



MINNESOTA ENVIRONMENTAL QUALITY BOARD

Wednesday, May 20, 2015

Meeting Location: MPCA Board Room

520 Lafayette Road North

St. Paul, Minnesota 55155

1:00 p.m. – 4:00 p.m.

****ATTENTION****

The main entrance to our building will be closed for lobby construction. An alternate (secure) entrance will be located on the west side of the building by the cafeteria from 6:00 a.m. to 5:00 p.m. Please see attached maps for building entrance and visitor parking.

AGENDA

The purpose of this meeting is to update the EQB on a number of items the staff is working on. Topics that will be addressed are the EQB website, the water report due September 15, 2015, a presentation on energy efficiency buildings by the Department of Commerce and a Georgetown Law Center presentation on these building efficiencies. The meeting also includes a decision item, and will serve as the opportunity to re-designate an RGU for one proposed project.

I. *Adoption of Consent Agenda

Proposed Agenda for May 20, 2015 Board Meeting
March Meeting Minutes

II. Introductions

III. Chair's Report

IV. Executive Director's Report

V. Elisabet Jupesta, Professional Fellow, American Council of Young Political Leader's (ACYPL) program.

ACYPL was recently awarded a U.S. State Department grant to implement a Professional Fellows Program (PFP) around the theme of legislative process and governance for fellows from Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Vietnam, part of President Obama's Young Southeast Asian Leaders. While in the U.S., each participant will take part in a month-long fellowship in a professional office and will work on an individual project that s/he will implement in their home communities upon their return.

VI. Designation of the Responsible Governmental Unit for Environmental Review**

Presenter: Courtney Ahlers-Nelson
EQB Staff, (651-757-2183)

* Items requiring discussion may be removed from the Consent Agenda

**Denotes a Decision Item

VII. Website Migration Update

Presenter: Megan Eischen
EQB Staff, (651-757-2346)

VIII. Building Efficiency Presentation

Presenter: Janet Streff
Department of Commerce, (651-539-1849)

IX. Building Efficiency Presentation

Presenter: Sara Hoverter
Georgetown Climate Center, (202-662-4233)

X. Water Report Overview and Work plan

Presenter: Anna Henderson
EQB Staff, (651-757-2456)

Weston Merrick
DEED Staff, (651-259-7175)

XI. Public Comment

XII. Adjourn



MINNESOTA ENVIRONMENTAL QUALITY BOARD

Wednesday, May 20, 2015

Meeting Location: MPCA Board Room

St. Paul, Minnesota

1:00 p.m. – 4:00 p.m.

ANNOTATED AGENDA

General

This month's meeting will take place in the MPCA Board Room at 520 Lafayette Road in St. Paul. The EQB board meeting will be available via live stream on May 20 from 1:00 p.m. to 4:00 p.m. You will be able to access the webcast on our website: www.eqb.state.mn.us

Please see attached maps for an alternative building entrance and visitor parking. The Jupiter Parking Lot is for all day visitors and is located across from the Law Enforcement Center on Grove Street. The Blue Parking Lot is also available for all day visitors and is located off of University and Olive Streets.

I. *Adoption of Consent Agenda

Proposed Agenda for May 20, 2015 Board Meeting
March Meeting Minutes

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IV. Executive Director's Report

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VI. Designation of the Responsible Governmental Unit for Environmental Review**

Presenter:

Courtney Ahlers-Nelson
EQB Staff, (651-757-2183)

Materials enclosed:

- Resolution, Findings, Conclusions, and Order
- Project description document (Attachment A) titled "Owatonna Energy Station, Steele County, Minnesota"
- Request from the Minnesota Pollution Control Agency (MPCA) requesting responsible governmental unit status (Attachment B)
- Receipt of the MPCA's request to reassign the responsible governmental unit

* Items requiring discussion may be removed from the Consent Agenda

**Denotes a Decision Item

Issue before the Board:

Designation of the responsible governmental unit (RGU) for environmental review to the Minnesota Pollution Control Agency (MPCA) for the Owatonna Energy Station by the Southern Minnesota Municipal Power Agency (SMMPA).

Background:

The proposed Owatonna Energy Station consists of the installation of four new 9,770 kilowatt (kW) Caterpillar natural gas fired electrical generating units. The units will be used for electric energy production for use during peak demand periods and to back up intermittent resources such as wind and solar power generation. The proposed project would make the facility's electrical generating capacity 39.1 (nameplate) megawatts and an 800 kW diesel-fired generating unit is also proposed to provide emergency power to the facility in the event of outage.

The initial proposal for the Owatonna Energy Station met the threshold for two mandatory environmental assessment worksheet (EAW) categories: Minnesota Rules 4410.4300, Supb. 3 Electric Generating Facilities, for which the EQB is designated as the RGU, and Supb. 15 (B) Greenhouse Gas Emissions, which designates the MPCA as the RGU.

The MPCA was determined to be the RGU, but as the project changed as a result of draft air permit, it was determined that the EQB may once again be the RGU. The MPCA has requested that the EQB designate an RGU for the proposed project.

Discussion:

Shortly after the initial EAW data submittal by SMMPA for the proposed Owatonna Energy Station in September 2014, MPCA staff and EQB staff followed the Minnesota Rules 4410.0500 for determining an RGU when multiple mandatory environmental review categories are met. Consequently, staff agreed that the MPCA would be the RGU for the EAW, as the MPCA has greater responsibility for approving the project (Minn. R. 4410.0500, Subp. 5 (B)) which would require a Title V Air Emissions Permit.

MPCA and SMMPA began working on the EAW and developing draft air permit limits. This process required significant communication and technical analysis by MPCA air permitting staff and the project proposers. During the process, SMMPA voluntarily accepted an annual fuel consumption limit to restrict air emissions from the proposed Owatonna Energy Station, thereby reducing the combined annual greenhouse gas emissions to levels below 100,000 tons.

By reducing the greenhouse gas emissions, the greenhouse gas emissions mandatory EAW threshold (Minn. R. 4410.4300, Subp. 15 (B)) with the MPCA as the RGU was no longer met by the proposed project. However, the electric generating facilities mandatory EAW category (Minn. R. 4410.4300, Subp. 3) remained with EQB as the RGU.

The MPCA has requested to maintain its RGU status for the proposed project because the project requires MPCA approvals, including a Title V Air Emissions Permit, amongst others. The MPCA has completed significant portions of the environmental review after months of working with the project proposers and have a greater expertise in this subject matter which will help in the assessment of this project.

When designating a different RGU, the EQB must determine that the designee has the greatest expertise in evaluating the relevant for the environmental review (Minn. R. 4410.0500, subp. 6). In this case, the EQB does not have the technical staff for developing a Title V Air Emissions Permit, nor to evaluate the environmental impacts and as a result, it is clear that the MPCA as greater expertise to contribute to the proposed project.

Staff recommendation:

Staff recommends adoption of the resolution and approving the Findings, Conclusions, and Order assigning RGU duties to the MPCA.

VII. EQB Website Migration Update

Presenter:

Megan Eischen

EQB Staff, (651-757-2346)

Materials enclosed: Website can be viewed at www.eqb.state.mn.us

Issue before the Board:

Discuss the migration and features of the new EQB website.

Background:

Over the past year, the EQB has been migrating its website into a newer content management system called Drupal. The site launched in August of 2014 in this new form, and an updated version of the site with new functionality and content went live April 1, 2015. We will walk through the improvements and new features of the website.

VIII. Building Efficiency Presentations, Department of Commerce

Presenter:

Janet Streff

Dept. of Commerce, (651-539-1849)

Materials enclosed: Environmental Initiative Memo with stakeholder feedback on building codes.

Issue before the Board:

The Climate Solution and Economic Opportunity assessed a policy option to implement Minnesota's Sustainable Building 2030 (SB2030).

Background:

(CSEO) analysis is part of an evaluation of policy options from across Minnesota's economic sectors for their potential to grow our economy and to reduce greenhouse gases that contribute to climate change. Some of the strategies being analyzed are in statute or are taken from publicly vetted state agency plans. However, some of the options have not had previous examination and the analysis aims to provide information to inform ongoing discussions. The goal is to provide timely and relevant information to allow for discussion on Minnesota's roadmap for developing a low carbon economy.

More information about these policies can be found at <http://www.environmental-initiative.org/projects/policy-options-cseo-stakeholder-engagement>

	2030 GHG reductions (Tg CO₂e):	2015 – 2030 cumulative reductions (Tg CO₂e):	Net present value of societal costs, 2015 – 2030 (million \$2014):	Cost effectiveness (\$2014/ t CO₂e):
Zero Energy Building Implementation in the Residential Sector	4.73	24.61	\$(823.49)	\$(33.46)
Zero Energy Building Implementation in the Commercial Sector	4.56	28.89	\$(1,226.73)	\$(42.46)
TOTAL	9.29	53.50	\$(2,050.22)	\$(38.32)

Discussion:

Operating, and maintaining buildings involve the consumption of large amounts of energy. In 2011, Minnesota's residential and commercial sectors consumed 39.6% of the total energy consumed in the state-- the residential sector at 21.3 % while commercial consumed 18.3%.

To ensure that new or renovated buildings serve us well into the future means constructing energy efficient buildings while pairing them with clean energy. Initiatives such as the national Architecture 2030, Zero Energy Ready or Minnesota's Sustainable Building 2030 (SB2030) can provide that assurance. As defined by NREL, a Net Zero Energy building "produces as much as or more energy than it uses annually and exports excess RE generation to the utility (electricity grid, district hot water system, or other central energy distribution system) to offset the energy used."

Building energy codes specify minimum requirements for new and renovated buildings. But these codes will not make buildings zero energy in time for Minnesota to accomplish its climate change goals. Stretch goals can be achieved by adopting SB2030 as an appendix to the Minnesota Building Code, which then makes it available for local jurisdictions to use.

This policy would provide incentives for or mandate construction of buildings so that net zero energy use in buildings is achieved incrementally by 2030 (60% - 2010; 70% - 2015, etc.) or upon completion of construction with zero-energy ready buildings.

IX. Building Efficiency Presentation, Georgetown Climate Center**Presenter:**

Sara Hoverter

Georgetown Climate Center, (202-662-4233)

Materials enclosed: Georgetown Report on Buildings and Climate

Issue before the Board:

Sara Hoverter of the Georgetown Climate Center will describe state policy, administrative and programmatic options that could provide more flexibility for Minnesota cities to increase resilience of their build environment to a changing climate.

Background:

In collaboration with MPCA staff, the Georgetown Climate Center (GCC) recently published a report (Sara Hoverter, Kraig Ahalt, Jan 2015) which explores steps that Minnesota state agencies and the Minnesota Legislature can take to enable more resilience to the changing climate at the local level, as well as some steps municipalities may already have authority to implement. Minnesota state agencies have helped support a more resilient built environment through assistance programs, including Minnesota GreenCorps, MN GreenStep Cities, GESP, and Buildings, Benchmarks and Beyond (B3) to name a few. The state building code (326B.121), however, prevents municipalities from adopting building codes that are "different" from the state code, even for local adaptation needs. Minnesota state agencies and the EQB have been focusing on climate change as part of the Climate Solutions and Economic Opportunities (CSEO) process. The GCC report presents options that support and/or complement CSEO recommendations (e.g., RCII-2).

Discussion:

Impacts from extreme precipitation, the urban heat island effect, extended heat waves, stronger wind storms, and more frequent ice storms and freeze/thaw cycles are beginning to affect building occupants, structures, the surrounding landscape, and related public infrastructure. While the state has already taken some steps to help municipalities adapt buildings in their communities to the effects of a climate that has already begun to change, there is much more that can be done to help make buildings more resilient and to protect both the buildings and the people using them.

While municipalities have options to encourage more resilient buildings, state level changes would allow communities greater flexibility to require particular resilient practices. Such changes could retain a statewide minimum standard and allow the state to control the amount of variation permitted. By explicitly allowing some variation, the state legislature and/or DLI could enable municipalities to better protect their people and property from current and anticipated impacts of the changing climate.

X. Water Report Overview and Work Plan

Presenter:

Anna Henderson

EQB Staff, (651-757-2456)

Weston Merrick

DEED Staff, (651-259-7175)

Materials enclosed:

- Overview of the EQB 5-year update to the state Water Plan
- One pager on the Water Industry Analysis

Issue before the Board:

Staff will present an overview of the interagency working groups' process for completing the report and provide an overview of the intended format and focus topics.

Background:

EQB is mandated to submit a 5-year update to the state water plan to the Legislature on September 15, 2015. An interagency working group is currently working on the policy portion of this report. EQB is also working with DEED on an original analysis of the state's water industry to characterize the economic impacts of this industry

XI. Adjourn

**MINNESOTA ENVIRONMENTAL QUALITY BOARD
MEETING MINUTES**

**Wednesday, March 18, 2015
MPCA Room Board Room, 520 Lafayette Road N, St. Paul**

EQB Members Present: Dave Frederickson, Julie Goehring, Brian Napstad, Erik Tomlinson, Kristin Eide-Tollefson, Dr. Ed Ehlinger, Mike Rothman, Kari Howe (for Katie Clark-Sieben), Michelle Beeman (for John Linc Stine), Matt Massman, Tom Landwehr, Leah Hedman (Attorney General's Office)

EQB Members Absent: Kate Knuth, Charlie Zelle, John Saxhaug, John Linc Stine, Adam Duininck, Katie Clark-Sieben

Staff Present: Will Seuffert, Megan Eischen, Caroline Magnuson, Anna Henderson, Erik Dahl, and Courtney Ahlers-Nelson

Chair Dave Frederickson called the meeting to order.

I. Adoption of Consent Agenda and Minutes

A motion to adopt the Consent Agenda and approve the February 18, 2015, meeting minutes was made and seconded.

II. Introductions

III. Chair's Report

Two incumbent members on the Board, John Saxhaug and Kate Knuth have been re-appointed by Governor Dayton for another term. There are no decision items on the agenda today.

IV. Executive Director's Report

Beginning August 2014, the Environmental Quality Board and the Department of Commerce have been leading an interagency effort to coordinate state agency resources and expertise on issues related to the projected increase in oil transport by way of pipelines across Minnesota. This report is twofold; to provide an informational resource to the general public and provide some level of analysis to support policy making going forward. It does not prescribe recommendations but it does highlight areas for further consideration. This report is not a tool to adjudicate any specific or proposed pipeline, but many of the issues will inevitably overlap.

The public comment period will begin immediately following this meeting and last through April 30th. But a request was made to extend the comment period, so unless the board has any concerns with this change, we will go ahead and amend this to May 31st. Once the comment period is closed, the team will reconvene and report back to the Board. The final report will be brought to the Board for approval at a date to be determined. Thank you to the staff who compiled all the information contained in this report.

The next meeting on April 15th, the Silica Sand Subcommittee will meet in place of the full Board to hear silica sand rule making updates from the three state agencies, unless any last minute decision items arise that warrant full Board action.

V. Interagency Report on Oil Pipelines

The Interagency Pipeline Coordination Team assembled this report to serve as an information resource for the general public and policy makers. The report explores four key areas related to the movement of oil across the state in their report:

1. economics of oil transportation
2. environmental and human health impacts
3. spill prevention, preparedness, emergency response
4. safety and pipeline approvals

The following people provided testimony:

- Mel Olson, United Piping, Inc.
- Dan Olson, Laborers' International
- Craig Sterle, Barnum, MN
- Willis Mattison, Citizens at Large
- Neal Illies, Clearwater County
- Cheryl Grover, Clearwater County
- Erin Roth, American Petroleum Institute
- Peter Holran, Enbridge
- Thane Maxwell, Honor the Earth

VI. Adjourn

The audio recording of the meeting can be found at this link:
ftp://files.pca.state.mn.us/pub/EOB_Board/

**RESOLUTION OF THE
MINNESOTA ENVIRONMENTAL QUALITY BOARD**

Designation of the Responsible Governmental Unit for Environmental Review of the Owatonna Energy Station
by the Southern Minnesota Municipal Power Agency (SMMPA).

BE IT RESOLVED, that the Minnesota Environmental Quality Board (EQB) approves and adopts the Findings of Fact, Conclusions and Order designating the Minnesota Pollution Control Agency (MPCA) as the responsible governmental unit (RGU) for the environmental review of the Owatonna Energy Station by the Southern Minnesota Municipal Power Agency; and

BE IT FURTHER RESOLVED, that David J. Frederickson, Chair of the Board, is authorized to sign the adopted Findings of Fact, Conclusions and Order.

**STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD**

In the Matter of the Request to Designate
the Responsible Governmental Unit For
Environmental Review of the Owatonna Energy
Station Proposed by the Southern Minnesota
Municipal Power Agency

FINDINGS OF FACT,
CONCLUSIONS OF LAW,
AND ORDER

The above-captioned matter came before the Minnesota Environmental Quality Board (EQB) at a regular meeting on May 20, 2015, pursuant to a request from the Minnesota Pollution Control Agency (MPCA) to designate a responsible governmental unit for the Owatonna Energy Station proposed by the Southern Minnesota Municipal Power Agency (SMMPA).

Based upon all of the proceedings herein, the Minnesota EQB makes the following:

FINDINGS OF FACT

1. On September 15, 2014, the MPCA received an Environmental Assessment Worksheet (EAW) data submittal from the SMMPA for a proposed project, the Owatonna Energy Station (Project).
2. In September 2014, the MPCA received an application for a Title V Air Emissions Permit as a result of the proposed Project.
3. The proposed Project includes the installation of four new natural gas-fired electric generating units with a capacity of 39.1 megawatts and 800 kilowatt diesel-fired generating units.
4. The proposed Project is described in the enclosure submitted to the EQB on May 4, 2015, titled, "Owatonna Energy Station, Steele County, Minnesota" attached hereto and incorporated by reference as Attachment A.
5. The proposed Project, based on its potential to emit criteria air pollutants, will require a Title V Air Emissions Permit issued by the MPCA. Title V Air Emissions Permits are total facility permits required for operating and issued for five years terms. The draft Title V Air Emissions Permit was prepared for the proposed Project in connection with environmental review. The MPCA is the permitting agency and also performs compliance and enforcement inspections.
6. Minn. R. 4410.0200, subp. 33 reads:

Subp. 33. **Governmental action.** "Governmental action" means activities including projects wholly or partially conducted, permitted, assisted, financed, regulated, or approved by governmental units, including the federal government.

Minn. R. 4410.0200, subp. 33.

7. Minn. R. 4410.0200, subp. 65 reads:

Subp. 65. **Project.** "Project" means a governmental action, the results of which would cause physical manipulation of the environment, directly or indirectly. The determination of whether a project requires environmental documents shall be made by reference to the physical activity to be undertaken and not to the governmental process of approving the project.

Minn. R. 4410.0200, subp. 65.

8. The EQB finds that the proposed Project is a "governmental action" under Minn. R. 4410.0200, subp. 33, and is a "project" under Minn. R. 4410.0200, subp. 65.

9. Minn. R. 4410.0500 provides for selection of the RGU for environmental reviews. Subp. 1 reads:

RGU for mandatory categories. For any project listed in part 4410.4300 or 4410.4400, the governmental unit specified in those rules shall be the RGU unless the project will be carried out by a state agency, in which case that state agency shall be the RGU. For any project listed in both parts 4410.4300 and 4410.4400, the RGU shall be the unit specified in part 4410.4400. For any project listed in two or more subparts of part 4410.4300 or two or more subparts of part 4410.4400, the RGU shall be determined as specified in subpart 5.

Minn. R. 4410.0500, subp. 1.

10. Minn. R. 4410.4300 establishes mandatory categories for the preparation of an EAW. Subp. 3 of this rule reads in relevant part:

Subp. 3. **Electric generating facilities.** For construction of an electric power generating plant and associated facilities designed for or capable of operating at a capacity of between 25 megawatts and 50 megawatts, the EQB shall be the RGU. ...

Minn. R. 4410.4300, subp. 3.

11. Minn. R. 4410.4300 establishes mandatory categories for the preparation of an EAW. Subp. 15, paragraph B. of this rule reads in relevant part:

Subp. 15. **Air pollution.** Items A and B designated the RGU for the type of project listed.

B. For construction of a stationary source facility that generates a combined 100,000 tons or more per year or modification of a stationary source facility that increases generation by a combined 100,000 tons or more per year greenhouse gas emissions, after installation of air pollution control equipment, expressed as carbon dioxide equivalents, the MPCA should be the RGU.

Minn. R. 4410.4300, subp. 15B.

12. Minn. R. 4410.4300, subp. 3 and subp. 15, paragraph B. apply to the proposed Owatonna Energy Station Project and, therefore, the EQB and the MPCA were determined to be the RGU for the environmental review.

As noted above, Minn. R. 4410.0500, subp. 1 provides that when projects are listed in two or more subparts of part 4410.4300, the RGU shall be determined as specified in subp. 5.

See Minn. R. 4410.0500, subp. 1.

13. Minn. R. 4410.0500, subp. 5B. (1) provides further instruction for identifying an RGU:

B. When two or more governmental units propose to carry out or have jurisdiction to approve the project, the RGU shall be the governmental unit with the greatest responsibility for supervising or approving the project as a whole. Where it is not clear which governmental unit has the greatest responsibility for supervising or approving the project or where there is a dispute about which governmental unit has the greatest responsibility for supervising or approving the project, the governmental units shall either:

(1) by agreement, designate which unit shall be the RGU within five days of receipt of the completed data portion of the EAW;

Minn. R. 4410.0500, subp. 5B. (1)

14. After the MPCA had received the EAW data submittal from SMMPA for the Owatonna Energy Station Project on September 15, 2014, EQB staff and MPCA staff mutually agreed that the MPCA should be the RGU as they have greater approval authority (issuing the Title V. Air Emissions Permit, required for operation as well as a Construction Stormwater Permit) and the technical expertise to evaluate the environmental impacts for the proposed Project.

15. MPCA and SMMPA began working on the EAW and in November 2014, the Project was also assigned to air permitting staff to draft a Title V Air Emissions Permit.

16. In January 2015, after three months technical analysis between MPCA air permitting staff and the project proposer in order to develop the draft Title V Air Emissions Permit, SMMPA voluntarily accepted an annual fuel consumption limit to restrict its air emissions. The agreed upon limit thereby reduced the combined annual greenhouse gas emissions to levels below 100,000 tons.

17. Based upon SMMPA's acceptance of the annual fuel consumption limit, the Owatonna Energy Station proposed Project is now no longer expected to produce 100,000 tons of greenhouse gases annually. As a result, Minn. R. 4410.4300, subp. 15, paragraph B. which identifies the MPCA as the RGU, no longer applies to the proposed Project.

18. Minn. R. 4410.4300, subp. 3 which identifies EQB as the RGU, still applies to the Owatonna Energy Station proposed Project.

19. On May 4, 2015, the EQB received a letter titled "MPCA Request for RGU Status" (attached hereto and incorporated by reference as Attachment B) from the MPCA requesting that the EQB determine which entity should be the RGU. The MPCA also stated they would like to remain the RGU for the environmental review of the Owatonna Energy Station Project.

20. Minnesota Rule 4410.0500, subp. 6 reads:

Subp. 6. **Exception.** Notwithstanding subparts 1 to 5, the EQB may designate, within five days of receipt of the completed data portions of the EAW, a different RGU for the project if the EQB determines the designee has greater expertise in analyzing the potential impacts of the project.

Minn. R. 4410.0500, subp. 6.

21. The matter was placed on the next available Board meeting agenda for May 20, 2015.

22. The EQB finds that, to designate a different RGU than itself, under Minnesota Rule 4410.0500, subp. 6, the EQB must determine that the designee has greater expertise in analyzing the potential impacts of the project.
23. For approximately 10 months, the MPCA has served as the experts on the issues related to air quality related to air emissions modeling, monitoring, air stack testing control equipment on emissions units and evaluating proposed draft air permit. This process required significant communication and technical analysis by MPCA air permitting staff and the Project proposers.
24. The May 4, 2015 letter from MPCA indicates that despite the change in the annual greenhouse gas emissions produced by the proposed Project, the Project will still require a Title V. Air Emissions Permit to be issued by the MPCA, as well as other MPCA permits. And that generally, the MPCA has the expertise in analyzing the potential for environmental impacts of projects related to electric generating facilities
25. On May 4, 2015, the MPCA sent a letter to EQB stating that the MPCA would like to retain its RGU status regarding the proposed Project because it has a “history working with this project” and because MPCA staff had already completed significant portions of the environmental review.
26. The EQB does not have the technical staff for developing a Title V Air Emissions Permit, nor to evaluate the potential environmental impacts. As a result, it is clear that the MPCA has greater expertise to contribute to the proposed Owatonna Energy Station Project.
27. In addition, the EQB recognizes that the MPCA has completed significant portions of the environmental review, and that it has access to experts in air and water quality, which have already contributed to the review.
28. The EQB finds that the MPCA has greater expertise than the EQB in analyzing the potential for environmental impacts of projects involving electric generating facilities such as the Owatonna Energy Station proposed Project and preparing EAWs and Environmental Impact Statements (EIS) for such projects.

Based on the foregoing Findings of Fact, the Minnesota Environmental Quality Board makes the following:

CONCLUSIONS OF LAW

28. Any of the foregoing Findings of Fact more properly designated as Conclusions of Law are hereby adopted as such.
29. The Environmental Quality Board concludes it has jurisdiction over the subject matter of this proceeding pursuant to Minn. Stat. ch. 116d, Minn. R. 4405 and 4410 generally, and specifically Minn. R. 4410.0500.
30. The EQB concludes the request for EQB’s consideration whether to designate a different RGU for the proposed Project was properly brought to the EQB Board.

31. The EQB concludes that the MPCA has the greatest responsibility for supervising or approving the Project and that the MPCA has expertise relevant for the environmental review and is best suited to analyze the potential for significant environmental impacts of the Owatonna Energy State proposed Project than EQB, and is therefore better suited as RGU to conduct the environmental review of the proposed Owatonna Energy Station proposed Project by the SMMPA.

Based on the Findings of Fact, Conclusions and the entire record of this proceeding, the Minnesota Environmental Quality Board hereby makes the following:

ORDER

32. The Environmental Quality Board hereby orders and designates the Minnesota Pollution Control Agency as the responsible governmental unit for environmental review of the proposed Owatonna Energy Station by the Southern Minnesota Municipal Power Agency Project.

Approved and adopted this 20th day of May, 2015.

David J. Frederickson, Chair
Minnesota Environmental Quality Board

OWATONNA ENERGY STATION, STEELE COUNTY, MINNESOTA

Project Overview:

The proposed project consists of the installation of four new 9,770 kilowatt (kW) Caterpillar natural gas fired electrical generating units, within a new building in Owatonna, Minnesota (see Attachment 1). The four new units will be used for electric energy production for use during peak demand periods and to back up intermittent resources such as wind and solar power generation. The proposed project would make the facility's electrical generating capacity 39.1 (nameplate) megawatts.

An 800 kW diesel-fired generating unit is also proposed to provide emergency power to the facility in the event of outage.

Construction Activities:

As part of its proposed project, SMMPA proposes to install four new 9,770 kW Caterpillar natural gas fired generating units within a new building at the facility (see Attachment 2). The new units will be used for electrical energy production for use during peak demand periods and to back up intermittent resources such as wind and solar powered generation.

Each of the four new engine-generator sets will have auxiliary equipment associated with the installation. This equipment includes air pollution control equipment, heat exchangers, pumps, filters, valves, etc. The four new generators will be housed within a single new building, to be constructed at the new power plant site. Radiators used to cool the engines and exhaust silencers used to reduce the sound emissions from the engines and vent the exhaust gasses to atmosphere will be located outdoors on the west side of the new building.

Construction of the new power plant building will begin as soon as all necessary permits and approvals have been obtained. The new building, along with the installation of the four new engine-generators, is expected to be completed in the fall of 2017. The construction period is expected to last approximately 24 months. No construction will occur outside the new power plant site.

Table 1 lists the equipment that will be at the facility, after the proposed project is implemented.

Table 1 – Generating Units at the Power Plant Site

Equipment	Fuel
EU 001 – 9,770 kW Caterpillar electrical generating unit (spark ignition engine/generator set) with 99-foot stack	Natural Gas
EU 002 – 9,770 kW Caterpillar electrical generating unit (spark ignition engine/generator set) with 99-foot stack	Natural Gas
EU 003 – 9,770 kW Caterpillar electrical generating unit (spark ignition engine/generator set) with 99-foot stack	Natural Gas
EU 004 – 9,770 kW Caterpillar electrical generating unit (spark ignition engine/generator set) with 99-foot stack	Natural Gas
EU 005 – 800 kW Caterpillar electrical generating unit (compression ignition engine/generator set) with 12.3 foot, 10 inch stack	Diesel

Project Purpose:

The purpose of the proposed project is to replace and relocate the electrical generating capacity that was lost when the Straight River flooded downtown Owatonna in September 2010, permanently damaging the existing generators located at 208 Walnut Avenue South. The proposed project will provide more reliable, modern, and efficient electrical generation to SMMPA. This new generation plant will be nearly twice as efficient as the old plant.

Permits and Approvals Required:

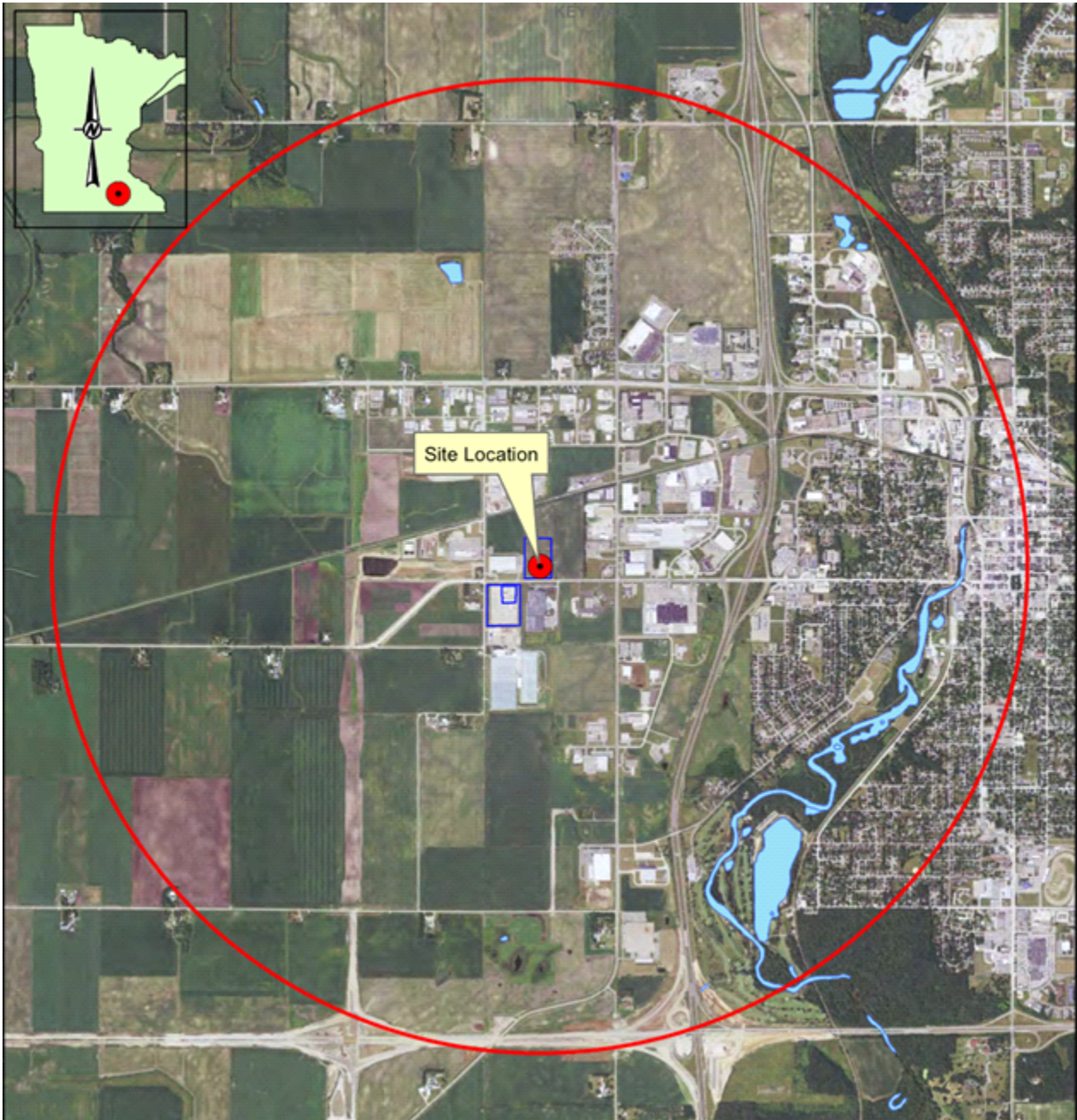
Table 2 lists the governmental permits and approvals as well as their status.

Table 2 – Governmental permits and approvals required

Unit of government	Type of Application	Status
MPCA	Air Emissions Permit	Submitted
MPCA	National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater General Permit (CSW Permit)	To be submitted
City of Owatonna	Building Permit	To be submitted

Attachment 1. Site Map – City of Owatonna Map

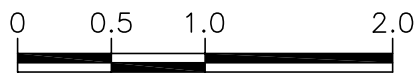
Attachment 2. Site Map – Equipment Location Map



NOTES: 3,000 METER RADIUS FROM CENTER OF SITE LOCATION SHOWN



NORTH



APPROX. SCALE (KILOMETERS)

FIGURE 3
 SITE LOCATION IN STEELE COUNTY
 OWATONNA ENERGY STATION
 OWATONNA, MN



emanuelson-podas
 consulting engineers

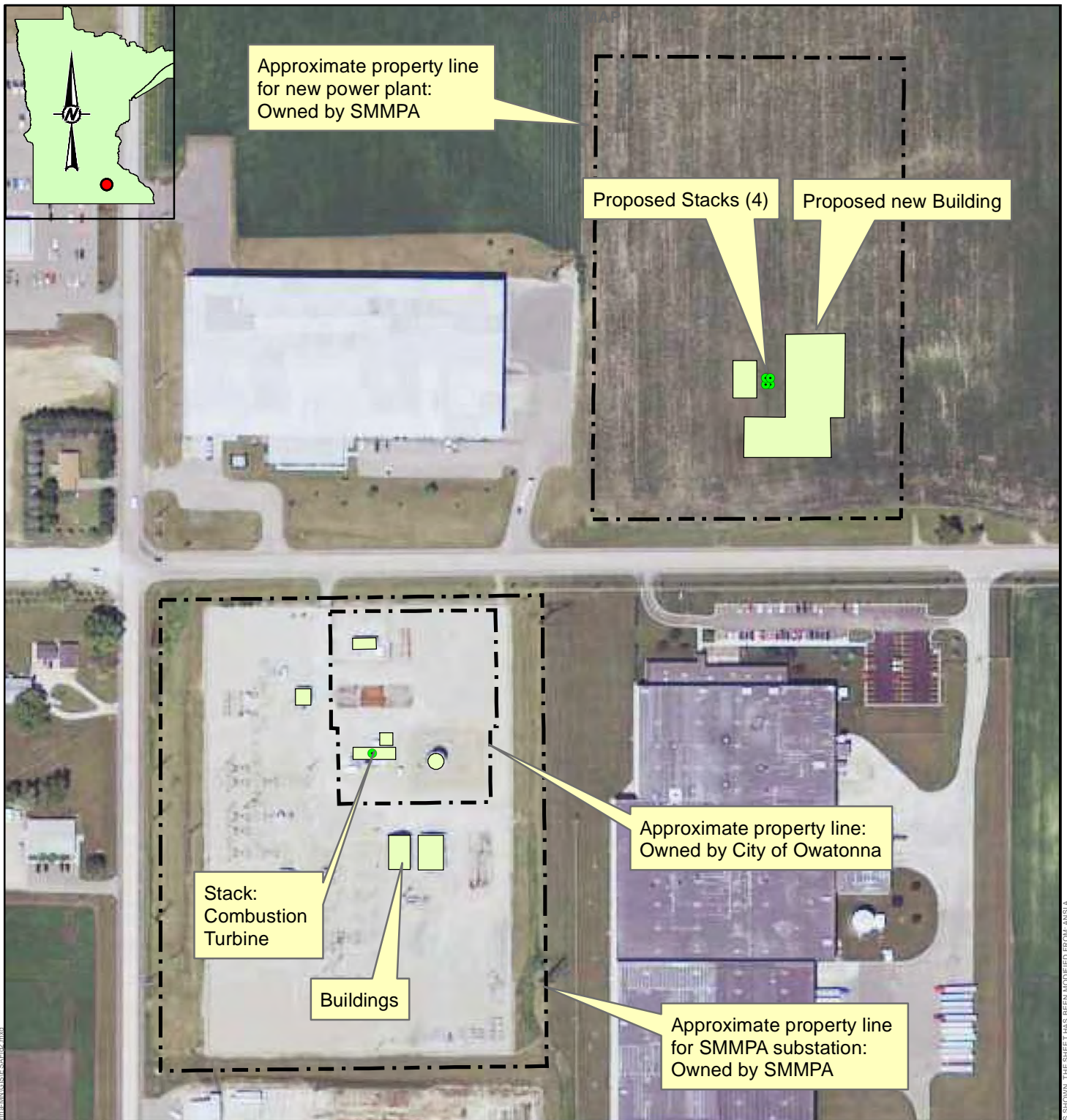
10401 Bren Road East
 Minnetonka, MN 55343
 ph: 952-930-0050
 fax: 952-930-0777
 www.epinc.net

PROJ NO: 3528.0000
 DATE: AUG. 2014
 DRWN BY: CAC
 SCALE: 1" = 1 KM

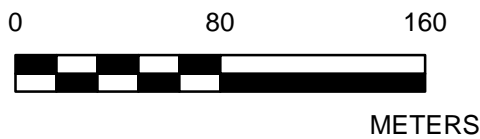
SHEET REVISED

ATTACHMENT

M3



LEGEND




NOTES

REFERENCE
NONE LISTED

CLIENT
EMANUELSON-PODAS INC.

PROJECT
OWATONNA ENERGY STATION
OWATONNA, MN

TITLE
SITE LOCATION

CONSULTANT	YYYY-MM-DD	2014-03-14
 Golder Associates	PREPARED	RCB
	DESIGN	RCB
	REVIEW	BAL
	APPROVED	BAL

PROJECT No. 1401787	CONTROL 01	Rev. 00	FIGURE 02
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Path: \\MINN-S-FS1-VM\Projects\Golder\Projects\140 PROJECTS\1401787 - EP - SMMPA, Owatonna\MN\GIS\ESL\EP.mxd

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANSIA



Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

May 4, 2015

Mr. Will Seuffert
Executive Director
Environmental Quality Board
520 Lafayette Road North,
St. Paul, MN 55155

RE: Requesting Responsible Governmental Unit Designation for Owatonna Energy Station

Dear Mr. Seuffert:

The Minnesota Pollution Control Agency (MPCA) requests the Environmental Quality Board (EQB) designate the MPCA as the Responsible Governmental Unit (RGU) for reasons discussed in this letter.

On September 15, 2014, the MPCA received an Environmental Assessment Worksheet (EAW) data submittal from Southern Minnesota Municipal Power Agency (SMMPA) for a proposed project – Owatonna Energy Station. The proposed project is located in Steele County within the city of Owatonna (see attached project description titled “Owatonna Energy Station, Steele County, Minnesota”) and will include the installation of four new natural gas fired electric generating units within a new building. The electrical generating capacity will be 39.1 (nameplate) megawatts and an 800 kilowatt diesel-fired generating unit is proposed to provide emergency power to the facility in the event of a power outage. In addition to the initial EAW data submittal, SMMPA also submitted an air permit application to the MPCA for the project.

In the initial EAW submittal, SMMPA indicated that the proposed project met the threshold for two mandatory EAW categories: Minn. R. 4410.4300, Subp. 3 Electric Generating Facilities, for which the EQB is designated as the RGU, and Subp. 15 (B) Greenhouse Gas Emissions, which designates the MPCA as the RGU. At that time, the MPCA staff and EQB staff agreed that the MPCA would be the RGU for the EAW, as we have greater responsibility for approving the project (Minn. R. 4410.0500, Subp. 5 (B)).

MPCA and SMMPA began working on the EAW and developing draft air permit limits. As more information became available through the process, the SMMPA’s greenhouse gas emissions fell below the EAW mandatory category (4410.4300, Subp. 15 (B)). Consequently, the proposed project no longer meets the greenhouse gas emissions threshold for a mandatory EAW with the MPCA as the RGU; however, the electric generating facilities mandatory EAW category remains with EQB as the RGU.

Based on our history working with this project, the MPCA recommends our agency be assigned the RGU. Further, we believe the MPCA’s expertise in electric generating facilities, authority in approvals such as MPCA air and stormwater permits and other applicable MPCA rule requirements such as Aboveground

Mr. Will Seuffert

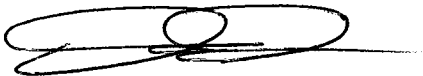
Page 2

May 4, 2015

Storage Tank rules, will greatly assist in the environmental review and assessment of the project. As such, pending EQB Board approval, the MPCA is willing to continue serving as RGU for the Owatonna Energy Station Project to complete the EAW.

Please feel free to contact me with any questions or comments. We look forward to the EQB's determination at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Dan R. Card". The signature is stylized with a large loop and a horizontal stroke extending to the right.

Dan R. Card, P.E.

Supervisor

Environmental Review Unit

Resource Management and Assistance Division

DRC\KG:bt

Enclosure: Project description titled "Owatonna Energy Station, Steele County, Minnesota"



VIA E-MAIL

Environmental Quality Board
520 Lafayette Road North
Saint Paul, MN 55155

May 5, 2015

Dan R. Card
Environmental Review
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint Paul, MN 55155

RE: Responsible Governmental Unit Designation for Owatonna Energy Station

Dear Mr. Card,

The Environmental Quality Board (EQB or Board) has received your request to designate the Minnesota Pollution Control Agency (MPCA) as the Responsible Governmental Unit (RGU) for the proposed Owatonna Energy Station, located in Owatonna MN.

This request will be presented to the Board at the May 20, 2015 EQB Meeting. The EQB will make a determination on whether to re-designate the RGU for the aforementioned project at that time. If you have any questions or need any assistance, please contact environmental review staff at 651-757-2873.

Sincerely,

Will Seuffert
Executive Director
Environmental Quality Board

WS\CAN:bt

cc: David J. Fredrickson, Chair
Minnesota Environmental Quality Board

Climate Solutions & Economic Opportunities Stakeholder Engagement

Residential, Commercial, Industrial, and Institutional
(Demand Side Energy Efficiency) Sector Stakeholder Meeting

Zero Energy Ready Codes/SB2030 Discussion Summary and Themes

The CSEO residential, commercial, industrial, and institutional (demand side energy efficiency) sector stakeholder meeting included nearly 100 participants representing 53 organizations and involved two sets of cross-sector stakeholder discussions covering four policy options/strategies within nine small groups.

The second set of discussions focused on the policy options of Zero Energy Ready (ZER) codes, based on expansion of the [SB2030](#) program, (policy option “Residential, Commercial, Industrial, and Institutional 2: SB2030/Zero Energy Transition/Codes”) and incentivizing the adoption of thermal renewables (policy option “Residential, Commercial, Industrial, and Institutional 5: Incentives and Resources to Promote Thermal Renewables”).

On the topic of **Zero Energy Ready codes**, the main themes that emerged from the discussions were as follows:

- Need for robust education, training, and technical support to accompany code changes (notably, this was by far the most consistent issue and need raised across all discussion groups and participating sectors)
- Concerns about how to cover the costs of grid and natural gas distribution infrastructure as customers withdraw from the system, including distributional impacts of shifting costs for infrastructure between customers
- Questions and concerns related to the interaction between aggressive mandatory green building/energy efficiency codes and the existing Conservation Improvement Program (CIP) if utilities are no longer able to provide incentives for or claim credit for efficiency improvements
- Impacts of a voluntary approach to ZER code adoption versus making it a statewide requirement
- Gaps in the SB2030 approach: Single-family residential and existing buildings
- Relationship to other green/sustainable building programs

Education, Training, and Technical Support

Across all tables, participants expressed the imperative of enhanced education and training that would cover all participants in the building value chain, from design to use. This included many mentions of the need for formal training—of architects, engineers, the construction trades, builders, and managers/operators—as well as the need for accessible, unbiased technical resources on best practices. The importance of training building inspectors was also specifically

mentioned by multiple participants, as was the importance of increasing energy literacy overall, given that behavior change amongst building occupants will also be critical to the long-term success of any program. Several participants also noted existing programs and resources that could form the foundation of any enhanced training and education framework that would accompany ZER code changes.

Covering Infrastructure Costs and Equity Issues Under the Current Utility Business Model

As was discussed extensively in the energy supply sector meeting, many participants expressed concern that, given current net metering laws and utility business models, significantly increasing the scale of distributed energy adoption (particularly on-site solar) has the potential to decrease the number of customers paying for electric grid infrastructure. In addition, several people pointed out that there would likely be distributional impacts of such a shift, whereby low-income customers who cannot afford new construction or renovations increasingly shoulder the costs of grid infrastructure while wealthier customers reap the benefits of newer, more efficient buildings. There may be similar risks posed to maintaining natural gas distribution infrastructure—as heating loads decrease for ZER buildings it may become more cost-effective to rely on electric heat, which would lead wealthier customers to withdraw from the system and leave lower-income customers to absorb an increasing share of costs.

Several participants mentioned that this is a topic of increasing interest across the country and these issues will likely be addressed through broader conversations on adapting the utility business model to a new set of social, political, and economic realities.

Interactions with CIP and Role of Utilities in Supporting Additional Efficiency Improvements

Another topic that resonated across groups and received significant attention was the potential interaction between increasing energy efficiency through mandatory building codes and the state's existing (or possibly even an expanded) Conservation Improvement Program (CIP), which requires utilities to work with customers to achieve energy savings above and beyond what would otherwise be required (by codes, for example). Many participants said that, based on their understanding of the current requirements under CIP, utilities would not be able to supply incentives for efficiency measures required under a ZER code, nor would they be able to count those measures towards their goals, making those goals increasingly difficult to attain. For some participants, this called into question what the role of utilities would be if a statewide ZER code were put in place and what adjustments would need to be made to CIP to ensure continued utility engagement.

Impacts of Voluntary vs. Statewide Code Adoption

Most groups spent at least some time discussing the impacts of and trade-offs associated with taking a voluntary approach to ZER code adoption (municipality by municipality) versus making it a statewide requirement. Several people noted that a voluntary approach would allow for much more aggressive and widespread action to capitalize on opportunities for greater building efficiency compared to the current regulatory framework, and that it is also more politically feasible than a state-wide mandate (for example, it would not require legislative action). On the other hand, numerous participants expressed concerns that adoption of codes one municipality at a time would come with numerous challenges—it would make successful design and scoping of

education and training programs difficult, it would be inefficient, it would create a regulatory patchwork, and it could drive development out of some communities into others. In addition, it was noted that a voluntary approach may not lead to significant emissions reductions due to low rates of adoption.

Gaps: Single-family Residential and Existing Buildings

A number of participants brought up the current gaps in what buildings would be impacted and addressed by SB2030, namely the fact that it would only apply to new buildings and major renovations, and that it currently only provides a standard for commercial buildings over 10,000 square feet. Extending the standard/program to existing and smaller residential buildings poses a number of technical, economic, and political challenges.

Relationship to Other Green/Sustainable Building Programs

Numerous participants also raised questions about the relationship between SB2030 and other existing green and sustainable building programs, including [Leadership in Energy & Environmental Design \(LEED\)](#) and codes developed by the International Code Council, such as the [International Green Construction Code \(IgCC\)](#) and the [International Energy Conservation Code \(IECC\)](#). There was general agreement that market confusion would need to be addressed, and that alignment, rather than conflict, with these other programs would be essential to positioning any Minnesota-specific codes for success.

Comments on Residential, Commercial, Industrial and Institutional Strategy #2: Zero Energy Ready Codes/SB2030

1. Application of codes/standards (what buildings would it apply to?)
 - a. Huge step forward to move from the public sector to the private sector (only two to four percent of our building stock is public)
 - b. Could it apply to existing buildings, at least public buildings (mandatory implementation of B3 protocol, and then SB2030)?
 - c. Segmentation—identify what buildings/occupants this is most appropriate for
 - d. Make tools available for residential projects
2. Voluntary adoption versus statewide requirement
 - a. Starting with it as an appendix for voluntary adoption is a good approach—allows stepped process to ramp up the necessary education and training
 - b. Allowing municipalities to opt is a huge step forward—right now they can not have a more stringent code than the state
 - c. Having a patchwork of codes across the state would be challenging
 - d. Department of Labor and Industry would prefer building code not go through legislative process (prefer that changes be made through rule-making)—appendix with voluntary option fits this
 - e. Voluntary adoption might not result in enough change to substantially impact GHG emissions
 - f. Need to ensure that this is implemented at the local level, but adoption one municipality at a time would be inefficient and ineffective
 - g. Provide local governments with incentives for adoption (or disincentives if they don't adopt)
 - h. Require inclusion of code changes in comprehensive plans for metropolitan municipalities (Met Council)
 - i. Voluntary adoption could shift construction to areas that don't adopt the code—don't want contractors to avoid specific cities
 - i. Scale is important—large cities need to adopt first so that small cities aren't negatively impacted
3. Costs/barriers/consequences
 - a. Infrastructure costs aren't covered—because of net metering, these buildings will not be paying for their connection to or use of infrastructure
 - i. Cross-subsidization is a big issue
 - ii. Fixed monthly charge (instead of tying it to amount of energy consumed) penalizes apartment dwellers and can hurt conservation efforts
 - iii. Efficiency to the point that using gas no longer makes sense—how do you continue to pay for infrastructure as you remove customers from the utility?
 1. If this pushes buildings away from gas and towards electric heating and cooling systems you are moving people to an efficient system
 - iv. Can you just put up the solar panels and not connect them to the grid?
 - b. Relationship between distribution of opportunities and cost-effectiveness
 - i. Cost-effectiveness is still questionable—University of Minnesota demonstration building would not be affordable housing

- ii. Cost-effectiveness is the key to scalability and social equity
 - iii. Risk of low-income people shouldering the costs (through rates or taxes) and high-income getting the benefits (new efficient buildings with low energy costs)
 - c. Utility business model is a barrier—need a new model
 - i. Volumetric charge poses a challenge/disincentive
 - ii. Various regional and national efforts looking at how to do this
 - d. Need a way to get at existing buildings—bringing current stock up to code would have a bigger emissions impact
 - e. Monitoring and evaluation of performance could be a significant cost—need to figure out what is realistic
 - f. Certification of new materials and technologies is a big barrier for new businesses
 - i. Availability of materials could be a barrier
 - g. If you increase costs enough it will mean less building/construction, which means job losses and not accomplishing our energy objectives either
 - i. Could particularly delay work for smaller buildings
 - h. Energy codes are not as well enforced in rural Minnesota, so increasing building costs in urban areas could have the unintended consequence of pushing sprawl into rural areas where it would still be cheaper
 - i. Doesn't fit well with the traditional process of budgeting and planning—need to do predictive modeling and think about the process differently
 - i. You are basically trading operating costs for capital costs, and existing cost models don't really fit that
 - j. Doing it at scale is a challenge—net zero energy homes are possible, but commercial is harder/less explored and retrofitting homes is also challenging
 - k. Meeting efficiency goals for industrial and research facilities can be particularly difficult
 - l. There is not currently a standard for residential buildings (under 10,000 ft²)
 - i. Limits the impact in rural areas
 - ii. Need a pilot for residential working with homeowners
 - m. Some site characteristics make it hard to meet aggressive targets
 - n. Homeowners don't always plan out more than five years—need to legislate long-term thinking
 - o. Potential for competition/conflict with existing local codes
 - p. Current “value of solar” calculation is not realistic
- 4. Opportunities
 - a. Would create jobs and new industries (for green building materials)
 - i. Developing innovative technologies in Minnesota could help drive the local market
 - ii. Could provide incentives throughout the value chain (not just customers, but also manufacturers, installers, etc.)
 - iii. Energy efficiency is better at producing jobs than energy generation—these are important metrics and we need the data so we can make these comparisons
 - iv. Deep retrofitting is labor-intensive and good for creating jobs
 - b. Would stimulate innovation in building design

- c. Provide customers with more choices (e.g., special rates to charge electric vehicles)
 - d. May seem like a stretch goal, but is really more of a benchmark—architects have been talking about net zero energy for a long time
 - e. Requiring this of all builders addresses the split incentive (cost to building owner, benefit to renter) by raising the bar for all buildings
 - f. This doesn't need to cost more—this is being tracked for the 75-100 buildings already participating in SB2030
 - g. Impacts people on a consumer level—isn't just a top-down utility program (which is good)
 - h. It is a selling point for commercial building owners to have efficient buildings
 - i. Focus on creation of value, rather than mandate (will be less distrust if it can be seen as a carrot instead of a stick)
 - j. Big savings is in reduction of natural gas use (for residential)
5. Policy/program structure and components
- a. Focus on reducing loads/energy use first and foremost (including reducing building footprints), with onsite generation coming in after
 - b. Include distributed energy—solar-ready building certification process should be included (need to start with a pilot to understand how to do this)
 - c. Need education, training, and technical assistance
 - i. Need education programs for people in the building trades (on energy)
 - ii. Need to educate the people conducting the energy audits (on building trades)
 - iii. Develop and distribute best practices/models
 - iv. Need easy access to information for architects, engineers, builders, local building officials, etc.
 - v. Need to educate and reorient building inspectors
 - vi. Will need a central portal/one-stop-shop for information that everyone needs
 - vii. Work with trade schools and technical colleges
 - viii. Information needs to not be overwhelming to people
 - ix. Consumers need access to unbiased information/data (not marketing)
 - x. Energy education for tenants/consumers needs to be institutionalized as well—behavior matters
 - xi. Should highlight successful models (e.g., Science Museum, innovative homes) through tours and other demonstrations
 - xii. Make resources available to municipalities for training municipal employees to do evaluation and enforcement (and for other costs related to code adoption)
 - xiii. Should leverage, rather than create where possible—engage existing trade ally networks and trade groups that are already working on this to elevate model projects
 - xiv. Not starting from scratch—in fourth year of program for public buildings and have learned a lot already about how to teach these things
 - xv. Building contractors currently have a well-developed, good training program

- d. Cost-effectiveness
 - i. Need to figure out how to meet standards at lowest cost
 - ii. Will be successful if we can demonstrate cost-effectiveness
 - e. Performance-based standards/incentives
 - i. The state should establish the rules of the game and minimum standards, but then let the market determine the rest (provide people with choices)
 - ii. Offer performance-based incentives (receive financial incentive if you reach a certain percentage of savings)—this is being used in other states
 - f. Need performance standards for new technologies
 - i. Multi-family residential heating units concerning, especially in the metro—deferred costs for people who can't afford them (these units are not meeting nameplate efficiency and need to be replaced every 6-7 years)
 - ii. Should not sacrifice building science and durability for sake of energy use reductions
 - iii. State should set and monitor standards for construction and operation (building performance)—diminish risk and maintain quality control
 - g. Financing
 - i. There are existing financing programs to pay for this work, so the financing is doable
 - ii. PACE programs or Green Bank to allow capital investments
 - iii. Do on-bill financing
 - iv. These projects will pay for themselves over time, so this can be done with private capital and market-driven
 - h. Incentivize the application of advanced monitoring and control technologies
 - i. Make the state Energy Savings Program tool a public portal (and make reporting mandatory for all utilities) to show what programs utilities are using and help identify the most cost-effective programs
 - j. Need to make sure that developers are deeply engaged in program design
 - k. Work with major commercial building owners to figure out best incentives
 - l. Need a clearer definition of “zero energy”
 - i. Should be source-based approach to achieving zero emissions (including any emissions generated offsite)—should count emissions from electricity
 - ii. Counting emissions from electricity sets you up for double-counting—should treat electricity as zero emissions (deal with those emissions at the source through other policies)
 - iii. Does nuclear count as net zero emissions?
6. Relationship to other green/sustainable building programs
- a. Concerns over possible market confusion
 - b. Green/Step Cities is a good example of how to consolidate information and make it accessible for people
 - c. Energy Star is widely recognized by building managers—should be compatible with Energy Star and LEED guidelines to minimize confusion
 - d. LEED is different because it addresses building materials, not performance
 - e. This is a little more aggressive than other programs (like LEED)
 - f. Relationship to international codes (e.g., international green construction code, international energy conservation code)

- i. Currently can't say if SB2030 is code-ready/compatible with 2018 national code or green construction code
 - ii. Risk of having multiple conflicting codes for construction—how would you enforce?
7. Relationship to other policies
 - a. What is the relationship to the RES (for homes, for solar gardens)?
 - i. This probably depends on whether the RES is a state-wide goal or a utility-by-utility goal
 - ii. How do these buildings interact with the grid?
 1. Application of stand-by rates
 - b. Relationship to efficiency standard—could make meeting utility-based goals more difficult by removing utilities' ability to claim savings
 - i. Utility role
 1. What is most cost-effective way to administer the program? Utilities or someone else?
 2. Could use performance threshold to trigger incentive and utility ability to take credit
 3. Can utilities still provide incentives if there is a mandate? Where would incentives come from?
 - ii. Hard to do both—NZE buildings might be better approach
 - iii. How do we still provide incentives for utilities to help meet goals? Involve them directly in providing training?
 - c. Relationship to thermal renewable energy standard/goal (should be linked)
 - d. Building energy disclosure requirement (for commercial buildings) in Minneapolis is building awareness and transparency
 - e. Connection to job training and economic development in the construction sector

Residential, Commercial, Industrial and Institutional Sector

Meeting Agenda

Tuesday, December 16, 2014

8:00 a.m. – 12:00 p.m.

Wilder Center

Saint Paul, MN

- 8:00** Introductions, Agenda Overview & Meeting Purpose
Lee Paddock, Facilitator, Environmental Initiative
- 8:30** Review Residential, Commercial, Industrial and Institutional Sector Strategies, Analysis Results and Key Questions
Janet Streff, Manager, State Energy Office, Minnesota Department of Commerce
- 8:50** Small Group Discussions I: Increase the Energy Efficiency Requirement and Incentives and Resources to Promote Combined Heat and Power
Small group discussions on the opportunities and challenges associated with increasing the energy efficiency requirement to 2.5 percent and promoting the use of combined heat and power (CHP) systems
- 9:40** Break
- 10:00** Small Group Discussions II: Incentives and Resources to Promote Thermal Renewables and Zero Energy Ready
Small group discussions on the opportunities and challenges associated with offering incentives and resources to promote thermal renewables and utilizing building codes to reach zero energy status for all Minnesota buildings by 2030
- 11:10** Report-outs of Highlights from Small Group Discussions
- 11:55** Next Steps
Lee Paddock, Facilitator, Environmental Initiative
- 12:00** Adjourn

Meeting handouts and other information can be accessed at <http://www.environmental-initiative.org/projects/cseo-stakeholder-engagement/meetings-cseo-stakeholder-engagement#RCIISectorMeeting>.

Meeting Participants

Participating Stakeholders

Bill Adamski, MN350
Ellen Anderson, University of Minnesota
DyAnn Andybur, City Of Duluth
Nina Axelson, Ever-Green Energy
Laura Babcock, Minnesota Technical Assistance Program (MnTAP)
Dennis Becker, University of Minnesota
Lisa Beckner, Minnesota Power (ALLETE)
Peter Berglund
Derek Bertsch, Missouri River Energy Services
Amanda Bilek, Great Plains Institute
Amy Blumenshine, Evangelical Lutheran Church in America
Bill Bond, Minnesota Crop Production Retailers Association
Rick Carter, LHB
Michael Cashin, Minnesota Power (ALLETE)
Peter Ciborowski, Minnesota Pollution Control Agency
John Dunlop, Renewable Energy Services
Tim Gallagher, Minnesota Power (ALLETE)
Ben Gerber, Minnesota Chamber of Commerce
Sean Gosiewski, Alliance For Sustainability
Bill Grant, Minnesota Department of Commerce
Alison Groebner, Minnesota Department Of Commerce
Katie Gulley, BlueGreen Alliance
J. Drake Hamilton, Fresh Energy
Roberta Henrich, UMR Geothermal, Inc.
Lynn Hinkle, Energy Jobs Association
Kathy Hollander
Cort Holten, Minnesota Propane Association
John Hottinger, Sierra Club
David Howd, Sierra Club North Star Chapter
Megan Hoye, Center for Energy and Environment
Jan Hubbard, Rural Renewable Energy Alliance
Eric Jensen, Izaak Walton League of America
Joel Johnson, Minnesota Rural Electric Association
Steve Johnson, Andersen Corporation
Lesley Kandaras, Metropolitan Council
Kurt Kimber, MN350
Jack Kluempke, Minnesota Department Of Commerce
Frank Kohlasch, Minnesota Pollution Control Agency
Holly Lahd, Minnesota Department Of Commerce
Sara Letourneau, BlueGreen Alliance
Annie Levenson-Falk, Legislative Energy Commission
Nick Mark, CenterPoint Energy
Gregg Mast, Earthtech Energy
Grania McKiernan, Xcel Energy
Scott McKown, Minnesota Department of Labor & Industry
Beth Mercer-Taylor, Institute on the Environment, University of Minnesota
Chris Meyer, Efficiency Detectives
Nick Minderman, Xcel Energy

Alan Muller
Peter Narog, Xcel Energy
Will Nissen, Fresh Energy
Lee Paddock, The George Washington University Law School
James Pearson, Xcel Energy
Annie Perkins, Andersen Corporation
Andy Polzin, Barr Engineering Co.
Chuck Prentice, MN350
Matt Privratsky, Minnesota Rural Electric Association
Michelle Rosier, Sierra Club
Brian Ross, CR Planning, Inc.
Mike Rothman, Minnesota Department of Commerce
Stan Sattinger, MN350
john Schmid, Standard Clay Products Co.
paul schollmeier, Efficiency Detectives
Steve Schultz, 3M
William Seuffert, Minnesota Environmental Quality Board
Nancy Silesky, Minnesota Propane Association
Brendon Slotterback, City Of Minneapolis
Grey Staples, The Mendota Group, LLC
Shane Stennes, University Of Minnesota
Robin Sternberg, Minnesota Department of Employment and Economic Development
Scott Strand, Minnesota Center for Environmental Advocacy
Joseph Sullivan, Center for Energy and Environment
David Thornton, Minnesota Pollution Control Agency
Susan Turbes, CenterPoint Energy
Christopher Tureson, Central Boiler, Inc.
Brian Urlaub, Enertech Global
Tom Vandervoort, Vandervoort Public Affairs
Karen Yeadon, Emerson Process Management
Bruno Zagar, Fond du Lac Band of Lake Superior Chippewa

Meeting Staff (Including Facilitators & Note Takers)

Greg Bohrer, Environmental Initiative
Ned Brooks, Minnesota Pollution Control Agency
Jessica Burdette, Minnesota Department of Commerce
Gena Gerard, Environmental Initiative
Ellen Gibson, Environmental Initiative
Mike Harley, Environmental Initiative
Kim Havey, Minnesota Department of Commerce
Anna Henderson, Minnesota Environmental Quality Board
Kevin Hennessy, Minnesota Department of Agriculture
Meleah Houseknecht, Environmental Initiative
Laura Millberg, Minnesota Pollution Control Agency
Stacy Miller, Minnesota Department Of Commerce
Timothy Nolan, Minnesota Pollution Control Agency
Eric Rehm, Minnesota Department of Commerce
Anna Sherman, Minnesota Department of Employment and Economic Development
Janet Streff, Minnesota Department of Commerce
Lise Trudeau, Minnesota Department of Commerce
Adam Zoet, Minnesota Department of Commerce



**Residential, Commercial, Industrial and Institutional (RCII) #2
SB2030/ Zero Energy Transition/Codes**

Policy Description

Operating, and maintaining buildings involve the consumption of large amounts of energy. In 2011, Minnesota's residential and commercial sectors consumed 39.6% of the total energy consumed in the state-- the residential sector at 21.3 % while commercial consumed 18.3%.¹

To ensure that new or renovated buildings serve us well into the future means constructing energy efficient buildings while pairing them with clean energy. Initiatives such as the national Architecture 2030, Zero Energy Ready or Minnesota's Sustainable Building 2030 (SB2030) can provide that assurance. As defined by NREL, a Net Zero Energy building "produces as much as or more energy than it uses annually and exports excess RE generation to the utility (electricity grid, district hot water system, or other central energy distribution system) to offset the energy used."² We adopt this definition for RCII-2 policy option.

Building energy codes specify minimum requirements for new and renovated buildings. But these codes will not make buildings zero energy in time for Minnesota to accomplish its climate change goals. Stretch goals can be achieved by adopting SB2030 as an appendix to the Minnesota Building Code, which then makes it available for local jurisdictions to use.

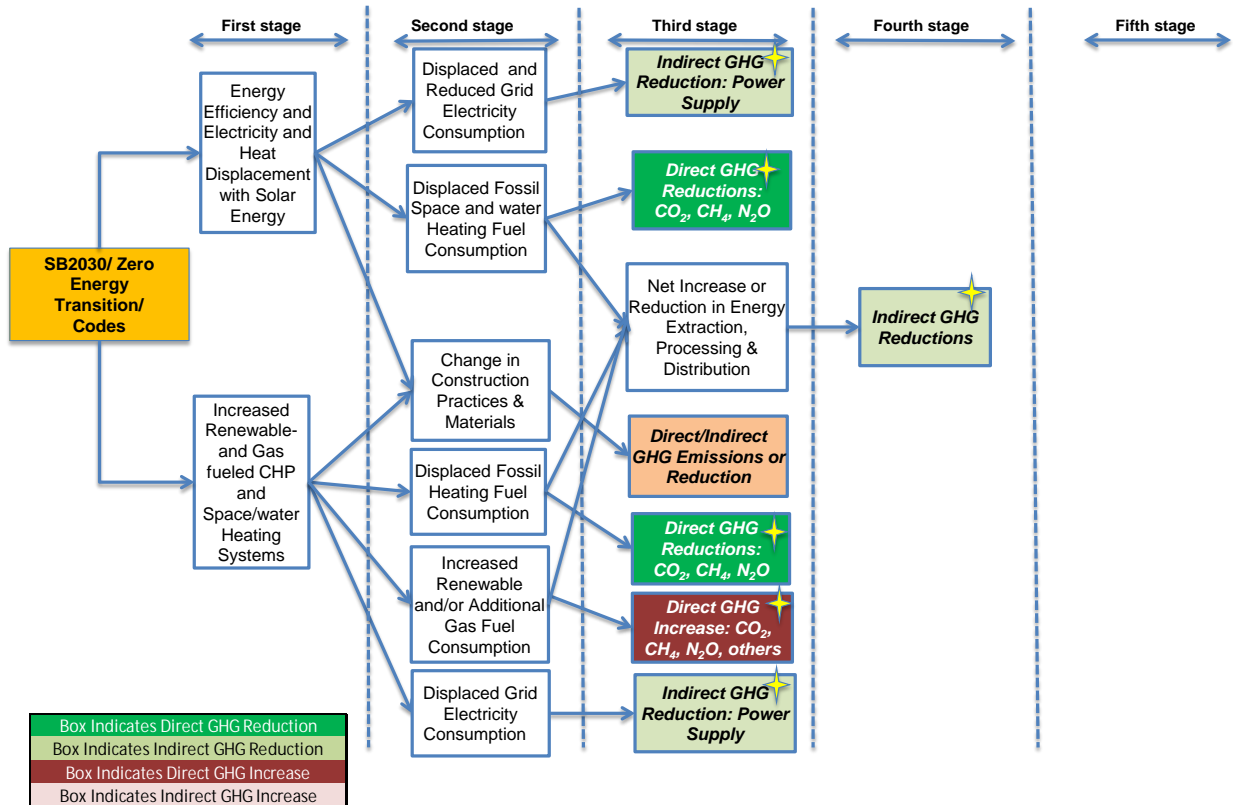
This policy will provide incentives for or mandate construction of buildings so that net zero energy use in buildings is achieved incrementally by 2030 (60% - 2010; 70% - 2015, etc.) or upon completion of construction with zero-energy ready buildings.

¹ Energy Information Administration, State Energy Data Systems.

² *Net-Zero Energy Buildings: A Classification System Based on Renewable Energy Supply Options*, Shanti Pless and Paul Torcellini, National Renewable Energy Laboratory, U.S. Department of Energy, Technical Report NREL/TP-550-44586, June 2010.

Causal Chain for GHG Reductions

A schematic causal chain for this policy is provided below. Increased capacity as well as use of CHP systems powered with natural gas to displace electricity from the central grid, and the use of cogenerated heat that displaces the fossil fuels (natural gas, distillate oil, coal, and propane) used for space heat and water heat that are under standard practice produced in furnaces, boilers, and water heaters. The application of solar water and space heat, and of energy efficiency, also displaces electricity and fossil fuel use. As such, GHG emissions savings accrue through the reduction of central grid electricity supply and fossil fuels formerly used for heating, but these savings are partially offset by emissions from natural gas and renewable fuels combustion. In addition, the reduced use of fossil fuel reduces “upstream” emissions associated with, for example, natural gas transmission and distribution, oil refining and transport, and natural gas and crude oil production. It is expected that these GHG emissions reductions and increases will be quantified. Increased use of renewable fuels will produce some increase in emissions associated with fuel processing and transport—for example, diesel-fueled equipment used for biomass harvesting and transport. These additional emissions, however, are highly variable depending on the source of the biomass fuel and the distance it must be shipped to the CHP facility. As a result, these incremental emissions may or may not be quantified, depending on data availability. Changes in building practices and in space and water heating equipment/appliance use in buildings may also produce changes in construction practices and materials that may have a positive or negative impact on GHG emissions. These impacts are indirect and uncertain, and will not be quantified.



Policy Design

Minnesota will develop a process for both commercial and residential buildings to reach zero energy status by 2030 through the MN Sustainable Building 2030 process – a performance-based process. The current SB2030 team will continue its training program to architects and engineers. It will also need to develop a residential SB2030 program and create training elements for residential developers and builders.

The Department of Labor and Industry will adopt SB2030 as its green stretch code and incorporate it as an appendix chapter. Jurisdictions that adopt it will then be able to require that all buildings in its jurisdiction are built to SB2030. Early adopting cities will assist in leading by example.

By stepping the requirement of voluntary use of SB2030 to mandatory use of SB2030, there will be time for appropriate training to get into place.

Goals:

- All new and renovated commercial buildings in the state, and all multi-family residential buildings four or more stories in height, will be required to use SB2030 through a stepped process, by 2020.
- All new one and two family dwellings and multi-family residential buildings three stories or less in height in the state will be required to use SB2030, through a stepped process, by 2025.
- Sufficient technical assistance and training is available to assist local units of government, architects, engineers, builders, developers in moving toward SB2030.

Timing:

New and Renovated Commercial Buildings:

- 2015:
 - State-bonded buildings and state-licensed buildings (a new requirement) must use SB2030.
 - All public buildings may use SB2030 and receive appropriate technical assistance
 - DLI adopts SB2030 as an appendix for statewide building code for green commercial buildings.
- 2016:
 - Implement incentive program for voluntary adoption by commercial private sector.
 - Local units of government may begin adopting commercial SB2030 Appendix for use in its city.
- 2018: SB2030 mandatory for all public buildings

- 2020: SB2030 mandatory for all new and major renovated commercial buildings

Residential Buildings:

- 2016: Complete design for energy standard for residential SB2030.
- 2018:
 - Implement design assistance program
 - DLI adopts residential SB2030 as an appendix for statewide building code for green residential buildings.
 - Local units of government may begin adopting residential SB2030 Appendix for use in its city.
 - Implement incentive program for voluntary adoption by residential private sector.
- 2025: SB2030 mandatory for all new and major renovated residential buildings

Parties Involved: All parties involved in owning, operating, renovating, occupying, or other activities associated with Minnesota's new or major renovations of residential, commercial, institutional, municipal, and industrial building stock.

Implementation Mechanisms

The program should be implemented as follows:

- Pass legislation mandating that all state-licensed buildings must now use SB2030 design guidelines. Provide funding mechanisms to assist state and local governments and school districts in meeting these criteria.
- Provide tax incentives, utility design assistance and incentive programs, financing incentives or other inducements for construction of new and major renovations of residential and commercial buildings to assist with voluntary adoption of SB2030 guidelines.
- Provide funding to provide additional technical assistance to local units of government, architects, engineers, builders and developers as the move toward SB2030 guidelines starts.
- Provide funding to develop residential SB2030 guidelines.
- Provide funding to ensure that the database of ongoing building performance tracking in all sectors continues to grow.
- Establish a clearinghouse that provides information and assistance on green building guidelines and standards, the best available technologies for certain applications, a database of ongoing building performance tracking in all sectors, and access to design assistance and software tools to calculate the impacts of energy efficiency and renewable energy strategies.

- Establish education and training programs for all key decision makers, building professionals, and other participants in implementing this policy, including design professionals, such as architects, engineers, interior designers, planners, and landscape architects; building owners; developers, contractors/builders, and building operators/facility managers; and the financing, real estate, and insurance communities.
- Mandate that state boards of licensing exams for building professionals cover knowledge of and test on SB2030 guidelines.

Related Policies/Programs in Place and Recent Actions

Guidelines that are either required or voluntary in Minnesota include Minnesota Sustainable Building Guidelines (SB2030), LEED, Green Globes, National Association of Home Builders Guidelines, GreenStar, Green Communities (Minnesota Housing Process), and ENERGY STAR.

Type(s) of GHG Reductions

Reductions in GHG emissions from avoided fossil-fuel combustion for electricity use, and from space and water heating.

Estimated Net GHG Reductions and Net Costs or Cost Savings

Summary direct GHG emissions reduction and option costs results for RCII-2, “SB2030/Zero Energy Transition/Codes”, are provided in the table below. These values include costs for program administration. Negative values are shown in parentheses. In the “Net present value of societal costs” column, negative values, and denote instances where the costs of the implementing the option (or part of the option) are LESS than the direct economic benefits of the option in avoided energy and other costs. Negative values in the “cost effectiveness” column indicate that there is a net direct economic benefit per metric ton (t) of carbon dioxide equivalent saved. Overall, this option results in over 9 million metric tons (which is the same as teragrams—trillion grams or Tg in the table below) of annual CO₂e savings in 2030, with about 54 million metric tons of CO₂e savings over the analysis period. Somewhat more than half of the savings comes from implementation of measures in the commercial and institutional sectors.

	2030 GHG reductions (Tg CO ₂ e):	2015 – 2030 cumulative reductions (Tg CO ₂ e):	Net present value of societal costs, 2015 – 2030 (million \$2014):	Cost effectiveness (\$2014/ t CO ₂ e):
Zero Energy Building Implementation in the Residential Sector	4.73	24.61	\$(823.49)	\$(33.46)
Zero Energy Building Implementation in the Commercial Sector	4.56	28.89	\$(1,226.73)	\$(42.46)
TOTAL	9.29	53.50	\$(2,050.22)	\$(38.32)

Quantification Methods:

The quantitative analysis of this option uses the following overall approach:

1. Estimate the total square footage of new and renovated commercial and residential buildings constructed per year in Minnesota using MN-specific, national, and regional data as appropriate and available.
2. Estimate the average energy consumption per square foot of average “standard” (pre-option) commercial and residential new and renovated buildings in MN, based on CBECs, USDOE EIA, and other data as available. These are estimated separately for commercial and residential buildings, by major fuel type (electricity, gas, oil products), and represent averages over the new and renovated building stock in each sector.
3. Estimate the change in energy consumption per square foot, again starting with standard (pre-option) values, for buildings built in each year that comply with SB2030. That is, for example, buildings built in 2015 will use 30% of the fossil energy and grid electricity used in (and thus save 70% relative to) buildings meeting the SB203 Energy Standard, (which is based on reductions over the average 2003 building energy consumption,) buildings built in 2020 would use 20%, and buildings built in 2030 would use 0% (on a net basis).
4. Estimate, again separately for buildings in each sector, the fractional average reductions from energy use in standard commercial and residential buildings in moving to Zero Energy Buildings that comes from the following sources: energy efficiency improvement, gas-fired CHP, solar thermal energy (space and water heating), solar PV installations, and biomass energy (space heating).
5. Calculate the net reduction (or increase) in different energy sources used per square foot of new and renovated floor area in each of the residential and commercial sectors.
6. Develop and apply projections of building area in the residential and commercial sectors, using MN-specific data as available plus expert judgment regarding building trends in MN.
7. Multiply the net values developed in step 5 by the new and renovated building areas developed in step 6 and, for years before 2020 in the commercial sector, and 2025 in the residential sector, by the ramp-in rates specified above for each sector to yield estimates of the net impact on use of energy sources in each sector.
8. Multiply the net impacts on fuel and electricity use in each sector by GHG emission factors appropriate for each combusted fuel and an appropriate marginal emission factor for avoided electricity use, respectively, to yield net emissions reductions by sector, fuel/energy source, and year.

9. Adopt average cost estimates, by sector, for the net capital cost of building energy efficiency improvements needed to achieve the energy use reductions assumed, and of the other energy systems (solar thermal and PV, biomass energy, gas energy) needed to achieve ZEB as described in step 4, less the cost of standard practice.
10. Multiply the cost estimates from step 9 with the estimated energy savings by type of measure included in the option annually to provide an estimate of the net costs of the option, by sector and year.
11. Multiply the net impacts on purchased fuels as developed in Step 8 by appropriate avoided costs for electricity and fuels saved/used.
12. Estimate “upstream” emissions reduction from avoided/additional fuels and electricity use using common emission factors used in many options for fossil fuels.
13. Apply representative estimates of the fraction of the additional capital costs of technologies used in the option that might be paid by a program sponsor, plus estimates of the ratio of sponsor administrative costs to the sponsor outlays for incentives, to estimate the administrative costs of the option.

Key Assumptions:

In addition to the goals described above, key assumptions used in the analysis of RCII-2, as reflected in the listing of analytical steps in the previous section of this document, include:

- Annual new and renovated square feet of commercial buildings, of multi-family buildings 4 or more stories tall, and of one and two family dwellings and multi-family residential buildings three stories or less constructed in MN through the modeling period. Annual new building for these three groupings were estimated based on a combination of historical and short-term (5-year) forecast data from Reed Construction Data³, combined with data and insights from MN agency staff, and data from the MN Economic Forecast (as of February 2014)⁴. The resulting forecast additions of new floor area range from 16 to 21 million square feet of commercial/institutional space, 4.1 to 4.5 million square feet of multi-family (4 stories and taller) space, and 35 to 56 million square feet of single family and small multi-family floor space annually from 2015 through 2030, with additions generally declining slowly in the later years of the analysis period. 0.6 units of renovated space were assumed to be added per unit of new commercial and institutional (CI) space. Renovated residential space was not included in the analysis of this option.

³ Reed Construction data was provided by The Weidt Group.

⁴ “Budget and Economic Forecast.” *Office of Management & Budget*, Feb. 2014.
<http://www.mn.gov/mmb/images/Budget%2526Economic_Forecast_Feb2014.pdf>.

- The fraction of new (and, for CI, renovated) floor space assumed to be covered by RCII-2 in specific years by sector is as shown in the table below. Values for other years were interpolated.

Table RCII-2-1. Fraction of Floor Space Assumed in RCII-2

Year	Commercial/ Institutional (Non- Residential)	Multi-family Residential as Defined In Policy Option Document	Single Family and Small Multi- family Residential
2015	12.0%	0%	0%
2016	15.0%	0%	0%
2018	20%	0.63%	0.63%
2020	75%	75%	25%
2025 and on	100%	100%	100%

- The annual target fraction of fossil energy use and off-site electricity to be reduced by year in each sector is as shown in the table that follows, based on RCII-2 targets. Again, values for other years were interpolated.

Table RCII-2-2. Annual Target Fraction of Fossil Energy Use and Off-Site Electricity Reductions

Year	Commercial/ Institutional (Non- Residential)	Multi-family Residential as Defined In Policy Option Document	Single Family and Small Multi- family Residential
2010/In Absence of Policy	30%	30%	30%
2015	70%	30%	30%
2018	70%	70%	70%
2030	100%	100%	100%

The fractional savings above apply to the per-square-foot baseline values for energy use under SB2030 energy standard, based on estimates provided by MN agency staff.

Table RCII-2-3. Baseline Values for Energy Use (ft²)

	Electricity		Heating Fuels	Total
	kBtu/sq ft-yr	kWh/sq ft-yr	kBtu/sq ft-yr	kBtu/sq ft-yr
Commercial/Institutional	71.50	20.96	61.10	132.60
Multi-family Residential	41.10	12.05	83.40	124.50
Single-family Residential	25.00	7.33	85.00	110.00

- 70 percent of the required energy savings (or on-site generation) in each year and in each sector come from electricity savings, with the remaining 30 percent from savings in on-site fossil fuel use (gas, oil, and propane/LPG).
- The fractions of reduction in energy use to achieve zero energy residential and commercial buildings from different sources of reduction were assumed, based on discussions with MN agency staff, to be as shown in the table below, with 2015 values used as a starting point, 2030 values uses as an end-point, and values for other years linearly interpolated.

Table RCII-2-4. Technologies for Electricity Savings

	Contribution as of 2015			
	Technologies for Electricity Savings			
	Energy Efficiency	Gas-fired CHP	Solar Space and Water Heating	Solar PV
Commercial/Institutional	96.0%	1.0%	2.0%	1.0%
Multi-family Residential	96.5%	0.5%	2.0%	1.0%
Single-family Residential	97.0%	0.0%	2.0%	1.0%

Table RCII-2-5. Technologies for Fossil Heating Fuel Savings

	Technologies for Fossil Heating Fuel Savings			
	Energy Efficiency	Gas-fired CHP (heat output)*	Solar Space and Water Heating	Biomass Heating
Commercial/Institutional	96.0%	1.0%	2.0%	1.0%
Multi-family Residential	94.1%	0.9%	3.0%	2.0%
Single-family Residential	90.0%	0.0%	5.0%	5.0%

Table RCII-2-6. Technologies for Electricity Savings by 2030

	Contribution by 2030			
	Technologies for Electricity Savings			
	Energy Efficiency	Gas-fired CHP	Solar Space and Water Heating	Solar PV
Commercial/Institutional	78.0%	2.0%	10.0%	10.0%
Multi-family Residential	78.5%	1.5%	10.0%	10.0%
Single-family Residential	79.5%	0.5%	10.0%	10.0%

Table RCII-2-7. Technologies for Heating Fuel Savings

	Technologies for Fossil Heating Fuel Savings			
	Energy Efficiency	Gas-fired CHP (heat output)*	Solar Space and Water Heating	Biomass Heating
Commercial/Institutional	90.9%	2.1%	4.0%	3.0%
Multi-family Residential	85.2%	3.8%	6.0%	5.0%
Single-family Residential	76.5%	3.5%	10.0%	10.0%

- The fractions of energy savings assumed to be achieved through solar space and water heating that is ascribed to application of transpired solar heating, a relatively inexpensive form of solar space heating, were as described in the table below:

Table RCII-2-8. Electricity Savings Due to Solar Heating

	Electricity Savings	Gas Savings
Commercial/Institutional	50%	75%
Multi-family Residential	50%	75%
Single-family Residential	50%	50%

- Performance assumptions for biomass and fossil-fueled heating sources used to estimate required new and avoided fuel consumption, respectively, were as follows, based on MN agency staff input:

Table RCII-2-9. Performance Assumptions for Biomass and Fossil Fuel

	Commercial/ Institutional	Multi-Family	Single Family and Small Multi-Family
Average Conventional Heating Fuel Efficiency, Fuel to Useful Heat (all	86%	86%	78%
Average Biomass Heating Fuel Efficiency, Fuel to Useful Heat	75%	75%	70%

- The net capital costs of building energy efficiency performance and on-site renewable energy systems used to meet the goals of the option were as shown in the table below. These costs were compiled from a variety of sources—see the RCII-2 worksheet for complete notes on the estimates of these parameters.

Table RCII-2-10. Capital Costs as of 2015 (2014\$)

Capital Costs as of 2015 (2014 dollars)					
Technologies for Electricity Savings					
Energy Efficiency	Gas-fired CHP (See <i>Note 4</i>)	Solar Space Heat with Transpired Solar Collectors	Other Solar Space and Water Heating	Solar PV (See <i>Note 3</i>)	
\$/first-year MWh saved	\$/kW	\$/first-year MWh saved	\$/first-year MWh saved	\$/kW	
Commercial/Institutional	\$ 238.48	\$ 3,606	\$ 618.80	\$ 1,037.52	\$ 3,100
Multi-family Residential	\$ 238.48	\$ 3,606	\$ 618.80	\$ 1,037.52	\$ 3,617
Single-family Residential	\$ 238.48	\$ 10,000	\$ 558.66	\$ 1,171.22	\$ 4,134

Table RCII-2-11. Technologies for Fossil Heating Fuel Savings

Technologies for Fossil Heating Fuel Savings				
Energy Efficiency (as for Natural Gas in RCII-4)	Solar Space Heat with Transpired Solar Collectors*	Other Solar Space and Water Heating*	Biomass Heating*	
\$/first-year MMBtu saved	\$/first-year MMBtu saved	\$/first-year MMBtu saved	\$/ (MMBtu/yr delivered)	
Commercial/Institutional	\$ 14.73	\$ 211.04	\$ 353.86	\$ 31.45
Multi-family Residential	\$ 14.73	\$ 211.04	\$ 353.86	\$ 31.45
Single-family Residential	\$ 14.73	\$ 211.04	\$ 442.45	\$ 32.62

*Consistent with values used in RCII-5 analysis

Table RCII-2-12. Capital Costs as of 2030 (2014\$)

Capital Costs as of 2030 (2014 dollars)					
Technologies for Electricity Savings					
Energy Efficiency	Gas-fired CHP (See <i>Note 4</i>)	Solar Space Heat with Transpired Solar Collectors	Other Solar Space and Water Heating	Solar PV (See <i>Note 3</i>)	
\$/first-year MWh saved	\$/kW	\$/first-year MWh saved	\$/first-year MWh saved	\$/kW	
Commercial/Institutional	\$ 259.49	\$ 3,606	\$ 618.80	\$ 1,037.52	\$ 1,402
Multi-family Residential	\$ 259.49	\$ 3,606	\$ 618.80	\$ 1,037.52	\$ 1,636
Single-family Residential	\$ 259.49	\$ 5,000	\$ 558.66	\$ 1,171.22	\$ 1,870

Table RCII-2-13. Technologies for Fossil Heating Fuel Savings

Technologies for Fossil Heating Fuel Savings				
Energy Efficiency	Solar Space Heat with Transpired Solar Collectors*	Other Solar Space and Water Heating*	Biomass Heating*	
\$/first-year MMBtu saved	\$/first-year MMBtu saved	\$/first-year MMBtu saved	\$/ (MMBtu/yr delivered)	
Commercial/Institutional	\$ 16.03	\$ 211.04	\$ 353.86	\$ 31.45
Multi-family Residential	\$ 16.03	\$ 211.04	\$ 353.86	\$ 31.45
Single-family Residential	\$ 16.03	\$ 211.04	\$ 442.45	\$ 32.62

*Consistent with values used in RCII-5 analysis

- Measure lifetimes, used for calculating levelized (annual) capital costs, were assumed to average 15 years for energy efficiency improvements and 20 or 25 years for renewable energy systems.
- For Energy Efficiency, operating and maintenance (O&M) costs were assumed to be 10% of levelized capital cost. In practice these costs may be zero or even negative, as

in cases where changes in technology (such as switching to long-lived LED bulbs) result in reducing maintenance costs, or may be modestly greater than for standard practice, such as for building energy controllers that need to be maintained, adjusted and calibrated periodically. O&M costs for gas-fired CHP were assumed to be the same as used for gas-fired CHP in RCII-1. Solar PV O&M costs were adapted from NREL, "Distributed Generation Renewable Energy Estimate of Costs"⁵ at about \$20 per kW-yr. O&M costs for biomass-fueled heating systems were assumed to be as estimated in RCII-5.

- Estimated avoided marginal emission factors for electricity generation (on an electricity delivered basis⁶) falls from 0.936 tCO₂e per MWh in 2015 to 0.758 in 2030, with avoided costs of electricity generation (again based on delivery to consumers, that is, factoring in transmission and distribution losses) rising from \$92.6 to \$148.1 per MWh delivered (nominal dollars) over the same time period. Natural gas avoided (wholesale) costs rise from \$4.78 to \$8.97 per GJ (again nominal dollars) over the same time period.
- Wholesale costs of biomass fuels used for renewable CHP rise from \$2.96/GJ in 2015 to \$6.73/GJ in 2030 (nominal dollars). Avoided costs of other fossil fuels were assumed equal to avoided wholesale costs for the various fuels, as estimated in the Common Assumptions used for all options, as were direct and, where applicable, "upstream" GHG emission factors for each fuel whose use is avoided (or, in the case of biomass, increased) by the measures in RCII-2.
- Administrative costs are estimated assuming that program sponsors will provide incentives equal to 35% (commercial/institutional sector) to 45% (single family/small multi-family) of capital costs. Administrative costs are assumed to vary from 10% (commercial/institutional) to 20% (single family/small multi-family) of incentive costs.

Key Uncertainties

A few uncertainties include:

- Legislative action will be required to enact this type of statewide policy. There are uncertainties around the support or resistance from various stakeholder groups regarding this kind of policy change.
- Program scalability needs to be considered in the design and execution of this proposal. While there is already an infrastructure in place the meet the current SB2030 requirements written into law, considerations need to be made for the funding mechanism that will be required for expanding the existing work.

⁵ Updated August 2013, and available as http://www.nrel.gov/analysis/tech_lcoe_re_cost_est.html.

⁶ That is, factoring in transmission and distribution losses, which, based on the electricity supply forecast prepared as part of this project, vary annually in the range of 5.77 to 5.86 percent over 2015 through 2030.

- Education and training will be needed to ensure that architects, engineers and other facility designers are able to meet the design requirements of the expanded SB3030 standard. While some training and education programs exist along with energy design assistance programs are able to meet the needs of the current requirements, some uncertainty remains as to the cost and effort of new training needs for an expanded standard.
- There are additional uncertainties regarding the interactive effects of this policy with other policies relating to utility renewable and energy efficiency requirements. For example, as more net zero buildings are implemented, there may be upward pressure on costs to maintain the electric transmission and distribution system potentially shifting more of these costs to ratepayers still connected to the grid. This could have a negative impact to ratepayers that will have continued responsibility for these costs.

Additional Benefits and Costs

Economy: Increased activity within the construction industry provides an economic benefit to the state of Minnesota. Increased sales and increased innovation of technologies to meet the needs of advancing standards and goals are also a benefit.

Environment: Energy efficiency and renewable energy implementation directly results in reduced carbon emissions and has the potential to be one of the more cost effective solutions for reducing greenhouse gas emissions. The environmental impacts of this policy could mitigate rising health care costs for air quality and carbon emissions related illness in Minnesota. Facilities that meet the standard also could reduce other environmental impacts to local water treatment systems and pollution control requirements as a result of more efficient and renewable operations from meeting the new standard.

Health: Per a Minnesota Department of Health analysis, increasing energy efficiency could benefit health by reducing climate change through reduced emissions. Emissions reductions may reduce the risk of cardiovascular and respiratory illness as well as cancer in communities exposed to energy-related emissions. (EPA; Kappos; Pope 2002, Pope 2000, Bernard) Building efficiency improvements could also reduce respiratory illness, reduce allergies and asthma, reduce sick building syndrome, and improve worker performance through changes in thermal environment and lighting.

Feasibility Issues

This policy would require merging two existing policy frameworks in Minnesota, Sustainable Buildings 2030 and Energy Codes. By adopting the SB2030 energy standard into Minnesota's Energy Code, the standard would be expanded to include new construction and major renovations for private commercial and residential facilities. Initial data indicates the costs for achieving the higher standard in the public sector remain competitive with building to a lower standard; however, the architecture, engineering and building construction industries may have concern over the cost impacts to delivering these services. If these industries believe the costs will increase

exponentially, there may be feasibility issues with passing legislation. This is one example where additional collaboration with stakeholders will be required to determine specific areas of contention and/or alignment that will make this broad policy shift feasible.

A specific example of a feasibility issue was provided above; however, below is a list of general items that need consideration to make SB2030 for private commercial and residential facilities feasible:

- Cost of building to meet standard; unintended costs
- Market acceptance of standard
- Availability of technology to meet performance requirements
- Trained network of service providers
- Incentives available for customers
- Accountability within policy enforcement
- Measurement and verification of performance

adaptation

Minnesota Options to Increase Climate Resilience in Buildings

GEORGETOWN CLIMATE CENTER
A Leading Resource for State and Federal Policy

Sara P. Hoverter

Kraig Ahalt

January 2015

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Executive Summary

The Climate Change Problem In Minnesota

The impacts of climate change pose a significant risk to both the people and buildings of Minnesota. In the coming years, municipalities will be at ever-increasing risk of flooding and the detrimental effects of increases in heat and humidity. By preparing buildings for these coming effects, Minnesota municipalities can help reduce the risk of harm to both their buildings and their occupants. Extreme heat and humidity events can endanger people unless buildings are designed or retrofitted to compensate, and the urban heat island effect can be mitigated by changes to buildings and sites, protecting people and saving energy. Increased flooding affects public health through contaminated water, water-borne illnesses, and damage to public facilities and homes. Building and site design can either contribute to or help to mitigate the frequency and severity of this flooding. Minnesota and its municipalities have already taken steps toward reducing this risk. However, municipalities' lack of authority to set building standards has hindered their ability to increase their resilience.

This report explores steps that Minnesota state agencies and the Minnesota Legislature can take to enable more resilience at the local level, as well as some steps municipalities may already have authority to implement. Minnesota state agencies have already supported more resilient buildings in some ways, including the MN GreenStep Cities program and the Buildings, Benchmarks and Beyond (B3) program. Still, many municipalities would like to do more to increase the resilience of buildings in their communities. The state building code, however, prevents municipalities from adopting building codes that are “different” from the state code. This restricts municipalities from using the building code to prepare local buildings for the coming effects of climate change that pose the biggest threat to that municipality. Three types of actions are presented as opportunities to improve the options to increase the resilience of buildings.

State Level Action

The Department of Labor and Industry (DLI) may be able to adopt a set of resilient building standards as a part of the state code, optional for municipalities. DLI has the authority to establish a “code of standards” governing construction of buildings in the state. Because the state building code is made up a number of different model codes -- including, for example, a residential code, an electrical code, and a commercial code -- it may be possible to add a set of resilient building standards for municipalities to follow, as an optional section of code.

The Minnesota Legislature could also amend the authorizing statute for the state code to allow municipalities to have more control over the building code where climate change conditions warrant it. Currently, § 326B.121 prevents municipalities from adopting their own building codes. Several options exist that would grant municipalities more authority than they currently have, while allowing the state to retain varying levels of control.

First, the authorizing statute could be changed to allow municipalities to apply to the state for approval whenever they have unique circumstances, including climate change effects, that warrant more-restrictive building standards. This would allow the state to retain control over the building code, and still allow the state to retain discretion over any changes. Massachusetts currently follows this model.

A second possibility would be to grant municipalities the power to enact building standards that are more, but not less, restrictive than the state code. California and Pennsylvania both follow this basic model, which establishes a minimum level of standards throughout the state but allows some variation in a more protective direction. In both California and Pennsylvania, municipal changes are subject to review by the state agency that oversees the building code and can be rejected or denied if they are found to be unsupported.

A third possibility would be to amend the code to allow municipalities to enact more-restrictive standards whenever climate conditions warrant them. Washington follows this model, with one exception, allowing municipalities threatened by climate change to amend their local codes in specific ways, while still maintaining a mostly uniform building standard across the state.

Any of these three models would provide Minnesota municipalities with at least some discretion to strengthen their local building codes, while giving the DLI some measure of review and control over the content and strength of those changes. All would take action by the state legislature to change the state code.

Municipal Options

Although municipalities may not use the building code to mandate resilience, they have a number of other options. Municipalities in Minnesota have broad municipal powers to regulate local matters, which translates into several pathways to take action to improve building resilience. Municipalities may issue best practices to inform and motivate building managers and developers about how they can increase building resiliency, including benchmarking programs and building design best practices to educate and encourage developers to use those practices. Municipalities may also use incentive-based tools to encourage more resilient buildings without running afoul of the state building code. Examples include offering expedited permitting, bonus density for resilient practices, or financial incentives such as tax breaks, permit fee reductions, or rebates and subsidies.

Conclusion

While the state has already taken some steps to help municipalities adapt buildings in their communities to the effects of a climate that has already begun to change, there is much more that can be done to help make buildings more resilient and to protect both the buildings and the people using them. While municipalities certainly have some options to encourage more resilient buildings, legislative or administrative change at the state level would allow them greater flexibility to require particular resilient practices, while keeping a statewide minimum standard and allowing the state to control the amount of variation permitted. By explicitly allowing some variation, the state legislature or DLI can enable municipalities that are eager to promote resilience greater opportunity to better protect the people and property of Minnesota.

Introduction

The impacts of climate change pose a significant risk to both the people and buildings of Minnesota. In the coming years, municipalities will be at ever-increasing risk of flooding and the detrimental effects of increases in heat and humidity. By preparing buildings for these coming effects, Minnesota municipalities can help reduce the risk of harm to both their buildings and their people. Minnesota and its municipalities have already taken significant steps toward reducing this risk. However, municipalities' lack of authority to set building standards has hindered their ability to increase their resilience. In order to understand how municipalities can increase the resiliency of buildings, one must look at (A) the risk that climate change poses to municipalities in Minnesota and (B) the powers that municipalities have in Minnesota. Municipalities may already have some authority to implement (C) possible solutions to increase building resilience. This report will explore steps that Minnesota state agencies and legislature can take to enable more resilience at the local level.

Climate Change Impacts in Minnesota

Climate change poses a serious threat to many industries and sectors within Minnesota, including building design and construction, business development, and public health. While determining just how climate change will affect a specific site or building is difficult, projected regional impacts can help show what is likely to occur.¹ By 2050, Minnesota expects to see a significant increase in average temperature and the number of days above 95 degrees,² in contrast to a 1.5 degree F increase since 1895.³ Increased heat poses a number of threats to human health, including cardiovascular, respiratory, liver, and neurological diseases, or even death.⁴ Those over age 65 or under age 5, without air conditioning, the poor, and those exposed to the elements through their occupations are the most vulnerable to health problems caused by extreme heat.⁵ Increased temperatures may also lead to more frequent drought, limiting agricultural production and access to water.⁶

In addition to the increase in average temperature, the National Climate Assessment projects that climate change in Minnesota will lead to increased heat wave intensity and frequency, degraded air quality, reduced water quality, and changing composition of forests as tree species migrate.⁷

Municipalities have an additional stressor to worry about: the urban heat island effect. Due to the high building density and choice of building materials, large urban areas have air temperatures warmer than surrounding rural

1 Larsen, L., Rajkovich, N., Leighton, C., McCoy, K., Calhoun, K., Mallen, E., Bush, K., Enriquez, J., Pyke, C., McMahon, S., and Kwok, A. Green Building and Climate Resilience: Understanding Impacts and Preparing for Changing Conditions 19. University of Michigan; U.S. Green Building Council, 2011 (hereinafter Green Building and Climate Resilience).

2 Interagency Climate Adaptation Team, Adapting to Climate Change in Minnesota 5 (2013), available at <http://www.pca.state.mn.us/index.php/view-document.html?gid=15414> (hereinafter ICAT).

3 ICAT at 4.

4 ICAT at 11.

5 Id..

6 See ICAT at 13.

7 ICAT at 10.

areas by as much as 1.8-5.4 degrees F.⁸ In the evenings, the disparity between urban and rural areas can be as much as 22 degrees.⁹ The increased heat increases energy demand, air conditioning costs, air pollution, and greenhouse gas emissions while contributing to heat-related illness and mortality.¹⁰ While urban heat has been most prominent in densely populated urban areas, it can also affect low-density sprawling development.¹¹

Hotter temperatures will affect both buildings and people in Minnesota. The increased number of extreme heat days coupled with the urban heat island effect and with increased humidity¹² will lead to increased indoor temperatures.¹³ Increased average temperatures will increase the energy needs to keep buildings at a habitable and safe temperature. The Midwest is projected to have a 30 to 60 percent increase in the number of days per year that air conditioning is necessary by 2070.¹⁴ This corresponds with an expected increase in the annual electricity demand.¹⁵ Interior cooling is one of the biggest drivers for building energy consumption.¹⁶

The increased cooling needs will also affect building HVAC systems; current systems are designed to meet historic cooling needs.¹⁷ As average temperatures increase, natural ventilation strategies, such as opening windows, will lose effectiveness for reducing interior building temperature because outdoor temperatures will be so high.¹⁸ The lack of natural ventilation will increase dependency on energy-intense cooling strategies. To help reduce this need, building design will have to include methods to reduce indoor temperatures to limit the increased energy need. As average temperatures increase, the greater stress on building cooling needs and lesser effectiveness of natural ventilation sources will exacerbate the public health risk of death or heat related illnesses in vulnerable populations.

Minnesota will continue to experience an increase in the frequency and severity of precipitation.¹⁹ The increased precipitation leads to flooding that is more frequent and of increased magnitude.²⁰ Future projections include greater annual precipitation, and more intense precipitation events, and a decrease in the number of dry days.²¹ The change in precipitation is projected to result in increased erosion and runoff in agricultural areas, increased flooding, and increased strain on stormwater management infrastructure.²² The change in precipitation will have serious effects for human health including: persistent mold, damage to homes and healthcare facilities, illness caused by contaminated water, stress and mental illness due to relocation and loss, and even death by drowning.²³

The design of individual buildings, along with those in the surrounding watershed, contributes to the potential for flooding. One of the largest contributors to flooding of buildings is the amount of impervious surface on the property, which prevents stormwater from infiltrating into the ground. Approximately two-thirds of impervious

8 Environmental Protection Agency, Buildings and their Impact on the Environment: A Statistical Summary 3 (April 22, 2009) available at <http://www.epa.gov/greenbuilding/pubs/gbstats.pdf>.

9 Id.

10 Id. at pages 3-4.

11 Green Building and Climate Resilience at 27.

12 Minnesota Dep't. of Public Health, *Minnesota Extreme Heat Toolkit: Introduction to Extreme Heat Events* (2012), available at http://www.health.state.mn.us/divs/climatechange/docs/toolkit_chapter1.pdf.

13 Id.

14 Green Building and Climate Resilience at 23.

15 Id.

16 *Id.* at 29.

17 *Id.* at 30.

18 *Id.* at 30.

19 INTERAGENCY CLIMATE ADAPTATION TEAM, ADAPTING TO CLIMATE CHANGE IN MINNESOTA 8 (2013).

20 *Id.* at 9.

21 *Id.*

22 *Id.* at 14.

23 *Id.*

surfaces are generally transportation surfaces like roads, parking lots, and driveways.²⁴ One third of impervious cover in urban areas consists of building surfaces like the roofs of offices, homes, stores, and patios.²⁵ The runoff caused by impervious cover not only contributes to flooding, but also washes pollutants and sediments into waterways.²⁶

The increased intensity and frequency of heavy precipitation put pressure on existing buildings and stormwater infrastructure.²⁷ More frequent storm events will lead to more frequent and more severe stormwater runoff and flooding, especially in urban areas.²⁸ Buildings will be at greater risk of damage from flooding and runoff.²⁹ A concentration of buildings that incorporate primarily impervious surfaces and lack of vegetation in urban areas exacerbates this risk of flooding.³⁰ Also, the increased risk of flooding will drive both public and private decision-making regarding the location of development.³¹

With regard to flooding, many property owners in Minnesota participate in the National Flood Insurance Program (NFIP), administered by the Federal Emergency Management Agency (FEMA) and the Minnesota Department of Natural Resources. Local governments enact floodplain regulations in conformance with the NFIP's requirements and maps. Communities that choose to can also participate in the NFIP's Community Rating System (CRS), which is designed to encourage local governments to enact floodplain standards above the NFIP's minimums. Communities that participate can earn insurance discounts for their property owners. The CRS includes some elements that could be implemented using building codes; these particular elements could be difficult for Minnesota municipalities to take full advantage of, because they have no authority to amend their building codes.

Landscaping choices can reduce or increase the impacts of climate change on Minnesota buildings. Increased vegetation near buildings and careful site design can reduce the urban heat island effect and can reduce the risk of flooding by helping to better manage stormwater.³²

Increased storm events will also affect the integrity of buildings and can guide decisions about materials. Builders should consider choosing building materials that are “more durable and resistant to water, less susceptible to water intrusions, and relatively inexpensive and easy to replace if flooding occurs.”³³

24 Environmental Protection Agency, *Buildings and their Impact on the Environment: A Statistical Summary 7* (April 22, 2009) available at <http://www.epa.gov/greenbuilding/pubs/gbstats.pdf>.

25 *Id.*

26 *Id.*

27 Larsen, L., Rajkovich, N., Leighton, C., McCoy, K., Calhoun, K., Mallen, E., Bush, K., Enriquez, J., Pyke, C., McMahon, S., and Kwok, A. *Green Building and Climate Resilience: Understanding Impacts and Preparing for Changing Conditions* 24. University of Michigan; U.S. Green Building Council, 2011. (hereinafter “Green Building and Climate Resilience”)

28 *Id.* at 26.

29 *See id.* at 24.

30 *Id.* at 28.

31 *See id.* at 24.

32 *Green Building and Climate Resilience* at 28.

33 *Id.* at 31.

Resilient Building Practices

To address many of these climate impacts, more resilient building practices can protect Minnesota buildings from some of the climate impacts projected for the region. As defined in “Green Building and Climate Resilience,” a resilient system can “operate at its normal capacity given more extreme climate effects such as higher or lower temperatures, greater wind speeds, and increased or decreased precipitation levels.”³⁴ The Midwest region is anticipated to experience both higher temperatures throughout the year and more variable precipitation, leading to heavier downpours and more flooding.³⁵

Some “green” building strategies can increase resilience in buildings, if they are appropriate to the climate impact that a particular region will experience. For example, green roofs can both help to mitigate stormwater runoff and flooding during heavy precipitation and to reduce interior temperatures on hotter days.³⁶ Additionally, warmer winter temperatures in Minnesota may increase the frequency of the freeze/thaw cycle, leading to ice dams that can damage roofs.³⁷ Construction techniques that minimize formation of ice dams may be critical in Minnesota’s changing climate. In Minnesota, those building practices that help to reduce flooding, to prevent large fluctuations in interior temperature, and to keep exterior temperatures lower can be categorized as resilient.

Municipal Building Codes

The Minnesota State Building Code (“the Code”) “applies statewide for the construction, reconstruction, alteration, repair, and use” of buildings.³⁸ It provides “basic and uniform performance standards, establish[es] reasonable safeguards for health, safety, welfare, comfort, and security of the residents of this state” and encourages the use of modern methods to reduce construction costs.³⁹ The Code supersedes building codes enacted by municipal ordinances.⁴⁰ The Code applies to all new construction in the state, but does not impose any restriction on buildings already in existence when the Code was adopted.

The 2006 International Code Council (ICC) model codes serve as the base for the Minnesota State Code.⁴¹ DLI is currently in the process of adopting the 2012 model codes, to take effect in January and February 2015, and does not plan to adopt another code update until the 2018 codes are issued (skipping the 2015 model codes).⁴² The Minnesota Code draws from the ICC’s Building Code, the Residential Code, and the Guidelines for the Rehabilitation of Existing Buildings.⁴³ However, Minnesota has not adopted the model codes in their entirety and has replaced some sections of the model codes with state-created rules.⁴⁴

34 Green Building and Climate Resilience at A-4.

35 Id. at B-11.

36 Id. at C-19-20.

37 Id. at C-22.

38 Minn. Stat. Ann. § 326B.121, Subd. 1 (2013).

39 Minn. Stat. Ann. § 326B.101 (2013).

40 Minn. Stat. Ann. § 326B.121, Subd. 1(b) (2013).

41 Minnesota Department of Labor and Industry, *Makeup and Use of the Minnesota State Building Code 4* (2007), available at http://www.dli.mn.gov/ccld/PDF/sbc_makeup.pdf.

42 Minnesota Department of Labor and Industry, CCLD Review, Summer 2014, available at <http://www.dli.mn.gov/CCLD/PDF/review30Summer14.pdf>.

43 Id.

44 Id.

The requirements adopted as the State Building Code create both a floor and a ceiling for local building standards; municipalities may not create building code requirements that are “different” from those found within the Code.⁴⁵ Municipalities may enact ordinances requiring that buildings remain in a state of good repair or safe condition but the definition of “state of good repair” cannot exceed the standards for new construction set by the state.⁴⁶ The prohibition on any municipal codes being more restrictive than state standards is based on the Code’s interest in statewide uniformity.

The rule that local ordinances must conform more or less exactly to state law governs conflicts between state building codes and municipal ordinances.⁴⁷ In Minnesota, this principle extends to all municipal actions, including any outside of the building code itself. Municipalities, therefore, may not avoid the state law by establishing new standards, even through methods other than literally amending the building code. The state considers municipal policies, even those not adopted by ordinance or other formal measures, as building code provisions and the State Code therefore preempts the policies.⁴⁸

As the Code currently exists, municipal building codes may only exceed State Building Code requirements where geological conditions warrant the heightened restrictions. With the approval of the state official,⁴⁹ a municipality may “adopt an ordinance that is more restrictive than the State Building Code where geological conditions⁵⁰ warrant a more restrictive ordinance.”⁵¹ However, there is no indication that environmental conditions caused by climate change constitute “geological conditions” for the purpose of the state.

Municipal Power in Minnesota

Municipalities derive their powers from the state.⁵² In Minnesota, the term *municipality* refers to any “county, town, city, school district or other municipal corporation.”⁵³ Minnesota separates municipalities into two categories: statutory cities and home rule charter cities.⁵⁴ Home rule cities are those that have adopted a home rule charter form of government, which means that the powers of the municipality are stated in the municipality’s governing charter.⁵⁵ All other municipalities that do not adopt home rule charters are statutory cities, which differs from home rule cities because the powers of statutory cities come from state law.⁵⁶

45 Minn. Stat. Ann. § 326B.121, Subd. 2(c) (2013). The statute forbids creation of different standards through ordinance or development agreement.

46 *Id.*

47 McQuillin Mun. Corp. § 24:503(3d ed).

48 *Builders Ass’n of Minnesota v. City of St. Paul*, 819 N.W.2d 172, 182 (Minn. Ct. App. 2012). The City of St. Paul adopted a “Uniform Egress Window Policy” requiring that all egress windows conform to a minimum size, which differed from the state code requirements. The court held that, because the municipal policy set forth legally enforceable requirements, “its practical effect would be the same whether put in place as an ordinance or a policy.” *Id.* “If cities could so easily enact their own building codes by simply delegating authority to another official and calling the regulations “policies,” the purpose of enacting a uniform state code would be subverted.” *Id.*

49 The state building official is appointed by the commissioner of labor and industry to “administer the [state building] code.” Minn. Stat. Ann. § 326B.127, Subd. 1 (2010).

50 Minnesota code does not define the term “geological conditions.”

51 *Id.*

52 See *Arcadia Development Corp. v. Bloomington*, 267 Minn. 221, 225 (1964) (“The city’s right to act here, as always, is dependent on a grant from the state.”).

53 Minn. Stat. § 471.345, subd. 1 (2009).

54 Minn. Stat. § 410.015 (1976).

55 Minn. Const. art. XII, § 4; *Nordmarken v. City of Richfield*, 641 N.W.2d 343 (Minn. Ct. App. 2002).

56 Minn. Stat. § 410.015 (1976).

Charter cities hold all the powers of the state with regard to local matters unless the municipality's governing charter states otherwise.⁵⁷ The charter may address municipal power regarding a wide range of subjects including municipal taxation⁵⁸ and licensing and regulating employment.⁵⁹ While a municipality may create the terms of its own charter, the state legislature has the ability to alter those terms.⁶⁰

Municipalities that do not adopt home rule charters are statutory cities. Statutory cities have only those powers given to them by state statute or constitution, including the powers of municipal corporations at common law, including the ability to create an official governing body and the power to pass laws or ordinances to regulate local matters.⁶¹ A statutory city has wide discretion to use these powers to regulate local matters, such as establishing a curfew or regulating the hours that businesses may operate.⁶² However, the powers of a municipality extend only to property (such as buildings) within the municipal territory.⁶³

Discretion Under Municipal Powers

The delegation of powers granted to a home rule charter municipality are construed strictly; the grant of power to a municipality is interpreted narrowly in that the municipality will not be found to take any more power from the state than what is clearly stated.⁶⁴ Effectively, a home rule city does not have any powers beyond those stated specifically within their charter, other than the general powers of municipalities to regulate local matters.

While Minnesota courts construe enumerated powers narrowly, they construe the police powers of a municipality broadly. Where a municipality is acting “to promote the health, safety, morals, or general welfare of the public,” the courts have found that the state legislature gave municipalities broad powers.⁶⁵ The courts of Minnesota broadly construe the municipality's police powers regarding matters that the state has not preempted. The courts grant even more deference when the regulated matter is of local concern. The courts apply a liberal interpretation of the powers of municipalities to regulate matters of local concern.⁶⁶

Because both statutory and home rule cities (usually) have the police powers of municipal corporations, cities of both types have broad discretion to regulate local matters for the public welfare. Even without a broad interpretation of the police powers, it is apparent that regulation taken to protect the safety of buildings within a municipality will constitute regulation for the public welfare. Reducing the risk of harm to public health and to buildings would be for the public welfare in even the most restrictive sense. Therefore, under this broad grant of municipal police powers, actions taken to help adapt buildings to the expected effects of climate change would generally fall within the powers of municipalities.

The broad grant of municipal power extends to how the courts would interpret authority for municipal actions. An exercise of municipal powers must have some substantial relationship to public health, safety, morals, or

⁵⁷ 32 Dunnell Minn. Digest MUNICIPAL CORPORATIONS § 3.00.

⁵⁸ *State ex rel. Board of Educ. v. Erickson*, 251 N.W. 519 (1933); *State ex rel. City of Minneapolis v. Erickson*, 195 N.W. 919 (1923).

⁵⁹ *Jefferson Hwy. Transp. Co. v. City of St. Cloud*, 193 N.W. 960 (1923).

⁶⁰ 32 Dunnell Minn. Digest MUNICIPAL CORPORATIONS § 3.01.

⁶¹ *See Horn v. St. Paul*, 80 Minn. 369, 371 (1900).

⁶² *See* 32 Dunnell Minn. Digest MUNICIPAL CORPORATIONS § 4.02.

⁶³ *Id.* at § 4.03.

⁶⁴ *Minneapolis General Electric Co. v. Minneapolis*, 194 F. 215, 218 (C.C.D. Minn. 1911).

⁶⁵ *Duluth v. Cerveney*, 218 Minn. 511, 516-517 (1944).

⁶⁶ *Id.* at 518.

general welfare.⁶⁷ The municipal government is regarded as the best judge of what is in the best interests of the municipality's public welfare, and courts generally will not question their judgment.⁶⁸ This should allow municipalities in Minnesota to decide that the risks of climate change pose a threat and therefore regulations taken to reduce those risks should reasonably relate to the public health, safety, or general welfare of the municipality.

Specifically, Minnesota courts have approved the use of municipal police powers to regulate specific industries, such as licensing and permitting, as long as the licensed business may affect the public health, safety, morals, or comfort.⁶⁹ This licensing power is what enables municipalities to regulate buildings through the permitting process; building regulation relates to the public welfare because it protects the community.⁷⁰ It is through this power that municipalities generally influence new construction and renovation of existing buildings through the permitting process.

The Inability of Municipalities to use Police Powers to Regulate Buildings

While municipalities in Minnesota may use their police powers to increase building resilience, they cannot use their general powers to require that buildings meet requirements that are beyond the standards established by the state building code.

The Minnesota building code explicitly denies municipalities the authority to have building codes that are “different” from the state building code.⁷¹ But the question remains whether municipalities could use other tools outside of the building code, based on its police powers. Some areas may be difficult to evaluate for conflict, such as areas where the municipality established policy instead of formally amending the building code.

The Minnesota Supreme Court has established a test for when the state building code preempts municipal ordinances. The state building code preempts when the municipal ordinance is a building code provision, it regulates a component of a structure, and it is different from the state code.⁷² “Building code provisions,” mean any regulation that “affects the construction and design of buildings.”⁷³ Minnesota courts have also rejected municipal “policies” that seek to establish building standards different from the state code.⁷⁴ The court’s keystone was that the “policy” had the force of law.⁷⁵ For building code preemption purposes, any municipal action that “sets forth legally enforceable requirements” is effectively a municipal ordinance and therefore cannot differ from the state code.⁷⁶ Because the state’s goal in enacting the code was to establish a uniform set of building standards, any municipal alteration, regardless of the form, would subvert that purpose.⁷⁷ Municipal actions not amending the building code but having the same force of law would, therefore, likely be preempted by the state building code.

⁶⁷ See *County of Freeborn v. Claussen*, 295 Minn. 96, 100 (1972).

⁶⁸ *Id.* at 101.

⁶⁹ *Franklin Theatre Corp. v. City of Minneapolis*, 293 Minn. 519, 198 N.W.2d 558 (1972); *Lyons v. City of Minneapolis*, 241 Minn. 439, 63 N.W.2d 585 (1954); Dunnell Minn. Digest MUNICIPAL CORPORATIONS § 6.01.

⁷⁰ Dunnell Minn. Digest MUNICIPAL CORPORATION § 6.01(c).

⁷¹ Minn. Stat. Ann. § 326B.121 Subd. 1(b) (2013).

⁷² *Builders Ass’n of Minn. v. City of St. Paul*, 819 N.W. 2d 172, 181 (Minn. Ct. App. 2012).

⁷³ *Id.*

⁷⁴ *Id.* at 181-182.

⁷⁵ *Id.*

⁷⁶ See *id.*

⁷⁷ *Id.*

Municipal Tax Powers

Municipalities have no inherent powers to levy taxes – any power must come from the state constitution or a statute. Statutory cities have no inherent power of taxation: “[i]n order for the tax to be effective, the City must be empowered by the legislature of our Constitution.”⁷⁸ The Minnesota legislature has, however, granted some taxing authority to both statutory and home rule cities.⁷⁹ The Minnesota Code enumerates the tax powers of statutory cities. Municipalities may levy taxes for purposes of paying the municipalities debts, to provide entertainment, to support forests, libraries, and firefighters, and several other purposes.⁸⁰

So long as the charter clearly includes the power to tax, a home rule city has the power to tax within its jurisdiction for municipal purposes.⁸¹ Because home rule charters are construed narrowly outside of their enumerated powers, the power of municipal taxation likely applies only to those home rule cities that specifically included that power within their charters.⁸²

Municipalities may only levy taxes and spend the money for a public purpose, which is defined as when it “will serve as a benefit to the community.”⁸³ The requirement that the tax be for a public purpose applies only to the use of the revenue collected.⁸⁴ This means that the defining factor determining whether the municipality has the power to tax a subject relies not on the nature of the thing to be taxed, but on what purpose the collected revenue is going towards.

In *Borgelt*, the Supreme Court of Minnesota held that actions taken to build, maintain, or repair the street constituted a public purpose. The purpose of any tax used to adapt buildings against the risk of the effects of climate change would be to protect the buildings from those effects. Protecting buildings from harm necessarily reduces the cost of maintenance and repair on those buildings to the public. Because a tax to support adaptation of buildings would benefit the community by reducing risks of damage caused by climate change, the tax should be for a public purpose.

None of the options in this report suggests that municipalities institute new taxes to raise general funds for adaptation. The options include only that municipalities may adopt tax credits or abatements for buildings that are already subject to property or other municipal taxes. Because these options involve only altering an existing municipal tax—but not instituting any new taxes—these exercises of municipal taxes should not exceed any grant of municipal power to tax.

Zoning Powers

Zoning code changes, as a municipal power separate from setting building codes, should not directly conflict with the state building code. Innovative strategies such as resilience zones may therefore be possible with municipal zoning authority in Minnesota. Communities around the country are experimenting with special zoning districts such as Community Resilience Zones, EcoDistricts, and Green Benefits Districts. These may prove to be useful tools for municipalities in promoting resilience. Community Resilience Zones are a type of special improvement district analogous to Economic Opportunity Zones or other special zoning districts designed to encourage a particular set of actions within a specific area. Resilience Zones would encourage resilient buildings, infrastructure, and direct

⁷⁸ *Country Joe, Inc. v. City of Eagan*, 548 N.W.2d 281, 286 (Minn. Ct. App. 1996).

⁷⁹ See Minn. Stat. § 412.251, 426.04.

⁸⁰ Minn. Stat. § 412.251

⁸¹ “Taxation for municipal purposes is purely a matter of municipal character. It is a subject which may be dealt with in a home rule charter.” *State ex rel Minneapolis v. Erickson*, 157 Minn. 200, 206 (1923).

⁸² See *Park v. Duluth*, 159 N.W. 627 (Minn. 1916) (finding that a home rule charter granting the city the power to institute a wheelage tax gave them the authority to implement a wheelage tax).

⁸³ See *Borgelt v. Minneapolis*, 271 Minn. 249, 255 (1965).

⁸⁴ 45 Dunnell Minn. Digest TAXATION § 1.04.

investment in a sustainable and climate-smart way.⁸⁵ EcoDistricts are touted by many urban areas as a tool to promote “just, sustainable and resilient cities and neighborhoods for all,” and emphasize environmental justice and community engagement in addition to environmental sustainability.⁸⁶ San Francisco is experimenting with Green Benefits Districts as a new type of public benefit corporation that will channel investment into open and green space in the community, based on community needs and desires.⁸⁷

These zoning innovations could be models for Minnesota municipalities to follow, but analysis of municipal zoning authority in Minnesota is beyond the scope of this report. Further analysis is necessary to see whether the legal authority of Minnesota municipalities would support these models or if additional statutory authority would be needed.

Summary of Potential Options

While municipalities may not enact building standards that are more restrictive than the state building code, there are other options for municipalities that are interested in adapting their buildings to the present and future effects of climate change. First, Minnesota municipalities have several options to use their own existing powers to encourage building adaptation. Second, municipalities may pursue state-level changes that can help support municipalities that are pursuing building adaptation.

Municipalities in Minnesota have broad discretion to undertake actions for local concerns so long as they do not run counter to State law. By restricting their powers to only things that incentivize, but do not require, action to increase the resiliency of buildings, municipalities can safely use their existing authority to support adaptation of buildings. For example, municipalities may issue best practices that recommend the actions that building owners should take to reduce the risk of harm caused by climate change. Municipalities may also exert this power by instituting incentive programs that motivate building owners and developers to take actions to make their buildings more resilient. Municipalities can motivate developers through either financial or development incentives.

Municipalities may also devote their resources to advocating for state actions that can allow more resilient buildings. At the state level, the Minnesota Department of Labor and Industry could adopt a building code that will better prepare buildings for the coming effects of climate change. Alternatively, the legislature could amend § 326B.121 to allow municipalities to have some higher level of control over the application of building codes in a municipality when climate concerns warrant different building standards.

⁸⁵ For more information, see Ceres, *Building Resilient Cities: From Risk Assessment to Redevelopment* (2013), available at https://dl.dropboxusercontent.com/u/44135324/Ceres-TNP_ResilientCities_FINAL.pdf.

⁸⁶ EcoDistricts, *Vision + Values*, at <http://ecodistricts.org/about/vision-values/>.

⁸⁷ Jared Green, Am. Soc. Of Landscape Architects, *The Dirt, Brilliant Idea: The Green Benefits District*, Sept. 26, 2014, at <http://dirt.asla.org/2014/09/26/brilliant-idea-the-green-benefits-district/>.

Statewide Action to Improve Municipal Ability to Adapt

Minnesota has taken several steps at the state level to help municipalities build resilience. However, state agencies and the legislature can do more to give municipalities additional freedom to adapt their built environments. The two main potential state actions would be (A) adopting an optional resilience section of the building code or (B) amending the state code to grant municipalities more flexibility over their local building codes.

DLI Authority to Adopt Optional Building Code Sections

The Minnesota Department of Labor and Industry (DLI) may have the authority to adopt an optional section of the building code for use by municipalities. If DLI has the authority to adopt an optional building code section, it could use that authority to adopt the International Green Construction Code (IgCC) or another model green code, allowing municipalities to use it to regulate construction standards. To understand the power of DLI over the building code, it is important to consider (i) the statutory authority to adopt a building code, (ii) the rulemaking process in Minnesota necessary to adopt the code, and (iii) whether the statute gives DLI authority to adopt an *optional* section of the building code.

Authority to Adopt the Code

The Minnesota State Code places the powers of administering and amending the state code in the hands of the commissioner of the Department of Labor and Industry.⁸⁸ The commissioner “shall by rule and in consultation with the Construction Code Advisory Council establish a code of standards for the construction, reconstruction, alterations, and repair of buildings.”⁸⁹ Because it has been delegated rulemaking power by the legislature, DLI can adopt the State Building Code by rule.

Through its rulemaking process, DLI adopts all relevant construction codes except for the state plumbing code. The plumbing code is governed by an independent legislatively-appointed plumbing board, which adopts the state plumbing code through a similar rulemaking process.⁹⁰ The Plumbing Board has adopted a Minnesota-created code in the past. The Board is currently engaged in an active rulemaking process to adopt the 2012 Uniform Plumbing Code (with amendments), as opposed to the International Plumbing Code, which is part of the International Construction Codes.⁹¹ Because DLI has largely adopted the set of International Construction Codes, coordination between the plumbing code and the other construction codes will be extremely important to ensure that those individual codes are compatible in practice under the umbrella of the State Code.

⁸⁸ Minn. Stat. § 326B.101 (2013).

⁸⁹ Minn. Stat. § 326B.106, Subd. 1 (2013).

⁹⁰ Minn. Stat. § 326B.435 (2013).

⁹¹ Minnesota Dep’t of Labor and Industry, Plumbing Code, <http://www.dli.mn.gov/CCLD/PlumbingCode.asp>; Minnesota Plumbing Board Rulemaking Docket, <http://www.dli.state.mn.us/PDF/docket/4715docket3.pdf>. See the discussion of Washington state, below, for another example of a state that adopts codes from multiple sources.

The State Code contains some requirements that the State Building Code must have. The state building code “must conform insofar as practicable to model building codes generally accepted and in use throughout the United States.”⁹² Without requiring so, the statute strongly implies that DLI should base the building code on a recognized model code or existing state specialty codes.

The statute also seems to support a performance-based code; it states, “[t]o the extent possible, the code must be adopted in terms of desired results instead of the means of achieving those results, avoiding wherever possible the incorporation of specifications of particular methods or materials.”⁹³ By focusing on results instead of means, DLI should have the authority to adopt a performance-based code if interested. Still, the building code must “encourage the use of new methods and new materials.”⁹⁴ This implies that the code should support innovative building techniques.

Any change to the State Building Code would require that DLI go through the state’s rulemaking process. To adopt the code, DLI follows the same rulemaking process as all other Minnesota agencies.

The Rulemaking Process in Minnesota

Minnesota adopts its state building code through a rulemaking process, as opposed to legislation. For the state building code, the Construction Codes and Licensing Division of DLI oversee the rulemaking process and adoption of the code.

Rulemaking in Minnesota begins with the rulemaking docket. Each agency must maintain a docket containing information on the rules the agency is pursuing or considering.⁹⁵ Agencies must submit their dockets by January 15 each year to chairs and ranking minority members of legislative committees with jurisdiction over the subject matter of the rules.⁹⁶ Because agencies must post proposed rules on the docket before they adopt the rules, it appears that rulemaking is designed to be a slow process. After posting the rules on the docket, the agency must then solicit comments from the public on the proposed rule at least 60 days before it can publish notice of the proposed rule.⁹⁷ For adoption of model codes, the agency does not need to publish or distribute the model code provisions; only those which differ from the model code.⁹⁸

Then the agency must publish a Statement of Need and Reasonableness to show why the rule is necessary and how it will affect the public.⁹⁹ The statement includes a summary of evidence and arguments that support the proposed rule.¹⁰⁰ It must also determine if there are less costly or intrusive methods to achieve the same purpose, describe the alternative methods that the agency considered and give reasons why they did not select the alternatives, and assess the probable costs of adopting the rule and the possible consequences of not adopting the rule.¹⁰¹

92 *Id.*

93 *Id.*

94 *Id.*

95 Mark Shepard, *Rulemaking: Process for Adopting Rules*, HOUSE RESEARCH (June 2012), available at <http://www.house.leg.state.mn.us/hrd/pubs/ss/ssadprule.pdf>.

96 *Id.*

97 *Id.*

98 MN ST § 16B.64 (2011).

99 Shepard, *Rulemaking*.

100 *Id.*

101 *Id.*

The agency then publishes a Notice of Intent to Adopt Rules; depending on the public response, this can occur with or without a public hearing.¹⁰² The agency then presents its case at the hearing or in front of an independent administrative law judge.¹⁰³ If approved, the rule then goes to the governor, who can veto all or a severable portion of the proposed rule within 14 days; if not vetoed, the rule takes effect.¹⁰⁴

If DLI were to adopt a green building code such as the IgCC in any form, it would need to use this rulemaking process. Because municipalities and those in the construction and development industry, among others, would certainly be interested in a change to the state building code, it is likely that this process would include a public hearing.

Does the Code Support Adopting an Optional Section of Code?

The Minnesota Code states only that the commissioner shall establish “a code of standards” for construction.¹⁰⁵ This language seems to mean that the department can adopt a set of codes, given past practice of adopting codes for residential and commercial construction, energy codes, etc. While the statute does not clearly state that DLI may adopt a green building code as part of the state code, the makeup of the state code gives some indication that it is possible. The current Minnesota Building Code consists of several different model building codes, including the 2006 International Building Code, the 2006 International Residential Code, the 2008 National Electrical Code, and many other model codes.¹⁰⁶ DLI is currently in the process of adopting the 2012 model codes, to take effect in January and February 2015, and does not plan to adopt another code update until the 2018 codes are issued (skipping the 2015 model codes).¹⁰⁷ If DLI adopts the 2018 codes on the same schedule as this update, the 2018 code will not be effective until early 2021, more than six years from now. The state code does not specifically state that several different model building codes may make up the state building code. As the code exists now, it is a compilation of various model building codes, most of which are promulgated by the International Code Council, yet this still constitutes the “code of standards” required by statute. As stated above, the plumbing code is adopted through a separate process and the plumbing board has not incorporated ICC codes for plumbing, requiring coordination across codes.

Because the authority to adopt the code has allowed the adoption of a number of different building codes to constitute the State Building Code, it seems logical that DLI could similarly adopt the standards set forth in the IgCC or in another model green code as a part of the state building code as well. This may require additional legislation or rulemaking to explain when and where, and to what buildings the IgCC standards would apply, but the wording of the statute along with past practice seems to imply that the state code may incorporate a set of green building standards after going through the required rulemaking process for mandatory codes.

The question of whether the statute allows DLI to adopt an *optional* section of the building code, however, is a different one. Currently the Minnesota state building code allows municipal codes to differ from the state code only when “geological conditions warrant” the difference.¹⁰⁸ Adopting an optional section of the code under the main State Code might imply that DLI was sanctioning different code provisions than required under the main code; the

¹⁰² *See id.*

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ Minn. Stat. § 326B.106, subd. 1 (2013).

¹⁰⁶ *See* Minnesota Department of Labor and Industry, *Makeup and Use of the Minnesota State Building Code* 1 (2007), available at http://www.dli.mn.gov/ccld/PDF/sbc_makeup.pdf.

¹⁰⁷ Minnesota Department of Labor and Industry, CCLD Review, Summer 2014, available at <http://www.dli.mn.gov/CCLD/PDF/review30Summer14.pdf>.

¹⁰⁸ *See* Minn. Stat. Ann. § 326B.121, Subd. 1 (2013).

statute does not currently give DLI explicit authority to do so. The section on Legislative Solutions, below, explores the possibilities for change to make DLI's authority more clear.

Municipalities should not consider a nationally recognized green building code such as the IgCC as the sole solution to create resilient buildings within the state. The standards contained within the code would still only apply to new construction and major renovations; it would not require that existing buildings take action to increase resiliency. Additionally, adoption of the IgCC would not mean that buildings would be safe from the effects of climate change. The IgCC building standards represent only one set of building standards that represent green building, and are not tailored to Minnesota or to Minnesota municipalities specifically. A different set of green building standards may fit better for Minnesota's challenges. Additionally, a statewide green building code may not be as effective as a municipally adopted building code tailored to the specific threats that a particular municipality will face. Last, a green building code in itself does not guarantee resilience to climate impacts or extreme weather – resilient building and green building are overlapping but not synonymous practices. Still, the ability to use a set of green building standards would help to increase the overall resiliency of buildings in Minnesota.

Legislative Solutions

While Minnesota law allows municipalities some opportunities to support adaptation through their buildings, the state could grant greater freedom to municipalities that are interested in using the building code to support adaptation, or could clarify DLI's authority to implement an optional code section for municipalities. As it currently exists, § 326B.121 prevents municipalities from passing any ordinance that differs from the state building code. This prevents municipalities from amending the local building code to reduce the risks that the effects of climate change pose to that municipality's buildings. In the case of a municipality where buildings are at risk of flooding, or higher temperatures and more heat waves are anticipated in the future, or disadvantaged populations are at greater risk, the municipality would have a strong interest in requiring that any new construction address these issues more specifically than the state code might otherwise require. The state legislature could help solve this problem by granting municipalities some power to locally amend the state building code when climate concerns pose a significant risk to buildings within that municipality.

Several states allow municipalities to amend a state building code when local conditions warrant more-restrictive building standards. The ways that these states grant authority over the local code to municipalities differ, but all grant more control to municipalities than Minnesota does. Some states require state approval for any local amendments, while others allow municipalities to amend the code independently. Essentially, the relationships between local and state control over the building code in these other states falls along a spectrum of municipal control, however, under all of these models the state code still establishes a state-wide minimum level of standards. To see how these different methods of municipal control may work in Minnesota, the municipal power to amend the building code in (i) Massachusetts, (ii) California and Pennsylvania, (iii) and Washington can serve as models. These states are listed along a spectrum from most state control to most municipal control over the building code.

Massachusetts

The Massachusetts State Building Code applies statewide to all buildings.¹⁰⁹ The building code is developed and adopted by the State Board of Building Regulations and Standards.¹¹⁰ The Massachusetts State Building Code regulates the “construction, reconstruction, alteration, repair, demolition, removal, [and] inspection” of all buildings in the state.¹¹¹ The Board must revise and amend the code every five years.¹¹² As in Minnesota, the Massachusetts State Building Code preempts any municipal ordinance in the state that is different from the state code, because the state legislature made clear that it intended the state building code to preempt local action on the issue.¹¹³ This general prohibition on municipal building codes extends to preventing creation of standards that are more restrictive than the state code.¹¹⁴

While the code applies to buildings statewide, one mechanism exists for municipalities to amend their local building codes.¹¹⁵ The town board or mayor of a municipality affected by the risks of climate change, or any other special circumstances, may appeal to the state Board of Building Regulations and Standards for permission to apply building standards that are more restrictive than the statewide standards.¹¹⁶ The Board may then approve the more-restrictive building standards if they find that standards are “reasonably necessary because of special conditions prevailing within such a city or town,” and that such standards conform with national and local building standards.¹¹⁷

The powers of municipalities to control the local building code are very similar in Minnesota and Massachusetts. Because of the similarity, Massachusetts may provide a good model for Minnesota as an option to give somewhat more flexibility to municipalities. Massachusetts does not explicitly state the reasons for which municipalities may seek to adopt an ordinance that is more restrictive than the state building code; Massachusetts requires only that the municipality have “special conditions” that warrant the change. This seemingly grants power to the municipalities to regulate buildings for a broader range of considerations.

Still, the Massachusetts model contains measures to retain state control over municipal regulation of building codes. Municipalities must appeal to the Board of Building Regulations and Standards and gain approval before the more-restrictive ordinance can become law. This allows the state to ensure that only those municipalities with an actual need can alter the building code, and serves as notice of the change to the state. However, the ability of a municipality to use this exception to address real climate concerns could be limited depending on the makeup of the Board granting authority. If the authorizing Board is not supportive of adaptation measures, a tool like this could become virtually useless to municipalities. In Minnesota, presumably DLI would gain this authority through new legislation, and would need to set up a process through which the approval could take place.

109 MASS. GEN. LAWS ch. 143, § 2A (1992).

110 MASS. GEN. LAWS ch. 143, § 93 (2002).

111 MASS. GEN. LAWS ch. 143, § 94 (2009).

112 MASS. GEN. LAWS ch. 143, § 94(h) (2009).

113 *See St. George Greek Orthodox Cathedral of W. Mass. v. Fire Dept. of Springfield*, 967 N.E.2d 127, 130-133 (Mass. 2012) (ruling that a municipality may not, by ordinance, require building owners to install only one of the four sprinkler systems allowed under the code. The court found that a state law preempted a municipal building code that was “inconsistent” with the state code).

114 *Id.* at 131-35. Finding that an ordinance that narrows the class of things that are allowable under the State Code is inconsistent with the Code and that the State Building Code preempts “inconsistent” municipal ordinances.

115 *See* MASS. GEN. LAWS ch. 143, § 98 (1989).

116 *Id.*

117 *Id.* Presumably, this means that the proposed amendment must have some industry-specific support to help improve the problem that the amendment seeks to help.

The Massachusetts State Building Code includes two other elements that could be models for Minnesota. The law 1) requires that the code be updated every 5 years (to be effective soon after enactment) and that it consider innovation in building, and 2) creates an optional energy “stretch” code that municipalities can adopt to meet a higher standard than the state’s base energy code.¹¹⁸ In reality, Massachusetts has updated its set of codes every three years in recent years, and adopts small updates to particular sections regularly.¹¹⁹ As greater understanding of the effects of climate change impacts develops, advancements in model building codes should lead to buildings becoming more and more resilient to the effects of climate change.

Massachusetts adopts the International Energy Conservation Code (IECC) as its base state energy code, and is currently operating under the 2012 IECC, adopted in July 2013 and effective in August 2013.¹²⁰ The state Board also allows municipalities to adopt a “stretch” energy code instead, based on the 2009 IECC but with more stringent requirements.¹²¹ As of October 2013, 134 municipalities had elected to follow the stretch code. Interestingly, since the adoption of the 2012 IECC, the stretch code for now has not been updated and so continues to be based on (but exceeds) the 2009 code.¹²²

Over time, as Minnesota adopts its new state building code, the model codes that Minnesota draws from should incorporate more resilient building standards, leading to a future code that creates more resilient buildings. While requiring updates on a regular schedule to the state building code may not produce an immediate benefit to the adaptation of buildings, including this requirement should, over time, lead to a statewide building code that requires that buildings will be built to a standard that is more resilient than they currently are.

California and Pennsylvania

In California, the California Building Standards Code applies statewide.¹²³ The California Building Standards Commission (the Commission) creates and adopts the code.¹²⁴ By creating the Building Standards Code, the state has established a minimum level of building standards that apply across the state. The Commission has previously followed a set of model codes from the ICC codes, the Uniform Codes, and the National Electric Code (NEC).¹²⁵ The relevant state agencies update their codes every three years, and are required to adopt or propose adoption of a new model code within a year of the publication of that model.¹²⁶

118 MASS. GEN. LAWS ch. 143, § 94(h) (2009); 780 CMR Appendix 115 AA, “Stretch Energy Code”, available at <http://www.mass.gov/eopss/docs/dps/8th-edition/115-appendices.pdf>.

119 See generally Massachusetts Executive Office of Public Safety and Security, *Building Codes*, for a list of updates since the last formal update in August 2010, available at <http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html>.

120 Massachusetts Executive Office of Public Safety and Security, *2012 IECC – New Energy Code Approved, Webinar Available*, <http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/buildings/new-energy-code-approved-for-release.html>.

121 See 780 CMR Appendix 115 AA, above.

122 See *2012 IECC – New Energy Code Approved, Webinar Available*.

123 See *California Apartment Ass’n v. City of Fremont*, 97 Cal. App.4th 693, 697 (2002).

124 CAL. HEALTH & SAFETY CODE § 18930 (2014). While this is true, some state agencies have the duty to propose the new codes to the Commission for approval; for example, the California Department of Housing and Development proposes the residential code. California Building Standards Commission, *Guide to Title 24, California Building Standards Code* (2010) at 15, available at http://www.documents.dgs.ca.gov/bsc/Title_24/T24TrainingGuide.pdf (hereinafter *Guide to Title 24*).

125 *Guide to Title 24* at 9.

126 CAL. HEALTH & SAFETY CODE § 18928(b) (2010).

In California, municipalities may adopt building standards that are more, but not less, restrictive than the State Building Standards.¹²⁷ The code states that municipalities have the ability to create more-restrictive “green building standards, reasonably necessary because of local climactic, geological, or topological conditions.”¹²⁸ Before the local amendments become effective, the municipality must publish an official finding that the modification to the building code is “reasonably necessary because of local climactic ... conditions”¹²⁹ The municipality must then file the finding and proposed modification with the California Building Standards Commission.¹³⁰ The Commission may reject a modification that is not supported by an adequate finding of cause.¹³¹

Similarly, the Pennsylvania Construction Code Act (PCCA) delegates authority to the state Department of Labor and Industry to set uniform building standards across the state.¹³² Any municipal ordinance exceeding the standards adopted by the Department is subject to review by the Department upon challenge.¹³³ In order to survive, the challenged stricter ordinance must meet four standards, one of which is that “certain clear and convincing local climatic, geologic, topographic or public health and safety circumstances or conditions justify the exception.”¹³⁴ While this process is slightly different than California’s process, the principle behind the law is similar: municipalities can enact stricter requirements than the state threshold, subject to check by state agencies.

The Minnesota legislature could grant municipalities greater power to compel building adaptation by following the California or Pennsylvania models allowing more, but not less, restrictive building standards where climate concerns warrant it. This model clearly states the specific reasons for which the municipality may adopt more-restrictive standards, and the state retains approval authority.

This option would require legislative change, but not a drastic one. The statute that limits municipal ability to change the building code, §326B.121, already contains an exclusion that allows municipalities to create different building codes where geological conditions warrant it.¹³⁵ Minnesota could create a relationship similar to California’s by simply adding the words “or climactic” after “geological” in the statute. Adding flexibility for topographic conditions, as California does, would also give municipalities more flexibility to handle local variation in geography. This would allow municipalities to create stronger building standards only when climate concerns warranted it.

Minnesota could also retain some control over the code by requiring that municipalities file a finding of cause with the state explaining why the modification is necessary. By requiring that municipalities show why the modification is necessary, the state can ensure that modifications only occur where actual need exists for more municipal control.

California has developed another legislative option through the state building code that may be an option for Minnesota. Occasionally, the California legislature will pass laws requiring that the California Building Standards Commission, in its updates to the building code, consider solutions to certain environmental concerns. For example, in 2012 the legislature passed a law requiring that the Commission consider incorporating a strategy to help reduce

127 CAL. HEALTH & SAFETY CODE § 18941.5 (2010).

128 CAL. HEALTH & SAFETY CODE § 18941.5(b) (2010).

129 CAL. HEALTH & SAFETY CODE § 17958.7(a) (1997).

130 CAL. HEALTH & SAFETY CODE §17958.7(a) (1997).

131 CAL. HEALTH & SAFETY CODE §17958.7(b) (1997).

132 35 P.S. § 7210.101 *et seq.* (2013)

133 35 P.S. § 7210.503 (j) (2013).

134 35 P.S. § 7210.503 (j)(2) (2013).

135 See Minn. Stat. Ann. § 326B.121, Subd. 1 (2013).

the urban heat island effect in the 2014 code update.¹³⁶ The legislature has also required that the Commission adopt building standards for installation of electric vehicle charging infrastructure¹³⁷ and graywater infrastructure.¹³⁸

Minnesota’s legislature could similarly address climate change concerns by passing legislation directing DLI to incorporate strategies to address certain climate concerns into the state building code. This would likely lead to more resilient buildings across the state, but would not necessarily grant municipalities more flexibility to address climate impacts that might affect them disproportionately. While Minnesota does not require a triennial update to the building code like California, the legislature could still set a deadline by which DLI must address the solution.

Washington

The State of Washington also has a statewide building code that applies to all cities and counties.¹³⁹ Washington has chosen by statute to adopt mostly ICC codes with the exception of the Uniform Plumbing Code.¹⁴⁰ While the code applies statewide, it establishes only minimum standards. Municipalities are “authorized to amend the state building code” so long as the amendments do not diminish the state-set minimum performance standards.¹⁴¹ In practice, this means that municipalities may adopt local building ordinances that are more restrictive than the state code. One exception to this policy exists, however. Any local amendments that affect single or multi-family homes are subject to review and approval or denial by the state building code council.¹⁴² The council will review these amendments to see whether they meet any of five criteria:

- Climatic conditions that are unique to the jurisdiction.
- Geologic or seismic conditions that are unique to the jurisdiction.
- Environmental impacts such as noise, dust, etc., that are unique to the jurisdiction.
- Life, health, or safety conditions that are unique to the local jurisdiction.
- Other special conditions that are unique to the jurisdiction.¹⁴³

The Washington model falls at the farther end of the spectrum of municipal control and provides the most control to municipalities to address local climate impacts. Unlike the California, Pennsylvania, and Massachusetts models, Washington does not require that municipalities get state approval before amending local codes for commercial properties.

State agencies and the legislature will need to determine whether they would support a solution that grants no long-term state control over more-restrictive local amendments to some or all of the building code. As a hybrid alternative, Minnesota could use Washington’s model and incorporate a requirement that the municipality serve notice to the state whenever it amends the building code. With or without formal notice, however, the legal floor for any building code would always be in effect, setting an absolute minimum on the building standards required. The building code establishes a set of statewide minimum standards for the state, meaning that municipalities still may

136 CAL. HEALTH & SAFETY CODE § 18941.9 (2013).

137 CAL. HEALTH & SAFETY CODE § 18941.10 (2014).

138 CAL. HEALTH & SAFETY CODE § 18941.8 (2011).

139 Wash. Rev. Code § 19.27.031 (2003).

140 Id.

141 See Wash. Rev. Code § 19.27.040 (1990).

142 Wash. Rev. Code § 19.27.060(1)(a) (2002).

143 Washington State Building Code Council, *Policies and Procedures*, 51-04-030; Policies for consideration of proposed local government residential amendments, available at <https://fortress.wa.gov/ga/apps/sbcc/Page.aspx?cid=326#030>.

not adopt building codes that are less restrictive than the state code. The state thus ensures that municipalities are not abusing their powers or setting building standards below the state code.

Conclusion

Each of these different solutions retains a different level of control for the state, while still ensuring that the state building code at the very least establishes a minimum standard. By establishing the state building code as the minimum floor, the Washington model gives municipalities the greatest ability to amend the building code to local conditions. On the other end of the spectrum, the Massachusetts model gives the state the most control over municipal amendments to the code. In the middle, the California model spells out the situations where municipalities may amend the code for local conditions.

Sources of Best Practices

State	State Code Establishes Minimum	Municipal Ability to Amend the Code	State Control Over Amendments	Serves Notice to the State
Minnesota	±	--	N/A	N/A
California	±	++	++	+
Massachusetts	±	+ to +++	+ to +++	+
Washington	±	+++	+	---

Legend

- + Shows that the criteria is satisfied
- Shows that the criteria is not satisfied

Icons indicate relative strength or weakness compared to other categories

+ to +++ shows that the criteria can fall within a range of results

Municipal Solutions

Municipalities in Minnesota may not amend the building code to require that buildings at risk of climate change meet a standard more restrictive than the state code. However, municipalities have a number of options to promote more resilient building.

Generally, municipalities can use their powers to *encourage* builders to follow resilient building practices. Because these projects help protect both the buildings and the people of a municipality, they should surely fall within the requirement that actions under the police powers be taken for the public welfare. Furthermore, because these actions only encourage—but do not require—builders and developers to meet the higher building standards, this should not violate the state-level prohibition on municipal building codes.

Municipalities can take two main groups of actions to help buildings meet more resilient building standards to reduce the risk of the harmful effects of climate change. Each group includes different types of tools a municipality may tailor to meet its own climate challenges. It is up to the municipality to determine which tools would be best to achieve its desired goals. The two groups of municipal action are (A) best practices and (B) incentive programs.

Best Practices

The term *Best Practices* refers to a collection of recommendations or suggestions that a municipality can put forward to prepare buildings for climate challenges. By encouraging builders and building managers to follow these best practices, municipalities can show steps that they believe are necessary to create climate resilient buildings in that area. Through different methods, best practices can increase the resilience of both new construction and existing buildings, and of both residential and commercial buildings. Through (i) Energy Benchmarking, municipalities can encourage buildings to become more energy efficient, reducing energy consumption across the municipality. Additionally, municipalities may encourage developers to follow (ii) building design best practices in order to create buildings with infrastructure to increase resiliency.

Energy Benchmarking

Buildings are one of the largest contributors to energy consumption in a municipality. Increasing a building's energy efficiency can reduce energy consumption and lower its energy costs, making it more resilient. For example, buildings with highly efficient envelopes are more likely to be habitable during power outages following extreme weather events and no air conditioning is available. Similarly, during heat waves efficient buildings can keep occupants healthy and safe, a particular benefit to those most vulnerable to heat such as the elderly or very young children. Benchmarking provides municipalities with a low-investment method to support increasing efficiency in existing buildings.

Energy benchmarking is a method of recording a building's energy usage in order to use the data to increase the energy efficiency of the building. Benchmarking has two general forms. First, a building may independently benchmark its energy use, using benchmarking data for its own purposes. Second, a building may benchmark its

energy use as a part of an organized benchmarking program administered by a municipality or other organization.

Many municipalities nationwide are engaged in energy benchmarking programs. These programs record a building's energy use and then use the data to inform the building's owners on management practices or capital upgrades that can increase its efficiency. Ideally, the potential financial savings will motivate those building owners to take steps to increase energy efficiency.

The most popular benchmarking tool for existing buildings is the EPA ENERGY STAR program. ENERGY STAR offers tools for states and municipalities to institute benchmarking programs. Most prominently, the ENERGY STAR Portfolio Manager program provides a tracking tool for building managers to enter their energy and water usage data. Users receive an ENERGY STAR score that reflects the energy efficiency of the building compared to similar buildings across the nation.¹⁴⁴ An average building will score a 50, while buildings that score over a 75 can be ENERGY STAR Certified.¹⁴⁵

The ENERGY STAR program provides municipalities with the necessary tools and comparative criteria to launch energy benchmarking campaigns. The website provides several examples of municipal benchmarking programs as a blueprint for municipalities. Minnesota has already instated mandatory benchmarking for publicly funded buildings through the Buildings, Benchmarking, and Beyond (B3) program.¹⁴⁶

The Department of Energy recommends using benchmarking as a tool for identifying which buildings are most in need of energy audits and improvements.¹⁴⁷ The Department identifies three different measures of comparison:

- *statistical*, where a building compares its energy performance against a population of comparable buildings. This type of analysis is most useful for common building types, like office buildings or warehouses, because a large number of buildings are available for comparison;
- *same building*, where a building tracks its energy performance against itself over time. This type of analysis is most useful for building managers that are actively trying to increase their buildings' efficiency; and
- *energy simulation*, where a building compares its energy performance against projections for a similar building.¹⁴⁸ This type of analysis is best for showing a building's efficiency shortcomings. It is a useful motivator by showing buildings how much more efficient they could become.

The Department reports that those buildings that are engaged in benchmarking tend to be most interested in tracking their own performance over time.¹⁴⁹ DOE also provides information to help guide municipal decision-makers on whether to invest in energy efficiency upgrades or simply alter management policies to better increase efficiency for their own properties.¹⁵⁰ Depending on the ENERGY STAR score, building managers can learn whether they can better increase their energy efficiency through capital investments or by adjusting energy maintenance practices.¹⁵¹

¹⁴⁴ *Learn About Benchmarking*, ENERGY STAR, <http://www.energystar.gov/buildings/about-us/how-can-we-help-you/benchmark-energy-use/benchmarking> (last visited February 18, 2014).

¹⁴⁵ *Id.*

¹⁴⁶ *B3 Guidelines Version 2.2*, BUILDINGS, BENCHMARKS & BEYOND, <http://www.b3mn.org/guidelines/index.html> (last visited February 25, 2014).

¹⁴⁷ Department of Energy, *SEE Action, Energy Benchmarking, Rating, and Disclosure for Local Governments 1* (May 2012) available at http://www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_factsheet_benchmarking_localgovt.pdf.

¹⁴⁸ *Id.* at 2.

¹⁴⁹ *Id.*

¹⁵⁰ *See id.* at 3.

¹⁵¹ *See id.*

While there is no guarantee that energy benchmarking will lead a building manager to invest in improvements to increase energy efficiency, it has been demonstrated in general to result in greater energy savings.¹⁵² Private investment to increase energy efficiency is more likely when municipalities “lead the way” by investing first in the energy efficiency of their own buildings.

Municipalities can use benchmarking by creating either of two different types of programs: (a) mandatory benchmarking, which require building managers to record their energy consumption or (b) benchmarking challenges, which encourage buildings to increase their energy efficiency through friendly competition. Publishing energy consumption data as part of a mandatory benchmarking program seems to be effective at spurring building managers into increasing efficiency. The competitive nature of energy reduction competitions also appears to be an effective method of increasing efficiency.

Mandatory Benchmarking

Some municipalities require that buildings benchmark their energy consumption and publish the data.¹⁵³ These municipalities often require that buildings then publish their energy consumption data.¹⁵⁴ Some municipalities fine buildings that do not benchmark their energy consumption.¹⁵⁵ Generally, cities identify the types of buildings that must benchmark their energy use based on the size and type of a building.¹⁵⁶ Mandatory benchmarking programs can apply to both private and public buildings.

Minneapolis is one such city with a mandatory benchmarking program and has been one of the early adopters of the concept. Minneapolis requires that all city-owned buildings benchmark their energy use.¹⁵⁷ Starting in 2014, all private commercial buildings larger than 100,000 square feet must benchmark energy use and all private buildings over 50,000 square feet must do so beginning in 2015.¹⁵⁸

Municipalities in others states have implemented mandatory benchmarking programs as well. Boston requires that all private buildings over 35,000 square feet and all public buildings benchmark their energy use.¹⁵⁹ In Washington, D.C., private buildings over 50,000 square feet and public buildings over 10,000 square feet must benchmark their energy use.¹⁶⁰ The District of Columbia enforces the requirement by fining noncomplying buildings \$100 per day.¹⁶¹

152 U.S. EPA, Energy Star Portfolio Manager, *Data Trends: Benchmarking and Energy Savings* (October 2012), http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf.

153 *See Policies that specify the use of ENERGY STAR tools*, ENERGY STAR, <http://www.energystar.gov/buildings/program-administrators/state-and-local-governments/policies> (last visited February 18, 2014).

154 *See Id.*

155 District Department of the Environment, District of Columbia, *Energy Benchmarking* (October 24, 2013), <http://green.dc.gov/energybenchmarking>.

156 *See generally* District Department of the Environment, District of Columbia, *Energy Benchmarking of Existing Buildings Frequently Asked Questions (F.A.Q.)* 9 (last visited February 25, 2014), available at http://green.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/BenchmarkDC_FAQ_021113.pdf.

157 Minneapolis, Min., Ordinance 47.190 (February 2013), available at <http://www.minneapolismn.gov/www/groups/public/@regservices/documents/webcontent/wcmslp-101277.pdf>

158 *Id.*

159 *See Policies that specify the use of ENERGY STAR tools*, ENERGY STAR, <http://www.energystar.gov/buildings/program-administrators/state-and-local-governments/policies> (last visited February 18, 2014).

160 *See generally* District Department of the Environment, District of Columbia, *Energy Benchmarking of Existing Buildings Frequently Asked Questions (F.A.Q.)* 9 (last visited February 25, 2014), available at http://green.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/BenchmarkDC_FAQ_021113.pdf.

161 District Department of the Environment, District of Columbia, *Energy Benchmarking* (October 24, 2013), <http://green.dc.gov/energybenchmarking>.

Mandatory benchmarking can influence both existing buildings and new construction. The ability to reach existing buildings is extremely helpful because few adaptive techniques can compel existing buildings to participate. The minimal costs of recording the data and administering the program fall primarily on the building managers.

Although most of these programs are relatively recent, mandatory benchmarking programs appears to be effective in two ways. First, requiring benchmarking increases awareness of any energy efficiency problem and encourages reasonable steps to improve efficiency. Second, the buildings on the lower end of the efficiency spectrum may take steps to increase their energy efficiency to avoid the stigma that comes with being among the least efficient buildings.

Benchmarking Challenges

Some municipalities have achieved increased building energy efficiency through benchmarking challenges. Energy benchmarking challenges are voluntary programs for buildings to increase their energy efficiency. Participants track their energy use through ENERGY STAR over time and the municipality grants awards based on different criteria for increasing efficiency. The competitions use ENERGY STAR Portfolio Manager to track results.¹⁶² Because these competitions rely on ENERGY STAR scores to rate building efficiency, the city has a relatively small role in tracking improvements. Building owners and managers, however, could be reluctant to participate because of the costs of verifying the energy use through a third party. If that is the case, the local government could play a role in helping to cover some of the costs of verification to increase the number of participants.

Energy benchmarking challenges have many benefits for municipalities. Like with mandatory benchmarking, benchmarking challenges can increase efficiency for existing buildings. Even more, hosting a benchmarking challenge can improve relationships with building managers that support climate and other environmental goals and can demonstrate that energy efficiency will save money.

Several municipalities have launched voluntary competitions among buildings to reduce energy consumption and increase efficiency, using the ENERGY STAR benchmarking tools to record progress.¹⁶³ Chicago, Denver, and Louisville are just some of the cities to host benchmarking challenges, encouraging buildings to increase their energy efficiency.¹⁶⁴ Chicago's Green Office Challenge was a no-cost competition between commercial property managers that accomplished a reduction of 72 million kilowatt-hours of electricity.¹⁶⁵ These competitions have reduced energy consumption with little cost to the city; the competitions received higher-than-expected participation even though the only reward for winning offered by the cities was recognition by the mayor.

Like mandatory benchmarking, benchmarking challenges can operate at a minimal cost to the municipality. Benchmarking challenges have been successful at motivating building managers to increase energy efficiency without offering physical or financial rewards to participants. In many cases, the only reward offered by the municipality is recognition by the municipality. Both Chicago and Denver achieved the increased efficiency without offering significant incentives; the city's mayor recognized winners in several categories. The low cost of these

¹⁶² U.S. EPA, *Host a competition to save energy*, ENERGY STAR, <http://www.energystar.gov/buildings/program-administrators/state-and-local-governments/host-competition-save-energy> (hereinafter "EPA, Host a competition") last visited February 18, 2014). Portfolio Manager is an online tool administered by the EPA used to measure and track energy and water consumption in a building.

¹⁶³ EPA, *Host a competition*.

¹⁶⁴ *Id.*

¹⁶⁵ *Chicago Green Office Challenge*, ENERGY STAR, <http://www.energystar.gov/buildings/about-us/how-can-we-help-you/communicate/energy-star-communications-toolkit/motivate-competition-2> (last visited February 18, 2014).

competitions makes them an attractive outlet for municipalities with fewer resources. Chicago has chosen to extend its Green Office Challenge indefinitely, continuing the behaviors that were shaped by the initial challenge.

Benchmarking challenges are clearly allowable within Minnesota municipal authority. Given the wide discretion that municipalities have to undertake actions for local matters that serve a public purpose, municipalities have the power to hold a friendly and voluntary competition to encourage building owners to increase their energy efficiency.

Benchmarking challenges have some downsides. Like mandatory benchmarking, there is no guarantee that participants in the program will actually adopt any techniques or practices to increase their efficiency. Although given the success of the Chicago and Denver programs, it is likely that at least some buildings will see an increase in efficiency. Municipalities will have to come up with some funds for the program: Denver funded its Watts to Water program partially through an EPA grant.¹⁶⁶

Benchmarking challenges are a low-cost option for municipalities to encourage existing buildings to increase their energy efficiency. The voluntary nature of the program can create good will with interested building managers but does not require anyone to take action.

Building Design Best Practices

Many best practices exist outside of energy benchmarking. These are helpful because they can often target both new construction and existing buildings. Best practices are often flexible—a municipality can adopt only those best practices that fit its particular challenges. A municipality has several options for establishing best practices. First, they may adopt, wholesale, a previously established set of best practices. This works well when the municipality faces predominantly common problems. Second, a municipality may adopt some of the best practices from an already-established code of best practices. This allows the municipality to push for only the best practices that are most directly applicable to the problems they face. Third, a municipality can create its own source of best practices. This will clearly be the most specific to local problems.

There are three major sources for best practices; (a) existing sources tailored to Minnesota, (b) national standards, (c) and individual site-specific standards.

Existing Best Practices Guidelines in Minnesota

Minnesota has already developed a number of different “Best Practices” guides to help municipalities and buildings to increase their sustainability. Minnesota GreenStep Cities provides a list of best practices for entire cities and individual buildings to increase sustainability.¹⁶⁷ The best practices include guidelines for increasing energy and water efficiency, methods for satisfying a green building framework, and incentives for redeveloping existing buildings.¹⁶⁸ The Buildings, Benchmarking, & Beyond program (B3) also provides sustainability goals for buildings.¹⁶⁹ The B3 guidelines provide tools for municipalities to “help make buildings more energy efficient and sustainable.”¹⁷⁰ The B3 guidelines set sustainability standards for the site, water, energy, indoor environment,

¹⁶⁶ *Denver Watts to Water*, ENERGY STAR, <http://www.energystar.gov/buildings/about-us/how-can-we-help-you/communicate/energy-star-communications-toolkit/motivate-competition-4> (last visited February 18, 2014).

¹⁶⁷ See generally *The GreenStep 28 Best Practices*, MINNESOTA GREENSTEP CITIES, <http://greenstep.pca.state.mn.us/bestPractices.cfm> (last visited March 31, 2014).

¹⁶⁸ *Id.*

¹⁶⁹ *B3 Sustainable Building 2030 Energy Standards*, BUILDINGS, BENCHMARKS & BEYOND, <http://www.b3mn.org/2030energystandard/index.html> (last visited February 25, 2014).

¹⁷⁰ *Buildings, Benchmarks & Beyond*, <http://www.b3mn.org/> (last visited February 25, 2014).

materials and waste for publicly financed buildings.¹⁷¹ Because any project may use them, the B3 guidelines provide an excellent tool for municipalities looking to make their buildings and sites more sustainable. Since the guidelines are tailored to the Minnesota climate, the B3 guidelines can arguably provide a better set of building standards than nationally based sustainability guidelines.

In addition to new sources of best practices, municipalities can increase building resilience by encouraging developers to follow those best practices in these existing state-wide sources that have the co-benefit of increasing the resilience of buildings and sites. Municipalities can also encourage GreenStep Cities and B3 to incorporate more specific resilience best practices into their programs. Statewide standards developed with the specific climate change impacts that Minnesota expects, like increased flood risks, increased temperatures and humidity, and longer periods of drought, may better prepare buildings than national standards.

LEED and Other National Standards

LEED is the leading national standard for green building. For municipalities incorporating green building standards into existing code, LEED either can provide a whole code or can be used as a resource from which to draw best practices. For example, a municipality could put forth the LEED for Existing Buildings Silver Criteria as its set of best practices for existing buildings. Alternatively, a municipality could incorporate the recommendations contained in the LEED: Building Design and Construction standards regarding green roofs into the best practices issued by the municipality. As discussed above, green building standards may need to be incorporated carefully in order to result in more resilient building practices, because green and resilient building standards are not exactly equivalent.

LEED standards can also serve as best practices for increasing energy efficiency and building resilience. LEED standards target both residential and commercial buildings.¹⁷² Buildings earn points for including certain practices, including building materials, water efficiency, regional priorities, and innovation, with different levels of certification available.¹⁷³

Several different LEED codes may be attractive to municipalities seeking to increase climate resilience. For municipalities seeking to shift new construction there is LEED for Building Design and Construction, which provides a green framework for a variety of buildings including homes, healthcare facilities, retail buildings, and schools.¹⁷⁴ For municipalities seeking to adapt their existing buildings, LEED Building Operations and Maintenance contains best practices for existing buildings such as increasing energy efficiency and limiting water waste.¹⁷⁵ For municipalities interested in adapting through residential buildings, LEED Homes provides best practices for single family and multi-family homes.¹⁷⁶

Municipalities could use LEED standards in one of two ways. One, incentive mechanisms like expedited permitting or bonus density could encourage buildings to meet LEED certification. Alternatively, a municipality could endorse

171 *B3 Guidelines Version 2.2*, BUILDINGS, BENCHMARKS & BEYOND, <http://www.b3mn.org/guidelines/index.html> (last visited February 25, 2014).

172 *Existing Buildings*, UNITED STATES GREEN BUILDING COMMISSION, <http://www.usgbc.org/ebom> (last visited February 25, 2014).

173 *LEED*, UNITED STATES GREEN BUILDING COMMISSION, <http://www.usgbc.org/leed> (last visited April 1, 2014).

174 *Getting to Know LEED: Building Design and Construction (BD+C)*, UNITED STATES GREEN BUILDING COMMISSION (January 1, 2011), <http://www.usgbc.org/articles/getting-know-leed-building-design-and-construction-bdc>.

175 *Getting to Know LEED: Building Operations and Maintenance (BO+M)*, UNITED STATES GREEN BUILDING COMMISSION (January 1, 2011), <http://www.usgbc.org/articles/getting-know-leed-building-operations-and-maintenance-om>.

176 *LEED*, UNITED STATES GREEN BUILDING COMMISSION, <http://www.usgbc.org/leed> (last visited April 1, 2014).

the LEED criteria most applicable to the climate concerns of the municipality as its best practices. For example, a municipality concerned about its apartment buildings' contributions to urban heat could encourage apartment buildings to meet the LEED standards for multi-family dwelling units regarding cool roofs.

National standards like LEED are valuable because of their uniformity. First, both developers and builders are more likely to be familiar with national standards. Additionally, nationally recognized standards come with a layer of credibility, because of their wide acceptance.

Municipalities that use nationally recognized standards should be able to find outside employees who are already knowledgeable on the standard. This should reduce the municipal investment necessary to train new employees. Municipalities that use independent green building standards in the permitting process, as a part of incentive programs, may need to devote greater resources to training permitting employees.

Site-Specific Best Practices

In addition to nationally recognized green building standards and those designed for the state of Minnesota, municipalities may also issue their own independent best practices that are tailored to their specific climate concerns. For example, a municipality at significant risk of flooding due to extreme storm events could recommend that at-risk buildings elevate HVAC systems and other critical infrastructure above what the code requires. A municipality addressing climate resilience could incorporate the resilience-specific standards from within a green building code or create its own.

The city of Saint Paul has created a set of Sustainable Building Practices for all public buildings, and all private development receiving more than \$200,000 in public financing.¹⁷⁷ Public buildings, for example, must meet energy, water conservation, stormwater management, and other criteria to achieve LEED Silver, compliance with the State Guidelines Building, Benchmarking and Beyond (B3) program, or Minnesota GreenStar Silver.¹⁷⁸ Similarly, Minneapolis has adopted by City Council resolution a policy that all municipal buildings meet LEED Silver with an emphasis on energy and Atmosphere.¹⁷⁹ By raising municipal buildings, and buildings built with public dollars, up to a higher standard, Saint Paul and Minneapolis are leading by example for developers in the area. Although these particular policies do not focus on climate resilience, many of the best practices serve both purposes. These examples show how a municipal policy based on best practices can be used to foster greater climate resilience.

Boston has issued best practices for climate change adaptation and resilience for existing buildings. The study and report tackles Boston's biggest climate challenges: flooding (rain and coastal flooding), severe storms, and extreme temperatures.¹⁸⁰ The best practices aim to improve the resilience of existing buildings against these multiple hazards.¹⁸¹ The guidelines include both general and site-specific recommendations. General actions include assessing building vulnerability¹⁸² and creating places of refuge to serve as shelters during storms.¹⁸³ Although

¹⁷⁷ Saint Paul Sustainable Building Policy, *available at* <http://www.stpaul.gov/index.aspx?NID=3671>.

¹⁷⁸ St. Paul Sustainable Building Policy for New Municipal and HRA Owned Buildings in the City of Saint Paul, *available at* <http://stpaul.gov/DocumentCenter/Home/View/16690>.

¹⁷⁹ Resolution 2006R-381, adopted July 21, 2006, *available at* http://www.ci.minneapolis.mn.us/www/groups/public/@citycoordinator/documents/webcontent/convert_282738.pdf

¹⁸⁰ Linnean Solutions, The Built Environment Coalition, & The Resilient Design Institute, Building Resilience In Boston 1 (July 2013) *available at* http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf.

¹⁸¹ *Id.* at 32.

¹⁸² *Id.* at 34.

¹⁸³ *Id.* at 36.

these best practices were created for use in a coastal community, they are designed to combat many similar climate problems and could be transferrable to Minnesota.

Site-specific recommendations include (1) increasing on-site vegetation to help reduce the urban heat island effect and provide shade¹⁸⁴ and (2) using pervious pavements, underground storage tanks, and site grading to better manage stormwater.¹⁸⁵ The report advocates that urban planners consider the effects of different building or paving materials on the urban heat island effect during planning.¹⁸⁶ To minimize the risk of flooding, the report supports utilizing FEMA retrofitting guidelines to elevate residential structures above Design Flood Elevation levels, protecting services equipment, and even relocating buildings.¹⁸⁷ The report includes heightened recommendations to flood proof industrial buildings and the potentially hazardous materials that may be inside.¹⁸⁸

The report also includes best practices for building exteriors. It recommends cool or green roofing to reduce the urban heat island effect.¹⁸⁹ To reduce energy use and heating costs, the report recommends increased insulation throughout buildings.¹⁹⁰ The report recommends reinforcing windows and doors and using energy efficient windows and shading devices to increase resistance to winds and manage heat gain.¹⁹¹ The report also includes recommendations for improving the resiliency of energy, heating, cooling, and ventilation systems.¹⁹²

The recommendations contained in the Boston report appear to be transferrable to most other municipalities. By identifying the best practices designed to address its most pressing climate concerns, a municipality may use the recommendations in this report to develop its own best practices for increasing building resiliency.

Conclusion

Municipalities can use best practices to increase building resilience. First, they may use energy benchmarking programs to help building managers track energy use and to inform the managers on ways to increase their energy efficiency. Municipalities can achieve this through either mandatory or voluntary benchmarking programs. Benchmarking programs can encourage change in existing buildings and spur energy efficiency.

Municipalities may also support adaptation in all types of buildings by issuing best practices relating to building design and management. A municipality can simply issue these best practices and encourage developers to follow them, or they can tie incentive programs into meeting specific green building standards to motivate developers and building managers. Municipalities can rely on national standards, standards put forth through a state program, or they can issue their own site-specific best practices.

Benchmarking programs and design best practices are not mutually exclusive. Each type of action has its strengths and weaknesses—benchmarking programs are better at reaching existing buildings while design best practices better reach new construction. Municipalities can draw from both of these types of programs to help support the adaptation for all types of buildings within the municipality.

184 *Id.* at 38.

185 *Id.* at 39-40.

186 *See id.* at 41.

187 *Id.* at 43.

188 *Id.* at 45.

189 *Id.* at 59.

190 *Id.* at 61.

191 *Id.* at 63-65.

192 *See id.* at 67-73.

Sources of Best Practices

Type of Standard	Municipal Familiarity	Specific to Minnesota's Unique Climate Challenges	Developer Familiarity with the Standards	Tailored to Address Specific Climate Concerns
National Standard	+	-	+	-
Minnesota-Based	+	+	+	+
Site Specific	+	++	?	++

Legend

- + Shows that the criteria is satisfied
- Shows that the criteria is not satisfied
- ? Shows uncertainty or variation relating to whether the criteria is met

Icons indicate relative strength or weakness compared to other categories

+ to +++ shows that the criteria can fall within a range of results

Incentives

Municipalities may adopt a number of different incentive programs to promote resilient building and still be consistent with the Minnesota state-level building code. Incentives are a flexible tool that a municipality may tailor to encourage builders to adopt its highest priority resilient building standards. For example, a municipality at risk of frequent flooding could use a grant program to encourage builders to elevate homes, while a different municipality concerned with urban heat could use a similar grant program to encourage builders to build cool roofs. For the examples listed in this section, it is important to remember that the mechanism is what municipalities should evaluate—each legal tool can be customized to encourage different resilient building techniques than those in the presented examples.

Incentive programs are also flexible in application. The size and scope of many of these incentive programs can be altered to fit the needs and resources of a municipality. For example, while Seattle may offer \$20,000 rebates to buildings that will incorporate green roofs, a smaller municipality may still be able to achieve results by offering \$5,000 rebates or even less. Incentive programs can still be successful on a different scale than those given as examples.

Municipalities can use (i) development incentives or (ii) financial incentives to help improve building resiliency. Development incentives focus on providing developers with some type of advantage for meeting resilient building

standards. Financial incentives focus on providing some form of monetary support for developers to meet the building standard.

Each of these legal tools will be evaluated based on a set of criteria that should help a municipality decide which tools are best for them. The evaluation criteria involves whether the tool is effective at motivating increased resiliency through new construction or existing buildings, how resource intensive the tool is for the municipality to implement, whether the tool will require that a municipality acquire new legal authority, and the overall effectiveness of the tool for increasing the resiliency of buildings within a municipality.

Development Incentives

Development incentives can help resource-limited municipalities promote resiliency and green development in buildings at a low cost.¹⁹³ However, the municipality must still offer something attractive to developers for these incentives to be effective. For this reason, development incentives are best for municipalities who want to address building resiliency through new construction. Two key development incentives include (a) expedited permit review and (b) density bonuses.

Expedited Permit Review

What Is It?

Municipalities may encourage resilient building by expediting the permit review process for buildings that will meet specified standards. Municipalities often achieve this by guaranteeing completion of permit review for qualifying projects within a certain number of days (often 30 or 90), getting developers building more quickly.¹⁹⁴ The municipality can tailor the resilient building standards to best protect buildings from the biggest climate concerns the municipality faces.

The expedited permit review process can apply to building, plan, or site permits.¹⁹⁵ Because of the flexible nature of expedited permit review and the generally low-cost of administering the program, this can be an attractive incentive for both small and large municipalities.

Chicago expedites its permit review process through its Green Permit Program.¹⁹⁶ The program reduces permitting time to less than 30 days for projects that meet certain criteria.¹⁹⁷ The resilient building standards differ for various types of buildings: large commercial buildings, for example, have more stringent requirements than hospitals.¹⁹⁸ Chicago has incorporated both LEED standards and independent best practices into its expedited permit program. Projects must meet different levels of LEED certification and have a certain number of “menu items” including green roofs, affordable housing, exceptional water management, or innovation in green building.¹⁹⁹

193 *A Local Government Guide to LEED For Neighborhood Development* 24, UNITED STATES GREEN BUILDING COUNCIL (April 2012), available at <http://www.usgbc.org/Docs/Archive/General/Docs6131.pdf>.

194 *See id.*

195 *Id.*

196 *Overview of the Green Permit Program*, CITY OF CHICAGO, https://www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html (last visited April 9, 2014).

197 Department of Buildings, City of Chicago, DOB Green Permit Requirements, available at <http://www.cityofchicago.org/content/dam/city/depts/bldgs/general/GreenPermit/GreenPermitTierStructure.pdf> (last visited April 9, 2014).

198 *See id.*

199 *See Helpful Tips for Anyone Applying for a Green Permit: Menu Items*, DEPARTMENT OF BUILDINGS, CITY OF CHICAGO, http://www.cityofchicago.org/city/en/depts/bldgs/supp_info/helpful_tips_foranyoneapplyingforagreenpermitmenuitems.html (last visited April 9, 2014).

The Chicago Green Permit Program serves as an example of how municipalities may tailor a national standard like LEED to the adaptive techniques that will best create more resilient buildings for the location. Chicago has achieved this by requiring that projects must satisfy LEED standards as well as incorporate “menu items” that include measures that address the concerns, climate related or not, of the city. Other municipalities should be able to use similar mechanisms to reduce flooding or heat risks to their buildings.

Evaluation Criteria

Expedited permitting will only build resiliency in new construction. Given the high costs of any development project, it is unlikely that guaranteeing a quick permitting process will be enough to incentivize finished buildings that would not otherwise adopt adaptive measures to do so. Because the potential delay due to the permitting process is only one element that goes into a building managers decision regarding renovations, it is not likely that simply promising a quicker permit review process will motivate a building manager to begin a major building renovation that they would not otherwise do.

Developing an expedited permit review process is typically a low-cost incentive for municipalities because expedited permitting should be feasible using existing permitting departments.²⁰⁰ Expedited permitting does, however, require that permitting staff have a thorough knowledge of the specific resilient building standards chosen by the municipality. This may require an upfront investment for municipalities who must train staff.

Expedited permitting will only be attractive in areas that feature frequent new construction. In many small municipalities, the permitting staff can easily review every application right away. However, in municipalities where permitting is in high demand and the review process can take months, a shorter process could be very attractive to developers.

Legal Authority

Expedited permit review programs fall within the powers of municipalities in Minnesota. Municipalities already have the power to regulate buildings through permitting. These programs should not require any new legal authority for municipalities because they come as a part of the municipalities’ existing permitting process.

Conclusion

Expedited permitting is a low-cost incentive for municipalities to encourage resilient buildings. Incentives such as expedited permitting will be most effective in municipalities with frequent new construction. Expedited permitting is most attractive to municipalities that already have sufficient capacity within the permitting department with existing staff.

Density Bonus

What Is It?

Municipalities can incentivize resilient building through bonus density programs. While bonus density can increase resilience, for example, in access to affordable public transportation and other public services, it can also create challenges during loss of power and extreme heat events for vulnerable residents. However, developers may be interested in bonus density for greater return on investment, and so it may serve as an incentive for them to incorporate resilient elements into their designs. Bonus density programs can take several forms; municipalities can offer height bonuses or floor/area ratio bonuses.²⁰¹ For example, a municipality could allow buildings that will

²⁰⁰ *A Local Government Guide to LEED For Neighborhood Development* 24, UNITED STATES GREEN BUILDING COUNCIL (April 2012), available at <http://www.usgbc.org/Docs/Archive/General/Docs6131.pdf>.

²⁰¹ Id. at 8.

include green roofs to build two stories higher than the level that the zoning regulations would otherwise allow. Generally, municipalities grant these bonuses to developers for reaching certain resilient building benchmarks. Builders can potentially make more money from construction by building more square footage, and so may choose to follow the practices.²⁰² Like other incentive programs, municipalities can set their own resilient building standards to address their specific climate concerns. The politics may be tricky with density, however – municipalities that have traditionally had a “small-town” feel and want to preserve it may not want dense development.

Seattle has used its zoning laws to institute a bonus density program. City zoning law can grant both greater height and/or floor ratio to commercial and residential buildings that, among other requirements, achieve LEED Silver ratings.²⁰³ This approach requires amending the zoning code to incorporate the bonus density allowance, which should be within the power of Minnesota local governments. While Seattle has tied the allowance into meeting LEED requirements, a municipality could alter the program to meet specific climate resilient building standards.

The City of Arlington, Virginia has instituted a tiered bonus density program. The higher level of green building certification that a building earns, the greater the bonus it receives. Buildings can receive between .15 and .35 additional floor area ratio and up to three more stories if they exceed LEED Silver certification.²⁰⁴ The program does not use a fixed system for granting bonus density; instead, the city makes determinations on a case-by-case basis.²⁰⁵ Minnesota municipalities could prioritize higher resilient building standards by adopting a graded bonus density program like Arlington. This would allow the municipality to give greater incentives for more resilient building design, while still offering rewards for buildings that include more incremental adaptive techniques.

Evaluation Criteria

Bonus density will largely impact new construction. It is unlikely that bonus density incentives will encourage a building owner to adopt climate resilient standards as part of small renovations. Anything short of large-scale renovations would not allow the building to take advantage of the increased floor space the developer is granted. However, the benefits of additional building space may outweigh the costs of incorporating resilient measures for new construction. Because of this, bonus density is likely only attractive for new construction and major renovations.

While bonus density may be very attractive in condensed urban areas, it is unlikely to be effective in rural or suburban areas. Outside of urban areas, the increased vertical space is at less of a premium—many municipalities value the lower density they currently enjoy. In these municipalities, height bonuses will not be effective. Because many Minnesota municipalities are relatively rural, height bonuses may not be an effective tool in much of the state.

Legal Authority

The use of density bonus programs should fall within the powers of municipalities in Minnesota. This is an extension of the municipal power to regulate land use through zoning. A municipality generally administers bonus density programs through the municipalities’ zoning code.

²⁰² *Id.*

²⁰³ *Id.* at 9.

²⁰⁴ *Green Building Initiative*, ARLINGTON ECONOMIC DEVELOPMENT, CITY OF ARLINGTON, available at <http://www.arlingtonvirginiausa.com/major-initiatives/green-building-initiative/> (last visited May 11, 2014).

²⁰⁵ American Institute of Architects, *State and Local Green Building Incentives 9*, available at <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aia076936.pdf>.

Conclusion

A bonus density program is an attractive incentive in urban municipalities or those with limited space. The low cost of bonus density incentives can make them an attractive option for municipalities. Bonus density will not be an effective incentive for municipalities with little new construction or those with lots of space to build because developers and building managers are not likely to be sufficiently motivated by this tool.

Financial Incentives

Financial incentives motivate developers to follow the recommendations the municipality puts forth to create resilient buildings by providing some form of funding to cover some of the costs. The downside is that they can require substantial investments from municipalities. Financial incentives include (a) Tax Incentives, (b) Grants, (c) Permit Fee Reductions, and (d) Rebates or Discounts. Each of these tools gives developers some form of financial incentive, generally through a payment, waiver, or credit, to motivate increased building resilience by reducing the cost to the developer.

Tax Incentives

What Is It?

Municipalities may encourage resilient building through tax credits or abatements. Municipalities may offer the credit for various taxes—most likely property taxes, but a municipality could also apply a credit to any taxes that it collects. Municipalities with taxing powers can design the tax credit to reward whatever green standard the municipality wishes to incentivize. The ability to use tax credits as a resilience incentive will largely rely on the municipalities' existing tax powers. Cities can offer tax incentives for completing specific resilient building projects or for achieving long- or short-term sustainability goals.²⁰⁶ A municipality may offer a tax incentive in the form of a credit that applies to cover the tax as it is normally applied, or in the form of an abatement that reduces or eliminates the tax that is collected.

Cincinnati instated a tax abatement program that offers abatements both to new construction that achieves LEED certification and to existing buildings that incorporate adaptive techniques.²⁰⁷ Under the abatement, properties are taxed at their property value, excluding the value added by the resilience improvements.²⁰⁸ The program is tiered; buildings that meet higher levels of LEED certification receive larger abatements.²⁰⁹ For buildings that meet LEED Platinum, (the highest LEED standard) there is no limit on the amount of the abatement. The Cincinnati program aims to solve the problem that arises when investing in green infrastructure upgrades raises the property value and therefore the property taxes on the building.²¹⁰ Now buildings that invest in green infrastructure upgrades will not have to pay property taxes on the added value that the investments bring to the property for as long as the abatement program exists.

The abatement program may be replicable in Minnesota municipalities. However, this is likely only an attractive option to municipalities with high property values or taxes. If property values are low, the added value of green infrastructure may not substantially add to the property taxes. Unless the added property taxes that would result

²⁰⁶ *Id.* at 6.

²⁰⁷ See *City of Cincinnati Community Reinvestment Area (CRA) Residential Tax Abatement*, CITY OF CINCINNATI COMMUNITY DEVELOPMENT, <http://www.cincinnati-oh.gov/community-development/housing-assistance/residential-property-tax-abatement/> (last visited April 10, 2014).

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ *Id.*

from a property investing in green infrastructure are sufficiently high, an abatement program may not motivate many building owners to take such measures.

Evaluation Criteria

Tax incentives have the power to motivate resilient strategies in new and existing buildings. Many municipalities should be able to use their existing property tax structures to introduce a tax incentive to shift behavior for both existing buildings that are already paying taxes and new buildings that soon will be.

Municipalities can customize the size and availability of tax credits to target their most pressing concerns.²¹¹ The efficacy of the credit is likely to rely in part on the size of the credit and the time it will take the builder to see a net savings. To best motivate action, the credit should provide savings to the building in the short term.

Tax incentives should require only a minimal resource investment from municipalities to administer because the upfront cost to municipalities should be minimal.²¹² Still, municipalities must be aware that, if the program is successful, and depending on the size of the tax credit or abatement, they will be decreasing their own tax revenue. While administering the program is not in itself expensive, a municipality must also consider foregone revenue. Municipalities must be careful to design a program that will provide enough of a credit to incentivize builders but not so large as to overly decrease their tax revenue.

Legal Authority

The use of tax incentives should not require any new delegation of authority. Municipalities will almost always use incentives as a credit or abatement of an existing municipal tax. The only question of legal authority that might arise is if a municipality seeks to introduce a new tax to try to support climate adaptation and resilience.

Conclusion

Tax incentives are a flexible tool for municipalities to increase the resilience of both new and existing buildings. The flexible nature of tax credits allows municipalities to tailor credits to incentivize the measures that the municipality needs, such as a municipality at risk of flooding offering a credit on property taxes toward buildings that elevate HVAC systems above the flood risk. Municipalities should be able to design a tax incentive that fits their resources, while making sure that any tax incentive they institute falls within the tax powers of the municipality.

Grants

What Is It?

Grants can incentivize climate adaptation and resilience by offsetting some or all of the costs to developers.²¹³

Grants can cover the cost of the necessary measures or can be applied to the total cost of the buildings, allowing a municipality to design a grant program that fits its financial resources.²¹⁴ Municipal grant funding can come from a number of sources. First, municipalities may cover the cost of offering grants with their own general funds. Second, municipalities may use various sources federal money to fund their grants. Finally, states often offer money to municipalities; some of this is federal money given to the states to distribute to municipalities. Municipalities may be able to apply to the state for money to fund grant programs.

211 American Institute of Architects, *State and Local Green Building Incentives 7*, available at <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aia076936.pdf>.

212 *See id.*

213 *Id.* at 12.

214 *Id.*

Quincy, Massachusetts is using grants to help property owners elevate their homes above flood map projections.²¹⁵ The city is using money from FEMA's Pre-Disaster Mitigation and Flood Mitigation Assistance programs to fund the grant program.²¹⁶ The grant funds up to half of the engineering costs and three quarters of the total project cost, up to \$20,000.²¹⁷ The owner covers the rest of the project cost. The grant program successfully reduced the storm damage risk to 46 properties from 2003-2007.²¹⁸ To advertise the program, each year the City of Quincy publishes that it is seeking funding from FEMA to support the program; the advertisements also publish that Quincy is seeking applications from potential participants.²¹⁹ In addition, the city also contacts properties that have suffered repetitive flood losses to notify them directly about the program.²²⁰

Without sufficient resources to fund the program itself, Quincy has used federal funding to target the most at-risk buildings. By tailoring its grant program to the buildings most at risk of flood damage, Quincy is able to use its limited resources to create real change in the city's vulnerability. Municipalities that rely on federal funding for grant programs must be careful not to overextend their source, however, and they cannot guarantee that programs will continue beyond initial funding.

The King County Solid Waste Division is using grants from the County Department of Natural Resources and Parks to fund green construction. The Green Tools Program awards grants to selected projects that are pursuing LEED Gold or Platinum certification.²²¹ The grants range from \$15,000-\$25,000 each with the money intended to go towards the design process.²²² The program has been successful in getting developers to build beyond existing requirements.

Although the King County program tied their grants to levels of LEED certification, a municipality in Minnesota could tie the grant to climate resilience best practices adopted by Minnesota GreenStep Cities or even standards designed by the municipality. Additionally, municipalities could provide different levels of funding. Grants could also fund the construction process rather than, or in addition to, design.

Evaluation Criteria

Grant programs are flexible in terms of disbursement because a municipality may tailor its grant program to fit the municipality's resources. Grants can fund different levels of the project, from design to implementation, and varying amounts of money. They can fund entire projects or simply offset some costs. The success of a grant program will likely be proportional to the relative cost of the technique that the grant covers. The more of the total cost that the grant covers, the more likely developers are to implement the strategy.

Grants can motivate adaptation of both new and existing buildings, and can incentivize new buildings to adopt priority resilience measures that the municipality puts forward. In municipalities with little new construction, grants may be an effective method to help retrofit existing buildings for greater climate resilience.

²¹⁵ *Case Study: Massachusetts Communities Reduce Storm Risk in Developed Areas*, STORMSMART COASTS, EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS (January 2009), available at <http://www.mass.gov/eea/docs/czm/stormsmart/ssc/ssc4-quincy.pdf>.

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ *Id.*

²¹⁹ *Id.*

²²⁰ *Id.*

²²¹ *King County Awards Green Building Grants*, NATURAL RESOURCES AND PARKS, KING COUNTY, WASHINGTON (Dec 3, 2009), available at <http://www.kingcounty.gov/environment/dnrp/newsroom/newsreleases/2009/december/1203LEED-grants.aspx>.

²²² *Id.*

The drawback to grant programs is that municipalities need money to run them. Municipalities with limited financial resources will not be able to fund their own grant programs, but may find county, state or federal programs to support them.

Legal Authority

The use of grant programs should be within the powers of all municipalities in Minnesota. Grant programs would fall under the municipal police powers to spend for the general welfare. This means that the municipal spending through the grants must be for a public purpose. Because these grant programs are to help increase the resilience of buildings within the municipality to the effects of climate change they should satisfy the public purpose test.

Conclusion

Because they provide funding for developers to use towards the resilience measures the municipality wants, grant programs can effectively motivate both existing buildings and new construction to increase their resilience. Grant programs often require a large investment from municipalities but they may be able to use some federal funding sources.

c. Permit Fee Reductions

What Is It?

Building permit fees are fees paid by a developer in order to gain the building permits necessary for any building projects. Both new buildings and major renovations can require building permits. Municipalities can incentivize resilient building by reducing or waiving permit fees for projects that will meet certain standards. Each municipality generally sets its own permit fees, which are generally tiered, with higher fees for more expensive projects. Municipalities may waive or reimburse qualifying projects of their application, building, or permit fees.²²³ Reduced permit fees are attractive to developers because they save the project money.²²⁴ By effectively reducing the cost of the whole project, builders may be motivated to include resilient building standards.

Oakdale, Minnesota offers a permit fee reduction of 20 to 25 percent for LEED certified buildings or major renovations meeting enough green items from Oakdale's list of choices.²²⁵ To date, mostly commercial construction projects have taken advantage of the reduction, and Oakdale staff estimate that perhaps 20 percent of projects have met the criteria since the program was instituted.²²⁶ Such a program could include specific climate resilient building standards.

Hull, Massachusetts—a town of only 10,000 people—instituted a permit fee reduction in program in 2009.²²⁷ The program aims to motivate builders to elevate homes at least two feet above building code requirements through a \$500 building permit credit.²²⁸ This program should be replicable in Minnesota; in Massachusetts, the state also has complete control over the building code.²²⁹

223 American Institute of Architects, *State and Local Green Building Incentives* 15, available at <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aia076936.pdf>.

224 *Id.*

225 City of Oakdale, Generation Green flyer, available at <http://www.ci.oakdale.mn.us/vertical/sites/%7B9D2ABE6F-4847-480E-9780-B9885C59543F%7D/uploads/%7BE0DB8AA0-0066-4602-B706-D3819F62689D%7D.PDF>.

226 Phone interview with Jennifer Hassebroek, City of Oakdale Building Department.

227 *Town Offers Builders Permit Credit for Freeboard*, STORMSMART COASTS (October 12, 2009), available at <http://tx.stormsmart.org/2009/10/12/town-offers-builders-permit-credit-for-freeboard/>.

228 *Id.*

229 *See id.*

Asheville, North Carolina has reduced its permit fee for certain sustainable practices. The city waives both permit and plan review fees for homes that use certain renewable energy technologies.²³⁰ Waiver-approved technologies include ENERGY STAR ratings, geothermal heat pumps, wind turbines, and solar panels.²³¹ Builders must pay the fees upfront, but later receive a rebate once the project is certified.²³² This allows the city to avoid granting the incentive until it knows the building has actually implemented the renewable energy tech.

Evaluation Criteria

Permit fee reductions can motivate developers to incorporate adaptive measures into their buildings. Permit fee reductions will be most effective in municipalities that have large amounts of new construction or major renovations. Because the costs of permit fees are only a fraction of the total cost of a construction project, it is unlikely that permit fee reductions alone will be enough to motivate many building managers. However, a permit fee reduction may incentivize those already engaged in construction projects to incorporate the best practices the municipality recommends to make the building more resilient.

Legal Authority

Like expedited permitting programs, permit fee reduction programs should fall within the powers of a municipality. This would also constitute a part of the municipality's power to regulate buildings through the permitting process. It should not require any new legal authority.

Conclusion

Permit fee reductions are attractive to developers because it can save them money. Since municipalities may vary the size of the fee reduction, municipalities of all sizes should be able to develop permit fee reduction programs with their existing resources. Permit fee reduction may not be effective in an area where there is little ongoing development, or if the amount of the fee reduction is not sufficient to incentivize the specific resilience measures.

Rebates and Discounts

What Is It?

Municipalities may also incentivize resilient building through a rebate or discounting program. Through these programs, the municipality provides a good or service to resilient buildings or projects at a discounted cost. This can take two forms; first, the municipality may offer a discounted service, such as discounted utility fees; second, the municipality can offer discounts or rebates on the necessary costs for adaptation projects. Through either mechanism, these programs provide some financial incentive to either encourage building owners to take the necessary steps or to compensate them for some of the costs of doing so.

Pasadena Water & Power offers rebates to buildings that increase their energy efficiency through the High Performance Building Program.²³³ The program offers financial incentives to customers who construct new buildings or undergo retrofitting to achieve energy efficiency that exceeds 12% above state recommended energy efficiency standards.²³⁴ The program rewards customers by providing rebates matching one month of the building's

230 *City of Asheville – Building Permit Fee Waiver*, DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY (September 28, 2012), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NC46F&re=0&ee=0.

231 *Id.*

232 *Id.*

233 See Pasadena Water & Power, City of Pasadena, *High-Performance Building Program*, available at <http://ww2.cityofpasadena.net/waterandpower/HPBP.pdf> (last visited May 11, 2014).

234 *Id.* at 2.

energy savings for each percentage better than the code that the building performs, up to \$100,000.²³⁵ The size of the rebate increases as buildings improve their performance above code; a building that increases its efficiency to 12% above code is entitled to one year of energy savings while a building that increases its efficiency to 30% above code is entitled to 30 months of energy savings.²³⁶ The rebate is awarded annually.²³⁷ Because the rebates are equivalent to the savings that the building will already receive from their own upgrades, buildings actually earn double the energy savings they would otherwise receive from just increasing their energy efficiency. Buildings that exceptionally outperform the code can receive more than four times their annual savings through the rebate.

The Southern Nevada Water Authority has also instituted a rebate program that may be transferrable to Minnesota municipalities. The Water Smart Landscapes Rebate compensates building managers for converting grass-covered land to desert in order to save on water use.²³⁸ Customers receive a rebate for \$1.50 per square foot of grass that they remove and replace with desert landscape up to 5,000 square feet.²³⁹ Above 5,000 square feet, the rebate becomes \$1 per square foot.²⁴⁰ The program has upgraded more than 160 million square feet of lawn to water-efficient landscape and saved billions of gallons of water a year.²⁴¹

A similar concept could be used in Minnesota to fight urban heat, reduce irrigation, and better manage stormwater. Municipalities could adopt a similar rebate system for urban buildings that convert paved and other nonporous surfaces to vegetation that will reduce heat and the risk of stormwater flooding.

Evaluation Criteria

Rebates and discounts provide direct financial support for resilience projects. Rebates and discounts can support both new construction and renovation of existing buildings. Unlike some other incentives, rebates or discounts can motivate action to retrofit existing buildings because it can directly cover some of the costs.

Although rebates and discounts can be effective, they can require a large investment from the municipality. A rebate or discount program is unlikely to sway property owners unless the program substantially reduces the total cost of the project. While the municipality may provide the funding for a rebate or discount program itself, it could also identify some federal funding, state, county or utility program to offset the costs, as with a grant program.

Legal Authority

Rebate programs should fall within municipal powers, but the source of the power will depend on how the program is applied. If a municipality is simply using the program to offer money to reimburse building managers and developers for the cost of meeting the resilient building standards, this should function similar to a grant program and satisfy the public purpose test. If rebates or discounts are offered as credits from utilities, the municipalities would perform more of a marketing and facilitation role.

Conclusion

Rebates can be an effective incentive for the municipalities that have the resources to use them. The direct financial support to developers can motivate them to follow the municipality's resilience standards to improve building

²³⁵ *See id.*

²³⁶ *Id.*

²³⁷ *Id.* at 3.

²³⁸ *Water Smart Landscapes Rebate*, SOUTHERN NEVADA WATER AUTHORITY, available at <http://www.snwa.com/rebates/wsl.html> (last visited April 7, 2014).

²³⁹ *Id.*

²⁴⁰ *Id.*

²⁴¹ *Id.*

resiliency. Rebates can incentivize upgrades to both new and existing buildings if they sufficiently reduce the cost of the resilient measures.

Conclusion

Municipalities seeking to improve building resiliency can use incentive programs to motivate building managers and developers to take action to increase their buildings’ resilience. These programs will generally involve only the municipalities’ existing power. Municipalities may effectively increase the resilience of their buildings by tying incentives to meeting the resilience standards most pertinent to that municipality. Municipalities with the right circumstances can motivate developers through development incentives like expedited permitting or bonus density. Municipalities with sufficient resources can motivate builders through financial incentives like grants, tax incentives, permit fee reductions, or rebates.

Incentive Programs

Tool	New Buildings	Existing Buildings	Authority	Resource Intensity
Bonus Density	+	-	+	+
Expedited Permitting	+	-	+	+
Tax Incentives	+	+	?	?
Grants	+	+	+	-
Permit Fee Reductions	+	-	+	-
Rebates/ Discounts	?	-	+	-

Legend

- + Shows that the criteria is satisfied
- Shows that the criteria is not satisfied
- ? Shows uncertainty or variation relating to whether the criteria is met

Icons indicate relative strength or weakness compared to other categories

Conclusion

Minnesota state agencies and municipalities have several options that could help them increase building resilience.

First, the legislature could amend the state code to grant municipalities more flexibility to adopt stricter building codes that would better promote building resiliency or to clarify the state Department of Labor and Industry (DLI)'s authority to adopt an optional code section or grant exceptions to municipalities. DLI might be able to adopt an optional code section for municipalities. Municipalities also could use their existing authority to support building adaptation.

Legislative Change

By amending Minnesota Statute § 326B.121 to allow municipalities to create a more-restrictive building code than the state code, the state legislature could grant municipalities the authority to create their own building codes to require new buildings to be more resilient to the most pressing climate change concerns of each community.

The Minnesota legislature, which created § 326B.121, has the power to amend it.²⁴² The legislature could enact any of several models granting DLI and municipalities varying levels of control over the local codes, but all ensuring a minimum standard set by the state. Additionally, the legislature could explicitly grant DLI the authority to adopt an optional section of the code for municipalities to follow, whether the IgCC, a B3 model, or something different. Last, the legislature could explicitly grant exceptions to municipalities for a variety of conditions besides geological – for example, climatic and topographic.

If properly designed, an amendment to § 326B.121 could grant municipalities the flexibility to prepare their buildings for the coming effects of climate change, without taking all control from the state level. The proper balance between the two will need to be determined among all the parties involved, but good models exist from other states to draw upon.

DLI Action

As discussed above, DLI may well have the authority to adopt the IgCC or another green standard as part of the set of construction codes it administers. Less clear is whether it could adopt that green standard as an optional code section for municipalities to choose whether to follow. Legislative change may be necessary if DLI is to be able to adopt this optional code section, or grant exceptions to municipalities for any reason other than local geological conditions.

²⁴² See M.S.A. Const. Art. 3, § 1 (reserving legislative powers to the legislative branch); M.S.A. Const. Art. 4, § 1 (defining the legislature as the Senate and House of Representatives).

Municipal Options

By relying on their own powers, Minnesota municipalities could pursue a goal of supporting building resilience. Municipalities can use their resources to promote efforts to increase resiliency in their buildings. This could occur through the issuance of best practices or model incentive programs for municipalities to adopt through their police powers. The scope of success will be limited, however, because without a change in state law or state code adoption, municipalities cannot require buildings to implement resilience measures. Without a requirement, only building managers and developers with a strong interest in increasing resiliency would participate. This group would likely include the buildings that are already trying to increase resiliency. Still, by providing resources, municipalities could encourage developers on the fence about increasing resiliency to take the plunge. The effectiveness of this approach will vary depending on the size of the incentives and the interest of building managers and builders.

All three approaches – legislative change, DLI action, and municipal options – potentially offer flexibility through local action. Municipalities would be able to decide which standards or programs best suit their needs and can tailor them to achieve those municipalities' goals. The low cost of some of these options allows municipalities with varying financial resources to implement approaches that can help them increase the resilience of local buildings to the changing climate.

Appendix I: Appendix of Statutes

Massachusetts Statutes

Massachusetts General Laws

Chapter 143 § 93. State board of building regulations and standards; establishment

There is hereby established within the department of public safety a board to be known as the state board of building regulations and standards, in this section and in sections ninety-four to one hundred, inclusive, called the board. The board shall adopt and administer a state building code. The board shall consist of eleven members, one of whom shall be the state fire marshal, or his designee, one of whom shall be the chief of inspections of the division of inspection of the department of public safety or his designee, both of whom shall serve ex-officio and shall be voting members of the board, and nine persons to be appointed by the governor, one of whom shall be a registered architect, one of whom shall be a registered professional engineer who is a mechanical engineer, one of whom shall be a registered professional engineer who is a structural engineer, one of whom shall be a representative of the building trades, one of whom shall be a general contractor of commercial or industrial buildings, one of whom shall be a building contractor of one or two-family homes, one of whom shall be a head of a local fire department, one of whom shall be an inspector of buildings in a town and one of whom shall be an inspector of buildings in a city. Organizations representing the appropriate constituencies shall submit names of persons for appointment as members to the board. Each member shall be appointed for a term of five years, except that in making his initial appointments, the governor shall appoint one member for one year and two members to serve for two, three, four and five years respectively, as he may designate. Any person appointed to fill a vacancy shall serve only for the unexpired term. Any member shall be eligible for reappointment. Any member of the board may be removed by the governor for cause, after being given a written statement of the charges and an opportunity to be heard thereon. No member shall act as a member of the board or vote in connection with any matter as to which his private right, distinct from public interest, is concerned.

A majority of the members of the board shall constitute a quorum for the purpose of conducting business, but a lesser number may adjourn from time to time.

The board shall annually elect a chairman and a vice chairman from its members; provided, however, that no member shall serve as chairman or vice chairman for more than two consecutive years.

Each member of the board who is not otherwise an employee of the commonwealth shall receive from the commonwealth fifty dollars for each day or portion thereof spent in the performance of his official duties; provided, however, that the total sum paid to any member in any fiscal year shall not exceed three thousand dollars. Each member shall be paid necessary traveling and other expenses incurred in the performance of his duties.

The chief of inspections shall be responsible for the proper administration of the activities of the board and the supervision of the staff thereof. The department may employ such other professional, technical and clerical staff as is deemed necessary to assist the board.

Chapter 143 § 94. Powers and duties

The board shall have the following powers and duties:

(a) To formulate, propose, adopt and amend rules and regulations relating to (i) the construction, reconstruction, alteration, repair, demolition, removal, inspection, issuance and revocation of permits or licenses, installation of equipment, classification and definition of any building or structure and use or occupancy of all buildings and structures and parts thereof or classes of buildings and structures and parts thereof, except bridges and appurtenant supporting structures which have been or are to be constructed by or are under the custody and control of the department of highways, the Massachusetts Department of Transportation, the Massachusetts Bay Transportation Authority, the metropolitan district commission or the Massachusetts Port Authority or for which said agencies have maintenance responsibility; (ii) the rehabilitation and maintenance of existing buildings; (iii) the standards or requirements for materials to be used in connection therewith, including but not limited to provisions for safety, ingress and egress, energy conservation, and sanitary conditions; (iv) the establishment of reasonable fees for inspections, which fees shall be collected and retained by the city or town conducting such inspections.

Such rules and regulations, together with any penalties for the violation thereof, as hereinafter provided, shall comprise and be collectively known as the state building code.

Whoever violates any provision of the state building code, except any specialized code as described in section ninety-six, shall be punished by a fine of not more than one thousand dollars or by imprisonment for not more than one year, or both, for each such violation. Each day during which a violation exists shall constitute a separate offense.

(b) To subpoena witnesses, take testimony, compel production of books and records and to hold public hearings. The board may designate one or more of its members to hold special public hearings and report on such hearings to the board.

(c) To make a continuing study of the operation of the state building code, and other laws relating to the construction of buildings to ascertain their effect upon the cost of building construction and the effectiveness of their provisions for health, safety, energy conservation and security.

(d) To recommend or require tests and approvals and specify criteria and conditions, of materials, devices, and methods of construction, either upon the initiative of the board or at the request of any interested person including, but not limited to, a manufacturer, builder, architect, engineer, inspector of buildings or building commissioner or local or state inspector, in order to ascertain the acceptability of said materials, devices and methods under the requirements of the state building code. The board shall issue certification of such acceptability, which certification shall be binding on all cities and towns.

(e) To review, on its own initiative or on the application of any inspector of buildings or building commissioner or of any local or state inspector, any interpretation under the state building code, and to reverse, modify or annul, in whole or in part, such interpretations except with respect to the specialized codes as defined in section ninety-six.

- (f) To establish an advisory board to be known as the technical code council, to assist in and make recommendations relative to formulation, promulgation and administration of the state building code. Said council shall be convened regularly by the chief of inspections and shall establish its own rules for the conduct of its business. Said council shall include a representative from each state department, commission, agency, board, or division concerned with the state building code, including specialized codes referred to in section ninety-six, and such other members as may be determined by the board.
- (g) To formulate administrative procedures and promulgate rules and regulations necessary to administer and enforce the state building code.
- (h) To revise and amend the state building code exclusive of the specialized codes referred to in section ninety-six, at least once every five years, and to send a copy of such revisions or amendments to each inspector of buildings or building commissioner in every city or town and to each state inspector.
- (i) To issue licenses to individuals engaged as construction supervisors. Fees for such licenses shall be collected and retained by the commonwealth.
- (j) To designate and retain, where advisable, certain qualified third party agents to perform screening, testing, or technical services to the board to carry out its mandates.
- (k) To develop requirements and promulgate regulations for the certification of inspectors of buildings, building commissioners and local inspectors pursuant to section three and to issue a certificate to individuals who meet said requirements.
- (l) To prepare courses of instruction or approve courses of instruction offered by others for training persons for certification as inspectors of buildings, building commissioners or local inspectors.
- (m) To develop requirements and approve courses of instruction to be offered by others relative to the continuing education of individuals licensed as construction supervisors.
- (n) To establish a continuing education advisory council to assist and make recommendations to the board relative to the formulation, promulgation and administration of requirements for the continuing education of individuals licensed as construction supervisors. The council shall consist of: the commissioner of public safety, or his designee; 2 licensed construction supervisors who shall also be members of the Home Builders Association of Massachusetts; 1 licensed construction supervisor who shall also be a member of the eastern Massachusetts chapter of the National Association of the Remodeling Industry; and 3 members to be appointed by the commissioner, 2 of whom shall be certified building inspectors and 1 of whom shall be an instructor in residential construction technology at a public or private college or university. The commissioner shall be chairperson of the council which shall meet regularly and may establish its own rules for the conduct of its business. The members of the council shall not be compensated for their services but shall be reimbursed for travel and other expenses necessary for the performance of their duties. The board may provide technical and clerical assistance to the council.
- (o) To adopt and fully integrate the latest International Energy Conservation Code as part of the state building code, together with any more stringent energy-efficiency provisions that the board, in consultation with the department of energy resources, concludes are warranted. The energy provisions of the state building code shall be updated within

1 year of any revision to the International Energy Conservation Code.

(p) In consultation with the department of energy resources, to develop requirements and promulgate regulations as part of the state building code for the training and certification of city and town inspectors of buildings, building commissioners and local inspectors regarding the energy provisions of the state building code, and to require that all new construction and any major reconstruction, alteration or repair of residential and non-residential buildings pass inspection by inspectors who have been trained and certified, demonstrating full compliance with the energy provisions of the state building code.

(q) In consultation with the department of energy resources, to develop requirements and promulgate regulations as part of the state building code, in addition to the requirements of the latest International Energy Conservation Code, requiring a process to ensure that all new non-residential buildings larger than 10,000 square feet and any major reconstruction, alteration or repair of all such buildings perform as designed with respect to energy consumption by undergoing building commissioning or acceptance testing. Such commissioning must be completed before the issuance of a certificate of occupancy.

(r) In consultation with the department of energy resources, professional organizations and other stakeholders, to prepare a report evaluating the advisability of a requirement of periodic commissioning for large non-residential buildings and, if such a requirement is deemed advisable, evaluating possible approaches to periodic commissioning.

Chapter 143 § 98. Rules and regulations imposing more restrictive standards

The board of selectmen in a town or the mayor in a city may recommend to the board the adoption of rules and regulations imposing more restrictive standards than those established by the state building code for construction, alteration, repair, demolition, and removal in such a city or town. If the board finds that more restrictive standards are reasonably necessary because of special conditions prevailing within such city or town and that such standards conform with accepted national and local engineering and fire prevention practices, with public safety and with the general purposes of a statewide building code, the board may, after notice to said board of selectmen or mayor, and after a public hearing, adopt rules and regulations, impose conditions in connection with the adoption thereof and terminate such rules and regulations at such time and in such manner as the board may deem necessary, desirable or proper.

Notwithstanding the foregoing, a city or town which is not served by a municipal water system may, with the approval of the board, adopt rules and regulations with regard to fire protection systems which are more restrictive than those established by the state building code; provided, however, that if the board does not issue a written decision within forty-five days of receipt of such proposed rules and regulations then they shall be deemed to have been approved by the board.

Appendix II: Stretch Energy Code

The Stretch Energy Code is the International Energy Conservation Code (IECC) 2009 with Massachusetts Amendments (780 CMR 115.AA).

101.1, 101.2, and 101.3 Replace as follows:

101.1 Title. This code shall be known as the Massachusetts Stretch Energy Code and shall be cited as such. It is referred to as “this code.”

101.2 Scope. This code applies to new residential buildings, renovations of or additions to existing residential buildings, new commercial buildings, and additions to existing commercial buildings. Renovations of existing commercial buildings, and replacement or reconstruction of existing commercial building components and elements, are not subject to the provisions of this code. Buildings not included in this scope shall comply with Chapter 13 or 34 of the International Building Code 2009 with Massachusetts Amendments (780 CMR 13.00 or 34.00) or for Single- and Two-family dwellings at 780 CMR 61.00, or 93.00, as applicable.

101.3 Purpose and Intent. The purpose of this code is to provide a more energy efficient alternative to the base code energy for new and existing buildings. A municipality seeking to ensure that construction within its boundaries is designed and built above the energy efficiency requirements of 780 CMR may mandate adherence to this code.

This code may be adopted or rescinded by any municipality in the commonwealth in the manner prescribed by law.

If adopted by a municipality, this code, rather than Chapter 13 or 34 of the International Building Code 2009 with Massachusetts Amendments (780 CMR 13.00 or 34.00) or for Single- and Two-family dwellings at 780 CMR 61.00, or 93.00, as applicable, shall govern.

This code shall regulate the design and construction of buildings to provide flexibility, and, permit the use of innovative approaches and techniques to achieve effective energy use.

(some sections removed here)

California Statutes

California Health and Safety Code

§ 18930. Approval or adoption of building standards; analysis and criteria; review considerations; factual determinations

(a) Any building standard adopted or proposed by state agencies shall be submitted to, and approved or adopted by, the California Building Standards Commission prior to codification. Prior to submission to the commission, building

standards shall be adopted in compliance with the procedures specified in Article 5 (commencing with Section 11346) of Chapter 3.5 of Part 1 of Division 3 of Title 2 of the Government Code. Building standards adopted by state agencies and submitted to the commission for approval shall be accompanied by an analysis written by the adopting agency or state agency that proposes the building standards which shall, to the satisfaction of the commission, justify the approval thereof in terms of the following criteria:

- (1) The proposed building standards do not conflict with, overlap, or duplicate other building standards.
- (2) The proposed building standard is within the parameters established by enabling legislation and is not expressly within the exclusive jurisdiction of another agency.
- (3) The public interest requires the adoption of the building standards. The public interest includes, but is not limited to, health and safety, resource efficiency, fire safety, seismic safety, building and building system performance, and consistency with environmental, public health, and accessibility statutes and regulations.
- (4) The proposed building standard is not unreasonable, arbitrary, unfair, or capricious, in whole or in part.
- (5) The cost to the public is reasonable, based on the overall benefit to be derived from the building standards.
- (6) The proposed building standard is not unnecessarily ambiguous or vague, in whole or in part.
- (7) The applicable national specifications, published standards, and model codes have been incorporated therein as provided in this part, where appropriate.
 - (A) If a national specification, published standard, or model code does not adequately address the goals of the state agency, a statement defining the inadequacy shall accompany the proposed building standard when submitted to the commission.
 - (B) If there is no national specification, published standard, or model code that is relevant to the proposed building standard, the state agency shall prepare a statement informing the commission and submit that statement with the proposed building standard.
- (8) The format of the proposed building standards is consistent with that adopted by the commission.
- (9) The proposed building standard, if it promotes fire and panic safety, as determined by the State Fire Marshal, has the written approval of the State Fire Marshal.
 - (b) In reviewing building standards submitted for its approval, the commission shall consider only the record of the proceedings of the adopting agency, except as provided in subdivision (b) of Section 11359 of the Government Code.
 - (c) Where the commission is the adopting agency, it shall consider the record submitted to, and considered by, the state agency that proposes the building standards and the record of public comment that results from the commission's adoption of proposed regulations.
 - (d)(1) The commission shall give great weight to the determinations and analysis of the adopting agency or state agency that proposes the building standards on each of the criteria for approval set forth in subdivision (a). Any factual determinations of the adopting agency or state agency that proposes the building standards shall be considered conclusive by the commission unless the commission specifically finds, and sets forth its reasoning

in writing, that the factual determination is arbitrary and capricious or substantially unsupported by the evidence considered by the adopting agency or state agency that proposes the building standards.

(2) Whenever the commission makes a finding, as described in this subdivision, it shall return the standard to the adopting agency or state agency that proposes the building standards for a reexamination of its original determination of the disputed fact.

(e) Whenever a building standard is principally intended to protect the public health and safety, its adoption shall not be a “factual determination” for purposes of subdivision (d). Whenever a building standard is principally intended to conserve energy or other natural resources, the commission shall consider or review the cost to the public or benefit to be derived as a “factual determination” pursuant to subdivision (d). Whenever a building standard promotes fire and panic safety, each agency shall, unless adopted by the State Fire Marshal, submit the building standard to the State Fire Marshal for prior approval.

(f) Whenever the commission finds, pursuant to paragraph (2) of subdivision (a), that a building standard is adopted by an adopting agency pursuant to statutes requiring adoption of the building standard, the commission shall not consider or review whether the adoption is in the public interest pursuant to paragraph (3) of subdivision (a).

§ 18941.5. Amendments, additions, deletions to standards; effective date; publication date; more restrictive standards

(a)(1) Amendments, additions, and deletions to the California Building Standards Code, including, but not limited to, green building standards, adopted by a city, county, or city and county pursuant to Section 18941.5 or pursuant to Section 17958.7, together with all applicable portions of the California Building Standards Code, shall become effective 180 days after publication of the California Building Standards Code by the commission, or at a later date after publication established by the commission.

(2) The publication date established by the commission shall be no earlier than the date the California Building Standards Code is available for purchase by the public.

(b) Neither the State Building Standards Law contained in this part, nor the application of building standards contained in this section, shall limit the authority of a city, county, or city and county to establish more restrictive building standards, including, but not limited to, green building standards, reasonably necessary because of local climatic, geological, or topographical conditions. The governing body shall make the finding required by Section 17958.7 and the other requirements imposed by Section 17958.7 shall apply to that finding. Nothing in this section shall limit the authority of fire protection districts pursuant to subdivision (a) of Section 13869.7. Further, nothing in this section shall require findings required by Section 17958.7 beyond those currently required for more restrictive building standards related to housing.

§ 17958.7. Local variances; findings; filing; rejection of modification

(a) Except as provided in Section 17922.6, the governing body of a city or county, before making any modifications or changes pursuant to Section 17958.5, shall make an express finding that such modifications or changes are reasonably necessary because of local climatic, geological or topographical conditions. Such a finding shall be available as a public record. A copy of those findings, together with the modification or change expressly marked and identified to which each finding refers, shall be filed with the California Building Standards Commission. No modification or change shall become effective or operative for any purpose until the finding and the modification or change have been filed with the California Building Standards Commission.

(b) The California Building Standards Commission may reject a modification or change filed by the governing body of a city or county if no finding was submitted.

§ 18941.9. Heat island effect; hardscape alternatives; standard specification

The commission shall, in the next triennial adoption process for the code adopted after the development of a standard specification by the Department of Transportation pursuant to subdivision (b) of Section 71400 of the Public Resources Code, consider incorporating that specification as an additional strategy for Heat Island Effect: Hardscape Alternatives in the California Green Building Standards Code (Section A5.106.11.1 of Appendix 5 of Part 11 (commencing with Section 101.1) of Title 24 of the California Code of Regulations).

§ 18941.10. Installation of future electric vehicle charging infrastructure for parking spaces in multifamily dwellings and nonresidential development; adoption of mandatory standards; consultation with interested parties

(a)(1) The commission shall, commencing with the next triennial edition of the California Building Standards Code (Title 24 of the California Code of Regulations) adopted after January 1, 2014, adopt, approve, codify, and publish mandatory building standards for the installation of future electric vehicle charging infrastructure for parking spaces in multifamily dwellings and nonresidential development.

(2) For purposes of paragraph (1), the Department of Housing and Community Development shall propose mandatory building standards for the installation of future electric vehicle charging infrastructure for parking spaces in multifamily dwellings and submit the proposed mandatory building standards to the commission for consideration.

(b)(1) In proposing and adopting mandatory building standards under this section, the Department of Housing and Community Development and the commission shall use Sections A4.106.6, A4.106.6.1, A4.106.6.2, A5.106.5.1, and A5.106.5.3 of the California Green Building Standards Code (Part 11 of Title 24 of the California Code of Regulations) as the starting point for the mandatory building standards and amend those standards as necessary.

(2) In proposing and adopting mandatory building standards under this section, the Department of Housing and Community Development and the commission shall actively consult with interested parties, including, but not limited

to, investor-owned utilities, municipal utilities, manufacturers, local building officials, commercial building and apartment owners, and the building industry.

§ 18941.8. “Graywater” defined; adoption of building standards for construction, installation, and alteration of graywater systems in nonresidential occupancies; considerations; effect on authority of Department of Water Resources

- (a) As used in this section, “graywater” has the same meaning as defined in Section 17922.12.
- (b) Notwithstanding Chapter 22 (commencing with Section 14875) of Division 7 of the Water Code, as a part of the next triennial edition of the California Building Standards Code (Title 24 of the California Code of Regulations) adopted after January 1, 2011, the commission shall adopt building standards for the construction, installation, and alteration of graywater systems for indoor and outdoor uses in nonresidential occupancies.
- (c) In adopting building standards under this section, the commission shall do all of the following:
 - (1) Ensure protection of water quality in accordance with applicable provisions of state and federal water quality law.
 - (2) Consider the adopted building standards for the construction, installation, and alteration of graywater systems for indoor and outdoor uses in residential buildings.
 - (3) Consider existing research available on the environmental consequences to soil and groundwater of short-term and long-term graywater use for irrigation purposes.
 - (4) Consider graywater use impacts on human health.
 - (5) Consider the circumstances under which the use of graywater treatment systems in nonresidential occupancies is recommended.
 - (6) Consider the use and regulation of graywater in other jurisdictions.
 - (7) Use Chapter 16 of the Uniform Plumbing Code, adopted by the International Association of Plumbing and Mechanical Officials, as the starting point for the building standards and amend those standards as necessary.
- (d) The commission may revise and update the standards adopted under this section at any time.
- (e) The commission’s adoption of building standards for graywater systems pursuant to this section shall terminate the authority of the Department of Water Resources to adopt and update standards for the installation, construction, and alteration of graywater systems in nonresidential buildings pursuant to Chapter 22 (commencing with Section 14875) of Division 7 of the Water Code.

Pennsylvania Statutes

§ 7210.503. Changes in Uniform Construction Code

(a) Administration.--

(1) Municipalities may enact ordinances which equal or exceed the minimum requirements of Chapter 1 of the 1999 BOCA National Building Code, Fourteenth Edition, or successor codes, relating to administration consistent with the provisions of section 501(c).

(2) An ordinance under this subsection applicable to the exception under section 104(b)(8) may require compliance with any of the following standards:

(i) Flame propagation criteria of the applicable edition of NFPA No. 701.

(ii) The ICC Electrical Code.

(iii) International Fire Code criteria as to number of portable fire extinguishers.

(b) Minimum requirement.--Subject to the provisions of this act, no municipality may propose or enact any ordinance which is less than the minimum requirement of the Uniform Construction Code.

(c) Modification of minimum requirement.--Subject to the provisions of this act, the municipal governing body may propose and enact an ordinance to equal or exceed the minimum requirements of the Uniform Construction Code under the law governing the adoption of ordinances in that jurisdiction. An ordinance under this subsection shall not be effective nor enforceable unless subsections (d), (e), (f), (g), (h) and (i) have been satisfied. Municipalities may enact ordinances pursuant to this section which adopt additional code requirements for alterations or repairs to residential buildings. Municipalities may enact ordinances pursuant to this section which adopt stricter code requirements than required by this act for the regulation of utility and miscellaneous use structures.

(d) Public hearing.--The municipality shall hold at least one public hearing prior to adoption of the ordinance.

(e) Notice of public hearing.--The municipality shall place notice in a newspaper of general circulation in the municipality at least seven days, but not more than 60 days, in advance of a public hearing to consider the proposed ordinance.

(f) Filing of proposed notice and ordinance with department.--The municipality shall provide notice and file a copy of the proposed ordinance with the department at least 30 days prior to public hearing. The notice shall contain the time and place of the public hearing and a summary of the changes proposed by the ordinance, including code sections affected by the changes. The department shall make proposed ordinances available for public inspection and shall post the notice on its Internet website within seven business days after receipt.

(g) Municipal action.--Following the public hearing, the municipal governing body may enact the ordinance under the law governing the adoption of ordinance in that jurisdiction.

(h) Amendment of proposed ordinance.--If the municipality proposes any substantive amendment to a proposed ordinance, the municipal governing body shall be required to meet the advertising, filing, notice and public hearing requirements of this section before enacting the proposed ordinance.

(i) Department review.--The department shall review all proposed ordinances required to be filed with the department under subsection (f) for compliance with subsection (b). If the proposed ordinance does not comply with subsection (b), the department shall advise the municipality of its findings, setting forth the reasons in writing. The municipality shall then withdraw the proposed ordinance or revise the proposed ordinance to meet the minimum requirements of the Uniform Construction Code.

(j) Challenge of ordinance.-- (1) Aggrieved parties shall have 30 days from date of enactment of the ordinance to file a written challenge with the department and shall serve a copy of the challenge upon the municipality. The challenge shall state the reason or reasons for the challenge. A municipal ordinance may not take effect for a period of 35 days following its enactment. If a challenge is filed in writing with the department within 30 days, the department has five business days from the end of the 30-day filing period to notify a municipality of the challenge. There may be no enforcement of the ordinance until a ruling is issued by the secretary or 45 days after the filing date of the last challenge to the ordinance, whichever occurs first.

(2) The department shall review any ordinance which would equal or exceed the minimum requirements of the Uniform Construction Code based on the following standards:

(i) that certain clear and convincing local climatic, geologic, topographic or public health and safety circumstances or conditions justify the exception;

(ii) the exception shall be adequate for the purpose intended and shall meet a standard of performance equal to or greater than that prescribed by the Uniform Construction Code;

(iii) the exception would not diminish or threaten the health, safety and welfare of the public; and

(iv) the exception would not be inconsistent with the legislative findings and purpose described in section 102.³

The department shall take into consideration, in rendering the determination, the provision, code development process history, purpose and intent of relevant provisions of the 1999 BOCA National Building Code, Fourteenth Edition, ICC International One and Two Family Dwelling Code, 1998 Edition, or their successor codes.

(k) Ruling by secretary.--A ruling on a challenge by an aggrieved party shall be issued by the secretary within 45 days of receipt of the filing of the last challenge to the ordinance or within 30 days of the hearing on the challenge which must be held by the department upon the request of the municipality in the municipality wherein the ordinance is proposed, whichever last occurs. If the secretary approves the ordinance, the municipality may begin to administer and enforce the ordinance. If the secretary disapproves the ordinance, the ordinance shall be null and void. The secretary shall state the reasons for the disapproval in writing to the municipality.

Washington Statutes

19.27.040. Cities and counties authorized to amend state building code-- Limitations

The governing body of each county or city is authorized to amend the state building code as it applies within the jurisdiction of the county or city. The minimum performance standards of the codes and the objectives enumerated in RCW 19.27.020 shall not be diminished by any county or city amendments.

Nothing in this chapter shall authorize any modifications of the requirements of chapter 70.92 RCW.

19.27.060. Local building regulations superseded--Exceptions

(1) The governing bodies of counties and cities may amend the codes enumerated in RCW 19.27.031 as amended and adopted by the state building code council as they apply within their respective jurisdictions, but the amendments shall not result in a code that is less than the minimum performance standards and objectives contained in the state building code.

(a) No amendment to a code enumerated in RCW 19.27.031 as amended and adopted by the state building code council that affects single-family or multifamily residential buildings shall be effective unless the amendment is approved by the building code council under RCW 19.27.074(1)(b).

(b) Any county or city amendment to a code enumerated in RCW 19.27.031 which is approved under RCW 19.27.074(1)(b) shall continue to be effective after any action is taken under RCW 19.27.074(1)(a) without necessity of reapproval under RCW 19.27.074(1)(b) unless the amendment is declared null and void by the council at the time any action is taken under RCW 19.27.074(1)(a) because such action in any way altered the impact of the amendment.

(2) Except as permitted or provided otherwise under this section, the state building code shall be applicable to all buildings and structures including those owned by the state or by any governmental subdivision or unit of local government.

(3) The governing body of each county or city may limit the application of any portion of the state building code to exclude specified classes or types of buildings or structures according to use other than single-family or multifamily residential buildings. However, in no event shall fruits or vegetables of the tree or vine stored in buildings or warehouses constitute combustible stock for the purposes of application of the uniform fire code. A governing body of a county or city may inspect facilities used for temporary storage and processing of agricultural commodities.

(4) The provisions of this chapter shall not apply to any building four or more stories high with a B occupancy as defined by the uniform building code, 1982 edition, and with a city fire insurance rating of 1, 2, or 3 as defined by a recognized fire rating bureau or organization.

(5) No provision of the uniform fire code concerning roadways shall be part of the state building code: PROVIDED, That this subsection shall not limit the authority of a county or city to adopt street, road, or access standards.

(6) The provisions of the state building code may be preempted by any city or county to the extent that the code provisions relating to the installation or use of sprinklers in jail cells conflict with the secure and humane operation of jails.

(7)(a) Effective one year after July 23, 1989, the governing bodies of counties and cities may adopt an ordinance or resolution to exempt from permit requirements certain construction or alteration of either group R, division 3, or group M, division 1 occupancies, or both, as defined in the uniform building code, 1988 edition, for which the total cost of fair market value of the construction or alteration does not exceed fifteen hundred dollars. The permit exemption shall not otherwise exempt the construction or alteration from the substantive standards of the codes enumerated in RCW 19.27.031, as amended and maintained by the state building code council under RCW 19.27.070.

(b) Prior to July 23, 1989, the state building code council shall adopt by rule, guidelines exempting from permit requirements certain construction and alteration activities under (a) of this subsection.

The nonpartisan Georgetown Climate Center seeks to advance effective climate, energy, and transportation policies in the United States—policies that reduce greenhouse gas emissions, save energy, and help communities adapt to climate change.

For additional information, please visit www.GeorgetownClimate.org.

GEORGETOWN CLIMATE CENTER
A Leading Resource for State and Federal Policy

Purpose

Manage our land to reduce impacts on water quality and quantity

Adaptively manage within the natural limits imposed on us

Characterize the economic impacts of Minnesota's water industry

Goals

1 We need to increase stable vegetation cover to protect water quality

#2 We need to manage our built environment to protect water quality from runoff and contaminants

#3 We need to manage our resources so we are resilient to increased water stresses

#4 We need to ensure infrastructure and ecosystems are resilient to floods and extreme rain events

#5 Identify and articulate the economic impact of the Minnesota's water industry

#6 Understand competitive strengths and provide data to support industry growth

Selection of Solutions

Voluntary: Clean Water Certification Programs in Agriculture production

Regulatory: Buffer requirements for Rivers and streams

System Change: Market-based program to reward commodity crop farmers for demonstrating environmental stewardship

More Study Needed: Study of how chlorides from use on impervious surfaces impact ecosystems

Voluntary: Renewable water goal for use of storm water runoff, rain barrels, and gray water

Regulatory: Require water use to be metered so we can better manage the resources

System Change: Right sizing infrastructure with the expectation of more frequent extreme precipitation events

More Study Needed: Downscaled climate projections that provide local and regional predictions

Provide data to catalyze private sector: Report may be released at a state sponsored Water Technology Summit aimed at promoting cluster formation

Establish a collective understanding: Articulate the water industry's economic contributions and strengths

Maintain competitiveness: Identify larger efforts that take collaboration across many companies and sectors

Minnesota's Water Industry & Economy Profile

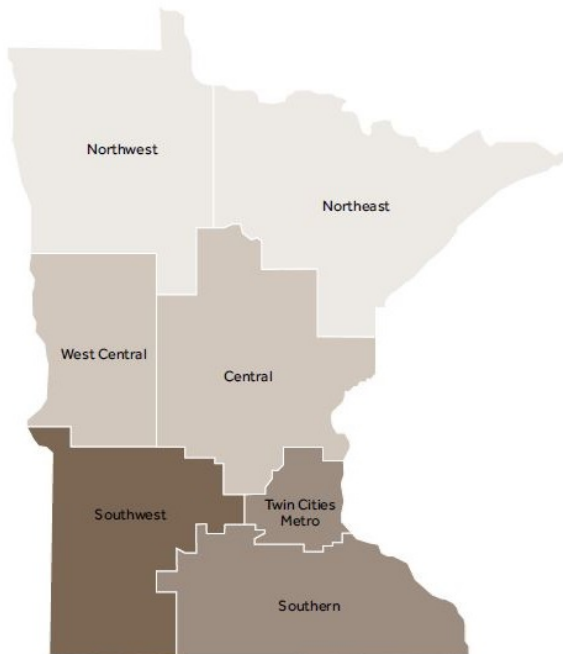
Analysis by The Environmental Quality Board (EQB) and Department of Employment and Economic Development (DEED) will document the state's environmental and economic water resources. This work will provide original analysis and give the most comprehensive review of the size, scope, and trends in Minnesota's water industry employment, wages, and investment. Furthermore, the document will serve as a baseline to measure future growth and assess ways to support industry competitiveness.



Results

Minnesota's Water Industry & Economy Profile is an important step forward in defining and scoping the state's water industry. A holistic understanding of trends in labor market characteristics, innovation, and investment helps companies and policy makers identify how to improve industry competitiveness. For instance, the report could observe the need for collective approaches like aligning workforce development programs, higher education, and industry or working with universities and private sector partners to seed a water innovation lab.

Scope



Minnesota's Water Industry & Economy Profile will identify the characteristics and trends in employment, wages, and total payroll in Minnesota's seven planning regions from 2000 to 2014. In addition to these labor market measures, the analysis will collect and organize a range of existing research on industry investment, patents, educational programs, and exports. In doing so, the report hopes to inform elected officials and the public on the importance of the industry to the state's economy, as well as barriers to future growth.

Example Water Products and Solutions



Method: Industry Survey & Administrative Data Sets

The research team will draw on a process developed for Pew's *Clean Energy Economy* (2009) and refined in *Minnesota's Clean Energy Economy Profile* (2014). This method includes an intensive search of administrative datasets for relevant employers and a survey to statewide water industry employers.