

# ENERGY AND EMISSIONS PLANNING

made simple in the central kootenays



rapid assessment of  
community energy and emissions

# SUMMARY

The E<sub>2</sub> Tool, developed by Stantec, has been used by local governments in BC to forecast energy and greenhouse gas emissions for their community, as well as to assess the impact of reduction measures. Driven by a desire to establish an Official Community Plan template for electoral areas and to set suitable targets for compliance with Bill 27, the Regional District of Central Kootenay (RDCK) hired Stantec Consulting in Vancouver BC to establish an OCP toolkit and to explore what policies and actions and targets they might expect to achieve. The E<sub>2</sub> Tool is both an assessment tool as well as a decision support tool for local governments looking to set achievable energy and emissions reduction targets and define policies and actions to assist in meeting them.

# BACKGROUND

The Regional District of Central Kootenay (RDCK) is bounded in the north by the Columbia-Shuswap Regional District, to the east by the East Kootenay Regional District and to the west by the Kootenay Boundary and North Okanagan regional districts. The District is comprised of nine incorporated municipalities (the cities of Castlegar and Nelson, the Town of Creston and the villages of Kaslo, Nakusp, New Denver, Salmo, Silverton and Slocan) and eleven mainly rural electoral areas.

The RDCK recently developed an OCP (Official Community Plan) template for use in its unincorporated areas. This OCP template incorporates sustainability features as well as the provincially legislated requirement to define GHG emissions reduction targets, policies and actions within Official Community Plans. The E<sub>2</sub> Tool (Community Energy and Emissions Tool), developed by Stantec, was used by the RDCK to develop community-specific targets. To leverage the opportunity, the municipalities of Nakusp, Kaslo and Creston also joined the RDCK in the collaborative process of evaluating and assessing targets specific to their communities.

*“While energy and emissions modeling can get very complicated and technical, most local governments need a tool to provide high-level assessment for fast decision-making. The E2 Tool provides such a simple, fast and inexpensive option for communities to understand and evaluate their energy and emissions.” – Ron Macdonald*

# THE E<sub>2</sub> TOOL

E<sub>2</sub> does not rely on special software. It is a Microsoft Excel-based tool, allowing for easy updating and flexibility. The tool can be used to:

- Develop forecasts of energy consumption and greenhouse gas (GHG) emissions for milestone years (2010, 2015, 2020, 2025, 2030) to 2050
- Assess and quantify the GHG reduction potential of various emissions reduction measures (i.e. policies and actions)
- Support decision-making through interactive evaluation of options and activities around which emissions reduction measures to pursue at the community scale
- Set energy GHG emissions reduction targets

E<sub>2</sub> was developed for use at the community scale, including Electoral Areas, and can be used by any size of community. The tool allows for rapid assessment with limited resources; using publicly available data and pre-set and customized emissions reduction measures. No specialized data sets or background studies are required.

## ESTIMATING COMMUNITY-WIDE EMISSIONS

E<sub>2</sub> can be used for any community-wide emissions where baseline data is available. The tool has been used for residential and commercial buildings, personal vehicle and commercial transportation, solid waste, and agriculture. It may also include industrial buildings if baseline data is available.

## MODEL INPUTS

The data inputs for E<sub>2</sub> include freely available data. Minimizing specialized data sets was a key requirement since not all communities have detailed statistics or studies available.

Key data requirements for the base model predictions include:

- Statistics Canada population and housing data,
- Community Energy and Emissions Inventory (CEEI) or equivalent community-scale energy and emissions inventory data
- Estimates from staff, or other sources of the possible population growth.

The tool accounts for both the impacts of population growth and other initiatives by higher levels of government. Population growth results in increased energy consumption and GHG emissions. Provincial and Federal initiatives accounted for include increased fuel efficiency standards for passenger and commercial vehicles, and proposed building code and equipment improvements.

Additional information that can be used in more customized settings includes housing forecasts, or estimates of changes in housing types, forecasts of commercial development and land use, actual or forecasted building permit data, demographic studies, etc.

## PROCESS

$E_2$  relies on a very simplified process that involved the following steps:

**STEP 1:** Input available data (CEEI and Statistics Canada).

**STEP 2:** The user defines a series of energy and emissions reduction measures (policies and actions) relevant to the community. There is an option to select measures from a pre-defined library of actions OR to create new measures. A combination of the two is permitted.

**STEP 3:** For new measures defined by the user, the user will have to define:

- the reduction potential (e.g., % reduction in GHGs or % improvement in energy efficiency), and;
- the level of uptake (e.g. % of homes that will undergo energy efficient retrofits by 2020).

Combining these two values gives the overall estimated impact of the measure. For pre-defined measures, the reduction potential is provided (based on research), but the user can select a level of uptake that suits the community in question. Where deeper analysis is required, actions and measures can be further assessed to fully understand the uptake / reduction potential – for instance, by adding additional transit stops a general assumption can be made based on local knowledge and research or standard spatial software (such as GIS) can be used independently of the tool to help inform the uptake and reduction potential inputs.

Example:

- Reduction potential: If a new commercial building meets the Leadership in Energy and Environmental Design (LEED) Gold standard, it is expected that the building will consume 40% less energy than a new commercial building that meets current building code.
- Level of uptake: If the local government provides a financial incentive to encourage commercial developers to meet the LEED Gold standard (for instance, a discount or rebate on building permit fees or development cost charges), it could be estimated that 15% to 30% new buildings will be built to meet this standard. Defining the uptake is a subjective activity though it is usually informed by the strength of the measure that the community wishes to deploy (e.g. information/outreach, non-financial incentive, financial incentive, and regulation). For example, an outreach campaign may result in a small portion of the population (e.g. <1% to 10%) adopting a particular action or behaviour, whereas providing a financial incentive may result in a larger uptake rate. Regulation has the greatest uptake, though it is not always permitted as a tool.

Based on the data provided,  $E_2$  calculates the impact of the selected measures and provides a visual display of electricity, energy and GHG emissions reductions anticipated as a result of the successful implementation of the chosen measures. The user may then add or remove measures or experiment with the level of uptake to see the impact on the reduction targets.

## BUILT-IN ASSUMPTIONS AND CALCULATIONS

Given that  $E_2$  makes use of available data (i.e. CEEI and Statistics Canada), methodologies and assumptions associated with the compilation of this data are implicit. The tool is explicit about assumptions made in forecasting and target-setting, including:

- growth rates used to project population growth in business-as-usual forecasts
- efficiency improvements as a result of senior government legislation or policy statements such as provincial building code improvements, and federal vehicle fuel efficiency standards (these assumptions are “pre-quantified” but can be modified)
- assumed efficiency improvements associated with specific measures (e.g., building energy efficiency of green buildings, fuel efficiency through fleet management, etc). These are based on a library of activities built up through research.

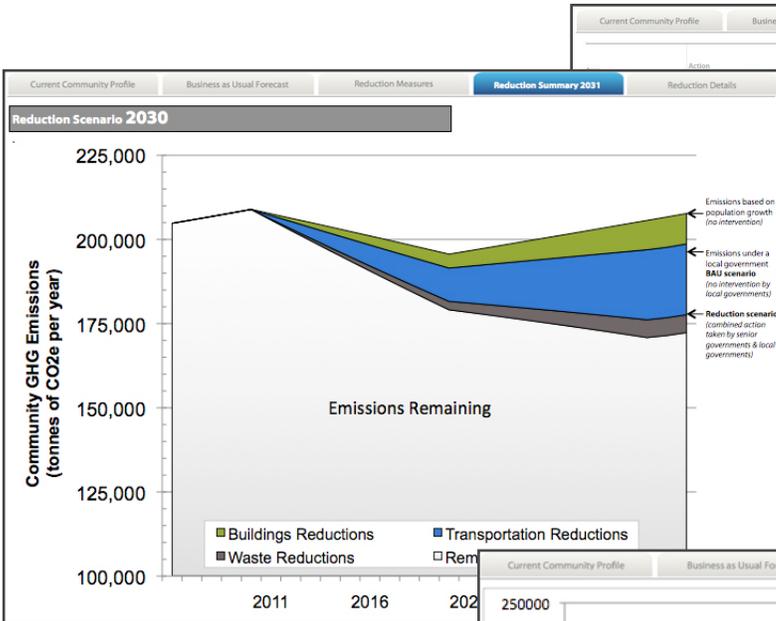
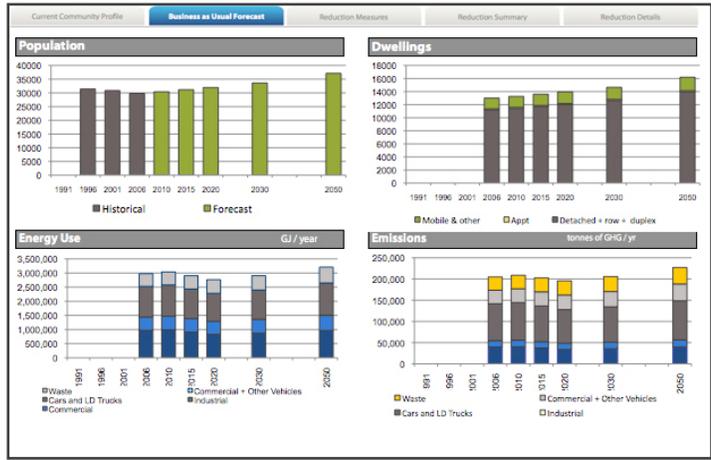
Additionally,  $E_2$  provides the user with the opportunity to fill in additional measures, which must be accompanied by assumptions around reduction potential and level of uptake (of the measure).

## RESULTS OF THE MODEL

Sample outputs from  $E_2$  are shown in Figures 1 through 5 on the pages that follow and include:

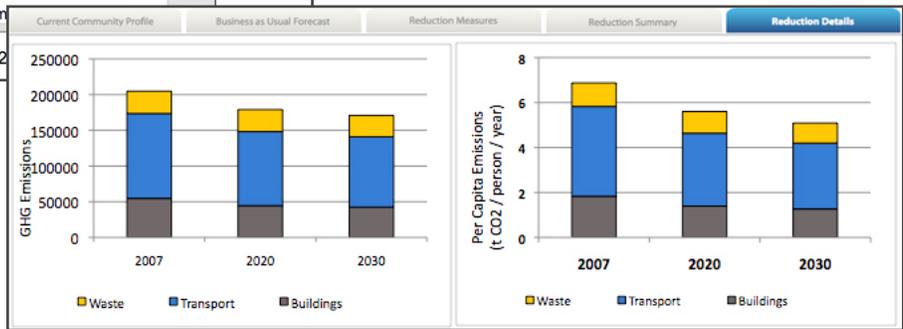
- A community profile highlighting population, dwellings, vehicles, annual energy use, energy spending and GHG emissions
- A business-as-usual forecast of energy and emissions based on population growth and housing projections
- A table of actions or measures that may serve as the basis for a community climate action plan
- An estimate of anticipated reductions by sector, including: reductions that are anticipated as a result of senior government activities; reductions that are anticipated in the buildings, transportation, and waste sectors as a result of local government activities (from user defined actions mentioned above), and; an additional 10% reduction for measures that are yet to be defined but are likely to present themselves in the next 5 to 20 years (2015 to 2030).
- A series of short, medium and long term energy and GHG reduction targets for a defined set of years (usually 2020, 2030 and 2050)

To maintain its “rapid assessment” efficiency,  $E_2$  does not provide a spatial representation / mapping as an output, but spatial data can be used as an input to inform the accuracy of the inputs as described earlier.



**Reduction Measures**

Action	Emissions Sector	[A] Savings for those that do it (%)	[B] UPTAKE (What share of the population do this by 2030? (%))	[C] Net Result (% of the sector)
Existing Residential Buildings	Existing Residential Buildings	30%	30%	9.0%
NEW Residential Buildings	NEW Residential Buildings	30%	25%	7.5%
Existing Commercial Buildings	Existing Commercial Buildings	30%	25%	7.5%
NEW Commercial Buildings	NEW Commercial Buildings	40%	25%	10.0%
Personal Vehicles	Personal Vehicles	5%	5%	0.0%
Personal Vehicles	Personal Vehicles	5%	15%	0.8%
Personal Vehicles	Personal Vehicles	5%	20%	1.0%
Personal Vehicles	Personal Vehicles	5%	20%	1.0%
Existing Residential Buildings	Existing Residential Buildings	10%	25%	2.5%
Waste	Waste	30%	56%	19.8%
Waste	Waste	30%	90%	27.0%
NEW Commercial Buildings	NEW Commercial Buildings	60%	10%	6.0%
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
2011-2030	Total Emissions		100%	0.0%



## TOOL APPLICATION

Once data has been inputted, the E<sub>2</sub> Tool can be used in a workshop setting as a starting point for discussions on setting community-wide targets. While setting targets can seem quite nebulous for most local governments; the tool helps to demystify the process by creating an understanding of the relationship between various policy instruments and their impact on reducing energy and emissions. E<sub>2</sub> provides local governments and community stakeholders with the opportunity to experiment with different policies and actions and see the effect of these different approaches on reducing energy and emissions. In doing this, the tool makes targets seem more tangible as users gain an understanding of the level of effort required to realize reductions in energy and emissions.

# ENGAGEMENT AND GOVERNANCE

The E<sub>2</sub> Tool has been used by several communities in BC. Specifically, it was used by the Regional District of Central Kootenay (RDCK) and the member municipalities of Nakusp, Kaslo and Creston to set community-wide GHG emissions reduction targets and to define policies and actions to achieve the targets. The target-setting exercise was carried out as part of the RDCK's Integrated Community Sustainability Planning process, which aims to guide the various Official Community Plans (OCPs) and ongoing discussions on sustainability and respond to provincial legislative requirements to set GHG reduction targets and incorporate them into OCPs.

Key players involved in the project included planning staff from the Regional District and the member municipalities of Nakusp, Kaslo and Creston. Staff were interviewed to explore potential reduction activities that might apply in their context. This was done remotely, but could also have been done as an interactive workshop where staff come together to explore measures and the impact on targets. Based on the initial reduction measures identified, the tool was run and the Regional District and participating member municipalities were provided with a summary report (based on the outputs of the tool) for their review and feedback, prior to finalizing targets for inclusion in their OCPs.

## POLICY FRAMEWORK

The project was largely driven by legislation enacted through the Local Government (Green Communities) Statutes Amendment Act (Bill 27, 2008), which requires local governments and regional districts to set GHG emissions reduction targets and incorporate them (along with policies and actions to achieve them) into Official Community Plans and Regional Growth Strategies.

The project was enabled by the Province's work to develop community energy and emissions inventories (CEEI) for all local governments in BC. Without the CEEI, a great deal of additional work would need to take place to gather data and compile inventories prior to using a tool such as this to develop community-wide targets.

This work ensures that energy and emissions impacts are considered in long-term planning within RDCK communities. GHG emissions reduction targets serve as goalposts to guide future decision-making, while OCP policies enable local government staff to implement land use practices that support compact, energy efficient, sustainable communities. Nakusp reinforced the energy and climate benefits of actions already defined in the OCP and identified a number of policies that were included in their OCP update. An anti-idling bylaw was adopted and energy potential from the hot springs will be investigated.

# IMPLEMENTATION

The GHG target piece was part of the bigger one-year long SustainABLE Central Kootenays project. The GHG assessment portion of the work was completed relatively quickly though use of the E<sub>2</sub> Tool – about one week to generate the draft outputs and some time was allowed to present, review and provide feedback on the data.

# BARRIERS AND BREAKTHROUGHS

Local governments, especially those in small, rural communities, often lack the internal capacity, time, or the financial resources to undertake detailed land use or planning studies. As well, for the purposes of setting targets, there are many unknowns in the future, and the accuracy of long term forecasts is obviously poor.

The E<sub>2</sub> Tool provides a complete package of information in a user-friendly format that allows staff to easily develop targets, and define policies and actions that will work for the community. The potential to use the tool in a workshop setting and the visual outputs from the tool allow local governments to develop and communicate targets, policies and actions in a highly visual and engaging way.

# RESULTS

E<sub>2</sub> allowed for a very cost effective, high level review of data that formed the basis for local discussions about energy and emissions in the community(s) involved. It communicated information in concise, graphic form that made it easy to understand and share with decision-makers.

# CONTACTS

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