

**Environment and Natural Resources Trust Fund  
2011-2012 Request for Proposals (RFP)**

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**LCCMR ID: 153-F3+4**

**Project Title:** Low Environmental Impact Sustainable Neighborhoods

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**Category:** F3+4. Renewable Energy

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**Total Project Budget:** \$ \$800,000

**Proposed Project Time Period for the Funding Requested:** 2 yrs, July 2011 - June 2013

**Other Non-State Funds:** \$ 0

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**Summary:**

A groundbreaking approach to climate change, air pollution, stormwater, and energy reduction in existing neighborhoods built upon a community driven "mini-district" system to sharply curtail demand, and incorporate renewable energy.

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**Sponsoring Organization:** U of MN

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**Location:**

**Region:** Metro

**Ecological Section:** Minnesota and NE Iowa Morainal (222M)

**County Name:** Hennepin, Ramsey

**City / Township:** Minneapolis, St. Paul

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|--------------------------|-------------------------|-----------------------------|----------------------|
| _____ Funding Priorities | _____ Multiple Benefits | _____ Outcomes              | _____ Knowledge Base |
| _____ Extent of Impact   | _____ Innovation        | _____ Scientific/Tech Basis | _____ Urgency        |
| _____ Capacity Readiness | _____ Leverage          | _____ Employment            | _____ TOTAL _____%   |

## 2011-2012 MAIN PROPOSAL

### PROJECT TITLE: Low Environmental Impact Sustainable Neighborhoods

#### I. PROJECT STATEMENT

This project addresses climate change, air pollution, water/stormwater management, and a ground-breaking approach to energy reduction in existing residential areas by developing a neighborhood scale or “mini-district” approach to sustainability and energy. A central component to the mini-district concept is the “eco hub.”

- Recent research suggests much greater energy efficiencies are possible with a “mini-district” approach serving a one- to nine-block area compared to simply retrofitting or adding renewable energy sources to individual houses.
- An “eco-hub” is a small building placed on a portion of a residential block, a vacant lot, or in a utility easement. The structure will house multiple forms of energy production, water systems and co-operative collection of recycling, waste, compost and support for community gardens.
- This mini-district approach is replicable and can be applied to any existing neighborhood in urban areas or moderate-sized towns throughout Minnesota.

This proposal is for the first phase of the development of a “Low Environmental Impact Sustainable Neighborhood.” It includes a comprehensive feasibility study, selection of two neighborhoods for initial deployment, and final prototype system design. The goals of the project are to:

- Develop a replicable, cost-effective neighborhood mini-district design and to provide heating and cooling to houses approaching “net zero” energy for the neighborhood. The system takes advantage of economies of scale and higher efficiencies possible at the neighborhood level. The hub will incorporate water, storm water, and waste management to reduce environmental impacts and costs of these systems.
- Optimize energy conservation on individual houses achieving 50-70% savings in some cases.
- Utilize renewable energy sources for the neighborhood system to the maximum extent feasible to support household energy and transportation energy. These include solar thermal, solar electric, and bio-fuels that can support heat pumps, co-generation, and transportation fuels.
- Initial studies suggest that this local, mixed energy supply could meet or exceed the remaining household loads on an annual basis.
- Engage residents in forming a cooperative that provides economic benefits, strengthens community, and provides jobs while increasing savings with better education and participation.
- Provide a cost-effective method of replacing aging infrastructure in cities and towns.

The study will create a co-operative neighborhood mini district (potentially up to nine square blocks) in which home residents will participate in the execution and management of the “mini-district and eco-hub.” This plant will house central heating, energy production for homes and cars, water and waste management, and recycling. The residents will participate in programs that will enhance their ability to reduce loads on the water and energy systems by creating co-operative gardens, recycling, bio-fuels including recycled restaurant grease (for co-generation in diesel generators and cars) and waste bio-mass. Partnerships with the City and neighborhood groups will organize and build a long term, affordable, and sustainable community that will be desirable to live in.

#### II. DESCRIPTION OF PROJECT ACTIVITIES

**Activity 1: Conduct feasibility study for sustainable neighborhoods.** **Budget:** \$500,000

Research will be conducted in the areas of energy technology, regulatory, and consumer markets to ascertain baseline data and determine pathways to developing these components. We will conduct surveys and analysis in these areas to determine an effective focus for the project.

| Outcome   | Completion Date |
|---|-----------------|
| 1. Identify technologies that will work in neighborhood scale                 | Year 1          |
| 2. Determine regulatory barriers  | Year 1          |
| 3. Determine homeowners willingness to participate, design engagement process | Year 1          |
| 4. Determine optimal scale for neighborhood energy                            | Year 1          |

**Activity 2: Organize, plan and design system for two model neighborhoods** Budget: \$250,000  
 Demonstrate a neighborhood district residential sustainability plan in two strategic locations.

| Outcomes  | Completion |
|---|------------|
| 1. Plan/design a neighborhood “eco-hub” structure and technologies to be used | Year 2     |
| 2. Plan/design infrastructure for underground piping and electrical lines     | Year 1     |
| 3. Plan/design connection and controls for homes                              | Year 1     |

**Activity 3: Ongoing Reporting and Outreach** Budget: \$50,000

| Outcome  | Completion |
|--|------------|
| 1. Sharing results leading to replication                                  | Year 1-2   |
| 2. Developing partner relationship and synergy that will solidify outcomes | Year 1-2   |

### III. PROJECT STRATEGY

#### A. Project Team/Partners

The project will be managed by John Carmody at the Center for Sustainable Building Research and Pat Huelman of the Cold Climate Housing Program at the University of Minnesota. Other University team members are Institute of Sustainable Enterprise (Tim Smith), the Energy Systems Design Program (Louise Goldberg), and the Mechanical Engineering Department (Jane Davidson). Recruiting and developing partners is critical to implement the plan. Strategic partner selection will build an effective approach to low impact sustainable development at a neighborhood scale. Project partners include: City of Minneapolis (Gayle Prest); City of Saint Paul (Anne Hunt); University Neighborhood Alliance (Dick Gilyard); and the Xcel Energy Innovation Corridor project (Greg Palmer). Partners under contract will be Center for Energy and Environment (Sheldon Strom); Neighborhood Energy Connection (Chris Duffrin), and Kestrel Design (Peter MacDonaugh).

#### B. Timeline Requirements

**This project will be completed over a two year period. The activity breakdown is shown below:**

|   | Year 1 | Year 2 |
|---|--------|--------|
| Task 1: Conduct feasibility study for sustainable neighborhoods       | X      |        |
| Task 2: Organize, plan and design systems for two model neighborhoods | X      | X      |
| Task 3: Ongoing reporting and outreach                                | X      | X      |

#### C. Long-Term Strategy and Future Funding Needs

This Phase 1 feasibility and design study will provide the necessary cost and technical information to proceed with pilot projects after two years. During Phase 1, the team partners will work to secure funding for the construction and testing of the pilot projects in Phase 2. Federal research and demonstration funds and utility program funds will be sought for Phase 2. This project will provide a clear pathway leading to replicable projects in other neighborhoods and cities. The project will attempt to reduce complication and cost while creating a template that can be adjusted to suit various sustainable approaches. We believe this energy reduction platform will be transformative in terms of increasing the speed in which residential conservation and sustainability can spread across the country.

**2011-2012 Detailed Project Budget**  
**Low Environmental Impact Sustainable Neighborhoods**

**IV. TOTAL TRUST FUND REQUEST BUDGET**

**2 Years**

| <u>BUDGET ITEM</u>  | <u>AMOUNT</u>     |
|---|-------------------|
| <b>Personnel: [name, responsibility, % of time, % salary:% fringe benefits]</b> |                   |
| 1. John Carmody, Project Manager for Community Systems, 25%, 75%:25%            | \$ 91,605         |
| 2. Patrick Huelman, Project Manager for Building Systems, 20%, 75%:25%          | \$ 58,429         |
| 3. Louise Goldberg, Energy Systems Design, 20%, 75%:25%                         | \$ 64,314         |
| 4. Tim Smith, Market, Regulatory & Policy Analysis, 10%, 75%:25%                | \$ 30,325         |
| 5. Jane Davidson, Solar Systems Design, 5%, 75%:25%                             | \$ 28,569         |
| 6. Jonathan Chaplin, Energy Systems Analysis, 10%, 75%:25%                      | \$ 25,086         |
| 7. Richard Strong, Sustainable Planning & Design, 20%, 75%:25%                  | \$ 53,640         |
| 8. Tom Schirber, Building Systems & Outreach, 20%, 75%:25%                      | \$ 38,730         |
| 9. William Weber, Community Systems & Outreach, 20%, 75%:25%                    | \$ 38,730         |
| 10. Richard Stone, Building Systems & Outreach, 15%, 75%:25%                    | \$ 22,017         |
| 11. John Chapman, Water Systems, 10%, 75%:25%                                   | \$ 19,017         |
| 12. Garrett Mosiman, Building Systems, 15%, 75%:25%                             | \$ 21,945         |
| 13. Graduate Student 1, Energy Systems, 50%, 75%:25%                            | \$ 42,500         |
| 14. Graduate Student 2, Building Systems, 50%, 75%:25%                          | \$ 42,500         |
| <b>Contracts:</b>   |                   |
| 1. Center for Energy and Environment, Community Energy Assessment               | \$ 75,000         |
| 2. Neighborhood Energy Connection, Community Energy Assessment                  | \$ 75,000         |
| 3. Kestrel Design Group, Water Systems Design                                   | \$ 50,000         |
| <b>Equipment/Tools/Supplies: General Office Supplies, Modeling Software</b>     | \$ 16,593         |
| <b>Acquisition (Fee Title or Permanent Easements):</b>                          | N/A               |
| <b>Travel: Local &amp; In-state miles</b>                                       | \$ 6,000          |
| <b>Additional Budget Items:</b>   | N/A               |
| <b>TOTAL ENVIRONMENT &amp; NATURAL RESOURCES TRUST FUND \$ REQUEST</b>          | <b>\$ 800,000</b> |

**V. OTHER FUNDS**

| <u>SOURCE OF FUNDS</u>  | <u>AMOUNT</u> | <u>Status</u>  |
|---|---------------|----------------|
| <b>Other Non-State \$ Being Applied to Project During Project Period:</b> | \$ 58,429     | <i>Secured</i> |
| <b>Other State \$ Being Applied to Project During Project Period: .</b>   | \$ 22,017     | <i>Secured</i> |
| <b>In-kind Services During Project Period:</b>                            | N/A           |                |
| <b>Remaining \$ from Current ENRTF Appropriation (if applicable):</b>     | N/A           |                |
| <b>Funding History:</b>   | N/A           |                |

## Project Manager Qualifications and Organization Description

John Carmody is the Director of the Center for Sustainable Building Research at the University of Minnesota. He holds a Bachelors and Masters degree in Architecture from the University of Minnesota. He has worked in building-related research for 30 years and is the author of several books on building design and construction. These include *Window Systems for High Performance Buildings* with Lawrence Berkeley National Laboratory, and the new edition of *Residential Windows: A Guide to New Technologies and Energy Performance*. Mr. Carmody was one of the leaders of a team that developed the *State of Minnesota Sustainable Building Guidelines* required on State-funded buildings. In 2008, the Center received funding to lead the State of Minnesota in its transformation to zero net energy and carbon buildings by the year 2030. His work also includes research on life cycle assessment of materials, affordable housing, post occupancy evaluations, and the development of decision-making tools for designers.

In 1997, the Building Research Group was established in the College of Architecture and Landscape Architecture and later became the Center for Sustainable Building Research (CSBR) in the newly formed College of Design. CSBR staff consists of 11 architects and one administrator. Through research, outreach and education, the Center for Sustainable Building Research is engaged in the transformation of the built environment. Working with other research entities within the University as well as public and private organizations is critical to CSBR's mission. CSBR serves as a resource for State of Minnesota, the design professions, the building industry, and the general public.

*Research:* CSBR conducts research in the following areas:

- Sustainable guidelines, standards and policy
- Affordable housing
- Windows and glazing
- Other building technologies
- Life cycle assessment tools
- Building evaluation

*Outreach:* CSBR provides outreach and dissemination of information to the design professions, individual communities, and the public agencies in the State. A particularly important aspect of CSBR outreach activities is the Design Assistance Program in collaboration with the Regional Sustainable Partnerships. As part of outreach activities CSBR staff members speak frequently at public seminars and at conferences.

*Education:* CSBR staff members teach in the MArch and MS Arch programs at the college. They also provide guest lectures and support for classes in other CDes Departments as well as in other colleges at the University. CSBR staff members also teach numerous continuing education classes through the AIA, USGBC, ASHRAE and other professional groups.

CSBR receives funding from a wide range of sources. In the last five years these include:

- *Federal:* Department of Energy, Department of Housing and Urban Development, Department of Transportation, Environmental Protection Agency, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory
- *State and local government:* University of Minnesota, IREE, and MNSCU; Minnesota Pollution Control Agency, Minnesota Housing, Minnesota Departments of Administration, Commerce, Transportation, and Natural Resources; Hennepin, Dakota and other metro counties; the Cities of St. Paul and Minneapolis.
- *Other:* McKnight Foundation, Wilder Foundation, Target Corporation, 3M Corporation, Xcel Energy, Green Communities Program, US Green Building Council, Green Building Initiative, Yonsei University Center for Sustainable Housing, Athena Institute

