CEP Background & History

Ensure economic competitiveness.
Provide reliable and affordable energy.
Protect the environment.

The Community Energy Plan (CEP) was developed in 2010, addressing potential strategies to ensure that Holland is an energy efficient city. The CEP is reviewed and revised every three to five years.

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BPW

In 2010, the City of Holland Sustainability Committee commissioned the development of a 40-year plan addressing potential strategies to make Holland a "world-class energy efficient city." The plan was created by the Project Work Team (PWT) comprised of City Staff and the principal consultant, Garforth International, under the guidance of the Mayor's Energy Task Force. The culmination of this work is what is known as the City of Holland Community Energy Plan (CEP). At that time, the CEP was intended to be seen as an economic prosperity plan. The stated primary high-level goals were to ensure economic competitiveness, provide reliable and affordable energy, and protect the environment. The document speaks to potential metrics to define progress toward each of these goals. Competitiveness is measured through energy costs, investments being made in the community, and employment levels. Reliable and affordable energy provision is measured through energy supply security, quality, and flexibility. The protection of the environment is measured in greenhouse gas reduction per capita. This last goal area was the only one with a recommended target provided by the PWT. The PWT recommended that Holland's inventory of greenhouse gas emissions per capita be reduced from the baseline 24 metric tons down to no more than 10 by 2050.

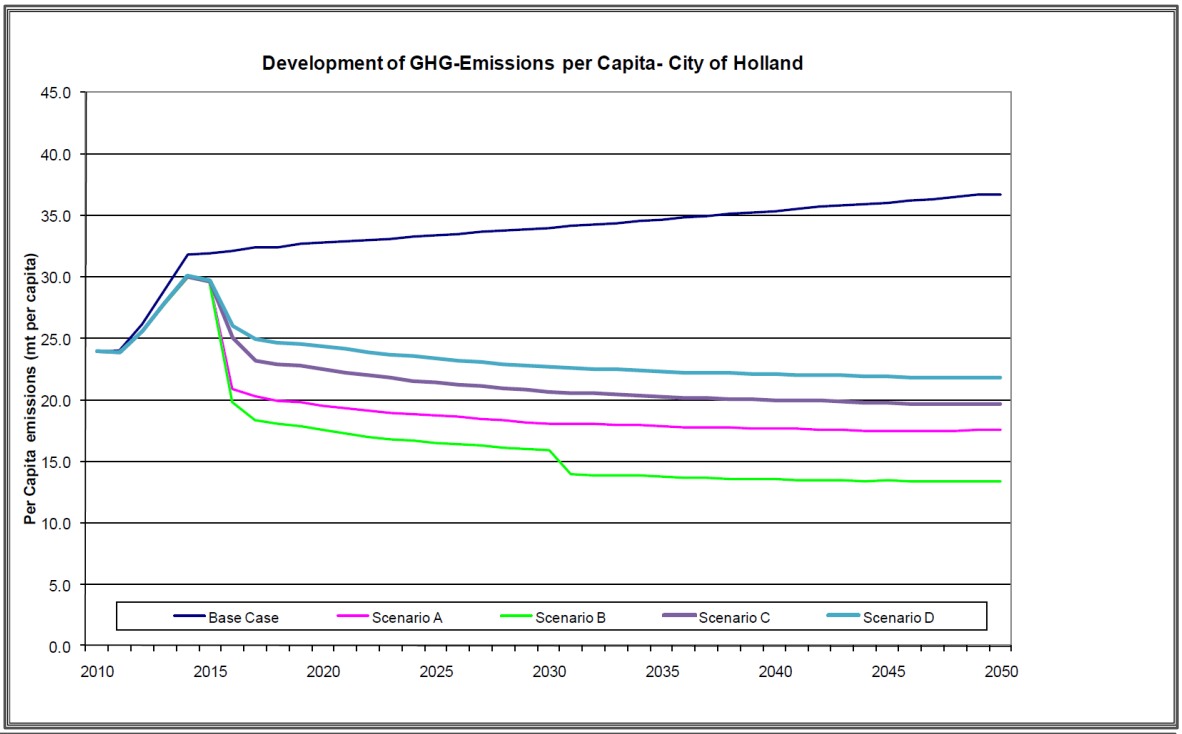
Greenhouse gas inventory for the City of Holland was determined by looking at the emissions generated by the use of energy within the residential, commercial, industrial, and transportation sectors. The PWT evaluated that due to anticipated economic growth in Holland's commercial and industrial sector relative to the modest increase projected in population, the greenhouse gas per capita would grow to 37 metric tons without the intervention of the strategies within the CEP. The approach to strategy development within the CEP was based on four principles, referred to as the loading order.

- Energy Efficiency: *If you don't need it, don't use it*. Develop efficiency in our buildings, our industrial processes, our transportation networks, and through local job creation making our commutes efficient.
- Heat Recovery: If it is already there, use it. Consider combined heat and power. Use existing waste heat. Structure mixed use neighborhoods to share heat.
- Renewable Energy: If it makes sense, go carbon-free. Consider renewable sources for electricity, heat, combined heat and power, and renewable fuels for transportation.
- Energy Distribution: Invest where it makes sense. Create flexible networks for the distribution of energy. Reduce energy conversion costs.

Within the context of the loading order, the plan constructed four different scenarios with incremental strategic investments. The strategies were comprehensive in that they addressed both supply and use of energy. The strategies also focused on "scale" initiatives with depth of impact.

These scenarios estimated both the capital cost to implement the strategies and the expected impact on greenhouse gas reduction. Scenario B drove the projected emissions to 13 metric tons by 2050. This scenario formed the basis of the PWT recommendation of a stretch goal to 10 metric tons per capita. The chart on the next page shows the anticipated progress in greenhouse gas reductions per capita by scenario as evaluated by the CEP PWT.

Anticipated progress in greenhouse gas reductions per capita by scenario

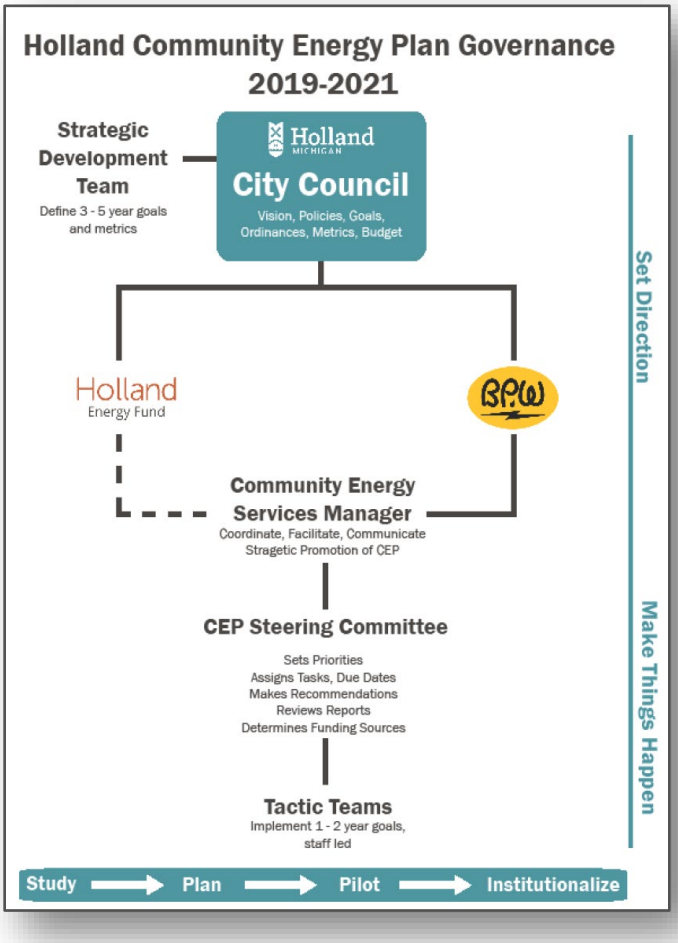


Strategic Measure	Base	A	B	C	D
Efficient renovation – all buildings					
Focused retrofits – single homes					
Energy performance labels					
Transportation efficiency gains					
Expanded appliance rebates					
Ongoing industrial efficiency gains					
Downtown district heating network					
Expanded snow melt services					
Industrial Park – district energy network					
Industrial environmental services					
70 MW solid fuel expansion (30% biomass)					
70 MW CCGT expansion					
30 MW CHP in Industrial Park					
10 MW Landfill gas capacity					
20 MW Bio-gasification expansion (2031)					
24MW Solar Power (PV)					
10% biogas in gas network					
37 MW Wind power					

In what is referred to as its "condition statement," the CEP identifies that "these recommendations should be seen in the context of providing an agreed strategic basis for future detailed decision-making. Some elements of these recommendations will obviously need to be refined with investment-grade analysis." This statement is important in that it establishes early that the CEP is more of a strategy than a plan. It is strategy that requires constant review and revision based on a clearer view of the world that only time can allow. It also provides clarity that the level of study needed on the costs and benefits of the proposed strategies prior to investment is not contained within CEP.

Holland City Council adopted resolution R2012.61 on July 18, 2012, committing to "evaluate, and work through the plan in an incremental, strategic manner to achieve optimum results for the community." The graphic below depicts the overall organizational structure of the CEP. Similar to other governance models, there is a clear division between functions that set direction and others that execute actions. Ultimately, City Council owns the plan. It establishes the long-term vision, creates policies and ordinances, sets short and long-range goals, and monitors progress through identified metrics.

The City Council is assisted by a Strategic Development Team, periodically assigned to step back, and view the progress from a higher-level, consider changes in the world and the community, and recommends prioritization of new strategies along with 3-5-year goals and metrics to keep the plan moving forward.



Ultimately, these initiatives are coordinated at a staff level under the Community Energy Services Manager, who is employed by the HBPW. This position ensures that the strategies and goals identified by City Council are acted upon through community task forces under the Steering Committee as contemplated by resolution R2012.61. This is where the transition occurs between "setting direction" and "making things happen."

As will be discussed more fully later, the City has created a not-for-profit corporation, Holland Energy Fund (HEF), to be a clearing house for specific energy efficiency programs authorized under PA 408 of 2014. The City also owns its own electric utility provider, the Holland Board of Public Works (HBPW). HBPW is responsible for electric supply and distribution to the residents and businesses in the City of Holland and portions of some of the immediately surrounding townships. Electrical energy efficiency programs, customer energy use electrification, customer distributed generation

programs, and electric supply portfolio adjustments are administered by the HBPW. Other statutorily authorized programs, such as residential home energy retrofits, on-bill financing, and building energy performance labeling are administered by staff under the governance of the Holland Energy Fund board.

Through the resolution, the City Council also created the original task forces to begin the process of evaluation of several of the proposed strategies. Specifically, seven different strategies were identified to be explored under the direction of a steering committee. They were as follows:

- Electric portfolio changes: Study the potential retirements and additions to the Holland Board of Public Works (HBPW) electric resource mix associated with the proposed scenarios.
- Home energy retrofit: Evaluate the potential of incentivizing deep residential building efficiency improvements through rebates and financing options.
- Building energy performance labeling: Determine options for the method of calculating residential building energy performance and develop a standard scorecard for presentation.
- Downtown district heat network: Evaluate the potential of supplying direct and/or waste heat to the core downtown and Hope College campus.
- Industrial bundle of services: Evaluate the potential of reducing energy transaction costs and capital investment by new customers within our core industrial park.
- Commercial and institutional building performance: Explore options for incentivizing building energy performance improvements within our schools, places of worship, and retail centers.
- Education and outreach: Create mechanisms for reporting progress on the CEP. Build a trusted resource in the community that can help residents and businesses understand the value proposition of making energy improvements and how to go about it.

The tactical action teams were asked to pull together subject matter experts and community resources through a four-step process of study, plan, pilot, and institutionalize. This approach allowed the depth of study on various strategies that the CEP acknowledges was not contained in the original document.

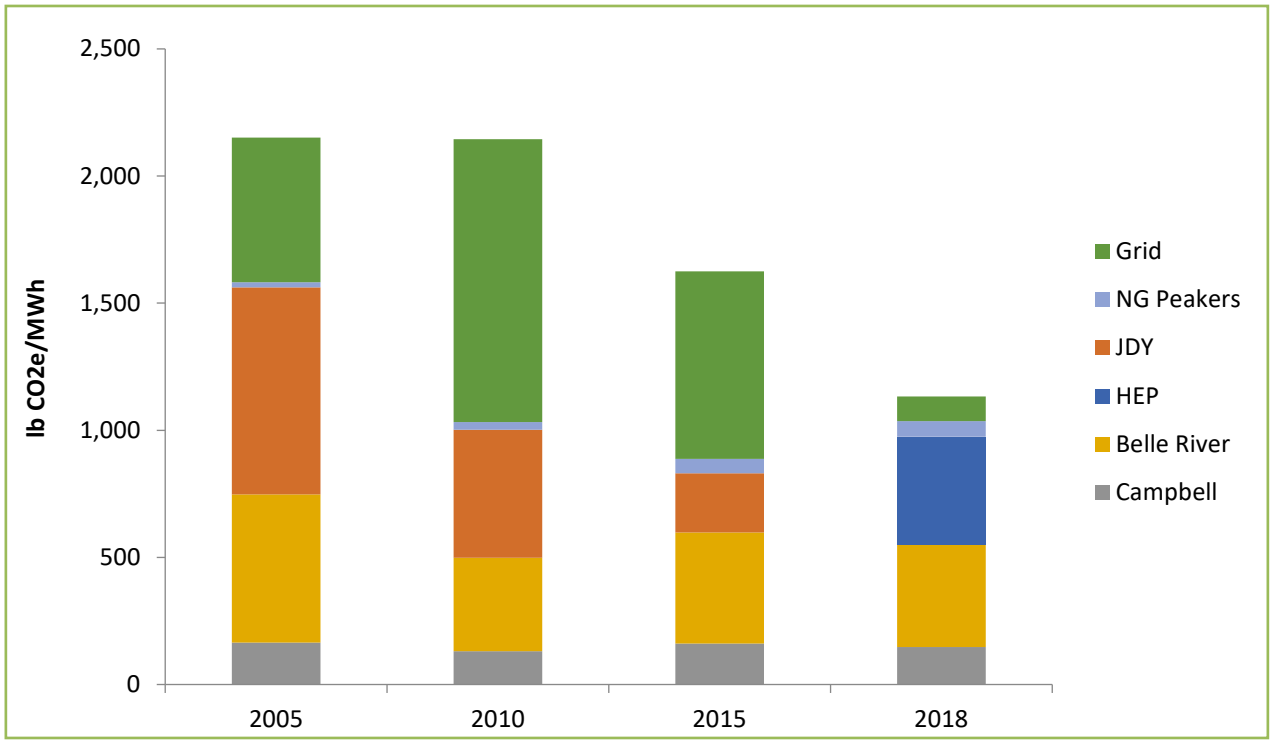
Through this first phase of strategy exploration much was accomplished. What follows is a review of the outcomes of each task force's work.

Electric Portfolio Changes

Some of the most impactful changes over the first ten years of the CEP are due in large part to changes that have been made in the HBPW's portfolio of electric resources. The task force in this area commissioned a thorough sustainable return on investment (SROI) analysis, which considered not only the direct financial costs and benefits, but also the indirect financial, social, economic, and environmental costs and benefits of each scenario. The resource mixes contemplated in scenarios A through D were supplemented by three other scenarios E through G, which contained iterations of the first four. The best economic result that yielded equivalent social and environmental benefits to scenario B, was scenario G. Scenario G was essentially the same as B, with a slightly larger investment in natural gas combined cycle technology. This larger investment was to account for the retirement of the James De Young coal-fired plant, which was not part of the Scenario B plan. The results of the SROI yielded three recommendations:

- Retire the James De Young plant – Ceased operations in 2016
- Invest locally in a 125-megawatt natural gas combined cycle plant – Operational in 2017
- Contract for power from two regional wind farms totaling 32 megawatts of supply – Completed in 2013

Additional to these changes, the HBPW has added another 2 megawatts of wind to its portfolio. The combined impact of these changes by 2020 has reduced the carbon intensity of the HBPW electric supply portfolio by 46% when compared to 2010.



Home Energy Retrofit

The CEP contemplates a two-phase strategy for residential building efficiency improvements. Of the 7,400 single-family homes in Holland, 4,500 would receive a "moderate" retrofit, targeting a 53% efficiency improvement at a cost of $28,000 per home. This would occur in the first 23 years of the plan. The remaining homes would be addressed in the latter years with a "high efficiency" retrofit, targeting a 66% efficiency improvement at a cost of $60,000 per home. These investments would be supported by a revolving loan program reducing barriers to accessing financing. The initiative would also be supported by an energy performance labeling system program to drive transparency and incentivize building owners to make improvements to enhance the marketability of their properties.

The tactical action team realized early that there would be a need to pursue legislation to enable a revolving loan program. Called "on-bill financing", these loans would be associated with the premise as opposed to the borrower and would be repaid through the electric bill. Because these loans are associated with the premise, they could also be transferred from property seller to buyer. With the assistance of our local representative in the Michigan House of Representatives, Joe Haveman, Public Act 408 of 2014 was put into place specifically authorizing local jurisdictions to create energy efficiency programs that utilize on-bill financing as an enabling mechanism.

While the enabling legislation was being pursued, the tactical action team also created a pilot of fifty homes to perform deep energy retrofits. Schneider Electric was hired to be the energy performance contractor for these homes. Since on-bill financing was not quite ready, Michigan Saves, a not-for-profit entity administering energy efficiency loans in partnership with local credit unions made financing available to homeowners. To further promote the program, the City of Holland provided incentives to supplement available rebates from energy waste reduction programs administered by both the HBPW and SEMCO, the local natural gas provider. The pilot program measured success by looking at the energy improvements achieved and the satisfaction level of the homeowner. Ultimately, the pilot was successful enough to receive Council approval to set up a long-term program.

To facilitate the Home Energy Retrofit Program and to administer on-bill financing, the City of Holland set up a special purpose entity called Holland Energy Fund (HEF). HEF is a wholly owned subsidiary of the City Holland, governed by a board comprised of City Council members, HBPW Board members, and the City's Finance Director, who serves as president. Loans to homeowners are made available by HEF through a $3 Million line of credit extended from the HBPW.

To date, over 225 homes have been retrofitted. Of those 125 have been financed through the on-bill program. Over $4 Million has been invested in the housing stock. In addition to energy efficiency improvements, customers note aesthetic improvements through new windows and a higher level of comfort. Homeowner satisfaction levels with the program are high. The level of investment at nearly $17,000 per project is about 60% original anticipated in the CEP. The efficiency improvements have been around 20-25% as opposed to the targeted 53%.

Building Energy Performance Labeling

The CEP identified building performance labeling as an enabling mechanism to drive improvements in the built environmental by providing education and awareness. Awareness of how a building scores compared to others in the market can provide motivation to the homeowner. The task force studied multiple potential scorecards. One option, the Department of Energy Home Energy Score, was incorporated into the Home Energy Retrofit pilot. As time progressed, other options continued to be evaluated. Today, residential buildings that are retrofitted under the City's program receive a Pearl Certification ranging from "Silver" through "Platinum" levels.

Downtown District Heat Network

Another scale project in the CEP involves the development of a hot water district heat network in the core downtown, including being able to serve the Hope College campus. The CEP anticipated the source of energy to be rejected heat from the power generation process. In this case the task force engaged the services of a joint venture partnership of three engineering firms, led by Burns & McDonnell, to perform a feasibility analysis of the options to provide a district heat network. In addition to the suggested hot water (180^F) system, the study considered a warm water (80^F) network that would leverage existing infrastructure in the snowmelt system coupled with water-sourced heat pumps, which would be made more efficient from the elevated temperature of the water.

The results of the analysis yielded two significant findings. First, given that much of the Hope College existing heating network used steam, the piping infrastructure would need to be replaced to carry hot water. Overall, the cost to install and operate the hot water network did not provide a cost savings when compared to natural gas direct heating in buildings. Second, the amount of heat rejected from the electric production facility capable of producing high temperature water amounted to about 50% of the heating demand in the study area. The demand on the Hope College campus alone outpaced the available supply. Conversely, the low temperature option provided more heat than what the area demanded. Another benefit of the low temperature option was the potential of utilizing the same system for cooling by reversing the heat pump process. Financially too, this option provided the better prospects for success. However, at a high-level, the business case was not certain and demanded a more detailed study of the application in different buildings.

The focused evaluation of the application of a low temperature district heat network formed the basis of a second study by the task force. This time, GMB Associates was engaged to perform an analysis of the financial return on investment and the carbon reduction potential associated with integrating the snowmelt system, as a low temperature district energy network, with three different building types; an existing building with a heat pump already in place, an existing building that would need to be retrofitted to accommodate a heat pump, and a planned new construction where a heat pump and the integration to the snowmelt system could be designed in

up front. Not surprisingly, the building requiring retrofitting performed the worst. In fact, the return on investment was negative. The building already served by a heat pump had a positive return, but was significantly less than a property owner would likely consider for a cash investment. The building not yet constructed had the best result, but again not a definite marketable business case.

The Civic Center renovation provided an opportunity to implement the low temperature option on an existing, yet renovated, building. The City of Holland incorporated heat pumps integrated with the snowmelt system into the renovation plans. The system has functioned well. However, early data implied that more energy was being consumed by the facility than was planned. Partly, this was due to energy management system programming and lack of adjustments for non-occupied times. Currently, the task force is gathering data to ascertain the actual improvements from the system. Final determination will likely be delayed well into 2021 or 2022 due to significant changes in building utilization due to the COVID-19 pandemic.

Industrial Bundle of Services

The conversion of energy from one form to another contains inefficiencies causing losses. For example, an industrial customer that requires compressed air operates a compressor driven by electric motor. The motor has less than 100% electrical efficiency. Further, energy is lost in the distribution of electricity from the HBPW through wires and transformers along the way. Even further, energy is lost in the production of that electricity at the power generation facility. The strategy investigated by this task force looked at whether a centralized facility could create multiple utility services (compressed air, steam, hot water, electricity, vacuum, etc.) that could be shared through a common distribution system to reduce the losses associated with energy conversion. The strategy also was put forward in the CEP as means of attracting business by potentially allow those businesses to avoid certain capital investments in various energy sources (compressors, boilers, etc.).

The task force focused on the area of the City where industry is clustered, near 48th Street and Waverly. The group attempted to survey businesses to understand the types and quantities of energy use in their facilities. Additionally, the team tried to benchmark other areas where centralized utility services have been successful. Two major takeaways came from this effort. First, the data coming from the industries lacked accuracy and show wide disparity of needs. This made it difficult to see a path to an investment in an energy production and distribution facility with enough scale to be feasible. Second, research by the task force showed that most applications of this type of service in other locations was made available by repurposing a defunct industrial complex and utilizing the distribution networks that were already in existence. The group found no examples where the systems were built with the intent to provide service to multiple industries from the onset. This task force did not recommend continuing to pursue this strategy.