University of Minnesota
Crookston Campus

CROOKSTON CLIMATE NEUTRALITY PLAN-DRAFT

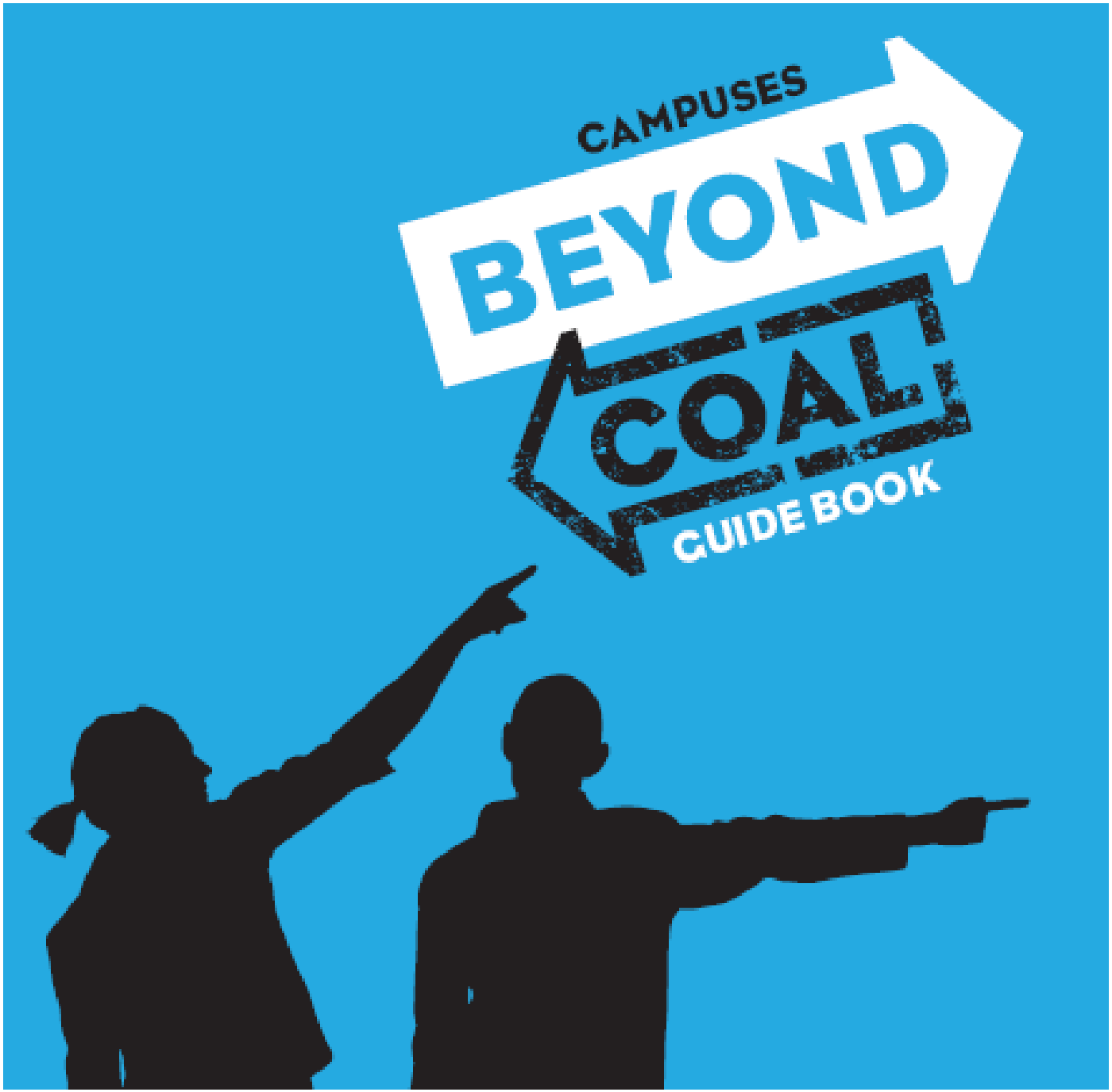
December 1, 2009

"What you do to the earth you also do to your children" – Red Lake Nation

- Carbon Neutrality is an ambitious goal
- This goal is attainable with no lost of comfort
- Attaining this goal will change the way you presently do business
- Each participate will learn skills that will be valuable in the future
- The campus has the opportunity to be a leader

Kids just say no—to fossil fuels

The Kids Are Alright. Not So Sure About the Adults.


CAMPUSES
BEYOND
COAL
GUIDE BOOK

Harvard Business Review
www.hbrreprints.org

Climate change affects your company's competitive landscape in ways you might not realize. Here's how to map your risks—and opportunities.

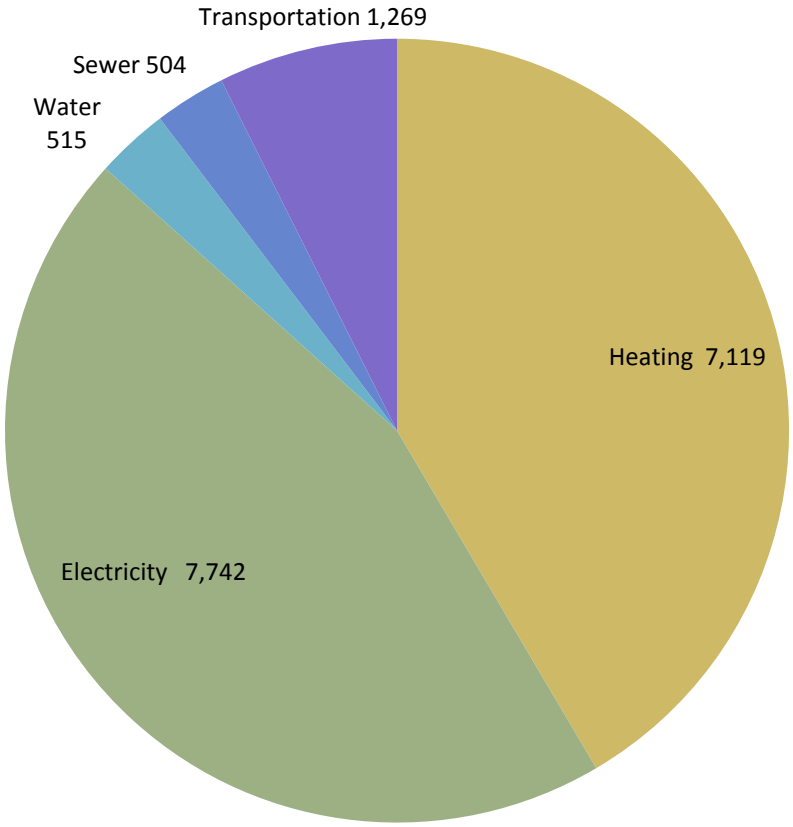
Competitive Advantage on a Warming Planet

by Jonathan Lash and Fred Wellington

Four Step Process

- Quantify your carbon “Footprint”
- Assess your carbon related Risks and Opportunities
- Adapt your business
- Do it better than rivals

University of Minnesota - Crookston CO2 Contribution of the total 19,157 tons in 2007



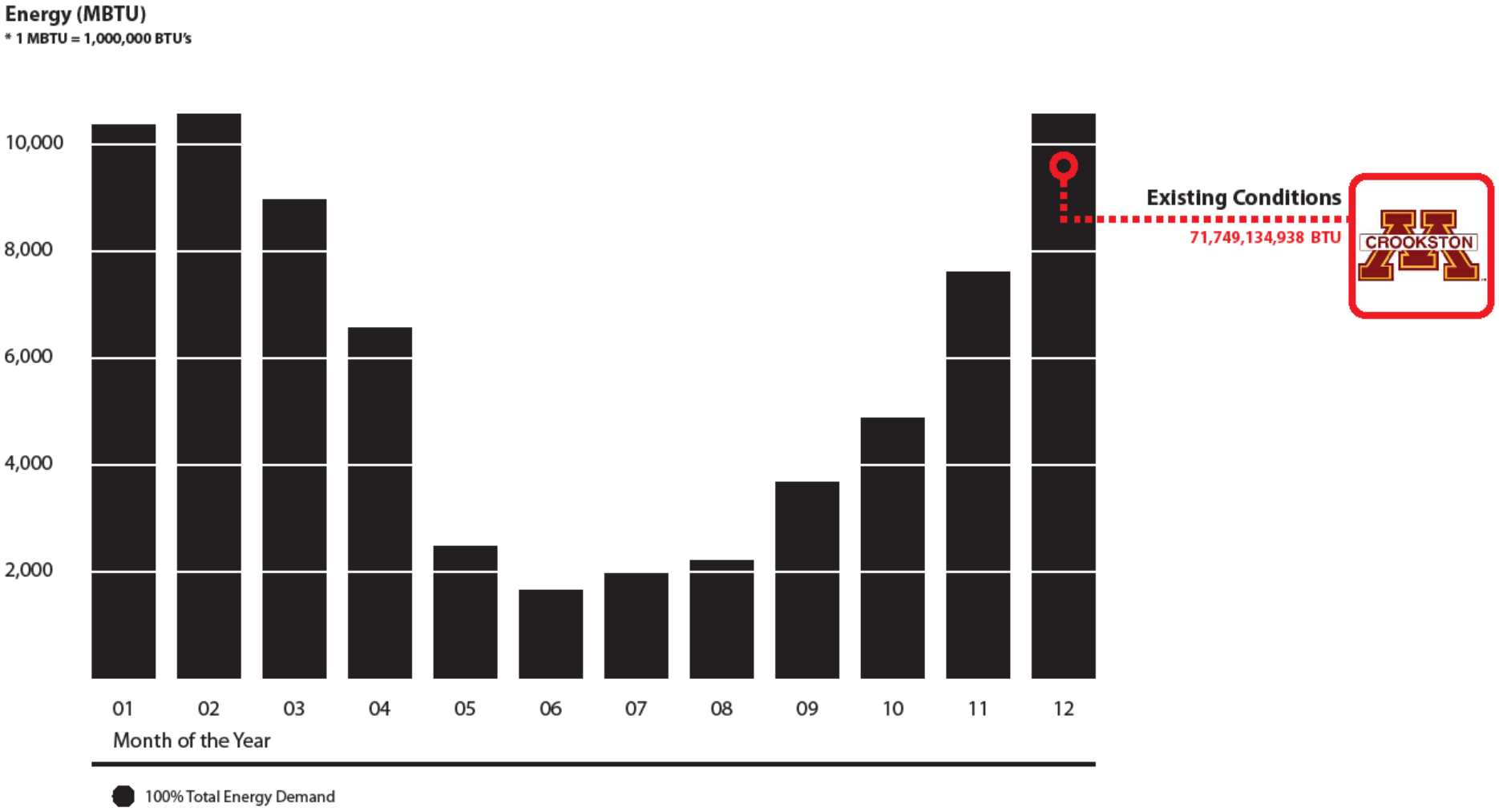
- Reduction in current energy use of 50%
  - Thru technology
  - Thru management

  But No reduction in occupant comfort or indoor air quality

- Reductions through Technology
  - Replace inefficient systems
  - Install metering
  - Install controls for operations
  - Install sensor for monitoring

- Reductions through Management
  - Establish Baseline for each building
  - Use B3 Benchmarking for comparison
  - Establish the least energy option
  - Develop strategies for run times.
  - Develop monitoring and inspection periods
  - Create periodic re-setup of systems

- Green Buildings – new construction and renovation
  - New Construction – 60% less than building code or follow MN 2030
  - Renovation – 40% less than building code or follow MN 2030


Energy (MBTU)
* 1 MBTU = 1,000,000 BTU's
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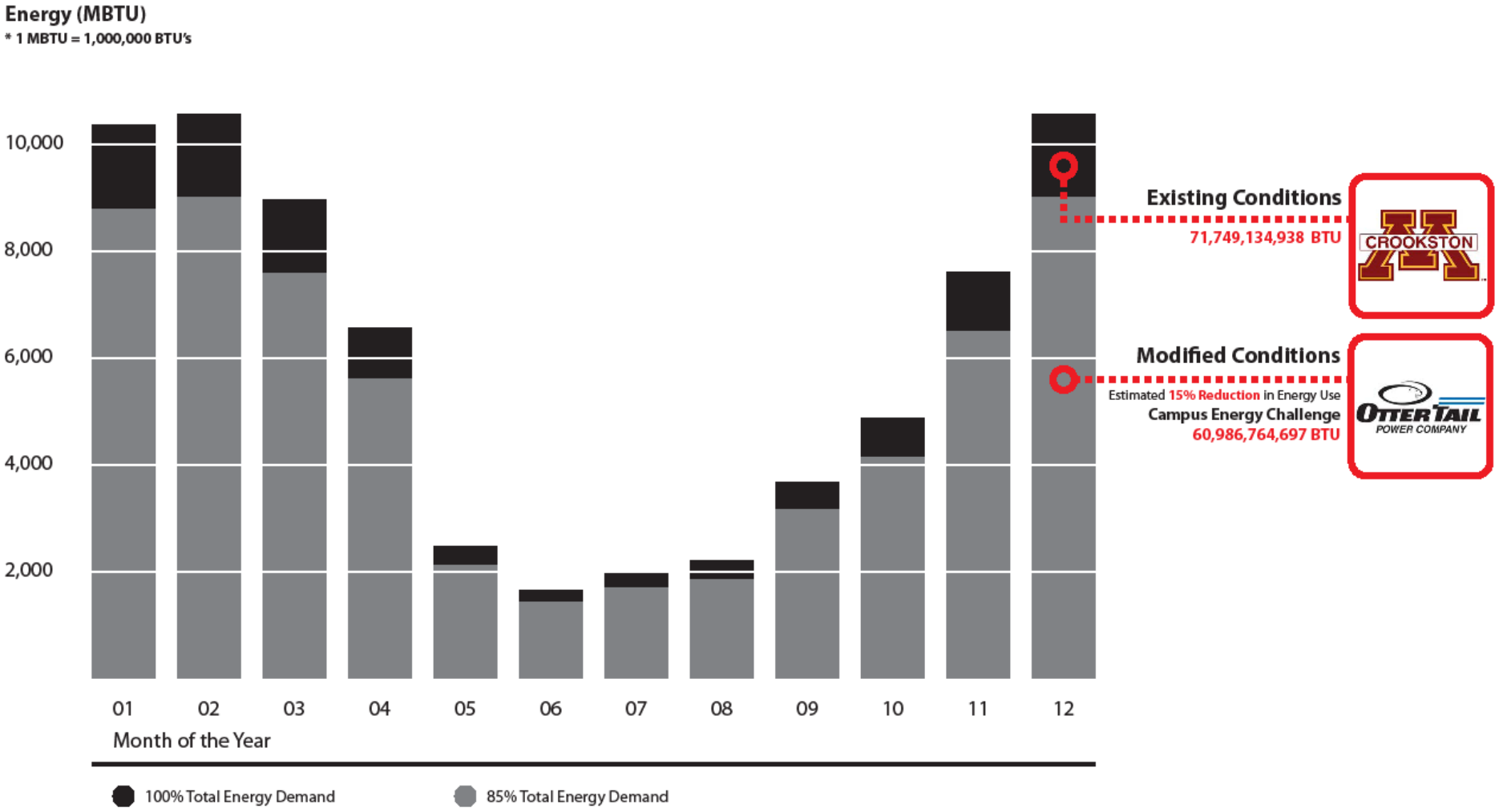
Month of the Year
100% Total Energy Demand
Existing Conditions
71,749,134,938 BTU
CROOKSTON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* 1 MBTU = 1,000,000 BTU's
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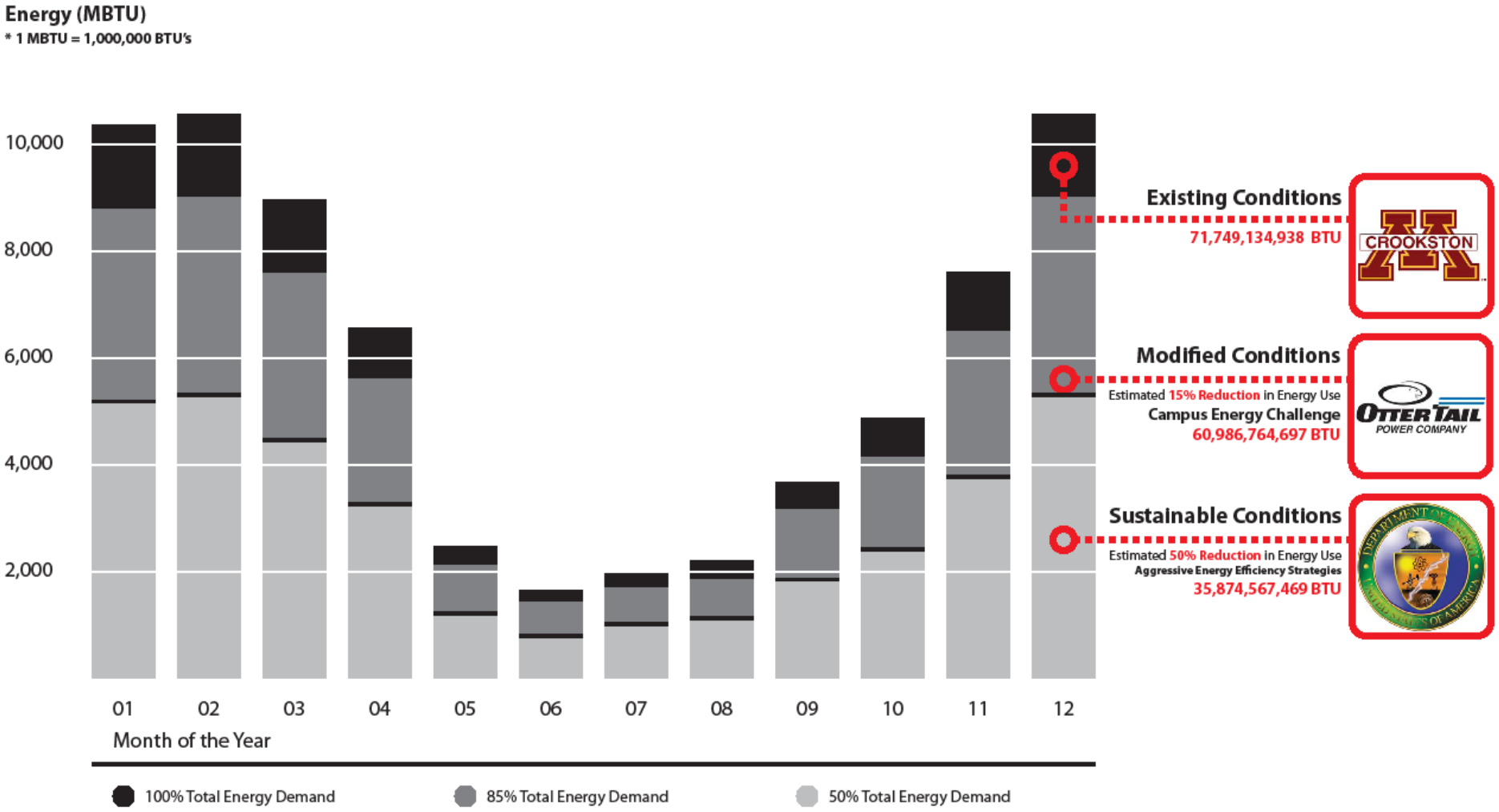
Month of the Year
100% Total Energy Demand
85% Total Energy Demand
Existing Conditions
71,749,134,938 BTU
Modified Conditions
Estimated 15% Reduction in Energy Use
Campus Energy Challenge
60,986,764,697 BTU


Energy (MBTU)
* 1 MBTU = 1,000,000 BTU's
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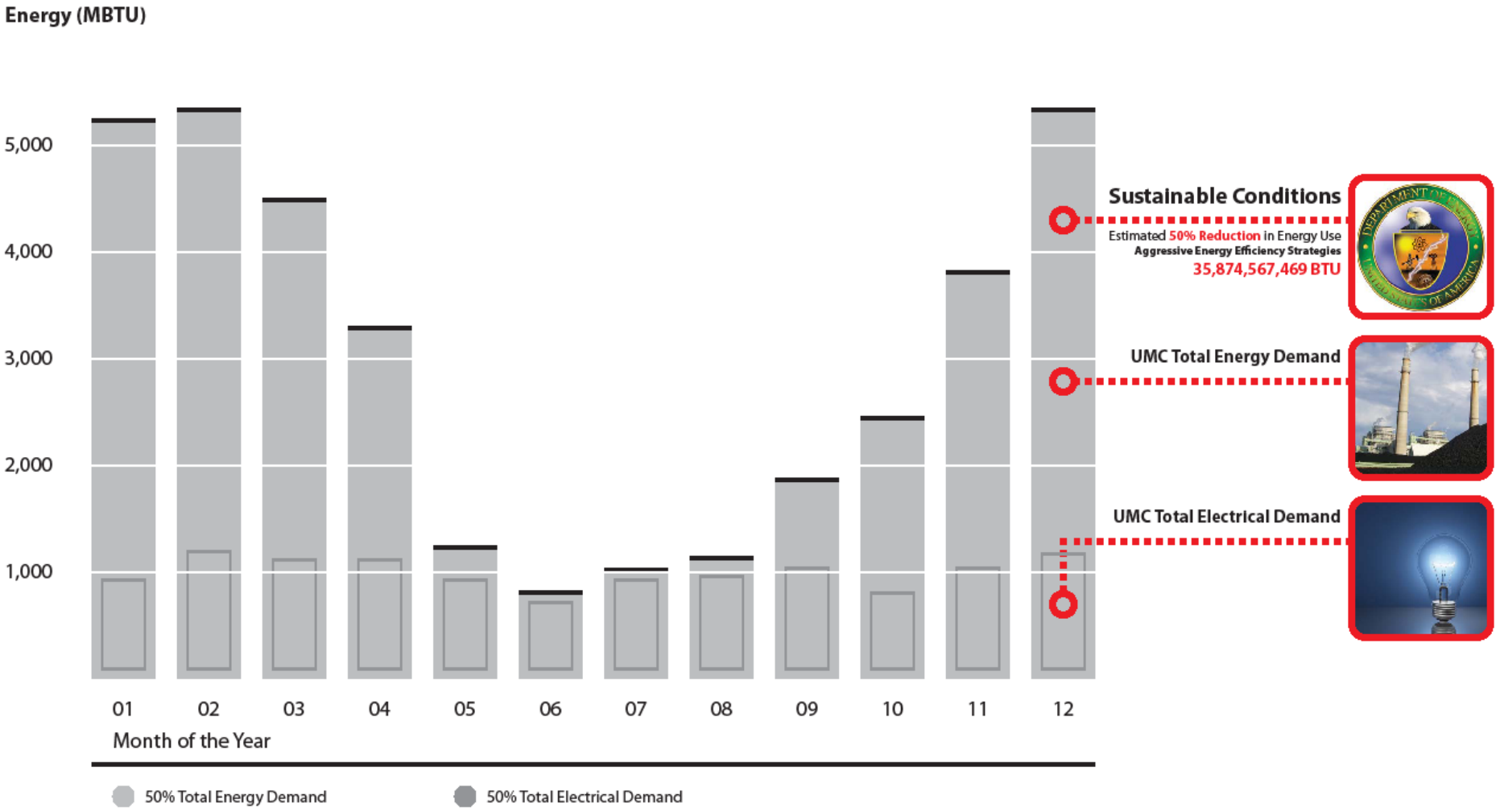
Month of the Year
100% Total Energy Demand
85% Total Energy Demand
50% Total Energy Demand
Existing Conditions
71,749,134,938 BTU
Modified Conditions
Estimated 15% Reduction in Energy Use
Campus Energy Challenge
60,986,764,697 BTU
Sustainable Conditions
Estimated 50% Reduction in Energy Use
Aggressive Energy Efficiency Strategies
35,874,567,469 BTU
CROOKSTON
OTTER TAIL
POWER COMPANY


Energy (MBTU)
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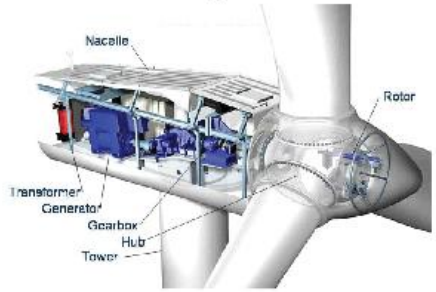
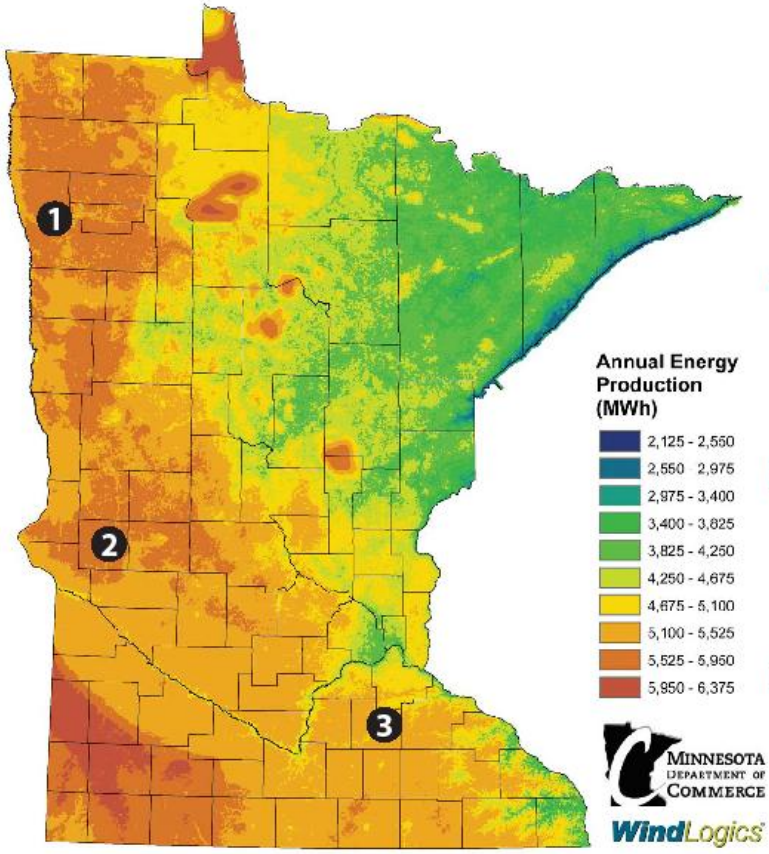
Month of the Year
50% Total Energy Demand
50% Total Electrical Demand
Sustainable Conditions
Estimated 50% Reduction in Energy Use
Aggressive Energy Efficiency Strategies
35,874,567,469 BTU
UMC Total Energy Demand
UMC Total Electrical Demand

Wind Turbine Diagram



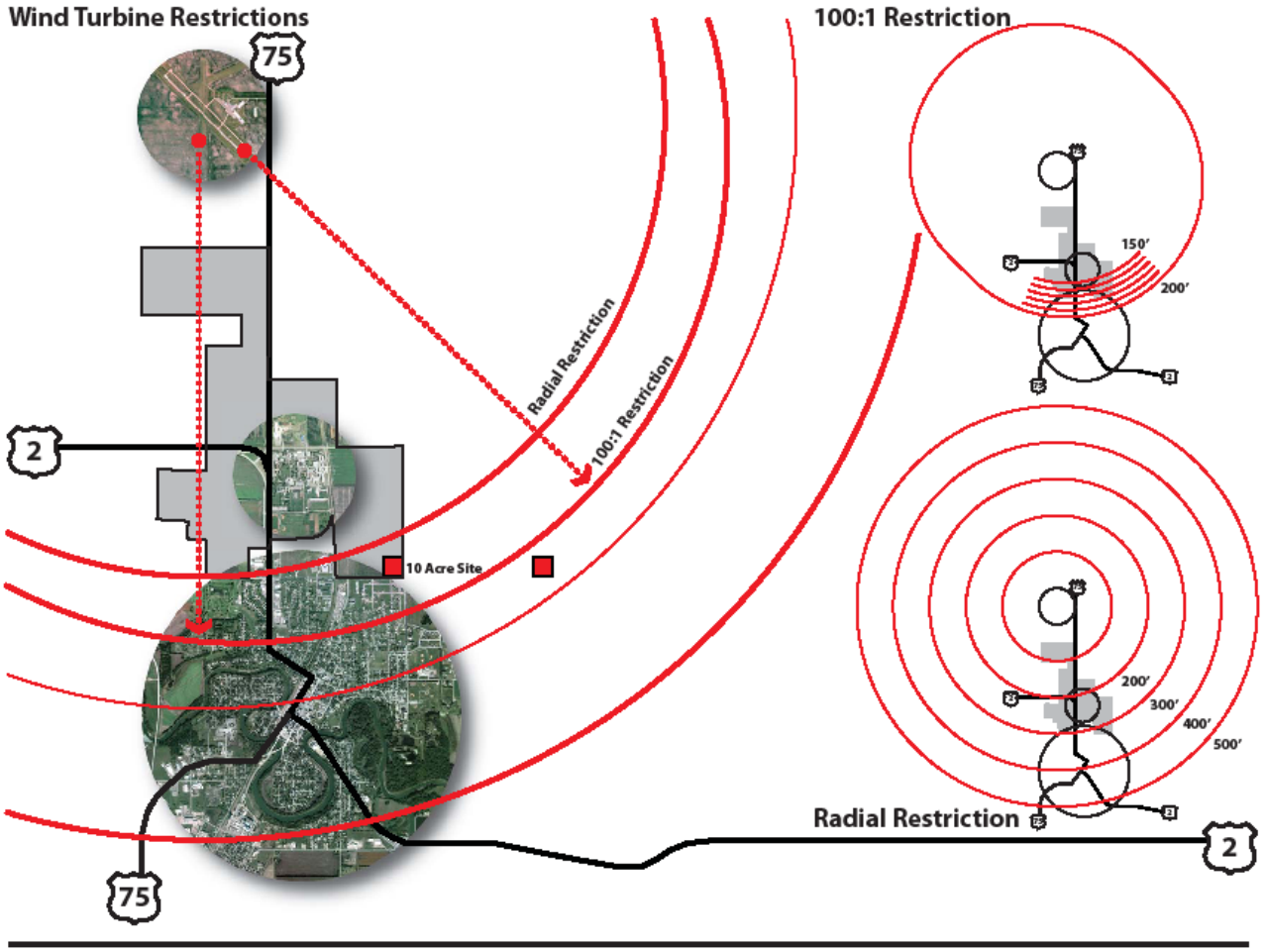
Wind Turbine Setting

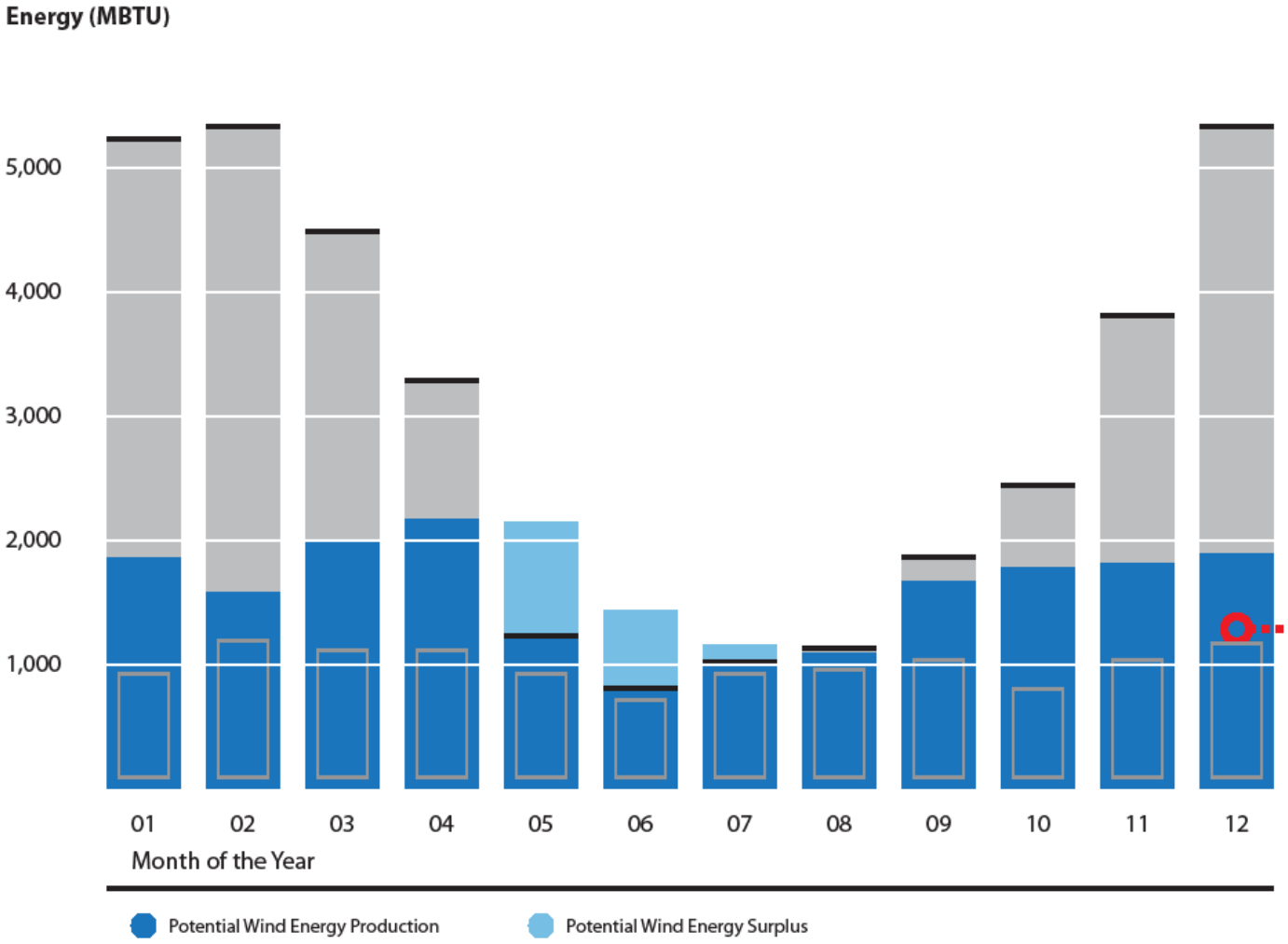


Carleton Wind Generation
3 1.65 MW Wind Turbine
5,100-5,525 MWh

UMM Wind Generation
2 1.65 MW Wind Turbine
5,525-5,950 MWh

UMC Wind Potential
1 1.65 MW Wind Turbine
5,100-5,950 MWh


Wind Turbine Restrictions
75
2
10 Acre Site
Radial Restriction
100:1 Restriction
75
100:1 Restriction
150'
200'
200'
300'
400'
500'
Radial Restriction
2



UMC Wind Potential

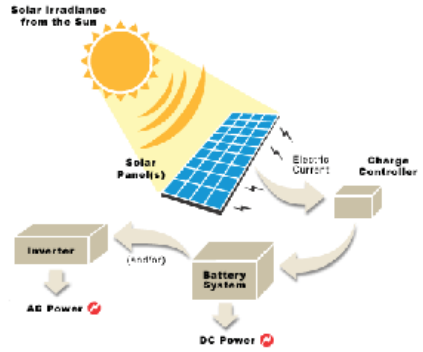
Potential Location 2-3 Miles East of Campus

Vestas 2.0 MW Wind Turbine

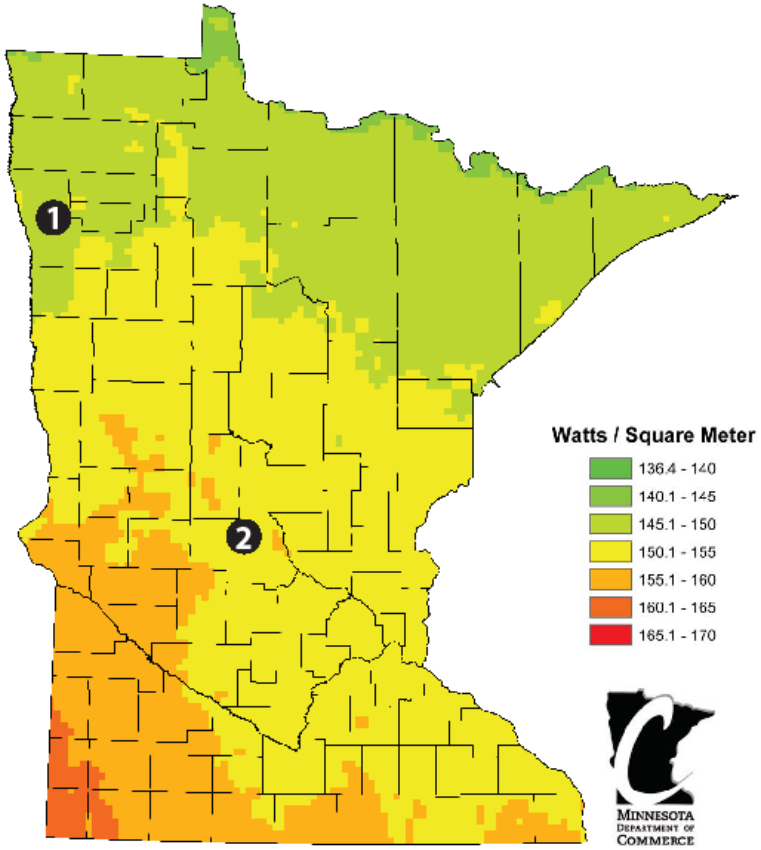
20,672,073,295 BTU

58%

Photovoltaics Diagram



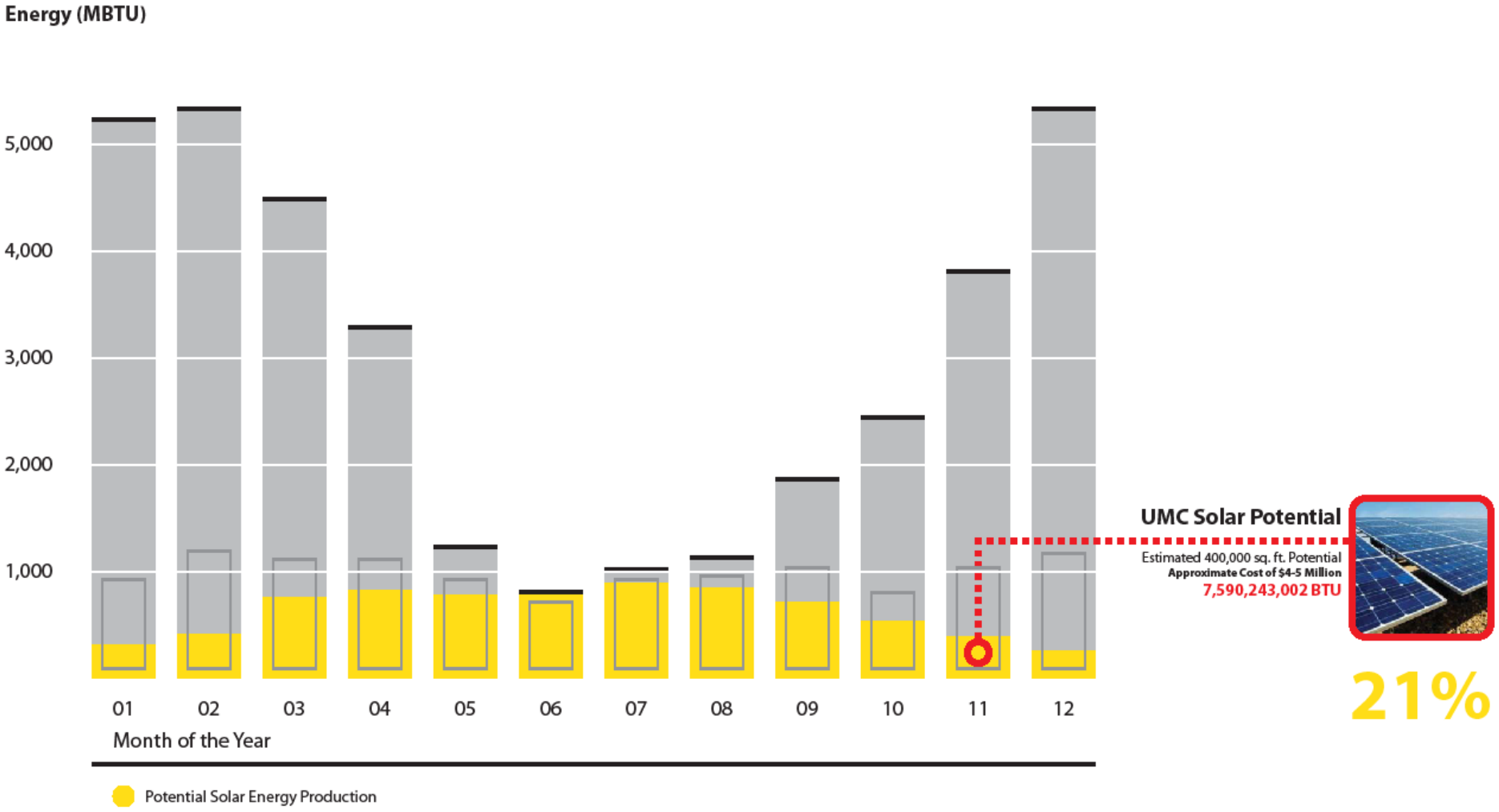
Photovoltaics Setting



The Springs Preserve
Estimated 39,000 sq. ft. Solar Field
Approximate Cost of $3.7 Million
2,900,455,000 BTU

2 St. John's University
Estimated 174,240 sq. ft. Solar Field
Approximate Cost of $2 Million
1,962,072,500 BTU

1 UMC Solar Potential
Estimated 400,000 sq. ft. Potential
Approximate Cost of $4-5 Million
7,590,243,002 BTU


Energy (MBTU)
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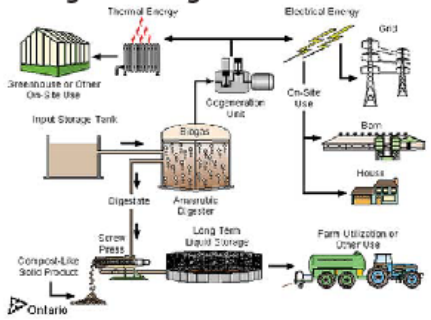
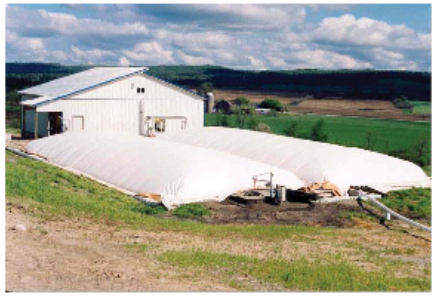
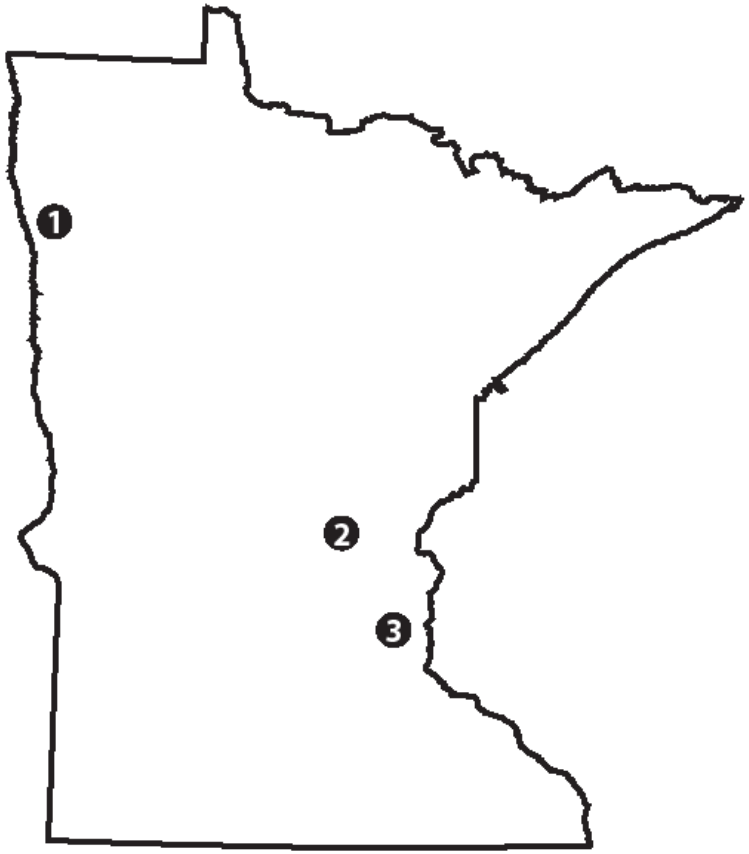
Month of the Year
Potential Solar Energy Production
UMC Solar Potential
Estimated 400,000 sq. ft. Potential
Approximate Cost of $4-5 Million
7,590,243,002 BTU
21%

Biodigester Diagram



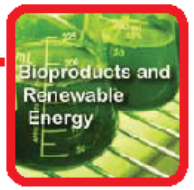
Biodigester Setting





3 Biodigester Research

Located on the St. Paul Campus
Prof. Philip R. Goodrich
1,753 kWh/cow/year

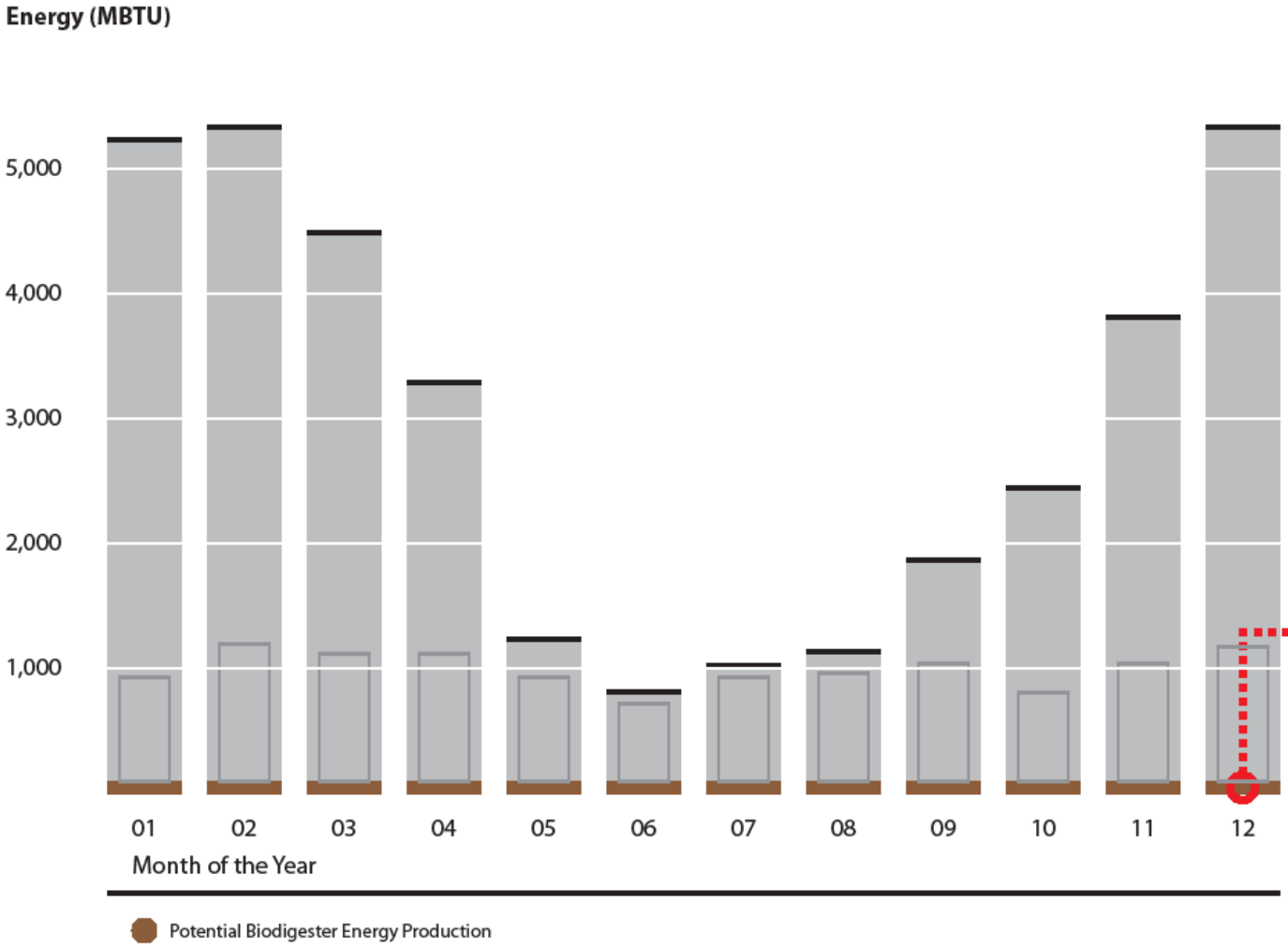


2 Haubenschild Farms

Located in Princeton, Minnesota
Dennis & Marsha Haubenschild
1,253 kWh/cow/year

1 UMC Biodigester Potential

Located at the NWROC Dairy & Beef Herds
Prof. Christo Robberts
1,196,364,892 BTU



UMC Biodigester Potential

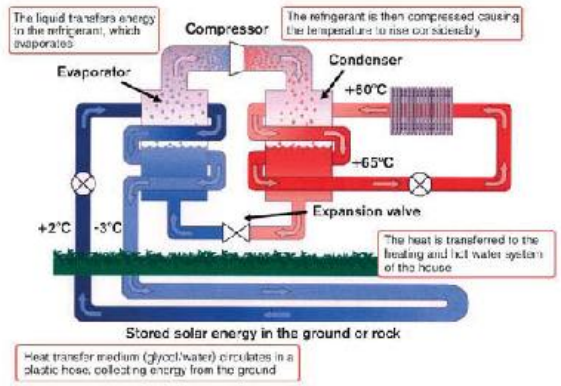
Located at the NWROC Dairy & Beef Herds

Prof. Christo Robberts

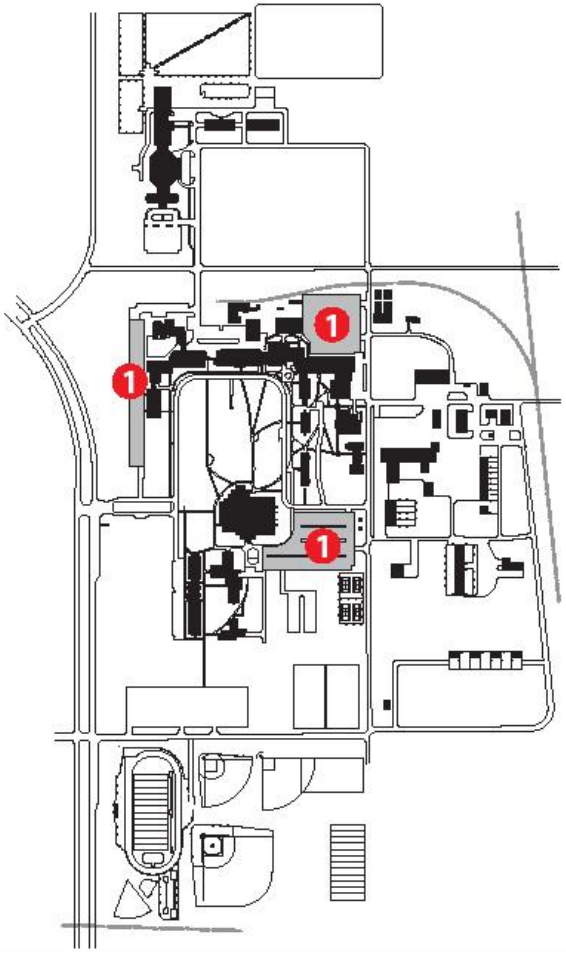
1,196,364,892 BTU

3%

Geothermal Diagram



Geothermal Setting



UMC Natural Gas Boiler

Potential Conversion of Existing Boiler

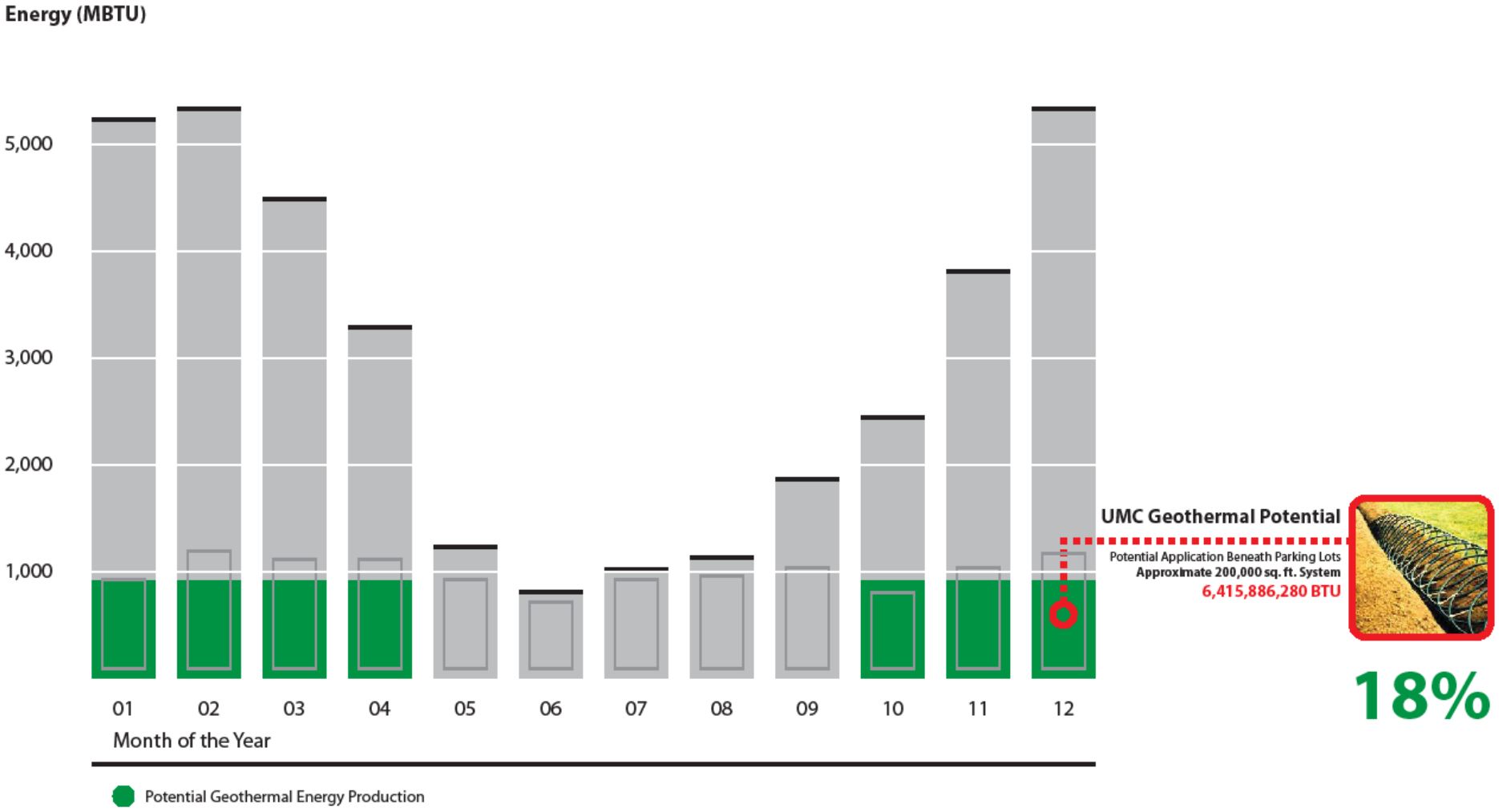
6,415,886,280 BTU

1 UMC Geothermal Potential

Potential Application Beneath Parking Lots

Approximate 200,000 sq. ft. System

6,415,886,280 BTU


Energy (MBTU)
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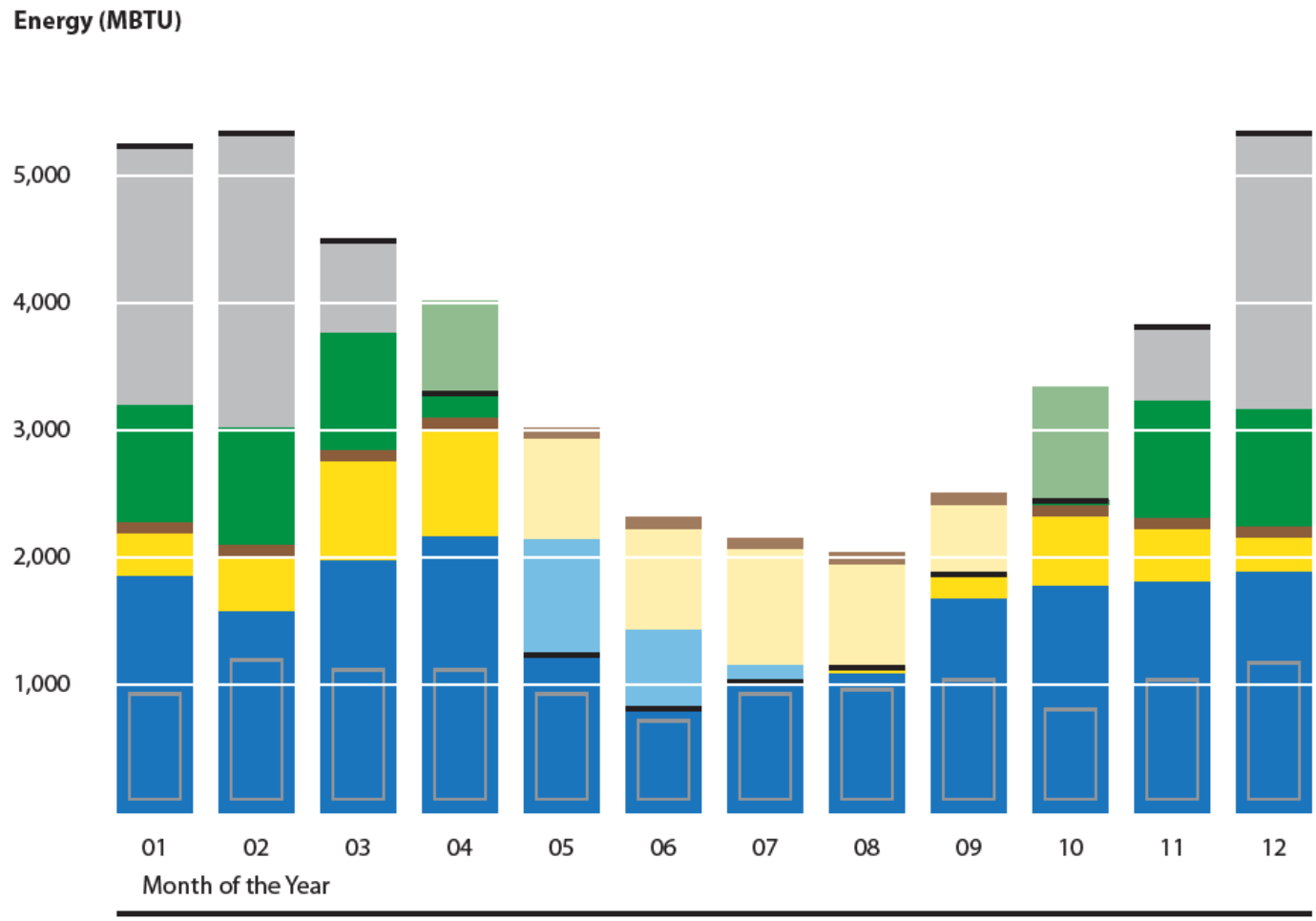
Month of the Year
Potential Geothermal Energy Production
UMC Geothermal Potential
Potential Application Beneath Parking Lots
Approximate 200,000 sq. ft. System
6,415,886,280 BTU
18%


Energy (MBTU)
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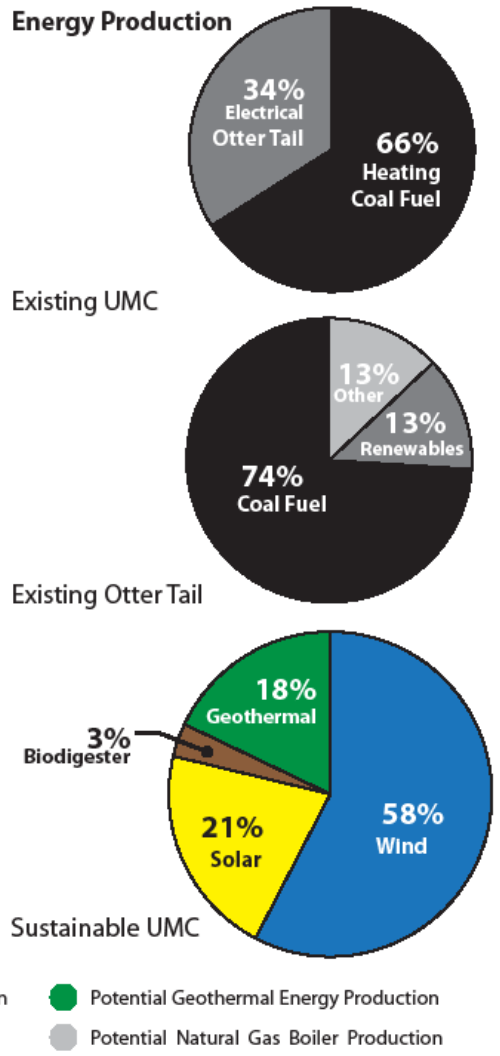
Month of the Year
Potential Wind Energy Production
Potential Solar Energy Production
Potential Biodigester Energy Production
Potential Geothermal Energy Production
Potential Natural Gas Boiler Production


Energy Production
34% Electrical Otter Tail
66% Heating Coal Fuel
Existing UMC
13% Other
13% Renewables
74% Coal Fuel
Existing Otter Tail
18% Geothermal
3% Biodigester
21% Solar
58% Wind
Sustainable UMC

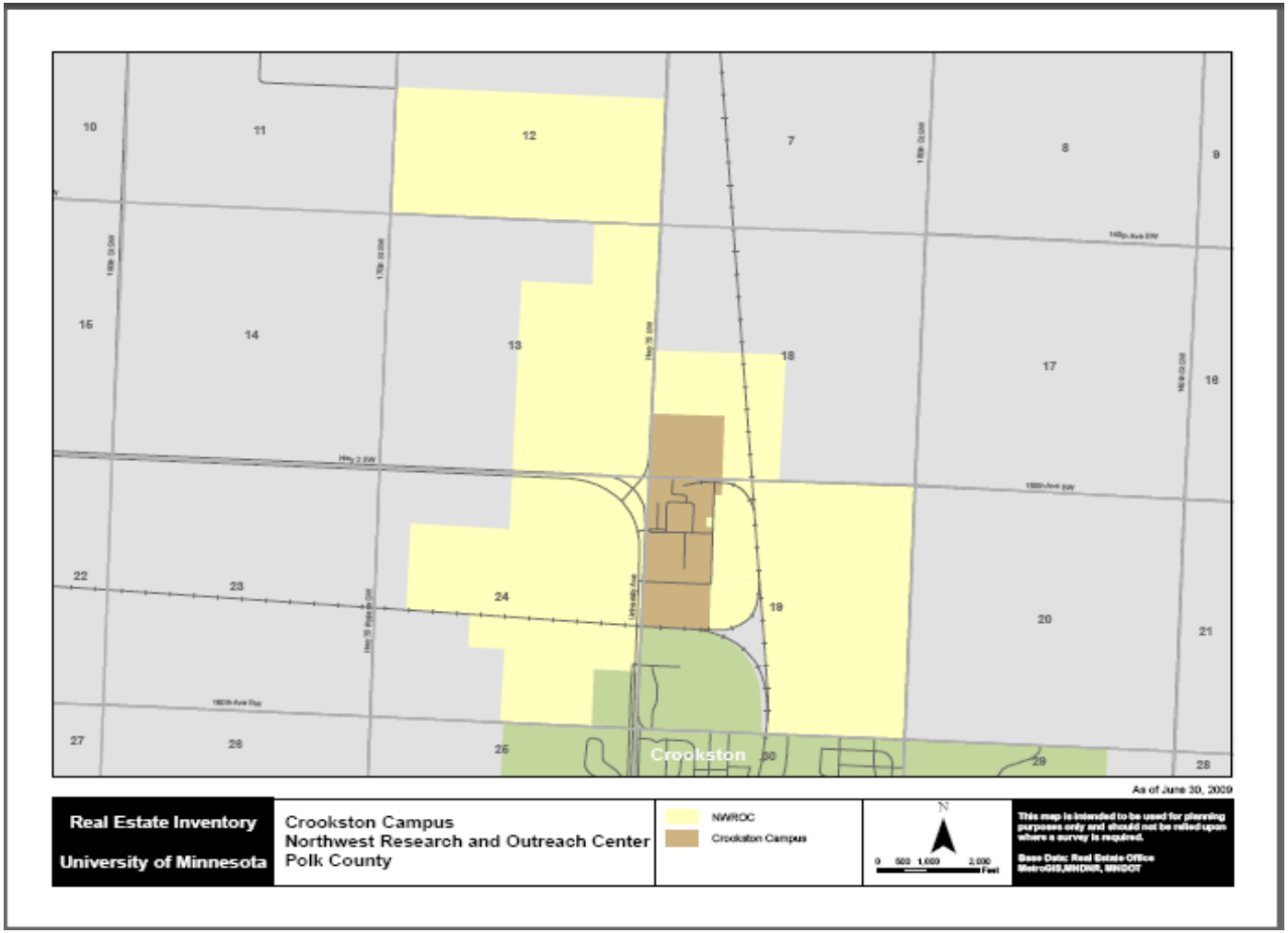
- Continue the work with Sodexo
- Look into setting up a local Coop with or without University assistance (insurance)
- Strengthen connections with local food producers
- Strengthen connections with local food network
- Develop a business plan for campus local foods

- Set goals each year for the percentage of local foods – perhaps as much as 5%/year
- Compost all organic matter from campus waste – soil supplement
- Display the carbon footprint of foods in the dining facility
- Help Sodexo develop a business plan to incorporate local foods into their operations

- Think about campus gardens as a – business opportunity for students (St Olaf)
- Think about how the current campus herds might became food for the students
- Establish menu that use more of the foods that are in season
- Use fair trade coffees, cocoas and teas

- Educate student about food choices and impacts
- Label the origins of foods – how far they have travelled
- Conduct orientation sessions for freshman about good food choices to avoid the freshman 20.
- Reduce food waste by 50% in the first year 5%/year after that

- Think about a “declining balance” accounting system rather than “all you can eat buffet style” – monitor it for good food choices
- Offer options for reduce calorie diets
- Develop food items with low environmental impact and low carbon ingredients
- Develop food items with low mileage ingredients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Crookston
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As of June 30, 2009
Real Estate Inventory
University of Minnesota
Crookston Campus
Northwest Research and Outreach Center
Polk County
NWROC
Crookston Campus
N
0 500 1,000 2,000
Feet
This map is intended to be used for planning purposes only and should not be relied upon where a survey is required.
Base Data: Real Estate Office
MetroGIS,MNDNR, MNDOT

- School Forest – 40 acres x .209 tons/acre =8.36 tons/yr
- Natural Area - 85 acres x .397 tons/acre = 33.745 tons/yr
- Farm Grounds – 1200 acres x .169 tons/acre = 202.8 tons/yr (assuming moderate tillage)

- Campus Grounds-175 acres (with almost a 1/3 building and roads and the opportunity for recreation on a 1/3 we will assume that about 1/3 can be converted to natural landscapes) x 1/3 x .397 tons/acre = 23.158
- Create a landscape ethic out of natural landscaping

- Total Carbon Sequestration = 268.06 tons of Carbon = If you assume that one ton of carbon is equivalent to approximately 4.03 tons of carbon dioxide then the sequestration rate would be **1080.30 tons of CO2/year** for all the lands that the University of Minnesota-Crookston currently owns.

- Switch to more efficient vehicles for the campus operational vehicles.
- The use of cleaner fuels would reduce the carbon footprint. Bio-fuels made from not from grains but from non-food sources, Switch grasses or field wastes

- Alternative for student cars on campus is the use of a common or shared car. These are called ‘Hour Car” and “WeCar”.
- In use at Carleton, St Olaf and Macalester Colleges
- Students can sign up for a campus car for an hour or a day. The cars are available on the campus for all to use.

- There is a one-time non-refundable $20 application fee and $30 annual membership fee. Once you're a member, you'll have access to our environmentally-friendly Prius Hybrid and Camry Hybrid for an hourly rate of $8 which includes your gas. The Daily rate is $59/day

- Use more telecommuting opportunities for staff when possible.
- Establish alternative transportation days in the spring and fall when it is seasonally possible. During the winter, establish ride with buddy /student/staff/faculty day.
- Set a goal of a 10% reduction of VMT for the first year and then 5% after that.

- The college could think about stocking students' most needed items in the bookstores and vending machines at reasonable prices so that it would be more expensive for the student to travel to Crookston for the items.
- The college might slightly subsidize the items to make this attractive.

- Bikes with large baskets for carrying student items would be convenient.
- The bike program could be run similar to the "Hour Car" where the student can reserve the bike when needed and is responsible for returning it to a secured rack.
- Incentives for the use of bikes by students could be created with a coupon for the snack bar or bookstore with each use.

- Build more student housing on campus.
- This will reduce commuting to and from campus.
- Make housing competitive with housing in the city
- Make housing more attractive to students by offering amenities that city housing can’t.

- Informing and educating students to be effective in what matters most in 21st Century
- Biofuels and Renewable Energy, Sustainability minor and Sustainable Development minor
- Promote soon to be majors in Environmental Science and Sustainable Facility Management.
- Promote study aboard programs to see Carbon Neutral Communities

- Create a common reading book club on sustainable topics (Faculty, Staff and Students)
- Develop campus visits to carbon neutral communities, schools and campuses in the US to see first hand alternative technologies
- Develop a carbon neutral theme in each of the courses during the freshman year
- Promote summer internship with sustainable professors, organizations, and NGOs

- Initiate the writing of case studies of success carbon neutral communities to be posted on the sustainability web site
- Create a campus wide performance indicator of carbon neutrality – something feasible to all "Carbon Kiosk" – show strategies and track their success
- Develop general courses in "Ecological Literacy"

Student Study Topics

C CURRICULUM

- Conduct annual assessment of the reduction of carbon dioxide and probability of meeting the campus climate neutrality goals
- Monitoring of energy usage in buildings
- Monitoring of energy usage in subsystems of buildings
- Evaluate the effectiveness of building energy reductions (technological and social)

- Examining alternative methods to reduce energy in buildings both from a social and technological perspective
- Examining the feasibility of bio-mass boilers
- Examining the feasibility of expanded animal waste digesters
- Examining the economics of energy transition to renewable for a typical farmstead

- Examining the specifics of solar photovoltaic and solar thermal application
- Evaluate the possibility of participation of the Crookston Community in the college quest for carbon neutrality
- Evaluate the economics of the college to initiate a food cooperative
- Evaluate the initiation of the hour car program
- Evaluate the initiation of a bike program

- Recycling and waste management are very important to the climate neutrality effort because addressing them can reduce emissions.

- According to the EPA, the disposal of solid waste produces greenhouse gas emissions in a number of ways. First, the anaerobic decomposition of waste in landfills produces methane, a greenhouse gas 21 times more potent than carbon dioxide. Second, the incineration of waste produces carbon dioxide as a by-product. In addition, the transportation of waste to disposal sites produces greenhouse gas emissions from the combustion of the fuel used in the equipment. Finally, the disposal of materials indicates that they are being replaced by new products; this production often requires the use of fossil fuels to obtain raw materials and manufacture the items.
  http://www.epa.gov/climatechange/wycd/waste/generalinfo.html

- *Current Efforts at Crookston*

- Currenty there are a couple enitities at UMC working on recycling. Custodial and Maintenance Scrap Materials (FMO is lead) and theRecycling Working Group of UMN Sustainability Committee (Peter Phaiah). There is also an ongoing recycling container program at DTS Fraternity.

- *Recommendations for UMC*

- *1.* Measure waste and create a baseline for solid waste and recycling at UMC

- 2. Reduce emissions associated with land filling and measure the outcomes

- 3. Reduce campus material consumption and measure the outcomes

- Research is a critical area for UMC to consider in its implementation of climate neutrality. Research related to climate neutrality has the double benefit of advancing knowledge in this area, preparing students in area that is guaranteed to be of importance in the coming decades and also meeting an important goal of the institution.

- *Current Efforts at Crookston*
- There are some existing research efforts related to carbon neutrality such as the research on potential carbon sequestration on campus, research on use of bio fuels for campus vehicles, research on potential use of methane digesters for use on campus and use of prairie plantings on campus. These research efforts help strengthen the climate neutrality efforts and connect faculty and students involved in this work to the larger campus wide initiative. In addition, there have been some student research projects related to sustainability.

- *Recommendations for UMC*
- Identify faculty research that might be of value to the climate neutrality goals of UMC across all disciplines and programs. (The survey development example)
- Provide micro grants and incentives to increase research interest in this area.
- Use available UROP funding in the service of advancing climate neutrality goals of UMC. Develop a network of research support for the students – the sustainability committees, individual faculty and P&A staff who might advise the students even as the students help UMC reach its climate neutrality goals.

- Communication of the efforts around UMC's progress towards climate neutrality is critical to making cultural change happen in the community. This cultural change, in turn, is critical to achieving climate neutrality. Outreach is another important aspect of the UMC's mission. In the context of UMC's climate neutrality efforts, UMC's work will serve to inform the region and assist in its transformation that is slowly underway. UMC can be a natural leader as it has been in the context of agriculture by helping rural communities on their own path to climate neutrality.

Current Efforts at Crookston

- There are excellent outreach efforts at the UMC through the North West Outreach Center (NWOC), through the Alternative Energy Work Group and through individual faculty work.

Recommendations for UMC

1. Communicate about UMC's climate neutrality efforts internally to a UMC audience as well as externally to a local, regional, and global audience.
2. Set targets and goals in terms of communication about climate neutrality and measure the outcomes every six months.
3. Build on current outreach efforts to connect to climate neutrality.
4. Initiate new efforts to do outreach specifically in the area of climate neutrality (For example, the Landowner's Guide to Prairie management could have a parallel Landowner's or Farmer's Guide to Climate neutrality)

- Connections and conversations refer to the how connections with individuals and organizations might be able to help the process for UMC to accelerate its progress towards climate neutrality. At a time where it is increasingly important to leverage constrained resources by developing partnerships this is a natural strategy to be employed – to partner with entities who have common goals and interests.

Current Efforts at Crookston

- The conversations and forums that UMC has had in the past have helped it get to this point. (List past events here). This process should be continued.

- Some of the emerging partnerships for UMC around climate neutrality are:

    a) City of Crookston

    b) Ottertail Grant

    c) Crookston Hospital

    d) Winnipeg Bus Company (name?)

Recommendations for UMC

1. Scope existing and potential connections of UMC around climate neutrality.

2. For every new project initiated with the goal to achieve climate neutrality, seek to partner with others.

3. Continue the tradition of conversations around sustainability, and focus some of them directly on the topic of climate neutrality.

- Addressing culture and process is critical to achieve climate neutrality.

- Translation of ideals and goals into action has to be a concerted effort and the desired goal is held as important in the collective consciousness of the members of the community.

- The reason why communities are not sustainable or climate neutral, despite there being the technologies available to make this possible, is because the goals and actions towards that end have not deeply entered into the culture if the community.

- Addressing the process of developing goals and action is a means to implement this transformation.

- Every community/organization needs a process unique to its own needs or the effort will be irrelevant. In effect, to be on the road to climate neutrality means also to be on the road to continuous transformation.

Current Efforts at Crookston

- By establishing specific committees, starting a Center For Sustainability and by taking the initiative to develop a climate neutrality plan in response to President Bruininks's signing of the President's Climate Change Commitment, Crookston has already made good headway in establishing a process. This process needs to be continued and accelerated.

Opportunities

- How can cultural change be brought into effect? By riding the wave of external changes that are happening in our society and by fostering the internal changes one step at a time. By looking for the strengths and innovative ideas within constituents – students, faculty and staff. Alan AtKisson author of *Believing Cassandra* offers three strategies for motivating transformation: (1) Promote the new, (2) Critique the old and (3) Facilitate the switch.

Recommendations for UMC

1. Establish an institutional structure and process to oversee the implementation of its Climate Neutrality Plan.

2. Set metrics in terms of achieving climate neutrality:

   For example, become 50% climate neutral by 2015

   Become 80% climate neutral by 2020 (Scientists are saying that we need to become 80% carbon neutral by 2020)

   Become 100% climate neutral by 20xx

3. Annually, map how Crookston is meeting its climate neutral – how far along it is in achieving the goal.

We are all in this together

Precedent #1_Middlebury College

logical framework-three objectives

- 1-reducing our GHG emitting activities
- 2-replacing dirty technologies with greener technologies
- 3-offsetting what we can't eliminate

Topics

_Space heating and cooling

_Electricity

_Transportation

_Solid Waste

_Sequestration

Conclusion: cultural context

Precedent #2_Oberlin College

Climate Neutral by 2020

Report by Rocky Mountain Institute

Three key resources are:

- Strategy
- Advanced Technology
- Time (something not typically associated with sustainability, however over the next 20 years many campus buildings will be remodeled, many facilities will be upgraded, and almost all equipment will be replaced or refurbished.

Outline

_Executive Summary

_Emisssions Inventory

_Emissions Reduction Measures

building and systems audit
building energy efficiency measures
other building related GHG reductions
transportation
water and waste water
landfill and garbage
energy supply options

_Three Scenarios

Baseline Scenario : Existing coal-fired plant
1-No-Brainers Scenario: Gas-Fired replacement plant
2-No-Regrets Scenario: Natural Gas-Fired combustion turbine
3-No Prisoners Scenario: Hydrogen Fuel Cells
reduction costs and benefits

_Offset Options

_Barriers and Risks

_Implementation and Financing

_Oberlin Policy Initiatives

Precedent #3_Cornell

Website Based deliverable-interactive and transparent

Inventory:

Profile the Situation

Forecast:

Solicit Ideas: 706 Ideas generated

_"wedge groups" formed based on themes

114 Themes Identified

19 Actions Endorsed

Actions:

Implement the Actions

Culture Change:

public documents for education and involvement

CROOKSTON CLIMATE NEUTRALITY

CLIMATE NEUTRALITY PLAN (CSBR)

E ENERGY

_OTTERTAIL ENERGY CHALLENGE GRANT

Eric Castle + Brenda Miller

New maintenance facility of NW ROC has a geo-thermal assisted heating system

_Primary infrastructure management/Transportation -
Fleet Services/Building retrofits/Custodial/Grounds Management (FMO lead)

REPORTS

McKinstry report
Schools cutting carbon report
Fabian Pommier campus energy audit of 2005

_OTTERTAIL ENERGY CHALLENGE GRANT

Custodians and maintenece staff of FMO can play a key role

R RESEARCH

Faculty role in proposing programs and conducting basic research

R+W RECYCLING + WASTE MANAGEMENT

_Custodial and maintenace scrap materials (FMO is lead)

Custodians and Maintenance staff of FMO

_Recycling Working Groups of UMN Sustainability Committee

Peter Phaiah

_Recycling containers on campus

DTS Fraternity

C+O COMMUNICATION + OUTREACH

_assist in coordinating relations/marketing aspects
_suggesting new projects which can improve campus visibility

Communitcation and Outreach Working Group

ALTERNATIVE ENERGY WORK GROUP
_meets once a month, a variety of representatives: mayor chairs, member of regional development, ottertail, organic farmer

Alternative Energy Work Group

F LOCAL FOODS

_Local foods working group
_encourage the use of local foods
* stimulates the local economy and heightens awarenness

_Campus food service (Sodexo)

Peter Phaiah

T+C CURRICULUM

Academic Affairs Office/ Department Heads/Curricular Working Group of UMC Sustainability Committee

Related Curricular Programs:
_Biofuels and renewable energy
_Environmental Science
_Sustainable Facilities and Management
_Sustainability minor
_Sustainable Development major

W WATER + LANDSCAPE MANAGEMENT

_Campus Stormwater Management Plan
_UTOC nutrient and stormwater managemnet plan

local planning committee, University engineers, consultant, agency personnel

_Evergreen Hall stormwater management using raingardens and permeable Nature Nook
_Nature Nook raingarden (completed)

_Green roof installation on campus flat roofs

CC CONNECTION + CONSERVATIONS

T TRANSPORTATION

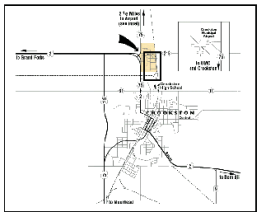
UMN SYSTEM
_REGENTS POLICY of 2004
_AMERICIAN COLLEGE AND UNIVERSITY PRESIDENTS CLIMATE COMMITMENT (ACUPCC)
_GREENHOUSE GAS REPORT (completed may 2009)
_UMN SUSTAINABILITY GOALS AND OUTCOMES REPORT
_STORMWATER MANAGEMENT GUILDLINES
_SUSTAINABILITY PLAN FOR UMTC

Amy Short

CROOKSTON COMMUNITY
ALTERNATIVE ENERGY WORK GROUP
_meets once a month, a variety of representatives: mayor chairs, member of regional development, ottertail, organic farmer

City Council

LOCAL SUSTAINABLE INFRASTRUCTURE?
_community wind project in Theif River



CAMPUS ENTITIES
_UMC CENTER FOR SUSTAINABILITY

Dan Svedarsky

_UMC OFFICE OF FACILITY MANAGEMENT AND OPERATIONS (FMO)
_campus infrastructure, physical planning, fleet services, building and grounds and custodial services

Tim Norton

_NORTHWEST REGIONAL SUSTAINABLE DEVELOPMENT PARTNERSHIP
_connecting citizens to the resources of UMN
_source of start-up grants and leverage funds

Linda Kingery

Lisa Gentele

_CROOKSTON CAMPUS WEBSITE

Tim Walsh

_UMC SUSTAINABILITY COMMITTEE-CHANCELLOR CHARLES CASEY 2008
_LOCAL FOODS, RECYCLING, CURRICULAR, COMMUNICATION AND OUTREACH, PHYSICAL OPERATIONS
_CAMPUS MASTER PLAN