Project Studies:

- Environmental review to characterize potential impacts to the natural environment if the project is within 220 metres of a wetland, water body or environmental reserve.
- Noise Impact Review to determine that noise guidelines can be achieved.
- Shadow/Flicker Assessment to determine that no resident is negatively impacted from a project's shadowing and flickering.
- Engineering study to ensure turbine and associated equipment is structurally sound and does not pose undue risk to the community.
- Site plan.
- All studies must be prepared by a qualified professional.
- Open house report that summarizes the feedback collected and provides solutions to mitigate identified challenges.

Conditions:

Height: The total project height (including rotor blade) will not exceed 12 metres.

Setback: The wind turbine must be setback a minimum of 36 metres from the closest property line, and a minimum of 12 metres from a play structure.

Suitable land use districts (discretionary): All districts.

Noise: The wind turbine must not exceed a nighttime noise greater than 35 decibels to the closest residential dwelling or other occupied building[1].

CSA: All project equipment must be CSA certified.

Approving Authority: The Town will determine the appropriate decision making authority during the development and implementation of the Bylaw.

[1] A Health Canada study found that at 46 db there are no direct health effects. 35 db was found to be the noise level in which wind turbines can cause annoyances to local residents. See Appendix E for more information.

Appendices

A - Renewable Energy Options Analysis Summary Report
B - Engagement Summary
C - Renewable Energy Fund
D - Small Wind Turbine Decision Framework
E - Summary of to 2014 Health Canada Study - Wind Turbine Noise

URBAN systems


cochrane
HOW THE WEST IS NOW

Appendix A

Renewable Energy Options Analysis Summary Report

URBAN systems

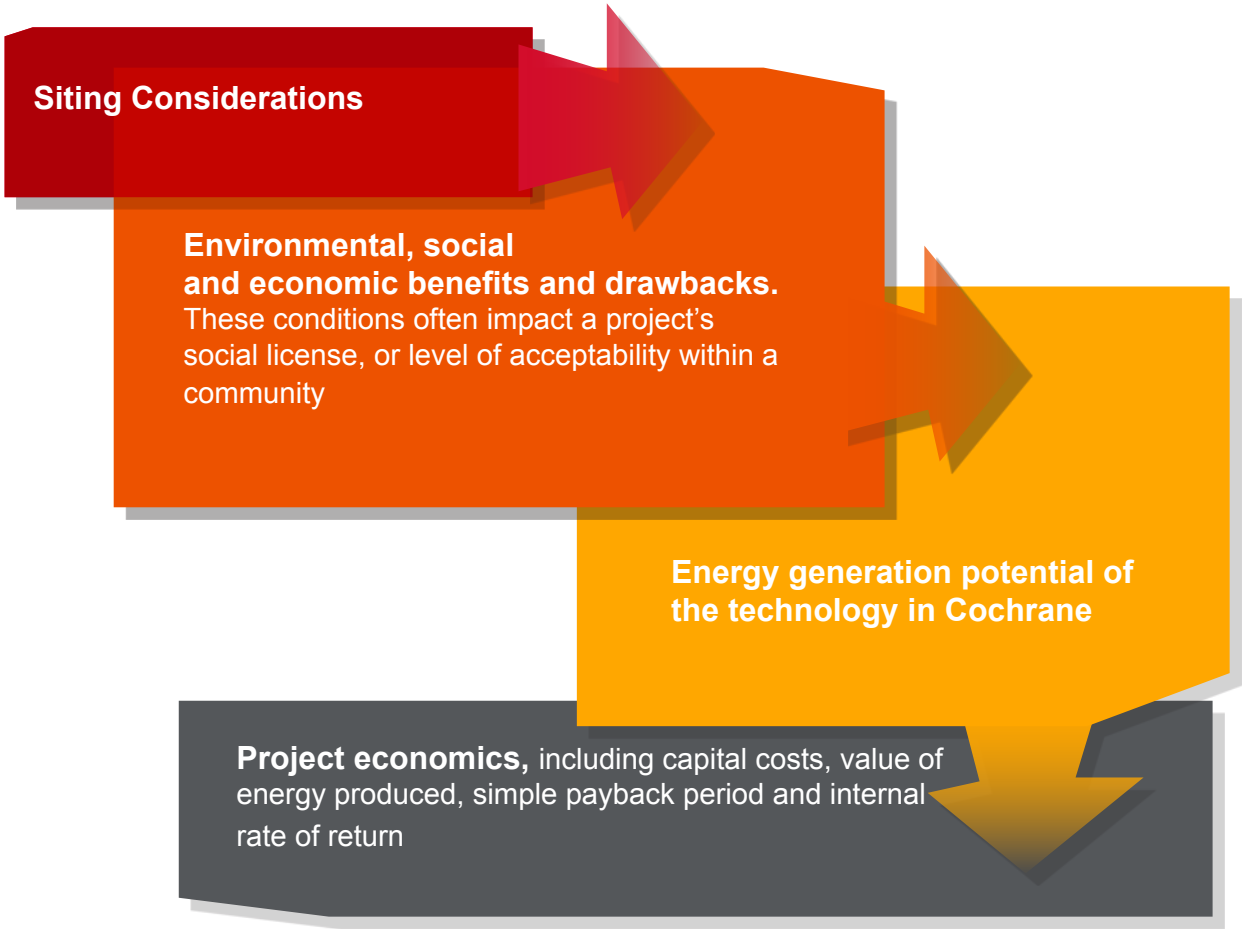

cochrane
HOW THE WEST IS NOW

The Renewable Energy Options Analysis

intends to fulfill a key objective of the Renewable Energy Framework Project:

Which renewable energy options are best suited for the Cochrane community?

The analysis completed in support of the Renewable Energy Framework (REF) takes a diverse approach on the notion of **'feasibility'** and **'suitability'**. For each technology the Town has considered :



The economic and financial assumptions used for the analysis are, as much as possible, specific to the Town of Cochrane and respective local energy service providers. These assumptions can have a significant influence on a project's total development costs, financial feasibility, and overall attractiveness as an investment opportunity. Electricity and natural gas rates are subject to uncertainty given Alberta's competitive market; should the market prices significantly shift, the viability of a renewable energy project will also change.

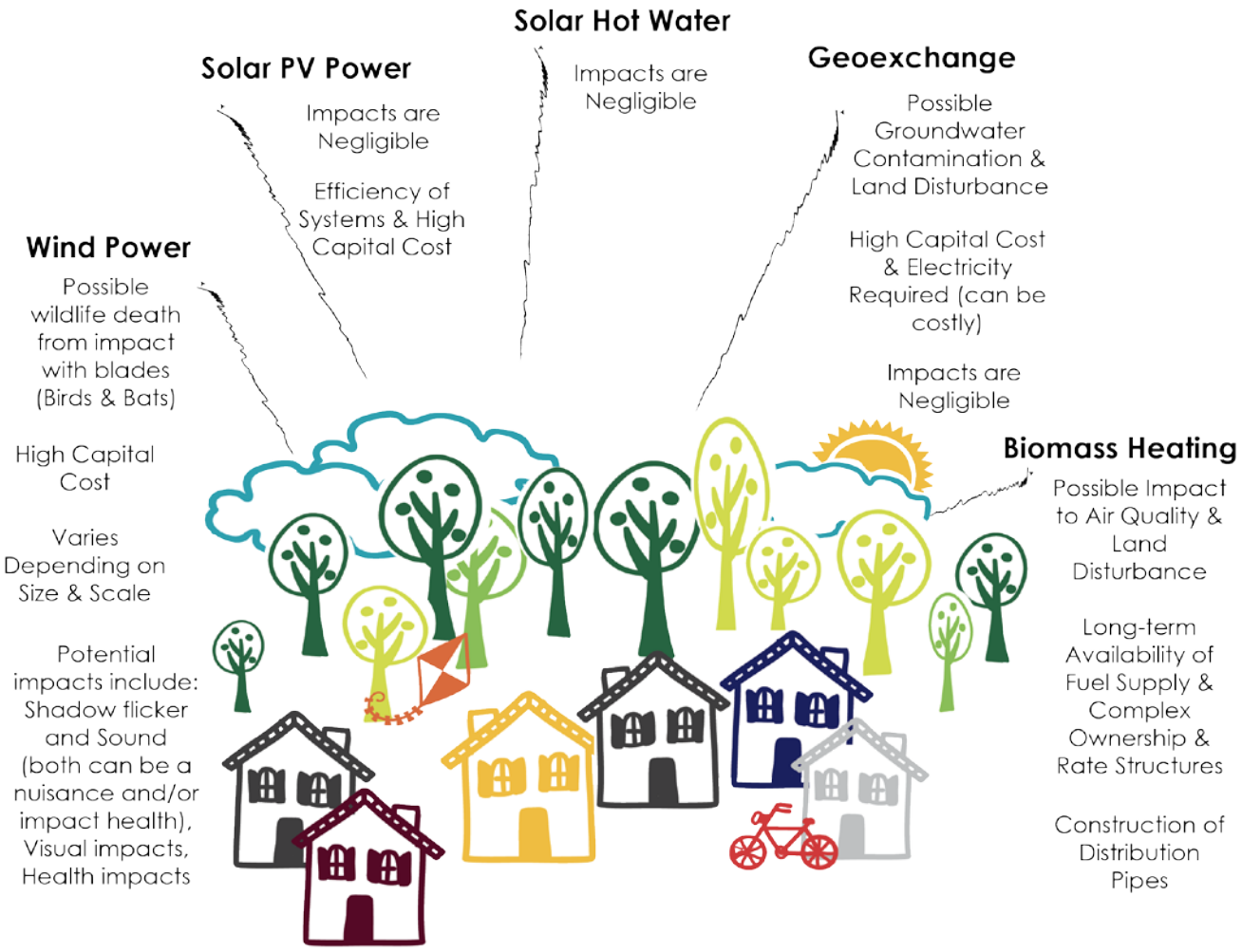
It is important to note that the presented scenarios are intended to illustrate the potential for renewable energy technologies in Cochrane. Project economics will vary depending on size, scale, and the suitability of the application. These are often best assessed on a case-by-case basis.

Benefits and Drawbacks of Renewable Energy

Traditional sources of energy, primarily fossil fuel energies like oil, coal and natural gas and large-scale hydroelectricity have significant environmental footprints, are becoming scarcer and more costly. Community-based renewable energy offer diverse environmental, economic and community benefits, and provide an opportunity to mitigate negative effects of traditional energy supplies. While all technologies have potential drawbacks, many can be mitigated through site specific considerations and best practices.

Key benefits for all of the technologies include:

- Produce little or no by-product such as greenhouse gases, air pollutants or other chemical pollutants; reduced water use and risk of contamination, reduced land use impacts, and minimal material waste production;
- Enhance the vibrancy of the local economy;
- Enhance local energy security;
- Revenue generation for local government from the sale of community produced energy;
- Retrofit or renew local infrastructure since many renewable energy projects can be incorporated into existing community infrastructure;
- Support more livable and vibrant communities as denser, compact communities are generally more amenable to community energy projects;
- Produce new partnerships and collaborations;
- Promotion of lifestyle choices surrounding reduction of environmental impact/footprint;
- Enhance local awareness regarding renewable energy or energy alternatives;
- Reduced dependence on ‘traditional’ sources of energy.



Environmental, Economic, Social

Potential Challenges of Renewable Energy Technologies

Wind

The feasibility of a wind project is primarily dependent on the wind speeds at the location and proximity of the site to where the energy will be used. Wind speeds can be optimized by increasing the height of the turbine and selecting the windiest areas.

A preliminary assessment of the wind resource in Cochrane indicates average wind speeds of 4.4 – 6.4 metres per second, and is considered to be marginal – poor quality. However, actual wind speeds will vary depending on site specific characteristics.

Both the 10 kilowatt (kW) and 50 kilowatt (kW) wind project scenarios were reviewed and would not likely be economically viable to the average homeowner or for the Town of Cochrane to consider due to the high capital cost and relatively low power output of small wind turbines. Both project scenarios likely have a significant payback periods and a negative return on investment. It may be that smaller wind turbines (i.e. < 5 kW) are more economically viable in different circumstances.

In the 50 kW scenario a sensitivity analysis indicates that the project could yield a positive return on investment if capital costs are reduced by 25% or electricity rates increase by 50%.

Solar PV

The feasibility of a solar energy project depends on the local solar radiation, site shading conditions, local climate conditions, value of electricity, and interconnection with the electrical grid. To maximize the electricity generated by solar panels, the panels should be in an area that is unshaded and allows for optimal orientation.

The price of solar PV equipment has reduced significantly over past decade and for many homeowners solar PV represents an attractive investment. Consider that between 2006 and 2011, the installed PV capacity in Canada grew from 20.48 MW to 558.74 megawatts (MW). In addition, the cost of PV modules has steadily decreased from $5.36/Watt to $1.52/Watt in the same period.[1] Since solar PV projects can be scaled to any size, so too can the investment into solar PV based on budget availability.

Cochrane has one of the best solar resources in Canada.

[1] *Natural Resources Canada. 2014. Environmental Health and Safety Impacts of Photovoltaic Technology. Available at: http://www.nrcan.gc.ca/energy/publications/sciences-technology/renewable/solar-photovoltaic/11934*

Based on the scenario assumptions, both residential and commercial solar PV projects in Cochrane could be economically viable depending on the economic expectations of the individual or organization. For example, a 5kW residential system involves an upfront capital cost of about $20,000. Electricity generated from such a system would be worth approximately $1,000 per year. The business case could become better if the project can be delivered if the system is constructed in a new building where some of the engineering costs are avoided and would be considered part of the overall design.

	50-kW Wind	10-kW Wind	10-kW Solar PV (Commercial System)	5-kW Solar PV (Residential System)
Energy Production Cost	**$277 / MWh**	**$602 / MWh**	**$127.8 / MWh**	**$120.7 / MWh**
Internal Rate of Return	**-2.1%**	**-8.4%**	**5.2%**	**5.7%**

Solar Hot Water

In Cochrane, solar hot water could provide up to 60% of a family's hot water needs. New homes built to be 'solar ready' offer an inexpensive way of setting the stage for future solar development. Panels can be installed at a much lesser cost when the prices decrease further.

Geoexchange

Geoexchange systems can be installed almost anywhere; however, generally areas with bedrock, till, and lacustrine deposits are more cost effective to drill. In Cochrane, the material deposited on the upland regions is till, and the lowlands is lacustrine making these areas potentially favourable for this technology. Based on the scenario assumptions, a residential geoexhange project in Cochrane would not likely be economically viable. Significant barriers include the relative low cost of natural gas combined with an increased adoption of high efficiency natural gas furnaces.

Natural gas is a relatively cheap fuel, which makes it challenging for heating projects such as solar hot water or geoexchange to compete with conventional, high efficiency furnaces. In BC, local governments are starting to require new homes to be constructed 'solar hot water ready' which makes eventual conversion to using solar hot water systems easier and less expensive. These bylaws provide a way of making it easier to transition to renewable energy if, and likely when, the costs of natural gas increase.

Biomass Heating

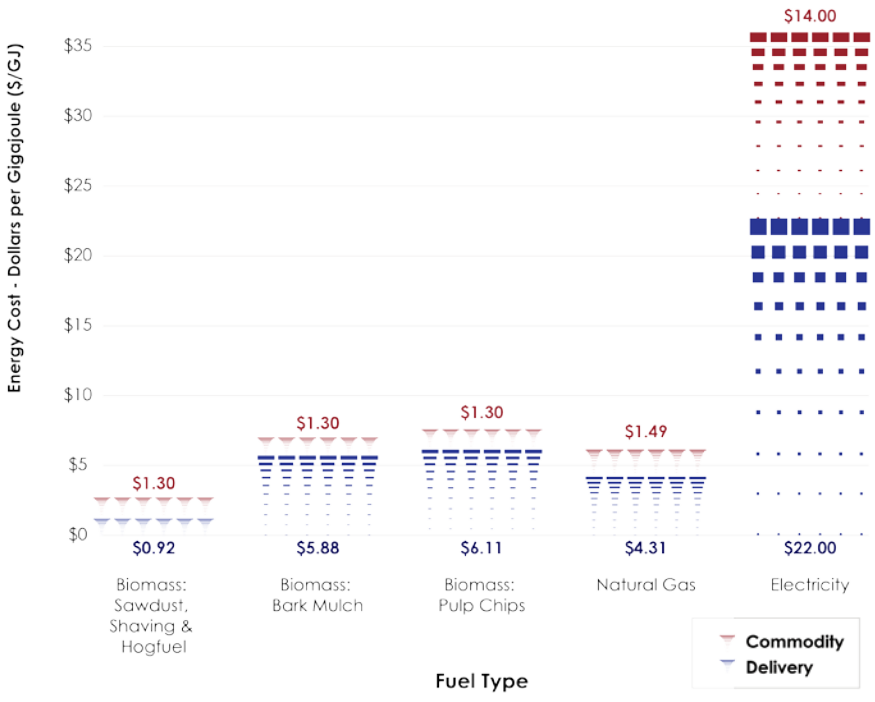
To develop a biomass heating project, it is first and foremost important to identify a secure and sustainable biomass source. Important characteristics of a sustainable feedstock are: availability, affordability, quality, and consistency.

Three potential sources of biomass near Cochrane were investigated: Spray Lake Sawmills, Brooks Sawmill, and wood waste collected at the Cochrane Eco Centre.

Staff at Spray Lake Sawmills, Brooks Sawmill, the Cochrane Eco Centre were contacted to determine details related to the types of products available, their quality, price, and quantity. The results are summarized in the graph below and show that mill waste such as sawdust, shavings and hog fuel could be available for approximately 60% less than the current price of natural gas and over 90% less than the price of electricity.

Although a specific biomass heating project has not been identified in Cochrane, for illustrative purposes project economics of a potential bioenergy project for a generic new commercial building 3.000 m^2 in size was evaluated.

Based on the scenario assumptions, developing a biomass heating system may not be economically viable. Although the relative cost of biomass is low compared with natural gas, the incremental capital costs of the system and that there are no efficiency savings to be gained, make it more difficult to yield a viable business case.



A lower cost biomass fuel source (or even one where revenues could be gained for disposing of wood waste), higher natural gas prices and/or a project with higher energy consumption could potentially yield a positive business case.

In general, biomass projects could be very viable with a use of a district energy distribution system that links multiple buildings to a central plant. The feasibility of these systems are more attractive in dense areas. The City of Vancouver, for example, is developing a district energy distribution network in high growth areas using systems supplied with natural gas. When renewable sources become economically viable, the systems can be more easily transferred.

Air Quality

With biomass heating projects, it is often the case that air quality conditions improve. This can be attributed to two key factors. Firstly, emissions from a single, well-managed facility are typically less than stack emissions from boilers and other heating units from individual buildings. Secondly, these systems can often lead to air quality improvements given the availability and opportunity to install best available technology emissions control equipment. Such equipment is often not required or too expensive for individual building boiler and heating systems.

Micro-hydropower

The Town also explored the feasibility of installing in-line turbines within existing water and wastewater infrastructure at sites throughout the community that have pressure reducing values. The exploration revealed that it is not feasible to install in-line turbines as there was insufficient flow to produce electrical power and recoup potential capital costs.

Conclusions

The results of this renewable energy options analysis confirm that small scale renewable energy projects don't have great economics unless there are optimal conditions. The value these projects offer to communities are more intangible. Solar photovoltaic projects offer the best energy generation potential and offer the greatest possible return on investment. Solar panels have been steadily decreasing in price over the last decade and these costs are expected to continue to fall as uptake increases. As well, solar projects offer few drawbacks in terms of environmental, social or community impacts.

Small wind projects can be expensive to install and operate, and are not considered to be financially viable. In some cases these systems can present environmental, social, or community challenges. At the same time, small wind systems appropriate for an urban setting can be incorporated unobtrusively and can offer important benefits to a development.

Renewable energy technologies that replace systems using natural gas - such as solar hot water or geoexchange - currently demonstrate poor feasibility considering the low cost of natural gas. However, in the case of solar systems, new homes built to be 'solar ready' offer an inexpensive way of setting the stage for future solar development.

While the biomass heating project assessed in this project did not generate a positive business case, it is likely that biomass heating could be viable in higher density areas such as the downtown and where several buildings are connected to one system (district heating model). It may be that a system fueled by natural gas could provide a stepping stone by utilizing the distribution technology, and the fuel source could be changed when economic conditions become more favourable. This option should be evaluated in greater detail during the planning stages for future development projects expected in the downtown core.

In order to accelerate the uptake of small-scale community based renewable energy technologies there will be a need to deploy creative techniques to support strong business cases for these projects. We recommend the focus of these efforts centre on solar photovoltaic and future district energy with biomass as a fuel source. The Town may also need to consider financial incentives to encourage the uptake of these technologies.

Appendix B

Engagement Summary

URBAN systems


cochrane
HOW THE WEST IS NOW

Renewable Energy Framework Engagement Summary

Introduction

On behalf of the Town of Cochrane, Urban Systems has assisted in developing a Renewable Energy Framework intended to:

- Raise awareness about renewable energy technologies and opportunities in Cochrane;
- Identify which renewable energy options are feasible for Cochrane (for both the community and the Town's corporate operations)
- Suggest a clear process to manage the development of renewable energy in the community (to provide clarity for project applicants and Town Administration);
- Encourage the uptake of renewable energy;
- Identify opportunities for the Town to install and operate renewable energy projects;
- Guide the Town in becoming a municipal leader in renewable energy policy and projects.

In order to raise awareness about the opportunities for renewable energy and generate input on which actions were preferred and why, public and stakeholder engagement took place over three separate events:

Topic	Event
Education and Project Context	Stakeholder Roundtable - (end March 2014) Public Drop-In at Mitford Park - (end April 2014)
Summary of Options Analysis & Draft Policy Guidelines	Stakeholder & Public Follow Up - (October 2014)

In addition, the project team gathered feedback from targeted stakeholders outside of the events outlined above including:

- Presentations at liaison meetings between the Town and local area developers;
- Rocky View School Division;
- Key individuals representing the No Wind Turbines in Cochrane group of stakeholders;
- Cochrane Environmental Committee;
- Cochrane Planning Committee.

Engagement Process & Timeline

March - April 2014 | **October 2014** | **December 2014** | **January 2015**

Education and Project Content
Initial conversations focused on context setting for the project and renewable energy education.

Draft Policy Guidelines
Follow-up sessions summarized the technologies options analysis and draft policy guidelines.

Framework Revisions and Follow-up
Feedback from the community directed revisions to the framework.

The revised document was presented to the Cochrane Planning Committee, Environmental Committee, Cochrane Environmental Community, the Developer's Liaison Committee, and circulated to community associations.

Participation

Overall, the community members and stakeholders we spoke with over the course of the project were passionate about renewable energy. People were appreciative that the Town was developing the Framework and bringing people together multiple times to discuss the options. In total we interacted with approximately 70 people over the course of the project. Many individuals participated from start to finish attending all of the engagement events.

For all of the stakeholder and public events, personal invitations were delivered to entice participation from identified groups and stakeholders: environmental groups, NGOs, technical and industry experts, community association representatives, schools, community members around the high school and businesses. As well, the public events were advertised in the local newspaper and on a website set up for the project: www.cochrane.ca/energy .

Throughout the process, we gathered contact information from stakeholders and community members and distributed project updates via a newsletter emailed directly to these individuals.

March – April 2014: Education and Project Context

1. Stakeholder Roundtable (end March 2014)
2. Public Drop-in at Mitford park (end April 2014)

The initial stakeholder and public conversations in March and April 2014 focused on context setting for the project and provided a high level overview of the renewable energy technologies that would be considered during the project.

For the public kickoff event in Mitford Park we tried to do something a bit different and also capitalize on another event that aligned well with this project. Our project team set up at Mitford Park during the Town's Rain-barrel and Compost Sale.

During both of the initial stakeholder meetings and public event key themes emerged:

- Generally strong support for most technologies;
- Polarized views on wind technologies in the urban context;
- Request for careful consideration of potential health, noise, safety and view impacts associated with all renewable energy;
- Discussion in regard to incentives to offset costs associated with renewable energy.

October 2014: Stakeholder & Public Follow Up - Summary of Options Analysis & Draft Policy Guidelines

In October we followed up with key stakeholders and the public to discuss the summary of the technologies options analysis and draft policy guidelines. We held two sessions over the course of the day and spoke with over 30 individuals.

Overall, feedback on the Draft Framework was positive. Strong support for all renewable energy technologies was expressed as well as for the short, medium, and long term goals that form part of the Framework. Many participants expressed a passion for enhancing local energy security with a reduced dependence on "traditional" energy sources.

Wind technology again proved to be the most polarizing topic, inspiring meaningful dialogue around potential health, safety and environmental impacts. Many participants took great interest in how small wind technology would be regulated and maintained with a focus on property setback guidelines. Group discussion focused on how to best integrate small wind technology into the Town of Cochrane.

Framework Revisions – December 2014

As a result of the feedback received at the stakeholder and public events held in the fall we revised the framework to reflect direction from the community. In particular we revised the small wind guidelines to better reflect the science of small wind turbine siting and associated noise guidelines, as well as perspectives from community members about the health and related impacts.

The revised document was presented to the Cochrane Planning Committee and Cochrane Environmental Committee in December-January for additional comments. As well, we engaged in follow up conversations with key stakeholders to discuss the evolution of the guidelines in the Framework.

Verbatim Comments from October 2014 Stakeholder and Public Engagement

At the October stakeholder and public events participants were encouraged to share written comments in regard to the renewable energy technologies and associated guidelines. A collection of unedited, verbatim comments is included below:

Short Medium and Long Term Goals:

- Is this funding structure sustainable? Local utility, local distribution.

Solar:

- Solar energy is a good idea as it doesn't interfere with those around you and it isn't an eye sore.
- What about solar incentives?
- Town of Banff re: solar program.

Small Wind:

- Decommission responsibility – who fall under.
- Full cost financing of life cycle turbine. How ensure?
- Ontario's 550m setback is arbitrary and was designated to address very large (>100m tall) turbines. It is not appropriate to apply this setback to smaller scale turbines.
- To the extent distance setbacks are used, they should be scaled to the size of the turbine. ie. 2x turbine height.
- Biophysical impact assessment is a good idea BUT what is the scope? How is it defined and by whom?
- Does the scope vary by size of turbine and/or technology?
- What are the criteria for birds, bats, water bodies?
- Does the Town have the in-house expertise to define these?
- How will sufficiency be determined?
- How will a BIA be used to review and decide projects?
- Make use of rules and guidelines already in place for wind regulation by the Alberta Utilities commission, Alberta Environment and Sustainable Resource Development.
- Don't reinvent the wheel.

- Stakeholders should include all the parents that have children going to the schools if the turbine is being placed in the school yard. Public service land tax payers.
- 100m is not enough.
- Is the setback is 220m then landowners within this range should be notified.
- 30m property line setback for 12m tall structures. How does this translate into 220m property line setback for 18m tall structures? This is arbitrary. What externally are you trying to regulate with distance?
- Our work has found that 100m setback is more than adequate to offset noise and other potentials s.a. shadow flicker.
- Regulating energy/kW –impacts aren't necessarily in the KW → regulate height etc not energy used i.e. 5Kw
- When you lower the turbine height you potentially allow shadow flicker to occur.
- I don't think wind power is a good idea anywhere within town limits. Eye sore, noise, flicker, loss of life to birds.
- I agree that the guidelines of 220m from bodies of water is a reasonable one.
- What about maintenance? How is that regulated?
- Who are the professionals for the shadow flicker assessment?
- If you want to make small wind work, the higher the turbine the greater the: power output, the less chance for shadow flicker and the less noise.
- A medical professional should be consulted before installing even 12 metres to a play structure (worry about children that suffer from seizures)
- Consider requiring operational monitoring and reporting of things like noise, wildlife and flicker.
- Setback: distance is an arbitrary regulation tool.
- Regulate based on impacts you actually desire to manage; noise (do a study), shadow flicker (do a study), safety – setback from property line (1.5x turbine height or similar) to cover topple distance, safety (CSA certification, engineering approval)
- Regulating based on arbitrary setback distances is a cop-out when there is a wealth of good science on wind turbines that can and should be used. Regulate turbine outputs that are predictable, measurable, and monitor-able.

Appendix C

Renewable Energy Fund

URBAN systems


cochrane
HOW THE WEST IS NOW

Renewable Energy Fund

The Town of Cochrane has committed to being a leader in the development of community based renewable energy projects. In support of this commitment the Town has proposed to develop a Renewable Energy Fund. The following provides an example of how a fund could be structured, though further details would need to be worked out prior to its implementation.

The proposed Renewable Energy Fund will initially require annual contributions from the Town's general revenues. Each annual contribution will be authorized by Town Council. It is proposed that the Renewable Energy Fund receive an annual allocation between $50,000 and $100,000 for at least the first 10 years of its existence. These funds will then be invested annually to support the development of the most financially viable renewable energy projects available to the Town.

Since renewable energy projects generate a source of revenue and/or cost-savings, it is anticipated that the Fund will be self-sustaining within 10 years, and eventually result in ever-increasing investments.

Increasing investments will be made possible by designing the Renewable Energy Fund in a manner that creates a "compounding effect"; similar interest in one's savings account[1].

Steps to develop a self-sustaining Renewable Energy Fund:

1. Establish required administrative and governance systems for the proposed Renewable Energy Fund;
2. Annually allocate funds to be invested into renewable energy systems;
3. Track energy produced from the renewable energy projects to monitor new Town energy-based revenues and/or savings;
4. (Re)allocate the revenues/saving to the Renewable Energy Fund;
5. On an annual basis, the resulting revenues/savings are then re-invested into the expansion of the Town's overall renewable energy portfolio.

1Compound interest arises when interest is added to the principal, so that, from that moment on, the interest that has been added also earns interest. This addition of interest to the principal is called compounding. A bank account, for example, may have its interest compounded every year: in this case, an account with $1000 initial principal and 20% interest per year would have a balance of $1200 at the end of the first year, $1440 at the end of the second year, and so on.

Appendix D

Small Wind Turbine Decision Framework

URBAN systems


cochrane
HOW THE WEST IS NOW

Small Wind Turbine Decision Framework

The following decision framework helps to determine whether or not a small wind turbine project proposal might be approved in the Town of Cochrane.

1. Size

< 12m / 100kW	>12m <30m <100kW	>30m >100kW
Is the proposal project less than 12 metres in height and less than 100kw in size?	Is the proposal project greater than 12 metres but less than 30 metres in height and less than 100kw in size?	Is the proposal project greater than 30m in height and 100 kw in size?

if yes

2. Setback

> 36m / >12m	> 150m	
Is the proposed project setback by at least 36m from the nearest property line and/or 12m from the nearest play structure?	Is the proposed project setback by at least 150 metres from the nearest property line and within area suitable for wind development (see Figure 1)?	Projects greater than 30m in height or 100kw in size are not applicable in the Town of Cochrane.

if yes

3. Noise

Noise
Is the proposed project able to meet the Town's /AUC's noise performance requirements?

if yes

4. Shadow / Flicker

Shadow / Flicker
Have shadow / flicker assessments ensured that no residential property will be adversely affected by the project proposal?

if yes

5. Environment

Environmental Review
Have the required environmental reviews determined the proposed project will not have an adverse impact on the natural environment?

if yes

6. Review

Documents
Have all supporting documents, studies and community engagement records been submitted to the Town for review?

if yes

7. Decision

If YES to all of the above, the decision goes to the Town to make a decision on the project proposal.

Appendix E

Summary of to 2014 Health Canada Study - Wind Turbine Noise

URBAN systems


cochrane
HOW THE WEST IS NOW

What the 2014 Health Canada Study Found:

Recent research by Health Canada *(Hc-sc.gc.ca, 2014)*[1] concludes that there is no evidence of a causal relationship between exposure to wind turbine noise and self-reported medical illnesses and health conditions.

In summary, the Health Canada study finds:

- No evidence to support a link between exposure to wind turbine noise and any of the self-reported illnesses and chronic conditions;
- No association between multiple measures of stress and exposure to wind turbine noise;
- No association between wind turbine noise and self-reported or measured sleep quality; and,
- No association between wind turbine noise and any significant changes in reported quality of life, or with overall quality of life, and satisfaction with health.

The study did find a correlation, but not a causal relationship, between increasing levels of wind turbine noise and annoyance. The Health Canada summary identified a number of other factors that may contribute to annoyance levels, including economic benefit, visual appearance and noise sensitivity.

1 Hc-sc.gc.ca, (2014). Wind Turbine Noise - Environmental and Workplace Health - Health Canada. [Online] Available at: http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/index-eng.php [Accessed 18 Nov. 2014].

URBAN
systems