FROM THE OFFICE OF THE MAYOR **ADMINISTRATIVE PROCEDURE MEMORANDUM NO. 4-10**

SUBJECT: MOTOR MANAGEMENT PLAN

Purpose: In keeping with the City's vision and commitment of creating an ecologically, socially and economically sustainable green capital city, all City of Madison agencies will implement a Motor Management Plan that will help reduce energy consumption and costs.

Background: As a service provider, the City of Madison and its facilities and operations have a huge impact on the environment, the economy and our community. Because the City is both a steward of our environment and a consumer of its resources, it must incorporate the principles of sustainability to ensure that our current and future needs can be satisfied.

Using *The Natural Step* sustainability framework, the City is working to enhance the sustainability of its facilities and operations by reducing its consumption of fossil fuels and other materials extracted from the Earth, reducing its dependence on synthetic and persistent chemicals, and mitigating its impact on physical ecosystems. Because our community will not be truly sustainable unless our residents are healthy, safe and prospering, the City will continue to pursue policies and actions that minimize the barriers that get in the way of residents' ability to meet their basic needs. The City also intends to lead by example.

Motors account for a large portion of our total electricity consumption. The goal of this policy is to implement a Motor Management Plan that will help reduce energy consumption and costs by:

- Giving guidelines on proper motor size and maintenance;
- Proactively planning for replacement due to failure;
- Installing variable frequency drives (VFD's);
- Governing the number of times a motor is rewound; and
- Replacing motors before failure if doing so results in a payback of ten years or less.

Energy savings with a Motor Management Plan typically reduces energy consumption by 5% to 7%. The City could see energy savings for these pieces of equipment as high as 12%.

Policy:

For All Motors

For all motors, regardless of size, this policy requires staff to ensure the motor being used is the proper size for the load attached to it. Staff will perform all preventative and predictive maintenance tasks appropriate for each motor application. Staff will also use an overall system optimization approach to motors and consider the use of variable frequency drives (VFD's) to reduce energy consumption. The best solution may involve a VFD, a new motor, or both.

For Motors Over 20 Horsepower

The City will use the latest version of Motor Master Software (a software package developed by US-DOE) to build an inventory of all motors over 20hp. For each motor, this inventory will include nameplate data, estimated run hours, estimated load, electricity costs, and available rebates.

An hourly engineering position in the Facilities and Sustainability Unit will be responsible for working with staff in all City agencies to:

- Inventory all of our motors over 20hp;
- Enter make, model, load and other info into Motor Master
- Help the City identify optimal models for replacement upon failure; and
- Prioritize which motors can be replaced in the short-term for long-term savings.

Agency staff including electricians, engineers and technicians will be needed to help this position acquire information needed for the inventory. Some motors may be in secure areas and qualified staff must also be on hand to ensure safety.

The Motor Master inventory will be used for each motor to make a decision to:

1. Budget for its replacement and identify when its replacement should take place.
2. Add a VFD to increase efficiency and reduce consumption.
3. When failure occurs, either:
    a) Rewind the motor;
    b) Replace the motor with a National Electrical Manufacturers Association (NEMA) Premium motor;
    c) Replace the motor with a Consortium of Energy Efficiency (CEE) "super premium" motor; or
    d) Any of the above and addition of a VFD.

Planning and Budgeting Replacements

<u>When simple payback is 10 years or less, the motor should be replaced or upgraded as soon as possible</u>.

Staff will develop a plan with motor suppliers to stock or have available on short notice replacements for critical motors.

Supporting documentation for annual capital budget requests and the five-year capital improvement plan (CIP) will include a list of motors that will likely need replacement or repair and cost estimates. Beginning with the 2012 capital budget, the line item will be called "Motor Management Plan" and the dollar figure for each year in the CIP will be driven by the motors on the list and their estimated repair and/or replacement costs.

For all general fund agencies, this will be a single line item in the section of the budget for Engineering's Facilities and Sustainability Unit. For each enterprise fund agency, a separate "Motor Management Plan" line will be added to their sections of the budget.

To ensure consistent implementation across the City enterprise, the establishment of the motor inventory and management of all agencies' Motor Management Plans will be the responsibility of the Facilities and Sustainability Unit.

Other Requirements

1. Tag each motor with planned decision to clearly communicate replacement/repair actions at time of failure.
2. Never rewind motors less than 20hp. Simple replacement of these smaller motors with current production is more economical.
3. Never rewind motors more than once. Each rewind causes a motor to lose efficiency.
4. Never rewind heat damaged motors. Motors are often burnt out because they cannot meet the demands of their load or run time. Rewinding them makes them less efficient.
5. Always replace a motor if rewinding it costs 60% or more of a new motor.
6. If motors are rewound, always rewind to Electrical Apparatus Service Association (EASA) standards.

For Motors Under 20hp

At the time of failure, staff will determine whether to replace these smaller motors with NEMA Premium motor or CEE “super premium” motor.

In this determination, staff will use information from name plate data, run hours, estimated load, electricity costs, availability of replacements, availability of rebates, and if applicable Motor Master software.

David J. Cieslewicz
Mayor

APM No. 4-10
November 18, 2010