

To: Warden and Members of County Council

From: Director of Public Works

Facilities Long Term Renewable Energy Plan - Evaluation Criteria and Weighting System

RECOMMENDATION

1. That Oxford County Council approve the Facilities Long Term Renewable Energy Plan project evaluation criteria and weighting system as set out in Report No. PW 2021-11 entitled “Facilities Long Term Renewable Energy Plan – Evaluation Criteria and Weighting System” for the purpose of developing a multi-year capital plan for renewable energy projects.

REPORT HIGHLIGHTS

- The purpose of this report is to provide County Council with an update on the development of a Facilities Long Term Renewable Energy Plan (LTREP) and seek County Council's endorsement of the proposed evaluation criteria and weighting system, such that the most attractive projects can be identified for inclusion in the LTREP.
- County staff have retained consulting services which assisted in identifying 100 potential renewable energy opportunities at various County sites. County staff are looking to evaluate and rank the projects with the proposed evaluation criteria and weighting system to develop a multi-year capital plan for renewable energy projects.
- Since 2015, Oxford County has generated 2.68 MWh of renewable energy through the implementation of various solar photovoltaic systems at over seventeen municipal sites, including over 965,000 kWh in 2020. As the most recent year with both consumption and generation data available, 2018 resulted in a renewable energy mix of 1.07% in comparison to the 2020 target of 5.3%.

Implementation Points

Following Council's review and endorsement of this proposed LTREP evaluation criteria, County staff will apply the criteria to evaluate the various renewable energy opportunities that have been identified and begin preliminary engineering studies on the top ten projects. In addition, staff will organize a multi-year plan that will be outlined in a follow-up report to County Council.

Financial Impact







There are no financial implications directly associated with this report. The review of renewable energy opportunities and follow-up preliminary engineering studies were a part of the 2020 Business Plan with \$50,000 in funding approved during the 2020 budget cycle.

Any financial implications related to the implementation of future renewable energy projects will be approved through the annual budget process.

Communications

Upon approval of this report and completion of a draft multi-year renewable energy plan, the document will be shared with Smart Energy Oxford (SEO) for information and feedback. Once that has been completed, the Facilities LTREP will be brought back to County Council. A copy of the final plan will also be posted to the Oxford County website.

Strategic Plan (2020-2022)

					
WORKS WELL TOGETHER	WELL CONNECTED	SHAPES THE FUTURE	INFORMS & ENGAGES	PERFORMS & DELIVERS	POSITIVE IMPACT
		3.iii.		5.ii.	

DISCUSSION

Background

On August 14, 2019, County Council approved Report No. **PW 2019-33**, which outlined the County's updated **Energy Management Plan** (EMP) for 2019. Part of this EMP included recommendations for 51 energy efficiency measures along with 13 qualitative goals to maintain Oxford County's incremental path towards 100% Renewable Energy (RE) by 2050.

One of these qualitative goals was to develop a LTREP in 2020. To align with this goal, County staff retained consulting services in early 2020 to begin preliminary work on a Request-For-Proposal to lay the framework for the plan. The intent of the LTREP is to compile a project listing of renewable energy opportunities at County owned sites that can be implemented over a multi-year planning horizon (i.e. 10-years). By constructing a project road map, County staff can make informed planning decisions around budget requests and project implementation, with the goal of progressing the County's sustainability objectives.

Renewable Energy Targets

Through the 100% RE Plan and EMP, targets have been set for energy reductions, Green House Gas (GHG) emission reductions, and renewable energy mix increases. Staff have tracked energy consumption and generation on an annual basis, and will continue to do so as a means of monitoring progress toward the long term targets. Tables 1 and 2 outline the community targets identified in the 100% RE Plan, as well as the County organization's targets for 2023 identified in the EMP respectively.

Table 1 – Summary of Community Targets Required to Achieve 100% RE by 2050

Year	Total Reduction from 2015 Baseline		Internal Renewable Energy Mix ²
	Energy	GHG Emissions	
2015	-	-	-
2020	1.7%	3.2%	5.3%
2025	10.5%	14.1%	11.7%
2030	19.3%	25.0%	19.5%
2035	28.1%	36.0%	29.1%
2040	36.8%	46.9%	41.4%
2045	45.6%	57.8%	57.8%
2050	54.4%	68.7%	80.3% ¹

¹ Assume the Ontario grid will be able to supply approximately 20% of its energy through renewable sources.

² Renewable Energy Mix refers to the County organization's ratio between renewable energy generated, and energy consumed

Table 2 – Summary of Short-Term Goals Outlined in the EMP³

Year	Total Reduction from 2015 Baseline		Internal Renewable Energy Mix ²
	Energy	GHG Emissions	
2023	7.0%	9.7%	9.2%

² Renewable Energy Mix refers to the County organization's ratio between renewable energy generated, and energy consumed

³ EMP targets are aligned with the 100% RE goals, but modified for the plan's short term duration

Further to these targets, the County organization's actual energy consumption and generation statistics are outlined in Table 3.

Table 3 – Actual Energy Consumption and Generation by the County Organization

Year	Energy Consumption (kWh equivalent)	GHG Emissions (Tonne CO ₂ e)	Renewable Energy Generation (kWh)
2015	44,078,410	3,949	76,751
2016	45,199,305	4,122	141,984
2017	42,012,404	3,850	448,702
2018	44,715,654	4,317	479,632
2019 ⁴	N/A	N/A	567,322
2020 ⁴	N/A	N/A	965,764
Total Generation			2,680,155

⁴ Consumption and GHG data has not yet been compiled as that reporting is currently aligned with Ontario Reg. 397/11 which has a two year lag. A goal of the EMP is to reduce this reporting lag.

Finally, the County organization's percentage change by each metric in relation to the baseline year of 2015 is summarized in Table 4.

Table 4 – Actual Percentage Changes Since 2015

Year	Reduction from 2015 Baseline ⁵		Internal Renewable Energy Mix ²
	Energy	GHG Emissions	
2016	-2.54%	-4.39%	0.31%
2017	4.69%	2.49%	1.07%
2018	-1.45%	-9.34%	1.07%
2019 ⁴	N/A	N/A	N/A
2020 ⁴	N/A	N/A	N/A

² Renewable Energy Mix refers to the County organization's ratio between renewable energy generated, and energy consumed

⁴ Consumption and GHG data has not yet been compiled as that reporting is currently aligned with Ontario Reg. 397/11 which has a two year lag. A goal of the EMP is to reduce this reporting lag.

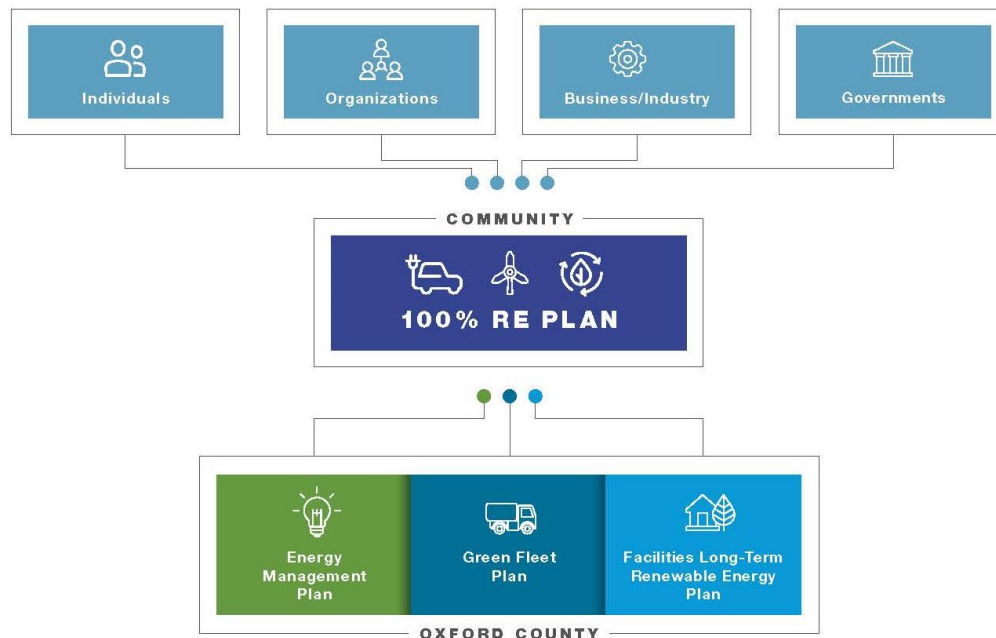
⁵ A negative reduction value equates to a net increase from the baseline.

Comments

Support of the 100% Renewable Energy Plan

The primary intent of the Facilities LTREP will be to support the goals of the *100% RE Plan*, which was adopted by County Council on June 27, 2018. Once complete, the LTREP will support the County organization's roadmap for changes in energy consumption, reduction in GHG emissions, and increases in renewable energy mix.

As illustrated by the below graphic, the LTREP will work in conjunction with the *Energy Management Plan* (2019) and the 2021 update of the *2016 Green Fleet Plan* to guide the contributions of the County organization towards the 100% RE goal. It is important to identify that the County organization is only one of multiple input entities that have a role in contributing to the 100% RE Plan.



Phase 1 – Project Development

At the start of the LTREP project, 41 County sites were reviewed in terms of site characteristics and energy consumption. Through the use of utility bills and hourly consumption data, energy trends were analyzed to understand facility operations that drive peak demands during heating and cooling seasons. Spatial characteristics of the property were also reviewed to understand constraints and opportunities for physical equipment components.

Based on the above items, sites were evaluated for the feasibility application of up to 14 various RE systems, which included:

- | | |
|--|---------------------------------------|
| 1. Solar PV (rooftop) | 8. Air source heat pumps for Domestic |
| 2. Solar PV (ground mount) | Hot Water (from indoor air) |
| 3. Solar PV (parking lot canopy) | 9. Rooftop units with heat pumps |
| 4. Solar thermal for Domestic Hot Water | 10. Wind |
| 5. Solar thermal for ventilation air | 11. Biogas |
| 6. Geothermal heat pumps for space heating and cooling | 12. Wood pellet boiler |
| 7. Air source heat pumps for space heating and cooling | 13. Waste heat recovery |
| | 14. Small hydro |

Through initial screening, two to four preferred application options were identified for each site, resulting in 100 potential RE system opportunities. The preferred site options were itemized by RE system and the following performance metrics were derived for each:

- *Annual Change in Electricity Consumption (%)*
- *Annual Change in Natural Gas Consumption (%)*
- *Renewable as Portion of Building Consumption (%)*
- *GHG Reductions (tCO₂e/yr)*
- *Estimated Capital Cost*
- *Net Change in Annual Utility Costs*
- *Costs/GHG (\$/tCO₂e)*

The above metrics were selected by the consultant as they provide a holistic approach to evaluating various types of renewable technology. Different technologies bring different benefits that include transitioning from carbon based fuels (i.e. natural gas), electricity and thermal generation from natural forces (i.e. solar/wind), or reuse of existing process by-products (i.e. biogas/waste heat). These technologies are then coupled with the cost to implement, as well as the ongoing costs of operation which will be impacted by future changes such as the increase in the price of carbon based fuels.

The metrics also help quantify regulatory restrictions that are currently in place, such as the inability to export excess electricity generated through solar PV systems (net-metering), and allow the team to size projects so they don't exceed 100% of energy demand (while still identifying export potential in the event that regulations change in the future). Together these metrics will allow staff to quantify various performance measures and recommend specific projects for implementation through the LTREP. These metrics also best represent and align with the County's desired outcomes for the implementation of these RE systems in relation to the goals of the 100% RE Plan and EMP.

Evaluation Weighting

With having the anticipated performance metrics itemized for each of the feasible RE systems, County staff need to define an evaluation scale and weighting system to derive the overall project ranking system which will identify the most attractive projects for inclusion in the LTREP. Based on the range of performance metrics across all 100 opportunities, a scoring scale from 1 (lowest) to 10 (highest) was created, as shown in Attachment 1.

In addition to the scoring scale, a weighting system was applied to each metric to signify the importance of each metric to the County. For example, based on targets laid out in the 100% RE Plan (refer to Table 1), reduction of GHGs is more important than the capital investment required to achieve the reduction as there is a desire to invest in achieving the plan's goals. To assist with justifying a weighting for each of the above metrics, staff reviewed the following published documentation:

- *100% Renewable Energy Plan*
- *Energy Management Plan*
- *Future Oxford Sustainability Plan*
- *Oxford County Strategic Plan*

Attachment 2 outlines a listing of references from each of the above four plans that support each performance metric. Based on the perceived importance of each metric, the following weightings, or multipliers, are being applied to the scoring scale to produce a final ranking:

Performance Metric	Weighting	Justification Summary
GHG Reductions (tCO₂e/yr)	7	Main intention of the strategic initiative and quantifiable targets are referenced in all four plans.
Annual Change in Natural Gas Consumption (%)	6	Goal to reduce gas consumption through switching fuel sources and has significant impact on strategic initiatives.
Renewable as Portion of Building Consumption (%)	5	Main intention of the 100% RE Plan.
Annual Change in Electricity Consumption (%)	4	Some initiatives support electricity conservation, while others encourage increased consumption through electrification as alternate fuel source. This weighting is to reward conservation, without penalizing increases resulting from fossil fuel conversion.
Net Change in Annual Utility Costs	3	While consumption metrics are ranked higher, there is still desire to take into account future operational costs.
Estimated Capital Costs	2	Capital investment is required to progress sustainable plans, but financial accountability is still required.
Costs/GHG(\$/tCO₂e)	1	No current references in any previously-published plans for this metric, but staff still feel it is a valuable part of the evaluation process.

Phase 2 – Project Verification

With Council's endorsement of the above evaluation criteria and weighting system methodology, County staff will finalize the initial ranking of the 100 RE project opportunities. The ranking will be further examined and refined to take into account the following necessary considerations:

- Some of the listed projects are mutually exclusive and if a certain RE system is selected, it will make another obsolete. For example, geothermal heat pumps and air source heat pumps may both be viable for a site, but air source may have better metrics, and if implemented, eliminates the need for a geothermal system at the same site as it would be redundant.
- Further understanding of waste heat technologies is required. The intent will be to include one waste heat project in Phase 2 of the study to take a closer look and use the findings to provide further costing information for other similar projects.
- There is value in elevating some of the lower-ranked solar projects to be completed earlier in the plan despite a potentially lower overall ranking. The County is familiar with solar PV technology and proceeding with some of these projects earlier and consistently throughout the plan will allow the LTREP to progress while other technologies are explored.

Once the ranking has been finalized, staff will direct the retained consultant to proceed with completing Preliminary Engineering Studies for the top ten projects as a means of verifying the feasibility of each.

Conclusions

Staff recommend that Council endorse the evaluation criteria and weighting system as outlined in this report. The proposed weighting has sufficient justification and support from previously-approved documentation which ensures alignment between the LTREP and existing strategic goals.

SIGNATURES

Report Author:

Original signed by

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Approved for submission:

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Chief Administrative Officer

ATTACHMENTS

Attachment 1: LTREP Scoring Scale, March 22, 2021

Attachment 2: LTREP Evaluation Weighting References, March 22, 2021