

SDE: Carbon & Energy

Sustainable Design and Energy Carbon and Energy

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Compelling Vision

Madison embraces sustainable approaches to energy to fuel our economy and community achieving an 80% carbon reduction by 2050.

Goals, Sub-goals, Recommendations

Goal 1. Influence transportation related health and carbon impacts so that Madison achieves a 10% reduction every five years to get to a goal of 40% by 2030.

Sub-goals:

1. *improve air quality*
2. *reduce car miles traveled*
3. *increase use of multimodal transit*
4. *increase low carbon fuel use*

Recommendations

1. Assess asthma rate annually; report to community
2. Impose moped license fee to go for air/asthma reporting & clean up efforts
3. Create incentives to replace 2 cycle engines
What: 2 cycle engines or engines of lawn mower, snow blower, landscaping equipment- incentives to trade in to go to electric
How: Job training (youth) to offset machine use
4. Provide incentives for biking, and public transportation use
5. Improve bus route maps, rapid transit and perceived quality of public transportation
6. Evaluate evening service and peak hour service
7. Explore taxi service as public transit with green fleet
8. Create kiosks at transfer points to offer better security and enhance riding experience
9. Improve viability of bike trail lanes to enhance safety;
 - a. Expand bike trail lanes on high traffic routes to accommodate walkers, roller blading and bikes
 - b. Improve Safety of bike trails that are on streets with cars
10. Offer bike station pods-park and repair
11. Health insurance give incentive for biking to work (as with health club visits)
12. Integrate commuter rail, light rail and multi modal transportation.
13. Promote incentives for alternative fuel vehicles." Preferred parking" and efficiency/emissions based parking rates
14. Create downtown toll zones (EZ pass)
15. Invest in infrastructure for dense development

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- a. critically revise zoning, City ordinances, procedures and administrative habits that discourage investors, employers and households.
16. City government prioritize the use of low carbon fuels in City operations and vehicle purchases. What: Current city fleet policy is focused on renewable fuels (e.g., biodiesel) How: transition to incorporate all fuel supply options including biogas, plug-in hybrids and electric car charging (including on- versus off-peak), and other fuels.
17. City government identify transportation fuel use and supply carbon footprint as part of an annual carbon/sustainability reporting for City operations as well as fuel bought and consumed in the area.
How: Existing resources from the Midwestern Governors Association and UW-Madison can be used to identify the approximate sources of fossil fuel in Madison's market (e.g., heavy crude imports from Albertan tar sands are the dominant feedstocks for most Midwestern refineries) and the lifecycle carbon footprint of alternative fuels available in this region.

Goal 2. Systematically upgrade new and existing buildings, equipment and infrastructure to achieve an overall energy reduction goal of 50% by 2030 (kWh and Therms).

Recommendations City Government

Subgoal: Prioritize and accelerate City's government building and equipment upgrade schedule

1. Reallocate portion of all City agencies' operating budget to the annual replacement of capital assets
2. Incentivize agencies to allocate operating budget resources to retool capital assets under their control
3. Establish program with City Engineering and to ensure that budgeted upgrades are spent (get it done) and spent on the approved items (don't let budgeted items get spent on unrelated agency desires)
4. Establish Long Term Capital Budget and "Citizens Budget Commission" to better balance City's stewardship of capital assets
5. Create an upgrade schedule for existing buildings with energy performance targets to upgrade
 - i. the bottom performing 30% by 2020 to 69% ENERGY Star level
 - ii. the middle performing 30% by 2022 to 75% (ENERGY STAR) level
6. Retro-commission existing city buildings
7. Upgrade 1 building per year to certify to LEED-EB: Operations and Maintenance

Other Recommendations:

8. Hire energy manager for city to measure and track efficiencies, savings and carbon
9. Implement low cost behavior-base operational programs that minimize energy use in operations

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What: behavior changes for occupants and facilities managers; e.g. like programs already implemented including energy efficiency software for computers, printer consolidations

How: Please note: Load shifting, such as rescheduling electricity uses to off-peak, can actually increase the carbon footprint (see Governor's Task Force on Global Warming, page 83). We don't have a capacity problem in WI, we have a carbon footprint problem. Instead, load management and demand response programs should be coordinated with GHG reduction

10. Give preference to LEED certified buildings in acquiring leased space
11. Direct City purchasing and procurement to give preference to buildings, equipment, products and services meet sustainability guidelines.

Recommendations

Private Sector

Sub-goals

1. *upgrade existing building stock- commercial and residential*
2. *new buildings meet zero net energy by 2030*
3. *promote compact infill development*

Subgoal 1. Upgrade Existing Buildings – commercial and residential

Short term Recommendations–

Provide marketplace information to factor in energy use performance (1-4)

1. Building owners disclose energy ratings
 - a. Residential at point of sale, major additions or by 2015
 - b. Multifamily
 - c. Commercial buildings
 - i. >200,000 square foot benchmark using ENERGY STAR Portfolio Manager by 2013
 - ii. <50,000 square foot benchmark by 2014
 - iii. >50,000 square foot benchmark by 2016
2. Benchmark private buildings – sales, rental and occupancy rate
3. Housing stock analysis, square feet, demo, age...
4. Track energy retrofit for low-income housing – ECBG (Energy Conservation Block Grant) program – pre and post tests and stats
5. City and community partners institute an awards program for building owners who a) measurably reduce [energy] consumption over a [12 month] period, and b) provide an educational report about how they did it, what vendors and products were used.....

Medium term Recommendations

1. Upon plan review of commercial property – for new or renovation of 50% or more of the GSF, building must be brought up to energy performance level of whatever current LEED ENERGY STAR level is prescribed in LEED-EB:O&M (69 points in 2010)

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2. Create policy with incentives and energy performance targets to upgrade existing buildings
 - i. the bottom performing 30% by 2020 to x level
 - ii. the middle performing 30% by 2022 to x level
3. For historic buildings, use the Historical Society Energy Manual and state historical tax credits
4. LEED Certification Silver with 30% Energy use below code for existing buildings receiving TIF funding

Subgoal 2. New Buildings & Development meet zero net energy by 2030

What: zero net energy: definitions-- a residential or commercial building that, on an annual basis, produces as much energy for electricity, heating and cooling from renewable sources as it consumes. **Zero net energy community** (or campus) - a community that on an annual basis, produces (ideally within its own borders) as much energy for electricity, heating and cooling from renewable sources as it consumes. This is achieved either by combining district heating and/or cooling from renewable sources with highly energy efficient buildings that also include on-site renewable energy, or by developing each building within the community as a zero net energy building. www.uwex.edu/shwec/zeronetenergy

1. Residential incentives for new construction/remodels that meet Home Performance with ENERGY STAR at the top 20% level, e.g. expedited permitting, decreased fees on permits
2. Assess fee for additions to new buildings – if they meet ENERGY STAR, will get percentage of fee rebated
3. Develop and adopt policy requiring LEED with Madison benchmarks for TIF funded projects in 2010
4. Adopt Green building policy and program for new commercial construction by 2011
 - i. Commercial LEED incentive – charge green building fee – rebate at different % based on LEED level achieved
5. Develop Zero Net Energy program and incentives by 2015 for residential/commercial buildings and development
 - ii. Engage key ZNE stakeholders to inform action plan to advance ZNE new buildings and retrofits
 - iii. Design so that each cycle of standards will improve the energy efficiency of new construction by approximately 15% to reach ZNE by 2030
 - iv. Incorporate Zero Net renewable energy infrastructure in neighborhood development plans
How: on-site capture; e.g. ground source heat pumps or other district clean energy source with on-site solar generation

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6. Adopt a Green Roof requirement in the codes and permits requiring green roof at minimum 50% vegetated on all new **CITY** and commercially constructed buildings that are heated and cooled with a waiver if that interferes with renewable energy rooftop systems

Sub-goal 3. Greening infill development

1. Promote infill development
2. Grant vacant and derelict properties conditional use for community gardens (pavement to green space)
3. Recognize the sustainability benefits for infill development when addressing other community and neighborhood concerns

Goal 3. 20% (40,000 people) of Madison's population will be actively engaged in energy efficiency and climate change programs (e.g. Mpower, etc.) by 2030

Sub-goals:

1. *Establish feedback and information systems*
2. *Mobilize marketing, programs, measurement and targets through educational programs and community partnerships so that by 2030, 60% of Madison's population will be aware that community members are being encouraged to engage with energy efficiency and climate change programs*

Sub-goal 1. Establish feedback and information systems

Recommendations:

1. Publish / Post City Government agencies utility bills for public to see
2. Help building owners compare their energy usage with other comparable buildings
How: Implement an energy consumption feedback system between local utilities and the City of Madison Assessor's Office to allow consumers to compare their energy consumption with other consumers in Madison based on building data (size, age, construction materials, etc.).
3. Create a secure data sharing mechanism between assessor's office and local utility providers
4. Implement public outreach between the city and utility providers to inform consumers of the availability of the new energy consumption feedback system

Sub-goal 2. Mobilize marketing, measurement and targets through community partnerships so that by 2030, 60% of Madison's population...

1. Continue Mpower Madison program 13-member partnership program on climate change
2. Rotate 5-year information campaign partnerships with media groups
3. Ask business and trade associations and chambers of commerce to actively and regularly promote energy efficiency and climate change information to their members and members' employees
4. Initiate an ongoing series featuring the energy and carbon reduction actions taken by high profile community members

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5. Encourage communities of faith to provide ongoing campaigns to change members' behaviors and raise awareness
6. Develop a series of special action days that ask people to take specific actions
7. City and partners create a recognition program citywide for innovative energy savings initiatives that achieve measurable results

Goal 4. Generate 25% of electricity, heating and transportation energy from clean energy sources by 2025.

Recommendations

1. Buy green power
 - a. Expand City's renewable energy purchase (now at 24%)
 - b. Encourage private sector green power purchase (residential/commercial)
2. Achieve higher renewable energy content in the grid
3. Increase on-site renewables generation
 - a. power electric vehicles with solar charging stations
4. Plan, design, incentivize and install community renewable energy (electricity, heating and fuel) systems
5. Work with utilities, institutions and businesses to authorize, facilitate and design district -scale sustainable energy systems
6. Adopt a general policy preference for energy sources located as close to Madison as reasonably practicable.
7. Divert urban organic wastes into fuel sources for local bio-digester energy production. Work with MMSD, Dane County Landfill and local businesses to identify and rank various opportunities for greater biowaste-to-energy projects.

Goal 5. Develop a Comprehensive Environmental Responsibility and Carbon Footprint Report for the City of Madison.

Sub-goals:

1. *Develop a carbon footprint baseline for public, City-owned and/or controlled facilities and activities.*
2. *Develop a carbon footprint estimate all facilities and activities within City limits (residential, commercial, industrial).*
3. *Prepare a matrix of metrics, both measurable and value-based, to establish baselines and track progress.*

Recommendations:

1. City hire a consultant to prepare baseline carbon analysis and outline of a climate action plan
How: City to commission private sector engineers, higher education resources or consultants to work with SDE committee to produce the carbon footprint data. State agencies (e.g., WI DNR and Public Service Commission), utilities, and organizations such as the Energy Center of WI and Focus on Energy have significant amounts of data for calculating metrics appropriate to the City of Madison.
2. SDE Committee will work with the consultants to develop the carbon budget and benchmarks for future years (e.g.2020, 2030, 2050)

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3. City will publicize the plan and incorporate the goals into future planning, budget and outreach activities

Carbon and Energy

Systemic threats

- 1) Urban sprawl
- 2) Excess generating capacity
- 3) Global deflation (depressing conventional energy costs)
- 4) Disconnect between economic and social costs of energy
- 5) Ignorance and apathy
- 6) Constrained public sector budgets

Biggest opportunities

- 1) Creation and expansion of green energy jobs that transform markets toward energy efficient technologies, net-zero-energy structures and conservation efforts, while supporting a robust local economy. (State clean energy development/jobs creation legislation)
- 2) Fuel-switching initiatives that support conservation and clean energy (GSHP's, plug-in vehicles, tec.)
- 3) Collaborative efforts to create in Madison sustainable energy clusters (aggregating customer-owned RE, cogen, district heating systems, microgrids, biomass zones, etc.)
- 4) Education and awareness are increasing. The tide is turning since gluttonous energy waste, exemplified by consumer goods such as Hummer Urban Assault Vehicles are falling out of fashion and this provides an opportunity to build upon the green shoots of energy awareness.
- 5) Social media/marketing.
- 6) Waste reduction. The reduction of energy waste and the diversion of municipal wastes (organic, consumer, industrial etc.) provide very strong opportunities to bolster the sustainability of our energy system. Reduced waste saves energy and diverted waste can be used to create cleaner energy to offset fossil energy.
- 7) Increased physical and mental well-being which is derived from a cleaner indoor and outdoor environment, a robust local economy and a sense of stewardship for future generations.

Baseline

1. Transportation:
 - a. Vehicle miles driven Per Capita
 - b. Public Transportation ridership (or miles)
 - c. Taxi ridership (or miles)

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2. Health and Social Welfare:
 - a. Asthma rates--
 - b. Level of mercury in the lakes--
 - c. Level of particulates in the air--
Woodstoves?--
 - d. Ozone Days per year--
 - e. Rates of Obesity (related to transportation; i.e., walking, biking, elevator use)--
 - f. Air, Water, Land

3. Built-Environment:
 - a. Participation in green power purchase:
 - i. %Business---
 - ii. % Residential---
 - b. Average energy use per household:
 - i. Electricity----
 - ii. Natural Gas---
 - c. BTU/SF/DD (per degree day)
 - i. Business--
 - ii. Residential--
 - d. Housing Stock analysis:
 - i. QTY of single family houses_____
 - ii. QTY of pre WW11 dwellings_____
 - iii. QTY of Dwellings from 1950-1980____
 - iv. QTY of Dwellings built after 1980____
 - v. Low Income Housing stock having energy retrofits--

4. Power Generation:
 - a. Power Plants:
 - i. Current Fuel Sources--
 - ii. Conversion from Coal to other sources; (Transition periods)--
 - iii. New Sources and their carbon footprints--
 - iv. Other sources of energy--
 - b. Current on-site solar installations:
 - i. Hot Water Residential____
 - ii. Hot Water Commercial____
 - iii. PV Residential_____
 - iv. PV Commercial_____
 - c. Size of installations:
 - i. Current total KW____
 - ii. Current total BTU (therms)____

5. Consumption/Individual
 - a. Carbon production Per Capita—
 - b. Water Consumption Per Capita—

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Gaps

- Technical assistance on deep energy retrofits isn't readily available
- Ramping up to produce a greater portion of clean energy locally to meet Madison's energy needs and keep local \$ in our economy
- Ability of city staff and businesses to measure their carbon footprint
- Availability of financing structures and incentives to promote significant clean energy progress
- Public understanding and motivation around energy efficiency and renewable energy