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An Overview of Motor and Drive Measures

Agenda

- Program Overview
- Measure Categories
- Review of eligible technologies, rules, and application forms for:
 - Variable Frequency Drives
 - High Efficiency Motors
 - Notched and Synchronous Belts
- Allocating Costs
- Q&A Period



Presenters



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About ERA

MANDATE

Reduce GHG emissions and grow Alberta's economy by accelerating the development and adoption of innovative technology solutions.

VISION

Alberta has competitive industries that deliver sustainable environmental outcomes, attract investment, and are building a diversified, lower carbon economy.

STRATEGIC PRIORITIES



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Measure Categories

Compressed air

Solar PV

Lighting systems and controls

Motors and drives

Combined heat and power
(CHP)

Refrigeration

Geothermal

COMING SOON

Water
heating

HVAC

Process
heating

Food
service

Building envelope
and windows



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Eligible Motor & Drive Measures Types

Variable Frequency Drives (VFDs)

High Efficiency Motors

Notched or Sync Belts



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Variable Frequency Drives (VFD)

- Same process outcome, less energy use
- Exponential energy savings associated with moving volumes
- Many applications from ventilation to mining



$$Q \propto N \text{ or } \frac{Q1}{Q2} = \frac{N1}{N2}$$

$$H \propto N^2 \text{ or } \frac{H1}{H2} = \frac{N1^2}{N2^2}$$

$$P \propto N^3 \text{ or } \frac{P1}{P2} = \frac{N1^3}{N2^3}$$



VFDs – Specific Rules

- Can only be installed to control pump or fan motors between 1-100 hp
- Can only be installed in retrofit situations, not new construction
- Incentive is based on the size of the motor (\$125/hp)
- Specification sheet for VFD must be provided



Variable Frequency Drives Application

STEP 1

Select the type of control on the motor prior to installing the VFD.

Measure Category

Motors and Drives

Measure Type

VFD

Measure

Select a Measure

VFD for Fan - ON/OFF CONTROL : Motor size 1 -100 HP

VFD for Fan - INLET DAMPER CONTROL : Motor size 1 -100 HP

VFD for Fan - DISCHARGE DAMPER CONTROL : Motor size 1 -100 HP

VFD for Pump - Throttle Valve : Motor size 1 -100 HP

VFD for Pump - Recirculation : Motor size 1 -100 HP



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Variable Frequency Drives Application

STEP 2

Provide the required information.

NOTE: Quantity refers to the number of VFDs, not the HP.

Quantity

Enter here

Fan Type

Select from list

Drive Type

Select from list

Centrifugal Blade Type

Select from list

Axial Blade Type

Select from list

Existing Flow Control for Fan

Type here

Rated Full Load CFM of Fan

Type here

Fan Nameplate



Select from computer (or) Drag and Drop documents to upload. Acceptable file types: .JPEG, .PNG, .PDF, .Docx, .xlsx

Fan Manufacturer

Type here

Fan Model

Type here

Motor HP i

Enter here

Estimated Annual Operating Hours i

Enter here



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Variable Frequency Drives Application

STEP 3

The emissions reduction estimates are automatically calculated. Review all costs to ensure they have been accurately recorded.

Note: Installation costs should be included in the labour costs. All other costs should be included in the design costs.

Per Unit Emissions Reduction

6.27

Total Emissions Reduction - VFD for Fan/Pump Motor

Calculated value

Equipment & Material Costs ⓘ

Enter here

Labour Cost ⓘ

Enter here

Design Cost ⓘ

Enter here

Total Cost

Calculated value



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Variable Frequency Drives Application

STEP 4

Review the calculated values.

The **Measure Incentive** is the incentive based on the measures list. The **Maximum Eligible Measure Incentive** is the calculated incentive cap relative to the total eligible project cost. The **Total Eligible Measure Incentive** is the lower of the two above values.

Incentive Per Unit

\$125.00

Measure Incentive - VFD for Fan/Pump Motor ⓘ

Calculated value

Maximum Eligible Measure Incentive - VFD for Fan/Pump Motor ⓘ

Calculated value

Total Eligible Measure Incentive - VFD for Fan/Pump Motor ⓘ

Calculated value



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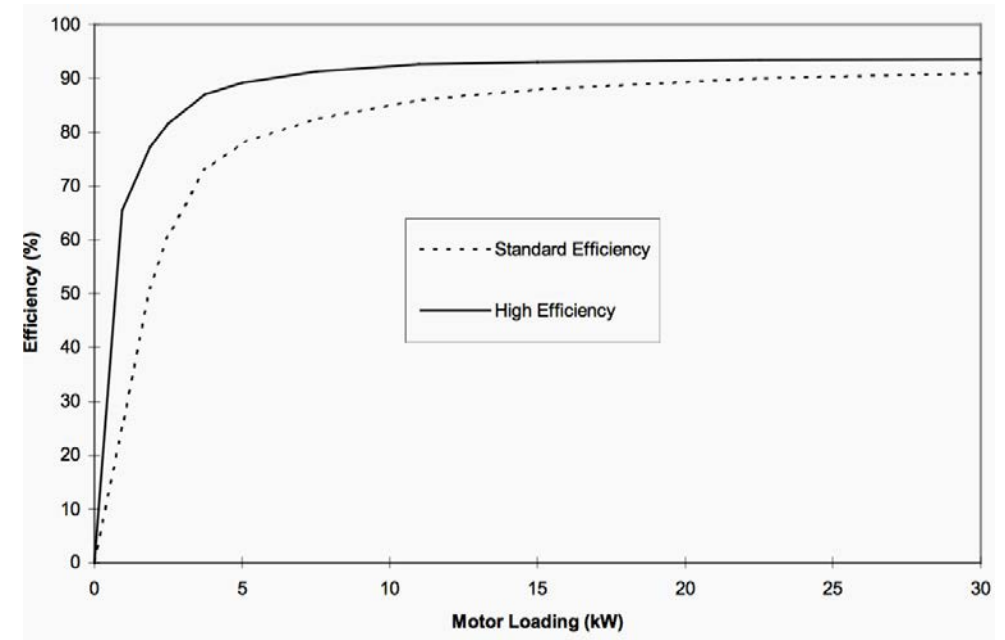
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High Efficiency Motors

- Better engineering, more efficiency motors
- A few percentage points, with lots of load, and high utilization can save a lot of energy.



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Requirements for High Efficiency Motors

- Incentive is based on the size of the motor
- Specification sheet for motor must be provided
- Must be installed in retrofit situations — new construction is not eligible
- Motor must meet minimum NEMA premium efficiency guidelines
- Size ranges between 1-500 hp
- Can cover Open Drip Proof and Total Enclosed Fan Cooled types



High Efficiency Motors Application

STEP 1

Select the type of motor (ODP or TEFC) and the size in HP.

Measure Category

Motors and Drives

Measure Type

Premium Efficient Motors - ODP

Measure

Premium Efficient Motors - 1 HP

Premium Efficient Motors - 1 HP

Premium Efficient Motors - 1.5 HP

Premium Efficient Motors - 2 HP

Premium Efficient Motors - 3 HP

Premium Efficient Motors - 5 HP

Premium Efficient Motors - 7.5 HP

Premium Efficient Motors - 10 HP

Premium Efficient Motors - 15 HP



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High Efficiency Motors Application

STEP 2

Provide the required information.

Quantity

Enter here

Estimated Annual Operating Hours ⓘ

Enter here

Existing Motor Nameplate Picture



Select from computer (or) Drag and Drop documents to upload. Acceptable file types: .JPEG, .PNG, .PDF, .Docx, .xlsx

Existing Motor HP

Enter here

Existing Motor Efficiency

Enter here

Existing Motor Age

Enter here

Is the Existing Motor Single or Dual Speed?

Single Speed

Dual Speed

Was Motor Previously Rewound?

Yes

No

Driven Equipment Details

Select from list

New Motor Efficiency

Enter here

Speed of New Motor

Select from list

Specification Sheet of New Motor



Select from computer (or) Drag and Drop documents to upload. Acceptable file types: .JPEG, .PNG, .PDF, .Docx, .xlsx



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High Efficiency Motors Application

STEP 3

The emissions reduction estimates are automatically calculated. Review all costs to ensure they have been accurately recorded.

NOTE: Installation costs should be included in the labour costs. All other costs should be included in the design costs.

Per Unit Emissions Reduction

0.258723

Total Emissions Reduction

Calculated value

Equipment & Material Costs ⓘ

Enter here

Labour Cost ⓘ

Enter here

Design Cost ⓘ

Enter here

Total Cost

Calculated value



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High Efficiency Motors Application

STEP 4

Review the incentive calculations.

The **Measure Incentive** is the incentive based on the measures list.

The **Maximum Eligible Measure Incentive** is the calculated incentive cap relative to the total eligible project cost. The **Total Eligible Measure Incentive** is the lower of the two above values.

Incentive Per Unit

\$15.00

Measure Incentive ⓘ

Calculated value

Maximum Eligible Measure Incentive ⓘ

Calculated value

Total Eligible Measure Incentive ⓘ

Calculated value



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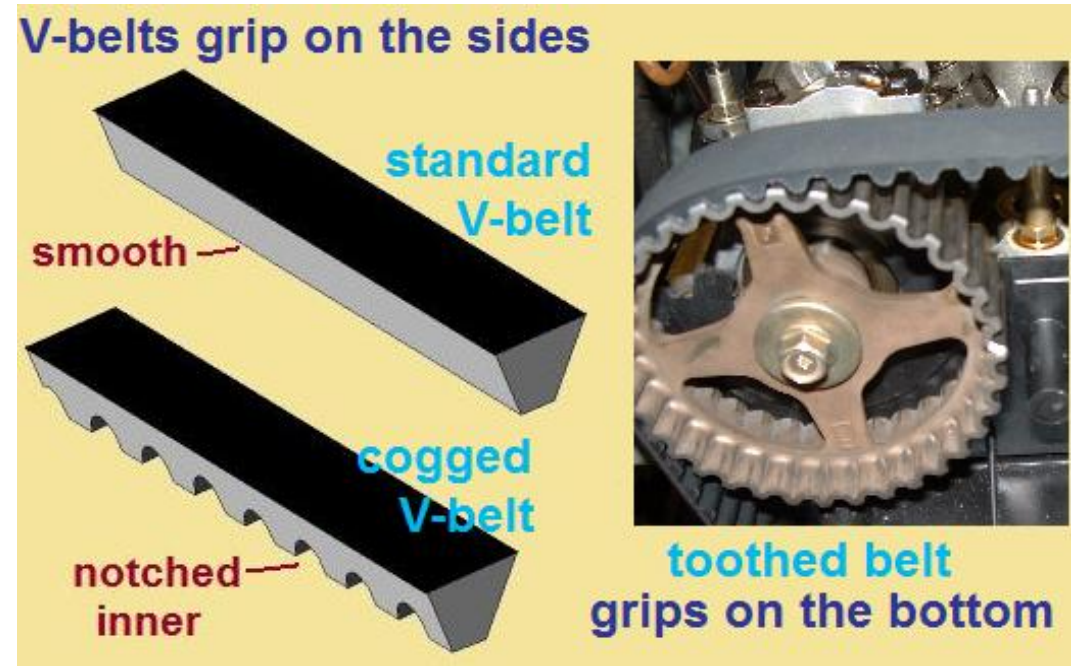
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Notched or Synchronous Belts

- More grip, less slip
- Friction = heat, heat = waste
- Process belts reduce maintenance obligations, improve efficiency and are cost effective



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Requirements for Notched or Synchronous Belts

- Two categories for incentives:
 - \$20 per belt under 6 feet
 - \$40 per belt 6 feet and longer
- The pulley system must be replaced if using a synchronous belt



Notched or Synchronous Belts Application

STEP 1

Select the measure and the length.

Measure Category

Motors and Drives

Measure Type

Notched or Synchronous Belt Retrofits

Measure

Notched or Synchronous Belt Retrofits - Shorte..

Notched or Synchronous Belt Retrofits - Shorter Lengths (Under 6 feet)

Notched or Synchronous Belt Retrofits - Medium and Longer Lengths (6 feet and up)



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Notched or Synchronous Belts Application

STEP 2

Provide the required information.

Driven Equipment Details

Select from list

Approximate Length of Belt (Feet)

Enter here


New Belt Specification Sheet



Select from computer (or) Drag and Drop documents to upload. Acceptable file types: .JPEG, .PNG, .PDF, .Docx, .xlsx

Quantity

Enter here

Estimated Annual Operating Hours 

Enter here

Existing Motor Nameplate Picture



Select from computer (or) Drag and Drop documents to upload. Acceptable file types: .JPEG, .PNG, .PDF, .Docx, .xlsx

Existing Motor HP

Enter here

Existing Motor Efficiency

Enter here

Existing Motor Age

Enter here



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Notched or Synchronous Belts Application

STEP 3

The emissions reduction estimates are automatically calculated. Review all costs to ensure they have been accurately recorded.

NOTE: Installation costs should be included in the labour costs. All other costs should be included in the design costs.

Per Unit Emissions Reduction

0.258723

Total Emissions Reduction

Calculated value

Equipment & Material Costs ⓘ

Enter here

Labour Cost ⓘ

Enter here

Design Cost ⓘ

Enter here

Total Cost

Calculated value



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Notched or Synchronous Belts Application

STEP 4

Review the calculated values.

The **Measure Incentive** is the incentive based on the measures list. The **Maximum Eligible Measure Incentive** is the calculated incentive cap relative to the total eligible project cost. The **Total Eligible Measure Incentive** is the lower of the two above values.

Incentive Per Unit

\$15.00

Measure Incentive ⓘ

Calculated value

Maximum Eligible Measure Incentive ⓘ

Calculated value

Total Eligible Measure Incentive ⓘ

Calculated value



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Allocating Eligible Expenses for Incentive Calculations

- The Maximum Eligible Measure Incentive is 50% of the project costs.
- If a project requires splitting costs between measures, please provide an estimate (see next slides).

Incentive Per Unit

\$15.00

Measure Incentive ⓘ

Calculated value

Maximum Eligible Measure Incentive ⓘ

Calculated value

Total Eligible Measure Incentive ⓘ

Calculated value



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Example for Allocation of Project Costs

A building is installing VFDs for two of their HVAC fans, one which is on a 25 HP motor and one which is on a 15 HP motor.

The project has the following costs:

- Equipment Cost for 25 HP VFD - \$6,000
 - Potential incentive: $25\text{hp} \times \$125/\text{hp} = \$3,125$
- Equipment Cost for 15 HP VFD - \$3,500
 - Potential incentive: $15\text{hp} \times \$125/\text{hp} = \$1,875$
- Labour Cost for Installing Both VFDs - \$1,000
- Design Cost for Sizing Both VFDs - \$500



Example for Allocation of Project Costs

The labour and design costs must be split between the two measures using an estimated allocation.

Here, the costs between the two VFD measures are evenly split.

	25 HP VFD	15 HP VFD
Equipment & Material Costs	\$6,000	\$3,500
Labour Cost	\$500 (50%)	\$500 (50%)
Design Cost	\$250 (50%)	\$250 (50%)
Total Measure Cost	\$6,750	\$4,250
Eligible Measure Incentive	\$3,125	\$1,875

Per Unit Emissions Reduction

6.27

Total Emissions Reduction - VFD for Fan/Pump Motor

Calculated value

Equipment & Material Costs ⓘ

Enter here

Labour Cost ⓘ

Enter here

Design Cost ⓘ

Enter here

Total Cost

Calculated value



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Project Cost Allocation in the Application

If allocating project costs between measures, please provide a document with the allocation descriptions in step 5 of the Pre-Project Application.



Documents



Select from computer (or) Drag and Drop **Invoices and Quotes** and **Specification Sheets** as required to upload. Acceptable file types: .JPEG, .PNG, .PDF, .docx, .xlsx



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Support Team

Website: eralberta.ca/esb

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Phone: 1-844-407-0025

By chat on the ERA website and program portal

Thank you. See you next time.



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