

ENR09 – Variable frequency drive electric motors

| WASHINGTON | CSP Enhancement Washington State Supplement | |
|---|---|---------------------------|
| Land Use Applicability: Cropland, Pastureland, Rangeland, Forestlar | | and January 2014 |
| Client/Operating Unit: | | Tract Number: |
| Farm/Ranch Location: | | Farm Number: |
| Specifications Date: | | Field Number(s): |
| Planned Installation Date: | | Proposed Treatment Acres: |
| Enhancement Description: | | Table of Contents |

This enhancement activity is for upgrading of existing single speed electric motors through the addition of variable frequency electric drives. A motor replacement may also be included in some cases. The primary use of this enhancement is for water pumping whether for irrigation, drainage or livestock watering. This enhancement is not intended for farmstead or animal housing applications.

Benefits

Motor-drive systems are matched to the pump or other machinery which performs the work that needs to be done. Each motor-drive system must be sized to meet the maximum expected load even if that maximum load only occurs infrequently. This maximum output condition is rarely the most efficient operating point of the motor-drive system. A variable frequency drive improves the system's energy efficiency under most operating conditions by matching the motor speed to the load. In contrast, the output of a single speed motor-drive system will rarely match the actual demand and is controlled in some way that often wastes a large part of the power it produces. Single speed electric motor-drive systems use more electricity during startup and as operating requirements vary during the run cycle. A variable frequency drive can start a motor slowly and ramp up to full speed reducing wear and tear on the motor.

Variable frequency drives achieve higher energy savings in applications with long annual run-times and when the system operates outside its best efficiency point for long periods of time. Equipment which operates with frequent on/off cycles or uses some kind of mechanical throttling (dampers on air systems or valves in liquid systems) are typically good candidates for a variable speed drive.

Motor-drive systems which generally operate under steady load conditions are not good candidates for variable speed drives.

Conditions Where Enhancement Applies

This enhancement applies to only the number of single speed electric motors without variable speed drives within the selected land use. This enhancement does not apply to single speed electric motors for farmstead or animal housing applications.

Criteria for variable frequency drive electric motors

- 1. Determine current and anticipated requirements in terms of peak and typical load conditions (as the load varies daily and by season, crop, or other appropriate activity).
- 2. Retrofit single speed electric motors with a variable frequency drives or replace single speed electric motors with an efficient motor and variable speed drive.

ENRO9 Page 1 of 3

Layout Sketch & Drawing (Provide sketch, drawings, maps, and/or aerial photographs.)

• Geo-referenced field map with all delineated treatment areas where CSP Enhancement ENR09 is to be applied.

Adoption Requirements

This enhancement is considered adopted when the selected single speed motor has been retrofitted or replaced with a variable speed drive.

Documentation Requirements

Receipts and pictures of the installed variable frequency drive(s).

References*:

US-DOE. 2001. GREENING FEDERAL FACILITIES: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers. 2nd ed. Part V Energy Using Systems. 5.7.2 Variable-Frequency Drives.

http://www1.eere.energy.gov/femp/pdfs/29267-0.pd

Field Office Technical Guide:

eFOTG, http://www.nrcs.usda.gov/technical/efotg/

Adjustable Speed Motor Drives; Energy Efficiency Fact Sheet Washington State University Cooperative Extension

https://pubs.wsu.edu/ItemDetail.aspx?ProductID=15186

USDA-NRCS WA Engineering Technical Note #20: Variable Frequency Drive (VFD) for Irrigation Pumping (A User's Guide for Conducting Economic Comparisons)

http://efotg.sc.egov.usda.gov/references/public/WA/ENG TN 20 041511.pdf

State Supplemental Information

None

ENR09 Page 2 of 3

^{*} Some online documents may take several minutes to download.

| Client Documentation | ENR09 | | |
|--|--|--|--|
| Documentation Form | | | |
| Producer: Da | te: | | |
| Tracts: Coun | ty: | | |
| Receipts and pictures of the installed variable frequency drive(s). | | | |
| Client's Acknowledgement (To be signed before the Enhancement is applied.) | | | |
| By signing below, I acknowledge that I: ● have reviewed and understand the site specific design, installation specifications and operation/maintenance requirements in this State Supplemental Sheet and have an understanding of the purpose(s) of this Enhancement; | | | |
| will install, operate, and maintain this Enhancement in accordance with the National Sheet, the Washington State Supplemental Sheet and the site specific specifications. | | | |
| will make no changes to the planned design and installation without prior written approval of the Natural Resources Conservation Service. | | | |
| will obtain all necessary permits and/or rights, and comply with all ordinances and laws pertaining to the installation, operation, and maintenance of this Enhancement, prior to the start of installation; and | | | |
| will assume responsibility for notifying all Utilities aff maintenance of this Enhancement. | ected by the installation, operation and | | |
| | | | |
| Signature | Date | | |

USDA is an equal opportunity employer and service provider.

ENR09 Page 3 of 3