

FORMAT		
1. Name of resource	RETScreen Expert	
2. Location	https://www.nrcan.gc.ca/maps-tools-publications/tools/data-analysis-software-modelling/retscreen/7465	
3. Alternative location	https://openei.org/wiki/RETScreen_Clean_Energy_Project_Analysis_Software	
4. Author[s]	Natural Resources Canada (NRCan)	
5. Publisher/producer/host	Government of Canada	
6. Year	Initial release 1998, version 8 released 2020	
7. Suggested citation	RETScreen Expert, available at https://www.nrcan.gc.ca/maps-tools-publications/tools/data-analysis-software-modelling/retscreen/7465	
8. Languages in which available	English, Arabic, Bengali, Bulgarian, Chinese, Croatian, Czech, Danish, Dutch, Farsi, Finnish, French, German, Greek, Hindi, Hungarian, Indonesian, Italian, Japanese, Korean, Macedonian, Polish, Portuguese, Romanian, Russian, Serbian, Spanish, Swahili, Swedish, Tagalog, Telugu, Thai, Turkish, Ukrainian, Urdu, Vietnamese	
9. Geographic area resource relates to	Worldwide	
10. Does the resource relate to a specific time frame?		
11. Type	Report	
	Toolkit/Framework/Roadmap	Yes
	Sign-post to other resource (database)	
	Case studies	Yes
	Other	Software – analytical tool, videos.
12. If this is part of an initiative, what is the initiative?	RETScreen Expert is a tool used in many energy management initiatives, including the Greening Government Operations for the Government of Canada, and worldwide.	
COLLECTIONS AND COLLECTIONS-BASED INSTITUTIONS		
13. Explicit links to collections	No	
14. Explicit links to museums/libraries/archives	No	
15. Types of institutions the resource covers	Museums	X
	Archives	X
	Libraries	X
	Other	Any facility or

		energy project
16. Types of collections/disciplines the resource covers	Arts, humanities and social sciences: philosophy, psychology, religion, social sciences, law, politics, language, arts and recreation, architecture, literature, history, geography and ethnology, anthropology, archaeology	
	Science, natural history, technology, medicine, engineering, manufacturing	X
17. If no explicit links to collections, justification for inclusion	RETSscreen Expert can be applied to any building or institution, including museums, libraries and archives.	
HOW IT CONTRIBUTES TO SUSTAINABLE DEVELOPMENT		
18. Collections-related activities the resource relates to (mark all that apply)		
Develop collections to protect and safeguard wider cultural and natural heritage more effectively, for example by targeting collecting to threatened forms of heritage in strategic ways		
Use collections to promote learning and educational opportunities that contribute to sustainable development more effectively, for example education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development and/or skills development relating to collections		
Use collections to promote cultural participation/social inclusion more effectively, for example by reducing barriers to participation, to ensure no-one is 'left behind'		
Use collections to promote sustainable tourism more effectively, for example by developing new products based on local cultural heritage, and/or considering the rights of stakeholder groups in relation to collections		
Use collections to support research that contributes to sustainable development (including all forms of personal and self-directed research at all levels that make use of stored collections) more effectively, for example by providing effective facilities, collections and information to meet researchers' needs		
Make decisions around collections that contribute to sustainable development more effectively		X
i. employment (recruiting, staff training, staff safety)		
ii. energy consumption, greenhouse gas emissions, reduction, monitoring and reporting		X

iii.	waste management and reduction of waste	
iv.	transport (forms of transport, energy use)	
v.	commercial activities including copyright and IP	
vi.	governance and management	X
vii.	security, disaster preparedness and risk reduction	
Direct external leadership, partnerships and collaborations towards sustainable development more effectively , for example by developing impactful partnerships		
19. Does the resource relate clearly to any international conventions (mark all that apply)?		
Culture conventions:		
1952, 71 Protection of Copyright and Neighbouring Rights		
1954 Protection of Cultural Property in the Event of Armed Conflict		
1970 Fighting Against the Illicit Trafficking of Cultural Property		
1972 Protection of the World Cultural and Natural Heritage		
2001 Protection of the Underwater Cultural Heritage		
2003 Safeguarding of the Intangible Cultural Heritage		
2005 Protection and Promotion of the Diversity of Cultural Expressions		
Rio Conventions:		
Convention on Biological Diversity (CBD), Convention to Combat Desertification (UNCCD), Framework Convention on Climate Change (UNFCCC)		X
AIMS AND CONTENT		
20. What issues does the resource aim to address?	<p>“RETScreen® is a Clean Energy Management Software system for energy efficiency, renewable energy and cogeneration project feasibility analysis as well as ongoing energy performance analysis.</p> <p>RETScreen Expert, an advanced premium version of the software, is available in Viewer mode completely free-of-charge.</p> <p>RETScreen empowers professionals and decision-makers to rapidly identify, assess and optimize the technical and financial viability of potential clean energy projects. This decision intelligence software platform also allows managers to easily measure and verify the actual performance of their facilities and helps find additional energy savings/production opportunities.”</p>	
21. Intended audience of resource	Professional and decision-makers involved in assessing and optimizing potential clean energy projects, and those involved in measuring and verifying energy-usage performance of facilities to help find additional energy savings/production opportunities.	
22. Process of	The software was developed to “allow for the	

development	<p>comprehensive identification, assessment and optimization of the technical and financial viability of potential renewable energy, energy efficiency and cogeneration projects; the measurement and verification of the actual performance of facilities; the identification of energy savings/production opportunities; and portfolio management of multiple facilities.”</p> <p>Source: https://en.wikipedia.org/wiki/RETScreen</p>
23. Organisation/structure/contents	<p>“Benchmark Analysis: allows the user to establish reference climate conditions at a facility site for any location on earth and compare the energy performance of various types of reference (benchmark) facilities with the estimated (modeled) or measured (actual) annual energy consumption of a facility. Energy benchmarking allows designers, facility operators, managers and senior decision-makers to quickly gauge a facility's energy performance, i.e., expected energy consumption or production versus reference facilities, as well as scope for improvements.</p> <p>Feasibility Analysis: permits decision-makers to conduct a five step standard analysis, including energy analysis, cost analysis, emission analysis, financial analysis, and sensitivity/risk analysis. Fully integrated into this five-step analysis are benchmark, product, project, hydrology and climate databases, as well as links to worldwide energy resource maps. Also built in is an extensive database of generic clean energy project templates as well as specific case studies.</p> <p>Performance Analysis: allows a user to monitor, analyze, and report key energy performance data to facility operators, managers and senior decision-makers, including a facility's actual energy performance versus predicted performance. The Performance Analysis module integrates near real-time satellite-derived weather data from NASA for the entire surface of the planet and is connected to the Green Button Standard.</p> <p>Portfolio Analysis allows a user to manage energy across a large number of facilities, spanning multiple energy efficiency measures in a single residential property to a portfolio comprising thousands of buildings, factories and power plants in multiple locations. Within the software, a user can create a new portfolio or open an existing file. The "My portfolio" database file is made up of individual facilities analyzed with RETScreen. Additional facilities can</p>

	<p>easily be added to the portfolio database. Sub-portfolios can be created to allow for comparison across different facility types and geographic regions, and a mapping tool helps the user visualize assets across the globe.”</p> <p>Case studies: Embedded in software for user reference.</p> <p>Source for the above text: https://openei.org/wiki/RETScreen_Clean_Energy_Project_Analysis_Software</p>
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FRAMEWORKS

<p>24. Framework structure</p>	<p>The RETScreen Expert workflow can be considered as a framework. “It consists of a series of worksheets (tabs located at top of software window) and accompanying databases. Generally, the user works from left to right, completing the Location worksheet first, followed by the Facility worksheet, etc. On each worksheet, it is recommended that the user follows the steps outlined in the ribbon near the top of the software window, completing each worksheet from top to bottom.</p> <p>The Energy Model worksheet is used to simulate the energy consumption and/or production of various types of facilities, including individual measures and systems. A fully integrated user manual facilities data entry by the user.</p> <p>Buildings and Factories RETScreen Expert can be used to evaluate various types of energy efficiency measures projects in buildings and factories. It can investigate the viability of energy efficiency improvements in a wide range of residential, commercial, institutional buildings, and industrial facilities, from single-family homes and apartment complexes, to office buildings, to hospitals, to large pulp and paper mills. The software can be used to assess projects incorporating a variety of energy efficiency measures associated with building envelope, ventilation, lights, electrical equipment, hot water, pumps, fans, motors, process electricity, process heat, process steam, steam losses, heat recovery, compressed air, refrigeration, and more. It is useful for both new construction and retrofits. Whole facilities can be modeled, or sub-systems and rooms can be studied individually.</p> <p>Step 1 - Fuels & schedules In this section, the user enters information about fuels and schedules considered for the base case and the proposed</p>
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case facilities.

Step 2 - Equipment

In this section, the user enters the information about the heating system and cooling system equipment, for the base case and the proposed case. The user clicks in the ribbon on the equipment they want to describe (e.g. boiler, heat pump, compressor, etc.) to access the data entry forms.

In the Heating System and Cooling System forms, the user enters information about the base case and the proposed case facility, including any proposed case end-use energy efficiency measures. The user also enters the "incremental initial costs" and "incremental O&M savings" associated with the proposed case end-use energy efficiency measures. For example, material and labour costs, including engineering and design costs that would have been spent on the base case facility, can often be credited when considering the incremental costs for the proposed case facility. The results are displayed in the "Include measure?" summary and are used along with the information specified in the other energy efficiency forms to calculate the annual fuel cost savings, simple payback, etc.

Note that the user should fill in these forms even if no energy efficiency measures are included in the proposed case heating and/or cooling system(s). The seasonal efficiency of the heating equipment and the seasonal coefficient of performance of the cooling equipment are entered in these forms, and the loads are calculated in the individual forms below (e.g. Building envelope).

Step 3 - End-use

In this section, the user enters the information about the facility characteristics, for the base case and the proposed case facilities. The user clicks in the ribbon on the end-use they want to describe (e.g. Building envelope, Ventilation, Lights, etc.) to access the data entry forms.

For complex projects, the user might want to use more than one form to describe each major building zone or each separate energy efficiency measure, etc. The user also enters key information about each form in the Description data entry cell at the top of each form. For example, this might be the name of the building zone (e.g. gymnasium, office, etc.) or it might describe the energy efficiency

	<p>measures under consideration (e.g. low-flow faucets, drainwater heat recovery, etc.).</p> <p>Within some of the forms the user can select more than one Method or Level to perform the calculations. When more than one method or level is available, the user selects the type of method or level by clicking on the appropriate button at the top of each form. The method or level chosen will typically depend on the availability of input data and the stage of project development (e.g. pre-feasibility vs. feasibility study).</p> <p>Step 4 - Optimize supply In this section, the user enters the information about the heating system and power system equipment used to optimize the energy supply, for the proposed case. The user clicks in the ribbon on the equipment they want to describe (e.g. solar water heater, wind turbine, etc.) to access the data entry forms.</p> <p>Step 5 - Summary This section summarizes key results (e.g. fuel saved, simple payback, etc.) based on the information entered in the previous steps (i.e., Fuels & schedules, Equipment, End-use and Optimize supply), for the base case and proposed case facilities, including detailed information for each fuel type used, as well as fuel consumption and annual energy use information for heating, cooling and electricity.”</p> <p>Source for the above text: RETScreen Clean Energy Project Analysis Software Open Energy Information (openei.org)</p>
25. Relevant policy considerations	Yes
26. Resources for implementation identified	Yes
27. Specific assessment points/indicators/milestones/action plan for monitoring	Yes
28. ASPECTS OF SUSTAINABILITY COVERED BY RESOURCE (mark all that apply)	
People (social sustainability)	
Planet (environmental sustainability)	X
Prosperity (economic)	X

sustainability)	
Peace	
Partnerships	
29. CROSS-CUTTING CONSIDERATIONS COVERED BY RESOURCE (mark all that apply)	
Gender perspectives	
North and South perspectives	X
HOW THE RESOURCE CONTRIBUTES TO AGENDA 2030 AND THE SDGs	
HOW AGENDA 2030 AND THE SDGs FEATURE IN THE RESOURCE	
30. SDGs and Agenda 2030 specifically mentioned?	No
31. SDGs specifically mentioned?	No
32. SDG targets specifically mentioned?	No
33. SDG indicators specifically mentioned?	No
SDGs AND SDG TARGETS AND LINKAGES	
34. Comments on SDG linkages	The resource can be used to increase the use of renewable energy in the energy mix (SDG 7.2), and to enhance energy efficiency (SDG 7.3). Working to decouple any institutional growth from environmental degradation supports SDG 8.4. Developing sustainable, reliable infrastructure supports SDG 9.1, and upgrading and retrofitting to enhance resource use and renewable energy supports SDG 9.4. Reducing the impact of cities supports SDG 11.6, and integrated planning that incorporates resource efficiency and mitigating climate change supports SDG. 11.B. Ensuring sustainable and efficient use of natural resources supports SDG 12.2. Adopting sustainable practices supports SDG 12.6. Enhancing institutions' contributions to climate change mitigation contributes to SDG 13.3. As RETScreen can be applied anywhere, and the resource includes specific climate data for all countries, it can be used to support SDG 9.A, on developing sustainable and resilient infrastructure in the Global South.
35. SDGs and SDG targets the resource helps advance	
SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all 7.2 By 2030, increase substantially the share of renewable energy in the	Proportion of energy that comes from renewable sources. Date to achieve net zero, and milestones towards that date.

global energy mix	
<p>SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all 7.3 By 2030, double the global rate of improvement in energy efficiency</p>	<p>Reduction in energy use.</p> <p>Upgrade of old equipment to more efficient equipment.</p> <p>Uptake of renewable sources of energy.</p>
<p>SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead</p>	<p>Plans in place to increase resource efficiency, reduce consumption, and to decouple economic growth from environmental degradation.</p>
<p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all</p>	<p>Development of research-useful collections to support reliable, sustainable and resilient use by researchers and others.</p> <p>Number and proportion of collections facilities and stores that support economic development and human well-being.</p> <p>Number and proportion of collections facilities and stores that provide affordable and equitable access for all.</p> <p>Investment in collections facilities.</p> <p>Inclusion of collections information in regional and transborder initiatives, notably via digital access for discoverability.</p>

<p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities</p>	<p>Number and proportion of collections facilities that:</p> <ol style="list-style-type: none"> 1. make efficient use of resources, with an ongoing drive for efficiencies and reductions in energy use and waste of all forms. 2. use clean and environmentally sound technologies, including climate-friendly energy sources and materials, with an ongoing commitment to reduce greenhouse gas emissions and waste of all forms. 3. adopt and/or prioritise collections-related processes and practices to reduce greenhouse gas emissions and waste of all forms.
<p>SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management</p>	<p>Plans in place to reduce negative impacts on air quality, and volume and forms of waste.</p> <p>Plans in place to eliminate waste of all forms as soon as possible.</p>
<p>SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>11.B By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction</p>	<p><i>11.B.1 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030a</i></p> <p>Disaster Risk Reduction strategies and plans in place, in line with the Sendai Framework for Disaster Risk Reduction, to ensure collecting institutions and collections are factored into planning, and contribute effectively to Disaster Risk Reduction.</p>

2015-2030, holistic disaster risk management at all levels					
SDG 12 Ensure sustainable consumption and production patterns SDG 12.2 By 2030, achieve the sustainable management and efficient use of natural resources		Reduction of material footprint in terms of reductions in consumption of biomass, fossil fuels, metal ores and non-metal ores.			
SDG 12 Ensure sustainable consumption and production patterns 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle		Clear visions, strategies and plans in place for all aspects of sustainability – environmental, social and economic (people, planet, prosperity)- across all areas of activity. Visions, strategies and plans relating to sustainability to be publicly available and incorporated into planning documents. Commitments to be in line with local, regional, national and/or international targets and ambitions. Incorporation of sustainability into reporting for funders and other stakeholders, including the public. Reporting to include commitments and progress towards targets.			
SDG 13. Take urgent action to combat climate change and its impacts 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning		Plans in place to enhance positive contributions to addressing climate change through use of collections. Plans in place to ensure collections, collections institutions and broader society can adapt effectively to climate change. Plans in place for effective education and awareness raising on climate change mitigation, adaptation, impact reduction and early warning. Plans in place to reduce negative contributions of collections-related functions, e.g. measuring greenhouse emissions with plans and targets in place to reduce them.			
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	