HOUGHTON COUNTY ENERGY PLAN

Vision Statement
Houghton County will be a model for rural communities in creating an affordable, sustainable, and community-driven energy landscape to support a vibrant regional economy and a high quality of life for all its members.
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Introduction

This Houghton County Energy Plan is the product of a community-based effort to reduce energy usage in Houghton County, Michigan, while improving the lives of its citizens. The small-town character of this community is very different than that of large, metropolitan areas, and the area has unique challenges in terms of reducing energy use. At the same time, Houghton County will need to fully take advantage of grassroots community action and collaboration in order to achieve the goals identified by community members and outlined in this plan.

Houghton County is a remote, rural community located in the western portion of Michigan’s Upper Peninsula. Houghton County is unique, but also representative of many communities across the country.

Demographics:
• Two cities (City of Houghton, population 2013= 7,650, and City of Hancock, population 2013= 4,596),
• Smaller villages and rural townships (total county population 2013=36,225)
• Total area 1,009.1 sq. mi, 36 person per mile, US Census Bureau 2014).
• Michigan Technological University is a mid-sized research university (about 7,100 students).
• Finlandia University- a small liberal arts University (about 567 students)

Location:
• We are one of the most remote counties in the United States.
  o Almost 500 miles away from Michigan’s state capitol, 700 miles from the state’s most populous city of Detroit.
  o Nearest metropolitan area is about a four-hour drive away in Green Bay, Wisconsin.

Cost of Living:
• One quarter of Houghton County residents (23.7%) live below the poverty level,
• Three-quarters of its housing units (75.6%) were built before 1980 (U.S. Census Bureau: State and County QuickFacts).
• Residents pay some of the highest electricity prices in the entire country ($0.25/kWh). Significantly higher heating demands than the national average with approximately 9,712 heating degree days (well above the national average of 4,524.)
1. Program Management and Partners

1.1 Description of Program Leadership and Management

The Houghton County Energy Plan (HCEP) is led and managed by the Houghton Energy Efficiency Team (HEET), a grassroots, community-based collaborative that was formed in 2014 to address local energy issues and compete for the Georgetown University Energy Prize (GUEP). HEET’s volunteer members represent a variety of organizations, including municipal government officials, committed residents, utility executives, service organization leaders, university staff and students, and local business and school leaders. The entire team includes over 60 local residents from a variety of backgrounds. Core leadership team members of HEET include:

- **Lynn A. Artman**, P.E., is a Lecturer in Construction Management at Michigan Technological University, Board member of New Power Tour;
- **Brad Barnett** is a PhD student in Environmental and Energy Policy at Michigan Technological University;
- **Laura E. Brown** is an Assistant Professor of Computer Science at Michigan Technological University;
- **Brent Burns** is Director of Industry Relations in addition to being a PhD student in Environmental and Energy Policy at Michigan Technological University;
- **David Camps** is the owner of Blue Terra Energy, LLC, local energy management services business;
- **Melissa Davis** is the Managing Director of New Power Tour, Inc., a local nonprofit whose mission is to promote alternative technologies and water and energy efficiency;
- **CarolEkstrom** is a church leader for the Keweenaw Unitarian Universalist Fellowship (KUUF);
- **Robert Handler** is a Research Engineer and Operations Manager of the Sustainable Futures Institute (SFI) at Michigan Technological University in Houghton, MI;
- **Abhilash Kantamneni** is a PhD student in Computer Science at Michigan Technological University;
- **Edward Louie** is a MS student in Environmental and Energy Policy at Michigan Technological University;
- **David McCowen** is the Key Accounts Executive with SEMCO ENERGY and is responsible for all new natural gas services in the SEMCO areas of Michigan’s Upper Peninsula;
- **Jay S. Meldrum** is the Executive Director of Michigan Technological University’s Keweenaw Research Center (KRC);
- **Jeff Ratcliffe** is the Executive Director of the Keweenaw Economic Development Agency;
● **Elmore R. Reese Jr.** is an active volunteer with the local community organization Main Street Calumet;
● **Barry Solomon.** is a Professor of Energy and Environmental Policy at Michigan Technological University;
● **Kim J. Stoker** is Executive Director of the Western Upper Peninsula Planning and Development Region;
● **Tom Tikkanen** is Vice Chairman of the Houghton County Board of Commissioners. He also serves on the board and is former director of Main Street Calumet; and
● **Richelle Winkler** is an Assistant Professor of Sociology and Demography at Michigan Technological University.

### 1.2 Staff and funding

As a community-led effort, HEET is currently staffed by passionate volunteers and operates without a source of income. Abhilash Kantamneni serves as the Energy Champion, providing critical leadership, coordination, and motivation among HEET members. Richelle Winkler currently serves as the Plan Manager, coordinating much of the logistics and advocacy. Participation in HEET is growing rapidly among the community, and has expanded beyond the core leadership (members listed above) to more than 60 volunteers. Government and utility liaisons have been identified. Plans are underway to create a structure for the long-term sustainability of the initiative. This includes the development of a Community Advisory Board, which will provide oversight and governance for the organization’s key implementation staff.

To increase the initiative’s capacity, HEET is also applying for the Joyce Foundation grant of up to $30,000. If received, the funds will be used to support an energy manager (EM) that will take on the responsibilities of both the Energy Champion and Plan Manager. The Energy Manager’s responsibility will be to work with regional planning bodies, county and municipal governments, and community-based organizations to attract resources and establish energy efficiency programs for Houghton County. In addition, the EM will document activities and coordinate logistics with the Community Advisory Board, the government and utility liaisons, and the volunteer coordinators. The Western Upper Peninsula Planning and Development Region (WUPPDR) has offered a cost match for the grant which will allow the Energy Manager to have an office located in the heart of downtown Houghton. This location will become the epicenter for HEET activities and outreach. Besides the possible Joyce Foundation grant, HEET will continue to seek local and external sources of funding to target key community energy events and programs.
Figure 1. Organizational Structure

Major efforts described in this plan will remain volunteer-driven, with volunteers coordinating efforts on outreach/marketing, education, service organizations, alternative energy, efficiency, and fundraising. The key responsibilities for each of these volunteer positions is outlined below:

- **Outreach/Marketing Coordinator**
  - Planning and organizing all community based outreach activities.
  - Position will work closely with other coordinators to develop communication channels and marketing materials.

- **Education Coordinator**
  - Works with school administrators and faculty to develop curriculum and service learning opportunities
  - Coordinate professional development opportunities for faculty related to energy efficiency and alternative energy

- **Service Organization Coordinator**
  - Identify and network/connect existing service organizational resources and mission with those of HCEP

- **Alternative Energy Coordinator**
  - Works with contractors and distributors to implement cost effective alternative energy projects

- **Efficiency Coordinator**
  - Works with contractors and distributors to implement cost effective efficiency energy projects

- **Fundraising Coordinator**
  - Writes grant proposals
  - Works with regional economic development organizations to identify financial opportunities

- **Government Liaison**
  - Builds connection between municipal and county government leaders.
Works closely with the fundraising coordinator to generate government and regional financial support
Engage with government leaders on energy issues

Utility Liaison
Coordinate data collection methodology and state mandated rebate programs with utilities

1.3 Community engagement and motivation

Segments of the community are inherently motivated by different needs and interests. At the same time, all residents face the same issue with high energy costs. The region’s cold climate creates substantial energy costs for home heating during long winters. This is further exacerbated by the region having some of the highest electric power rates in the country. Individuals and businesses are motivated by cost savings, while religious and community service organizations are motivated by their mission to help those most in need. Houghton County and other municipal governments have an interest in the wise use of taxpayer money and promoting economic growth. Because of the potential for substantial reductions in energy costs, energy efficiency resonates with all of these motivations.

In response to these local concerns and with the intent to compete for GUEP, HEET was established by a few members of the community in January 2014. Since the first monthly HEET meeting in February of 2014, membership has grown exponentially and encompasses a broad and diverse cross-section of the community. To date, HEET’s engagement efforts have focused predominantly on word of mouth, which has led to great support by local media outlets and community groups. Through the 50+ individual meetings over 1500 people have provided ideas and direction to HEET culminating in a community meeting held in September 2014 that was attended by more than 100 community members (see Figure 2).

Figure 2. Houghton County Community Energy Planning Meeting - Sept 17, 2014

Photo Credit: Dan Roblee (Daily Mining Gazette)
At the September 2014 meeting, the community officially generated the material for its vision statement, specific goals, and strategies. Following the meeting, many HEET members spread the word to other organizations in which they participate, further increasing interest in the effort. Open meetings will continue to be held quarterly. A webpage was developed (www.houghtonenergyefficiency.com) and plans are underway to expand the site to include a community forum for greater engagement. The HEET Facebook page (URL) has more than 184 likes and contains HEET- and user-generated interviews, energy saving success stories, quotes, and pictures. HEET’s web presence is also supported by the efforts of partnering organizations such as New Power Tour, which have helped spread energy efficiency information through their own communication channels. A more detailed explanation of HEET’s community engagement strategy efforts is described in the sections below.

1.4 Community involvement

Local government involvement and commitments: Houghton County has 21 municipal governments (2 cities, 5 villages, and 14 townships). HEET has received commitment letters from the Houghton County Board of Commissioners, both cities (Houghton and Hancock) and three of the five villages (Calumet, Copper City, and Lake Linden). These represent a majority of population centers, covering about 70% of residents in the County. Efforts are currently underway to involve the rest of the populace through their local townships and village council entities.

Local businesses: Local business owners and leaders are involved by participating as part of HEET’s management team and through energy efficiency project implementation. Members of HEET that occupy upper management positions with regional planning agencies, economic developments agencies, and chambers of commerce are helping coordinate the involvement of local business groups. Local contractors have expressed interest in donating winterizations over the two year competition period. Local hardware stores are willing to sponsor educational programs on energy efficiency that benefit members of the community.

Partnering Organizations: Local nonprofits and volunteer organizations (Appendix C) are committed to providing volunteers, expertise, and resources to the extent available/possible in order to implement the energy saving plan. They are a foundational part of the energy saving strategies. Key nonprofits such as New Power Tour will be managing specific components of the overall plan like energy efficiency. Schools and universities including Michigan Technological University and Copper Country Intermediate School District are committed towards saving energy, coordinating volunteers, and achieving the educational goals of the plan. Multiple religious, environmental and service organizations are pursuing energy saving activities, educating their members about energy savings, and partnering with local stakeholders to achieve the goals in the energy plan.
**Major landlords:** As a rural community, Houghton County does not have large rental agencies. However, HEET is establishing a coalition of local landlords that own multiple properties, to identify energy savings strategies that can benefit both renters and landlords. The coalition will also aid in developing strategies to engage other landlords to participate in energy efficiency programs efforts.

**Citizen Groups:** Citizen groups representing demographic diversity, from the Keweenaw Young Professionals to the Bluffs Senior community, are helping HEET engage their respective core membership.

1.5 Current incentive and financing programs

**Incentives from utilities:** In partnership with local gas (SEMCO) and electric utilities Upper Peninsula Power Company (UPPCO) and Ontonagon County Rural Electric Association (OCREA), Efficiency UNITED offers energy conservation and optimization services including rebates, educational tools, and retail and contractor partnerships. Efficiency UNITED consists of eighteen Michigan energy providers offering conservation and optimization services (in accordance with Michigan Public Act 295). Programs available to Houghton County residents include appliance recycling assistance, ENERGY STAR and high energy consumption appliance rebates, online energy audits, and no cost weatherization assistance to residents in need (200% of the poverty level or below). Baraga Houghton Keweenaw Community Action Agency also offers no cost weatherization to low income homes funded by the State. As such, these programs are mandated through the State of Michigan. HEET is currently working with local utilities to expand these programs and target high needs community members.

**Other programs:** Since the initial phase of the competition, HEET has worked with local stakeholders to bring the following changes: 1) Created a transparent and one-step residential solar energy permitting process; 2) Began the process of establishing the County as a Property assessed clean energy (PACE) financing district; and 3) Established a partnership between a local credit union (MTEFCU) and a non-profit (MichiganSaves) to offer low interest, no home equity rates for energy efficiency and renewable energy upgrades for residents, businesses and municipalities. HEET will continue to work with county and municipal leaders to incentivize energy savings.

2. Energy Savings Plan

Following the DOE Guide to Community Energy Strategic Planning, HEET created the following vision statement based on input from about 100 participants at the September 2014 community meeting: **Houghton County will be a model for rural communities in creating an affordable, sustainable, and community-driven energy landscape to support a vibrant regional**
economy and a high quality of life for all its members. The goals and strategies presented can be linked back to this vision statement via the flowchart shown in Figure 1 in the Appendix.

The community identified four primary goals to be pursued through the HCEP: (1) increasing energy efficiency; (2) increasing the use of alternative energy sources; (3) engaging schools, universities, and the community in educational efforts; and (4) ensuring equitable access across the community as activities are carried out. Table 1 details the sub-goals for achieving each of these overarching goals.

### Table 1. Goals of the HCEP

| Energy Efficiency | Reduce electricity consumption by 10% by the end of 2016  
| Reduce gas consumption by 10% by the end of 2016 |
|-------------------|--------------------------------------------------------|
| Alternative Energy | Meet net metering State capacity by 2016  
| 25% alternative, 50% regional generation by 2025  
| 50% alternative, 100% regional generation by 2040 |
| Education | 100% K-12 & university involvement by 2016  
| 100% of school districts develop an energy plan by 2016  
| 100% of community reached by 2016  
| 100% of municipalities have access to energy planning tools by 2016 |
| Equitable Access | Target program participants rates (ex. 10% of all residential weatherization projects will be done on veteran-occupied housing units):  
| · ethnic minority residents (8%)  
| · families with children (25%)  
| · female-led households (7%)  
| · low-income residents (50%)  
| · residents living outside of Houghton/Hancock (50%)  
| · residents living in multi-unit structures (20%)  
| · residents living in rental units (30%)  
| · residents living in housing units built before 1980 (90%)  
| · seniors 60 years old+ (20%)  
| · veterans (10%) |

The four primary goals are inter-related. Equitable access goals along with its principal underpinning root in affordable energy is an encompassing aspect of all the other goals. The energy efficiency and alternative energy goals would not thrive if not built off a strong educational foundation. The relationship between these primary goals are shown in Figure 3.
2.1 Energy Efficiency

Increasing overall efficiency and exergy will be achieved by focusing on two strategies: optimizing heating energy source and reducing energy losses. Natural gas is the most exergy efficient energy source available to local residents to heat their homes. For this reason, the conversation of electric systems to natural gas heat will be pursued when possible. Reducing electricity and gas consumption will be achieved by increasing the efficiency of the existing housing and municipal buildings. Weatherization will be the primary strategy for improving the energy efficiency of homes followed by optimizations in water heating and municipal lighting. There are already several local programs dedicated to weatherization, however, they are underfunded and underutilized. HEET will used a community based outreach strategy to connect these resources to community needs and achieve the HCEP goals described above. Some of these existing programs are identified in the paragraphs below.

In order to identify where in the home weatherization is needed most an energy audit must be conducted using a thermal imaging camera and/or a blower door and smoke pencil test so that air leaks and thermal bridges can be visualized. Energy audits are an essential first step towards evaluating which energy saving measures will yield the greatest savings. However, due
to the high cost of these energy audits and lack of knowledge about available service providers, many people invest in energy saving measures haphazardly and miss potential “low hanging fruits”. Several participants in HEET meetings voiced a need to reduce the cost of an energy audit by 75 percent. A partnership with local fire departments, which have access to thermal imaging cameras, will be made such that they could use energy audits as a fundraising instrument.

After an energy audit, energy saving strategies can then be prioritized and pursued. New Power Tour, a local non-profit organization, aims to increase the use of alternative and energy efficient technologies. Current programs such as the Copper Country Winterization Project will continue its seven-year partnership with New Power Tour, which will be a valuable resource in winterizing homes and municipal buildings. HEET plans on working with the program leaders to help promote, build up, and expand this existing program to enable many more homes to be weatherized.

In addition to manpower, the cost of energy efficiency resources and supplies have been identified as a primary barrier. Therefore HEET will help aggregate all potential energy efficiency retrofit prospects to lower transaction costs. For example HEET will coordinate bulk purchases of items like light bulbs, energy meters, hot water heater blankets, insulation, etc. for both local municipal governments and residents. These purchases will be aggregated regularly.

The above energy efficiency improvement process is effective for homeowners and municipal governments, renter occupied housing units face a set of unique challenges. As identified by Bird and Hernandez (2012) landlords and tenants face the problem of split incentives. This occurs when landlords control the building infrastructure and its appliances but pass on the energy costs to the tenants. As a result the landlord has no incentives to build to high energy efficiency standards or purchase energy efficient appliances. On the other hand tenants are faced with a temporal split incentive. They are compelled by utility costs to be more energy efficient but hesitate to invest in energy efficiency retrofits because they are unsure that the will stay long enough to reap a positive return on investment. The HEET team will work with local municipal, county and utilities to evaluate policies and strategies to circumvent these dual split incentives. Potential programs include the following in Table 2.
Table 2. Potential Policy Response to the Split Incentive Problem

<table>
<thead>
<tr>
<th>Description</th>
<th>Benefits</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green or energy efficiency lease</td>
<td>Higher rents offset by lower utility costs.</td>
<td>Requires cooperation from landlord and tenant.</td>
</tr>
<tr>
<td></td>
<td>Mutual commitment to conservation.</td>
<td>Continual capital improvements and maintenance necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Currently geared toward commercial leases.</td>
</tr>
<tr>
<td>Energy efficiency mortgages (PACE financing)</td>
<td>Capital improvements can be done at one time and paid in installments.</td>
<td>Benefits remain with the property and lien complicates property resale.</td>
</tr>
<tr>
<td>On-bill financing</td>
<td>Capital improvements are tied directly to utility company payments.</td>
<td>Liability for property owner.</td>
</tr>
<tr>
<td>Regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green building codes</td>
<td>Potential to benefit all new housing developments, including buildings for low-income tenants.</td>
<td>Only applies to new construction.</td>
</tr>
<tr>
<td>Low-income rental mandates</td>
<td>Potential for high scale implementation in low-income rental housing.</td>
<td>Creates serious disincentive to provide low-income housing.</td>
</tr>
<tr>
<td>All-in Services Weatherization assistance program</td>
<td>• Notional weatherization program, usually implemented as grants.</td>
<td>Cannot be implemented at scale because of cost; inefficient.</td>
</tr>
<tr>
<td></td>
<td>• Differs from state to state.</td>
<td>No follow-up for maintenance.</td>
</tr>
<tr>
<td></td>
<td>• Has highest reach; especially under the U.S. Stimulus Program.</td>
<td>Hardly used for low-income rental housing.</td>
</tr>
<tr>
<td>Concelere Services</td>
<td>Highest success rate for efficiency gains and behavioral improvements; addresses poverty concerns effectively.</td>
<td>Cannot be implemented at scale because of cost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Highest expense.</td>
</tr>
</tbody>
</table>

Source: Bird & Hernandez, 2012

The HEET team will create a website and utilize social media platforms where Houghton County residents can share their energy efficiency stories, e.g.: the energy savings realized by installing programmable thermostats, hot water heater blankets, and compact florescent bulbs. As one example, a typical resident saved 33 percent on his electric bill simply by lowering the temperature of his hot water tank and putting it on a timer and cleaning out the heat exchanger on his refrigerator. On the municipal front, some local townships have already achieved significant savings by aggressively pursuing energy efficiency retrofits. HEET will facilitate the cross-platform sharing of energy plan best practice resources to all municipalities.

Financing energy saving measures will come from multiple sources in order to meet the diverse array of needs and resources. Houghton County officials in partnership with HEET have initiated the process of establishing a Property Assessed Clean Energy (PACE) financing district, which will allow more extensive energy saving measures with longer payback period to become financially feasible for more people. Houghton County is also working with financial institutions to implement a collateralized revolving loan fund specifically for energy saving projects. HEET is also leveraging crowd funding resources to bring in targeted funding for specific energy initiatives. MichiganSaves, a statewide non-profit, and a local credit union (MTEFCU) have partnered to offer low interest, no home equity loans for energy efficiency upgrades and retrofits.
Houghton County is disadvantaged by a lack of certified energy efficiency experts in the area. Local entrepreneurial programs such as Smartzone can help facilitate the generation of new businesses and opportunities to fill this need. These programs will be complemented by volunteer energy mentors and energy advocates, as was referenced in the previous section.

In summary, rural and remote communities around the country face similar challenges to pursuing energy efficiency goals as Houghton County. Lack of financial and human resources coupled with an inexperienced energy workforce are barriers to creating and implementing a successful energy plan. The HCEP is built on grassroots volunteer community members, and thus can serve as a model for rural communities across the nation.

2.2 Alternative Energy

While alternative energy development is a paradigm that is tangential to energy efficiency, our community will seek creative integration of alternatives into our energy infrastructure to promote sustainable (a key principle defined in the community’s vision) and efficient use of resources. The main strategy to achieve increasing alternative energy adoption is PACE financing which will facilitate meeting the HCEP goal of meeting the net metering goal. The HCEP will provide avenues to connect alternative energy information to the community through strategies discussed in the following sections.

Residents of our community pay some of the highest electricity rates in the country (~$0.25/kWh). While high utility bills can incentivize energy efficiency, there is a lack of awareness in the community of exactly how high our rates are when compared with the rates in the rest of the region, State or the country. HEET plans on promoting the adoption of self-generation using alternative energy sources to drive a conversation about high local energy rates, and thus stressing the need for community-wide energy efficiency.

For example, in early summer 2014, a member of our leadership team used data from the only residential solar system within Houghton city limits to show that our high electric rates make Houghton County the ‘best place in the continental USA’ for solar. The fact that our county has the fastest payback period (7 years) on installed solar, despite high snowfall (218 inches) and low sunshine (average 3.8 usable sun hours per day) simply due to such steep electric rates resonated deeply with the community. His work was featured in national press and media, with HEET subsequently gaining a lot of exposure and buy-in of stakeholders, both locally and across the State of Michigan.

HEET is currently working with the most influential institutions in our community: local church groups and school districts, to install net-metered solar energy systems on their properties. The process of planning solar, wind, and other alternative energy systems gives contrast to show the affordability and accessibility of pursuing energy efficiency.
In summary, alternative energy development is a challenging topic across many poor rural communities. In our own community, alternative energy split the populace along political and ideological lines. Renewables are seen by many community members as a “rich person’s hobby”, since technical and economic barriers prevent community wide implementation. Our model provides rural communities with the means and strategies of using local alternative energy installations as a talking point to drive the need for widespread energy efficiency.

2.3 Education

Education is a key component to the success and sustainability of any well-developed energy plan. It involves engaging with diverse community partners to promote broad understanding of and interest in energy infrastructure, social constraints, and practical energy savings options. The HCEP includes a combination of traditional educational programming in the local K-12 public school systems, partnerships with the two local universities, and extensive community training.

- **K-12 Public Schools**: Each school district will develop its own energy curriculum. Appropriate curriculum will be developed for the elementary, middle, and high schools and shared across districts. Additionally each school will develop and share best practices and strategies within their community.

- **Universities**: The students and faculty at Michigan Technological University in Houghton (7100 students) and Finlandia University in Hancock (667 students) are a pool of resources to help implement energy strategies across Houghton County through service learning and community engaged research projects. Additionally students working with HEET will take their experience and continue to serve as energy efficiency ambassadors and champions in communities across the world.

- **Community**: The plan is to reach 100% of all community members with energy education through leveraging the large array of community networks listed in Table 3. The Houghton County community includes 76 churches, well over 30 service/non-profit organizations, 21 cities/townships, 21 assisted living centers, and a variety of other volunteer groups that will be contacted and asked to participate as volunteers for education and implementation. These organizations can serve as a source of potential volunteers, energy advocates, and community leaders for the GUEP advisory board in addition to hubs for communication outreach.

The educational coordinator will lead the engagement and implementation of programming for the nine local school districts, and two area universities, Michigan Technological University and Finlandia University. Proposed educational programming will directly impact other sections through the energy plan include efficiency by installing retrofits and upgrades to facilities, equity by reaching diverse and disadvantaged populations of the community, and alternative energy by leveraging the research and development faculty at the
universities. The broader initiatives developed through the energy prize competition will leave lasting effects in the community by creating a new generation of energy conscious citizens.

K-12 School Districts

The K-12 school districts include:

<table>
<thead>
<tr>
<th>District</th>
<th>Student Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams Township, K-12</td>
<td>442</td>
</tr>
<tr>
<td>Public Schools of Calumet, Laurium &amp; Keweenaw, K-12</td>
<td>1512</td>
</tr>
<tr>
<td>Chassell Township Schools, K-12</td>
<td>255</td>
</tr>
<tr>
<td>Dollar Bay - Tamarack City Area Schools, K-12</td>
<td>313</td>
</tr>
<tr>
<td>Elm River Township, K-6</td>
<td>5</td>
</tr>
<tr>
<td>Hancock Public Schools, K-12</td>
<td>819</td>
</tr>
<tr>
<td>Houghton-Portage Township, K-12</td>
<td>1382</td>
</tr>
<tr>
<td>Lake Linden-Hubbell Public Schools, K-12</td>
<td>515</td>
</tr>
<tr>
<td>Stanton Township Public Schools, K-8</td>
<td>149</td>
</tr>
</tbody>
</table>

The Copper Country Intermediate School District oversees and manages nine area districts in Houghton Country, Houghton-Portage Township Schools, and Lake Linden-Hubbell Public Schools have already committed to incorporating energy saving techniques into the science teaching curriculum with expected commitment letters from the remaining districts. Houghton-Portage Township School district implemented a district wide energy upgrades starting in 2008 and ending with Energy Star certification for both its elementary school and high-school/middle school buildings. In 2010 alone the district saved over $70,000 by reducing its energy costs by over 30%. Their expertise in district efficiencies will be leveraged to incorporate similar savings across the other eight area districts.

Programming and curriculum development is the core mission for energy education in the area. It is imperative that the next generation develop a working knowledge about their relationship with energy and what they can do to reduce their energy usage starting at an early age. The State of Michigan Energy Office has gathered a variety of regional and national programs which teachers and educators can start implementing today, such as Dr. E’s Energy Lab, EnergyQuest, Kid Wind, etc. To maximize resources and begin implementation immediately, the educational coordinator and districts will leverage nationally proven energy education programming in their classroom lesson plans.
To leverage the competitive atmosphere among local districts, schools will compete against each other to see who can save the most energy over the course of the next two years. This competition can continue past the end of the GUEP by having future student classes continue their rivalries.

Universities

Michigan Technological and Finlandia University have a variety of programs and groups designed to improve energy efficiency and educate others about their impact on the planet. Enterprise is a student-driven, multidisciplinary program that works with real-world clients on delivering an innovative product, pioneering solution, or a much-needed service. The hallmark of the Enterprise Program is the experiential training it provides to students. Green Campus, Alternative Energy Enterprise, Efficiency Through Engineering and Construction, are just a few of the key groups that will be leading technical advice throughout the course of the competition. This network of energy clubs similar to a model developed by Massachusetts Institute of Technology (MIT), will be established in Houghton County secondary schools and at Michigan Technological and Finlandia universities. These clubs are dedicated to fostering energy awareness and excitement students through experiential learning projects, energy project site visits and community discussion forums. Clubs at the university level are intended to be interdisciplinary, and are focused on raising the “energy-IQ” of the campus and the broader community. Moreover, HEET will work with Michigan Tech and Finlandia to develop service learning (helping with weatherization and data collection) and community engaged research projects (implementing the surveys and data analysis discussed previously) that support HEET efforts.

Michigan Technological University’s Center for Pre-College Outreach can bridge the gap between the K-12 area districts and University programs through its own innovative programming such as Summer Youth Programs, Mind Trekkers, and Get WISE. The expertise and programming knowledge through the Center will provide immediate resources to educate the broader Houghton County community.

Community-Wide Programs

In order to reach 100% of the community with educational and training information regarding their energy consumption and overall awareness, a variety of community organizations will be participating. Leaders from churches and other religious organizations have expressed their interest to learn about energy saving measures they can promote to their own membership. This medium will reach much of the audience not currently engaged with the local school systems or universities. Additional media from the Daily Mining Gazette will report monthly on the score of the energy saving competition and feature educational information on notable energy saving efforts. The community will also be directed to a newly developed website, where
organizations and individuals can see the competition's progress for both efficiencies gained and programs developed. However, like many rural areas in the U.S., Houghton County’s population is a classic example reflecting the “digital divide”. A significant portion of the community has limited access to the internet. Thus, HEET’s engagement efforts have also focused on non-digital communication channels as described in the sections below.

The educational coordinator will be responsible for creating and distributing educational materials to community organizations. The materials will include hard copy brochures, radio, newspaper, regularly scheduled community meetings, and other forms of communication which drive community members to keep energy efficiency and energy saving strategies on the top of their minds. Materials will include information on zero to low cost energy saving measures which have a high return on investment.

2.4 Equitable Access

The Houghton County community has placed a high priority on equitable access to affordable and sustainable energy through energy efficiency retrofits. The term “fuel poverty” refers to the affordability of energy by evaluating the proportion of income a family spends on energy costs. A family is considered “fuel impoverished” when it spends more than 10% of its income on energy to adequately heat their homes and meet other basic human needs. The HCEP seeks to achieve “affordable energy” through weatherization and other basic needs energy efficiency retrofits, reducing the total cost of energy consumed by residents and municipalities. As Table 1 notes, our plan has placed specific targets for efficiency programs to serve key community member groups (target groups) based on socio-demographic characteristics (e.g. income, type of housing unit, geographic location, etc.). Equity goals are established to ensure that strategies are utilized to help all members of our community with emphasis on those with limited financial resources. For example, low-income rental units frequently use more energy per square foot (as much as 40% more) than privately-owned housing and cannot afford efficiency upgrades or alternative energy.

In order to reach these critical groups, our plan sets forth an aggressive community-based outreach (CBO) strategy intent on targeting existing formal and informal community communication networks. The CBO strategies for the HCEP include:

Formal Communication Paths:

- Preliminary Survey of Energy Attitudes, Barriers and Usage: Some of the most powerful impediments to the widespread adoption of alternative energy and energy efficiency technology are cultural and institutional (Sovacool, 2009). Conflicting values, norms, and beliefs about the role of decentralized energy and an individual’s capacity to change his

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or her energy consumption present significant challenges to reducing Houghton County’s use of electricity and natural gas. A community survey will be implemented to collect data on Houghton County residents’ energy expenses as a percentage of their household income, determine the perceived barriers to energy efficiency technology retrofits, and other basic demographic information. Information from this survey will guide communication and outreach strategies for addressing perceived barriers and help identify segments of the Houghton County population that need energy efficient retrofits the most. The survey will be dispersed by mail, online, and in person and will representatively target respondents by township, gender, income, and housing type using stratified random sampling techniques.

- **Outreach & Marketing through Existing Community Networks:** Many members of target groups are connected to existing community organizations. These organizations have established relationships and communication channels with target group members through formal service programs. The HCEP will tap into these existing networks to efficiently communicate energy education and programming information. This reduces redundant communication costs and leverages established trust between target groups and existing organizations. Table 3 contains a list of some key target groups and the organizations that HEET will partner with to disseminate information.
### Table 3. HEET Communication Network

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Communication Organization</th>
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<tbody>
<tr>
<td>Housing Unit Type</td>
<td>Apartment complexes</td>
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<td></td>
<td>Township housing commissions</td>
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<tr>
<td>Low Income</td>
<td>Baraga-Houghton-Keweenaw Community Action Agency Association</td>
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<td></td>
<td>Big Brothers Big Sisters</td>
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<td></td>
<td>Child &amp; Family Services of the Upper Peninsula, Inc.</td>
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<td></td>
<td>Copper County United Way</td>
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<td>Michigan Department of Human Services</td>
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<td>Local faith-based organizations</td>
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<td></td>
<td>Habitat for Humanity</td>
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<td></td>
<td>Keweenaw Family Resource Center</td>
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<td>Teaching Family Homes</td>
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<td>U.P. Kids</td>
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<td></td>
<td>Western Upper Peninsula Food Bank</td>
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<tr>
<td>Non-white ethnic groups</td>
<td>Keweenaw Bay Indian Community</td>
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<td></td>
<td>Local faith-based organizations</td>
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<tr>
<td></td>
<td>Michigan Technological University - Center for Diversity and Inclusion</td>
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<tr>
<td>Residents of Non-Houghton/Hancock</td>
<td>Kiwanis, Lions, and Rotary clubs</td>
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<td>Townships</td>
<td>Municipal governments</td>
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<td></td>
<td>School districts</td>
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<td></td>
<td>Western Upper Peninsula Planning &amp; Development Region</td>
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<td></td>
<td>Volunteer fire departments</td>
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<td>Seniors</td>
<td>Public libraries</td>
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<td>Doelle Senior Citizens Center</td>
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<td>Hancock Eagles</td>
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<td>Harmony Gardens Adult Day Care Center</td>
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<td>Little Brothers’ Friends of the Elderly</td>
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<td>Local faith-based organizations</td>
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<td>Western Upper Peninsula Food Bank</td>
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<td>Female-headed households</td>
<td>1st Way</td>
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<td></td>
<td>Barbara-Kettle-Gundlach Shelter Home</td>
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<td></td>
<td>Local faith-based organizations</td>
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<td>Teaching Family Homes</td>
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<td>Western Upper Peninsula Food Bank</td>
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<td>Houghton County Veterans’ Affairs Office</td>
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<td>Keweenaw CARE Corps</td>
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<td>American Legion Posts</td>
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<td>Disabled American Veterans</td>
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<td></td>
<td>Local faith-based organizations</td>
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<td>Marine Corps League</td>
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<td>Military Order of the Purple Heart</td>
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<td>Veterans of Foreign Wars Posts</td>
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<td></td>
<td>U.S. National Guard Post, Dollar Bay, MI</td>
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</tbody>
</table>
• **Major Employers**: Major area employers will serve as a focal point for information dissemination. While many businesses may be unable to make financial contributions to project efforts, large employers provide an excellent, efficient means of distributing information to a large number of people. Opportunities for “in-house” presentations will be pursued so that presentations and question and answer sessions can take place to share program benefits with employees. The leadership team has engaged the local economic development agencies, the Planning and Development Commission, and Chambers of Commerce to leverage their networks in an effort to realize this vision.

**Informal Communication Paths:**

• **Opinion Leaders**: Opinion leaders are highly respected and active members of the community who are capable of motivating and persuading residents to pursue energy usage reduction and alternative energy adoption. The HEET will identify key community opinion leaders willing to promote and share stories of positive experiences using energy efficiency and alternative energy technologies.

• **Create a Citizens’ Advisory Board**: A citizens’ advisory board will be formed with community leaders from the target groups. This group will provide feedback into engagement strategies to increase participation by target group members. The board will meet semi-monthly with the HEET. Members of the board could be the “Energy Advocates” described below or other members of the community (e.g. service organization representatives) with strong ties to specific target groups.

• **Competitions**: Competitions will be held between communities and school districts to achieve efficiency and alternative energy targets, and among dormitories, fraternities and sororities of the two local universities.

• **Neighborhood Canvassing**: Canvassing efforts will be used to communicate key information by sharing information door to door and implement the community surveys described above. District and township canvassing groups will be created using local volunteers to share information on programs and energy reduction benefits. These efforts are intended to reach a high percentage of Houghton County residents. Canvassing efforts will be highly concentrated efforts conducted over short timeframes and coordinated across municipalities to build community “momentum” during critical stages (e.g. the competition kickoff).

• **House Meetings/Parties**: The use of house meetings/parties in local communities allow neighbors to share energy challenges and success stories. These meetings present a “low stakes” atmosphere where informal relationships can be established between community members, and technology adoption and program benefits can be discussed.

• **Energy Advocates**: Community “Energy Advocates” (EA) will be trained to conduct simple home energy audits and share program information with residents. Modeled after [Oregon State University’s Neighborhood Sustainability Stewards](https://oregonstate.edu/sustainability/neshasteward), volunteer EAs will be established in each township/district and will be designated as point persons for...
additional volunteer recruitment in for that area. EA’s will participate in a training program to identify major residential energy consumption sources, how to share that knowledge with others, and how to save money by adopting energy efficiency practices. The EAs’ training will include fieldtrips to local homes to understand the fundamentals of residential energy efficiency practices, meet with guest speakers, and develop strategies to help reduce neighborhood energy consumption. The EA will be the primary connection between the HEET and townships and districts for volunteer recruitment and local outreach coordination (canvassing, house meetings, etc.).

- **Earned Media:** The HEET will target local “earned media” opportunities. Earned media refers to efforts to gain coverage by local newspapers, radio stations, and local blogs. These outlets have a high trust factor by local residents and can help to encourage local “word of mouth” sharing of project information. The team has already generated a significant amount of “earned media” through the preliminary GUEP application stages and through the community energy visioning process. HEET will continue to engage media outlets as the competition moves forward. In print, The *Daily Mining Gazette* (the local newspaper) and other local media have actively reported on HEET’s efforts (Appendix A).

- **Audience Driven Communication:** Communication pieces will be designed and adapted to address specific target audiences to maximize engagement.

- **Additional communication channels:** CBO direct-marketing efforts will focus on direct mail, electric and gas utility bill inserts (subject to approval), email, and door hangers. These channels often have low per contact success rates, however, the cost of administration is much lower and can reach a wider audience than can be realistically achieved in person.

A preliminary HCEP timeline and milestones is included in the **Appendix** of this document.

### 2.5 Measurement Plan:

The four top-level goals energy efficiency, alternative energy, education, and equality were developed with measurable metrics in mind as shown in Table 1 and will be evaluated as follows:

- **Energy Efficiency:** Efficiency goals will be measured with quarterly data on electric and natural gas consumption aggregated to the zip code level and provided by our three primary utility companies (Upper Peninsula Power Company, Ontonagon County REA, and Semco Natural Gas) as specified in the attached data collection agreements. The data will be reported to GUEP.

- **Alternative Energy:** The Michigan Public Service Commission publishes annual net metering reports. We will collect these data into a spreadsheet showing renewable-generated kWh each year from 2000 through 2017. Additionally, HEET will directly solicit data on off grid alternative energy installations.
- **Education:** The number of schools (based on the number of energy plans and energy curriculum development) and community organizations (number of volunteers) engaged will be reported by each organization to HEET. We will keep a working spreadsheet with this information, updated quarterly.

- **Equity:** Assessment will include a mix of indirect metrics including the number of housing units weatherized, number of presentations/meetings with target audience organizations, as well as direct metrics such as percent of income spend on energy before and after weatherization. Data for these metrics will be generated through both self-reporting mechanisms hosted on the HCEP’s platform, and through questionnaires administered at the point of program service delivery (e.g. when a home is winterized through a project volunteer or partnering agency). In addition, a community follow-up survey will be administered at the end of the first year to assess progress towards the equity goals and evaluate outreach strategies. The survey will collect data on weatherization activities and alternative energy technology adoption by respondents, and the survey’s results will be used to make references to the overall Houghton County population. The data will be used to evaluate progress toward the HCEP equity goals by reflecting the socio-demographic mix of program participants in relation to the target goals described in Table 1 above.

2.6 Long Term Plan Components

Houghton County is serviced by two electric utilities (UPPCO and OCREA) that own little to no generation assets. They are simply distribution utilities that buy and transmit energy that is produced in Wisconsin. UPPCO is a private investor-owned utility regulated by the State of Michigan and OCREA is a rural electric cooperative. For the residential sector, they currently do not offer a rate structure that incentivizes efficient use of energy. Residents in our community pay a flat rate for all energy used, with no time-of-use rates, interruptible meters, or tiered rate plans.

Utilities that only distribute energy have no natural incentive to offer energy efficiency plans beyond state mandated energy efficiency programs, since these programs for them would be a zero sum game. In fact, there is some concern among members of our community that increased efficiency will perhaps lead to utility companies increasing electric rates in order to compensate for falling electric sales. In order to disrupt this ‘grid-utility-death-spiral’ scenario, the community aspires to have a greater stake in local electricity generation.

Working with the utility companies to create more local generation opportunities creates a natural incentive for our utility companies to pursue, incentivize, and aggressively target community wide energy efficiency as an alternative to capital investment in generation capacity expansion.
Numerous small rural communities across the country find themselves in the ‘zero sum game’ of electric utility companies, much like Houghton County. Our HCEP and model will provide other rural communities with a means to incentivize their utility companies to aggressively pursue efficiency by increased local generation.

3. Utility Data Reporting

Pending Utility Approval

4. Innovation

The Houghton County Energy Plan incorporates innovative approaches to achieving community engagement and improving access to energy efficiency financing. The uniqueness of HEET’s engagement strategy rests in its truly bottom-up, community-driven approach. Houghton County’s participation in this competition was initially driven by a lone community member who was unaffiliated with the local government, utilities, or any local community service organization. HEET, which serves as the primary organizational force behind Houghton County’s participation in the competition, is purely driven by voluntary participation of community members. Its success rests on our ability to partner with and work through a wide variety of already existing community organizations. It is our goal for every member of Houghton County to feel personally invested and a “part of the team.”

Our Energy Plan is guided by a vision statement developed through a broad-based community visioning session. It incorporates goals and strategies distilled from over hundreds of ideas and suggestions emerging from multiple community meetings and public forums. The execution of the plan relies almost entirely on community volunteer mobilization through existing community organization networks and is evaluated by a community member board. This bottom-up approach allows for the community to identify its priorities and goals before other interests have the opportunity to frame the discussion. While local governments, utilities, and businesses are integral partners to achieving success, our efforts start and begin with community members.

An additional innovative aspect of our engagement plan is the use of best practices derived from the fields of sociology, political science, psychology, organizational theory, and marketing. Drawing heavily from constructs from the Theory of Planned Behavior (Ajzen, 1991) and its application to environmental behaviors (Kaiser and Gutscher, 2003), the HCEP will guide efforts to understand the barriers to individual adoption of energy efficiency technologies and how the use of local values, norms and social networks can overcome these barriers. For example, our efforts will focus on engaging groups that have traditionally not been
associated with energy efficiency efforts, like religious and service organizations. This will help HEET reach more community members while adding to the legitimacy of our goals.

For financing energy savings, Houghton County has setup the rules to allow for a PACE financing district. Neighborhood energy efficiency upgrades will be grouped into aggregate entities until the PACE financing threshold is reached. The process will be repeated until all homes in the County have been incorporated. HEET will partner with energy efficiency contractors to ensure program goals are met through these efforts.

Homes will be audited to determine a priority of energy saving strategies with the highest return on investment energy saving measured ranked the highest. Homeowners will get to choose how much PACE financed energy upgrades they want to take on. Additionally, a fund will be setup to allow local business to donate a percentage of customer purchases to a local energy fund.

5. Potential for Replication

Our plan develops a “roadmap” for small communities with limited resources to achieve ambitious energy efficiency increases. Much like Houghton County, many communities (both rural and urban) lack the financial resources to launch large scale, capital intensive energy efficiency projects. Even when communities have local energy efficiency programs, they usually struggle to achieve high levels of participation, particularly high risk members such as low income families and seniors. The Houghton County plan creates a replicable framework for these types of communities by:

- Demonstrating a community-driven planning process using public visioning exercises and continuous public feedback through forums and advisory boards to develop a plan that integrates into and emphasizes local values and goals.
- Creating a CBO template that showcases how pre-existing community networks can increase the public awareness and participation in available energy efficiency programs.
- Creating a volunteer-driven organizational structure (including specific management and coordination positions with “job descriptions”) to cost-effectively implement energy efficiency programs.
- Developing specific programs to generate needed, but lacking, community resources (e.g. a limited weatherization labor force) through certificate programs and partnerships with local institutions.
- Producing a website and other communication pieces (flyers, mailing inserts, recruitment scripts) that can be easily adopted and modified by other communities.
- Designing a replicable program that bulk purchases energy efficiency supplies from wholesalers at discount rates for individuals.
• Showcasing partnerships with local schools to reduce their energy consumption, generate volunteers for community weatherization projects, and educate community members through specifically designed curriculum for K-12 students.
• Fostering partnerships with local community-based organizations (particularly service and religious organizations) to engage high-need target groups in energy efficiency programs.
• Working with local universities to develop community guides/manuals of best practices for energy efficiency outreach, engagement and programing which can be shared with communities and agencies across the country as well as service learning and community engaged research projects that partner campus and community partners.

Our efforts in Houghton County will serve as a test bed for rural energy efficiency policies and strategies. Neighboring counties are already seeking assistance from HEET to replicate these strategies in their own communities.

6. Likely Future Performance

The work led by HEET in implementing HCEP will have long-term impacts in energy savings due to strategic investments in technology. The upgrades that will be made to improve energy efficiency, including winterization, installing energy efficient lighting, programmable thermostats, and hot water heater blankets, have lifespans of several years to decades or more. Whole home real-time energy monitors will be offered or required as a part of PACE financed energy saving upgrades. These improvements and retrofits will continue to function for many years after the GUEP competition. Alternative energy investments made during the GUEP competition are also expected to last decades.

Perhaps even more importantly, the activities outlined in the HCEP are intended to create long-term increases in social capital. Increases in community awareness and engagement in the activities described above are expected to help change societal norms in favor of energy consciousness and energy efficiency, thereby generating a long-term cultural change toward energy awareness and efficiency. The networks and knowledge generated from this competition will continue to pay dividends in energy savings. The community will continue to support the educational seminars, programs, and partnerships with/by schools which will continue to foster a future generation with a high degree of energy awareness, knowledge, and interest to continue championing the Houghton County energy vision statement.
7. Georgetown University Energy Prize Award

If Houghton County is awarded the $5 million GUEP prize, the money will be used to create a community trust fund for the purpose of investing in long term community energy efficiency projects. Funds from the trust would be used to make grants and microloans for residential, commercial, and municipal energy efficiency projects focusing on “high return on investment” opportunities. In addition the fund will support a community Energy Manager to coordinate energy efficiency initiatives throughout the county. The fund would be overseen by a community board which would be authorized to determine how funds would be used. Allocation of funds would be guided by similar equitable access goals described in the “Equity” section of this plan. The prize purse will be seen as a foundational investment into the fund, and it will be used to attract additional investments in the form of charitable donations from community members, businesses, charitable foundations, government agencies and other sources. Donors will have the opportunity to make unrestricted donations to the fund or designate donations to specific energy efficiency projects.
References


Appendix

Appendix 1. Interlink between vision statement, goals, and strategies.

1. Efficiency
   - Reduce electricity consumption by 10% by end of 2016
     - Reduce electricity consumption of municipal buildings by 10%
     - Reduce electricity consumption of residential buildings by 10%
       - Increasing the efficiency of housing stock
         - Energy audit homes with thermal imaging and blower test
         - Reduce energy consumption by lighting
           - Install energy efficient CFL and LED light bulbs
         - Reduce energy consumption by refrigeration
           - Clean evaporator coils
           - Replace refrigerators older than 10 years old
         - Reduce energy of hot water heating
           - Install hot water heater blanket
           - Reduce hot water temp to the minimum needed
         - Increase heating efficiency
           - Install programmable thermostat
           - Furnace tune up
           - Clean ducts
           - Check for leaks
         - Reduce heat loss
           - Caulk and weatherize windows and doors
• Insulate exterior walls
• Seal and insulate crawl spaces

- Reduce gas consumption by 10% by end of 2016
  - Reduce gas consumption of residential buildings by 10%
    - Increase heating efficiency
      - Install programmable thermostat
      - Furnace tune up
      - Clean ducts
      - Check for leaks
    - Reduce heat loss
      - Caulk and weatherize windows and doors
      - Insulate exterior walls
      - Seal and insulate crawl spaces
    - Reduce energy of hot water heating
      - Install hot water heater blanket
      - Reduce hot water temp to the minimum needed
  - Reduce gas consumption of municipal buildings by 10%
    - Increase heating efficiency
      - Install programmable thermostat
      - Furnace tune up
      - Clean ducts
      - Check for leaks
    - Reduce heat loss
      - Caulk and weatherize windows and doors
      - Insulate exterior walls
      - Seal and insulate crawl spaces
    - Reduce energy of hot water heating
      - Install hot water heater blanket
      - Reduce hot water temp to the minimum needed

2. Alternative Energy Sources
   - 2016
     - Meet State net metering minimum
     - Increase renewable self-generation by 500%
   - 2025
     - 25% fuel mix from renewable
     - 50% regional generation (western UP)
   - 2040
     - 50%+ Fuel mix from renewable
     - 100% regional generation (western UP)

3. Education
   - 100% K-12 & University Involvement
     - Develop/adopt energy curriculum
       - K-5
       - 6-8
       - 9-12
     - Universities develop a volunteer base
- Fraternities
- Sororities
- Other student/faculty orgs
- Service Learning Opportunities

- 100% of school districts develop an energy plan
  - Staff/faculty leader
  - Student organizations

- 100% of community reached
  - 100% of churches reached
  - 100% of service organizations reached
  - 100% of township government reached
  - 100% of other quasi government units
    - fire department
  - 80% of community engaged

- 100% of municipalities have access to energy planning tools
  - 80% actually create some form of an energy plan

4. Equitable Access

- Switch 25% of electric heat to gas

- Income
  - 50% of all weatherization will be to low income households (200% above poverty line or less)

- Age
  - 20% of weatherization projects impact residents/homeowners over the age of 65 (HC 65+ population: 16%)
  - 25% of weatherization projects impact residents/homeowners with children under the age of 18 (HC younger than 18 population: 20.5%)

- Geography
  - 50% of all weatherization projects will be outside the Houghton/Hancock bound

- Gender
  - 7% of weatherization projects impacted Female household with children [no husband present] (HC: 4.6%)

- Housing
  - 20% of weatherization projects impact housing units in multi-unit structures (HC housing units in multi-unit structure: 15.5%)
  - 30% of weatherization projects impact renter occupied residential units (HC rental tenure: 29.5%)
  - 90% of weatherization projects impact housing units built before 1980 (HC Housing stock built before 1980: 75.6%)

- Veteran Status
  - 10% weatherization projects impact veterans’ residents (HC veteran population 8.4%)

- Ethnicity
• 8% weatherization projects impact non-white ethnic residents (HC non-white population: 5.8%)
Appendix 2. HCEP Timeline & Milestones