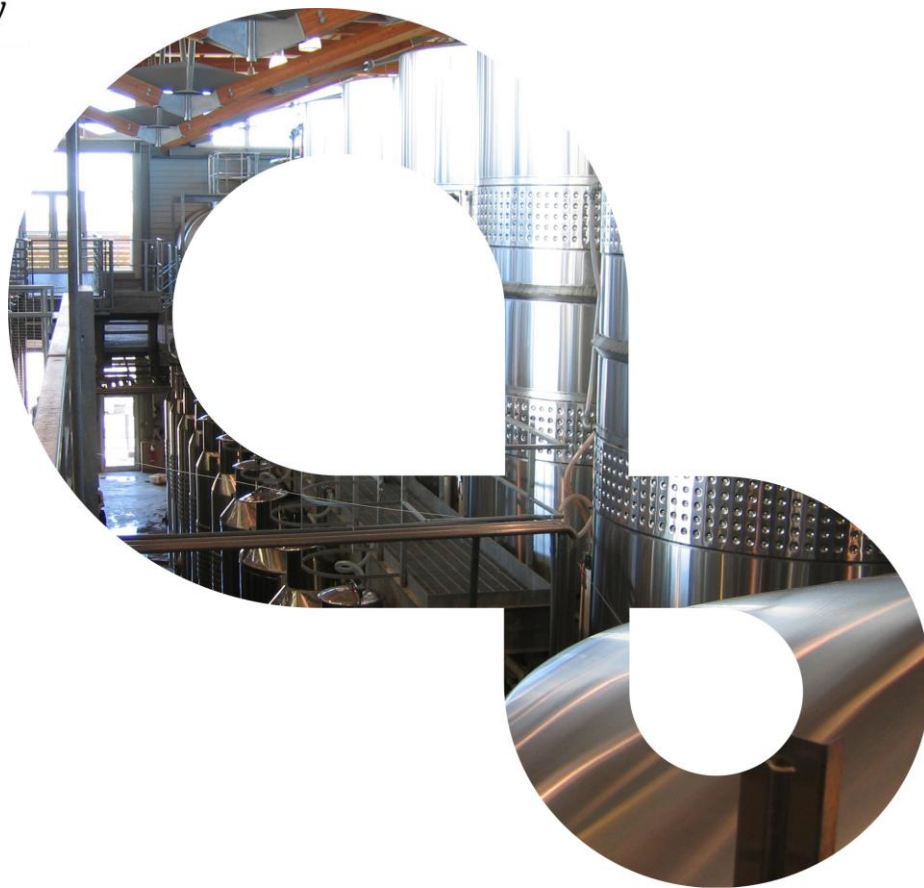


ENERGY EFFICIENCY IN ELECTRIC MOTORS IN TESLA SECTORS

25th June, Brussels

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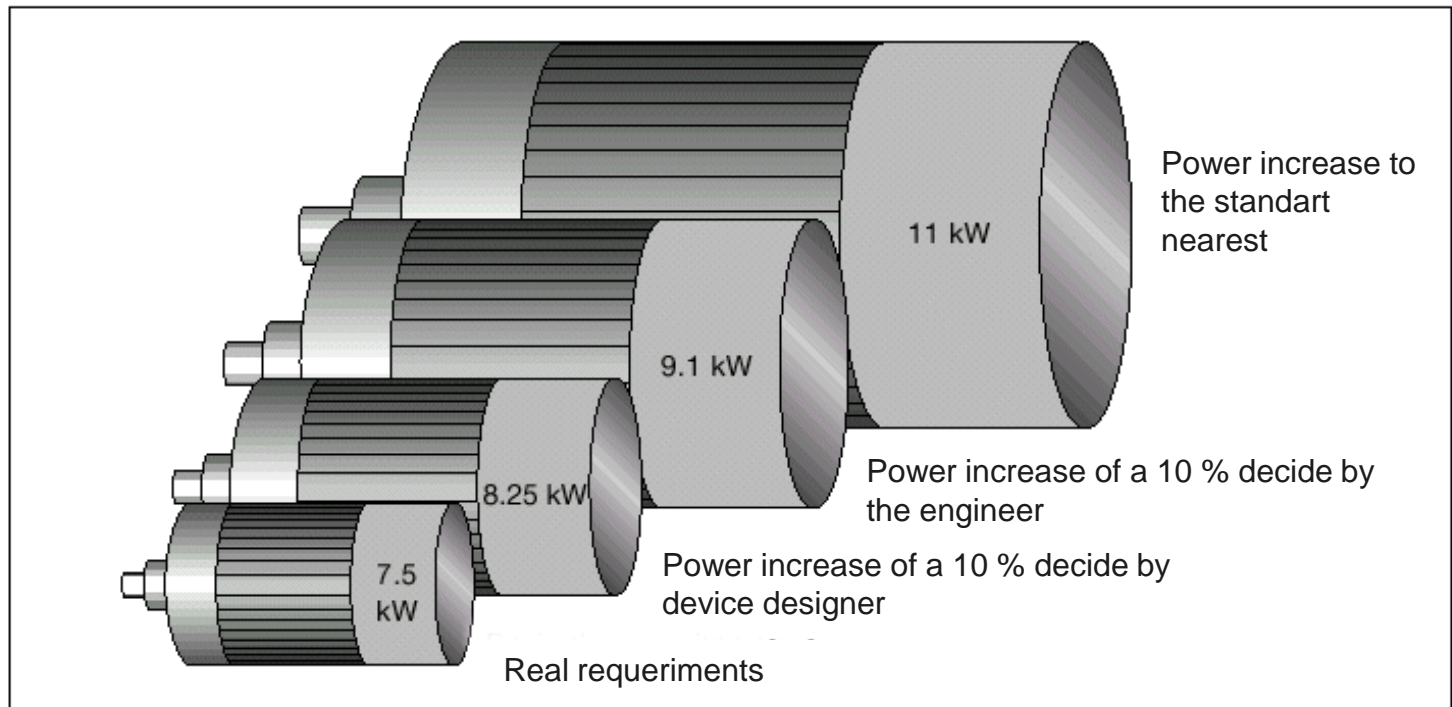
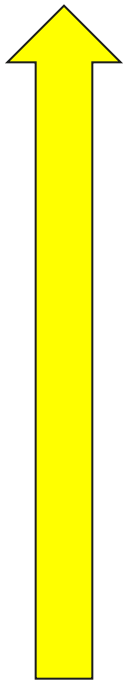
Co-funded by the Intelligent Energy Europe
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- What are the opportunities to save energy in electric motors?
- **1.- To do an inventory of electric motors that are installed in the cooperative with the following methodology:**
 - a) Identify the motors and the associated process (pumping, ventilation, drives...)
 - b) Identify the electric characteristics: Power, demand current, voltage, power factor, operation regime.
 - c) To know how many hours operates the motor?
 - d) Starting device and control: inverter, turn on star – triangle, static turn on
 - e) Maintenance programme

- What are the opportunities to save energy in electric motors?
- **2.- Accurate selection of the motors:**
 - a) It is very common to see oversized motors. It causes too high nominal power with respect to the nominal power needed to cover the needs.
- An oversizing provokes:
 - An increase in the losses
 - An increase in the power installed
 - A reduction in the electric power factor ($\cos \varphi$)
 - A global energy consumption reduction in energy efficiency in processes

- What are the opportunities to save energy in electric motors?
- **2.- Accurate selection of the motors :**

More than necessary energy consumption



- What are the opportunities to save energy in electric motors?
- **3.- Replace old engines by new ones:**
- From 1965 electric engines have been improve and as a consequence currently different in efficiency from 3 % to 7,5 % according the electric power can be achieved.
- In old engines with too many operation hours the efficiency has been reduced so it results interesting to measure the performance of them.

$$P = \sqrt{3} V_l \times I_l \times \cos \rho$$



- What are the opportunities to save energy in electric motors?
- **3.- Replace old motors by new ones with high efficiency.**
- Currently the requirements of the EN 60024-30 published by the European Commission classify the efficiency energy in motors in the range from 0,75 kW – 375 kW, of 2, 4 and 6 poles

Classification

IE1: Motors with a standard efficiency. Similar to EFF2

IE2: High efficiency motors, similar to EFF1

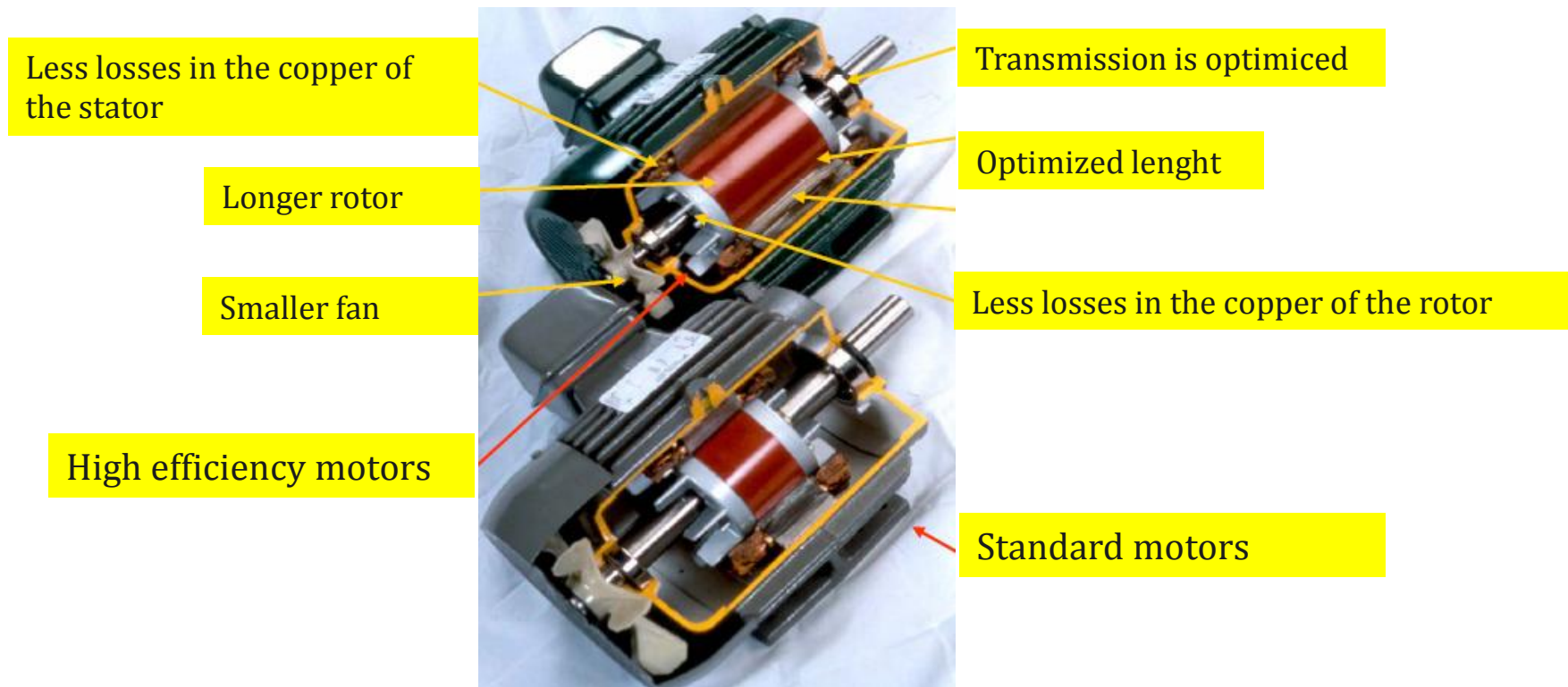
IE3 : Premium efficiency motors. Losses are reduced to 15 %. They are similar to EFF2

IE4: Super premium efficiency motors, similar.

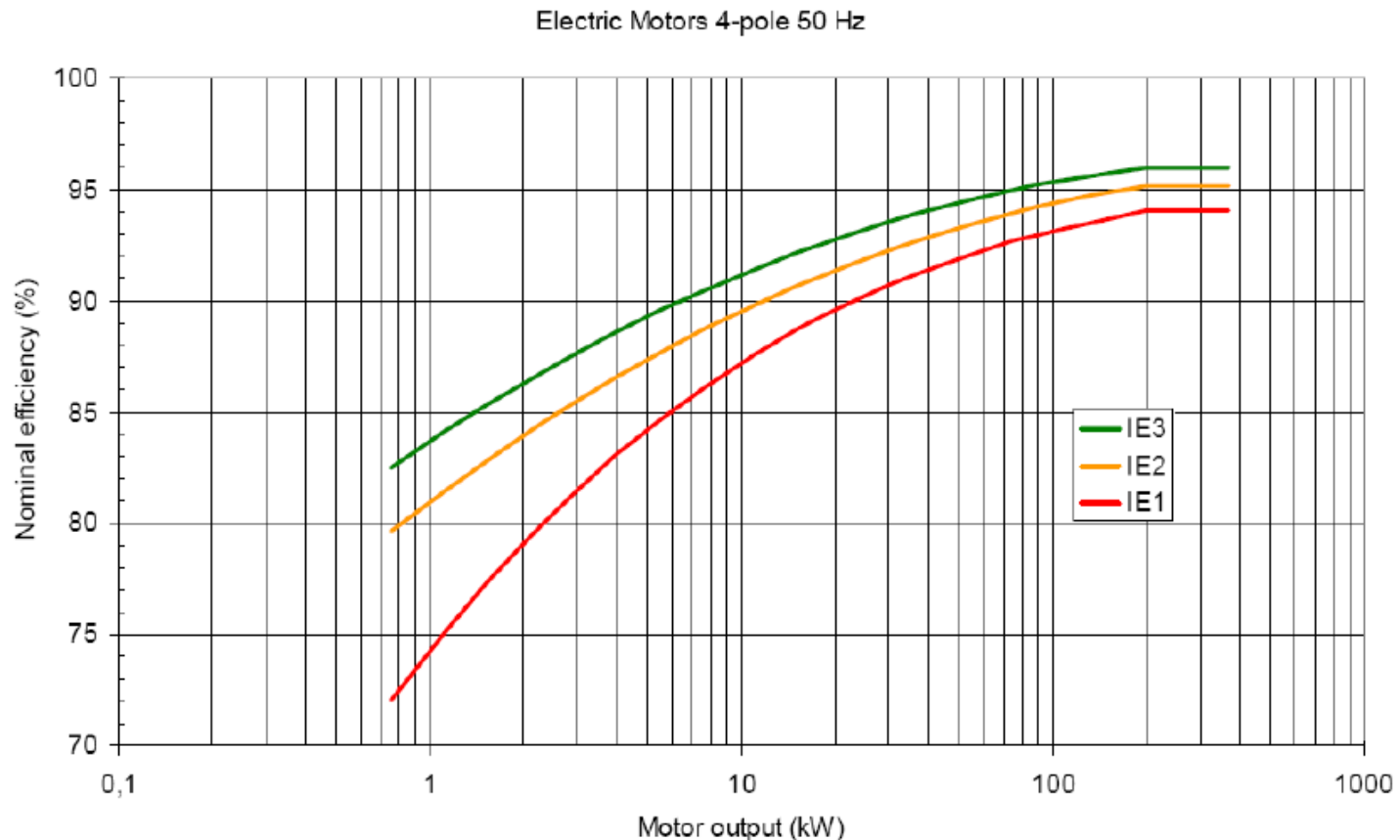
IE4: Ultra premium efficiency motors.

- What are the opportunities to save energy in electric motors?
- **3.- Replace old motors by new ones with high efficiency.**
- Characteristics of high efficiency energy motors:
 - More drivers surface so the resistance is lower and the losses by Joule effect (Losses = $I^2 \cdot R$) will be decreased
 - Use of steel with better magnetic properties.
 - Ventilation losses are reduced due to the better design.
 - They operate at lower temperatures
 - They endure better the voltage variance and the harmonics existence
 - The power factor are higher
 - They are quieter
 - The operation lifetime is higher

- What are the opportunities to save energy in electric engines?
- **3.- Replace old engines by new ones with high efficiency.**



- What are the opportunities to save energy in electric motors?
- **3.- Replace old mototrs by new ones, with high efficiency**



- What are the opportunities to save energy in electric motors?
- **4.- Install speed drives**

The aim is to modify motor speed to be sure that it always works in optimal conditions.

There are devices like (pumps, fans, elevators, compressors or conveyors) that operate at variable charge.

In these devices, it is interesting to be able to modify motor rotation speed. Thus, the device will be operating in optimum condition and will not demand more than necessary power.



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Profits:

- Saving up to 40 % of energy
- To increase lifetime of all components
- Less noise



Example of electric motors in reception stage



There are different types of press. The most common ones are pneumatic, but there are also old devices use in case of emergency



Cooling production is the most energy consuming process. Therefore, cooling systems have to be studied in depth.

After filtration phase, wine is bottled.



Automation devices with chain transportation and specific machines are used

In reception phase, motors to move conveyors are needed.





Mills are located after the storage station and electric motors are needed.



- Centrifugation processes needs big electric motors to move the raw materials and to separate phases.
- Electric motors with power installed around 30 kW are needed.
- This is the highest energy consumption process in this kind of cooperative



- Mixing process is very important and big electric motors are used in it.



- In these processes, motors' power is in the range from 50 kW to 150 kW, according ly with the size of the plant.



- To mixture raw materials, small electric motors are needed.



- The product is granulated by a machine. This machine needs big electric motors to do it.



- Before packaging, the product is dried by fans.
- These fans are very adequate to install speed drivers in them.



- Finally, the product can be packaged or stored to be supplied in bulk.



- In reception phase the materials are inside of containers or boxes.
- It is very common to have machines to download the material.

Drying



Handling and classification





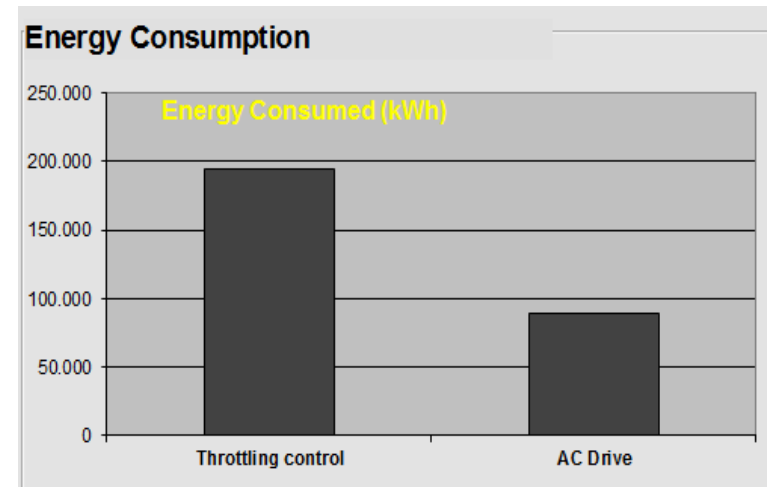
- In this kind of devices ,the use of small electric motors is very common. These motors are used to activate chains and transporters.



- After the reception, the cleaning and drying processes are common. In these cases, electric energy to activate motors and fans is needed.

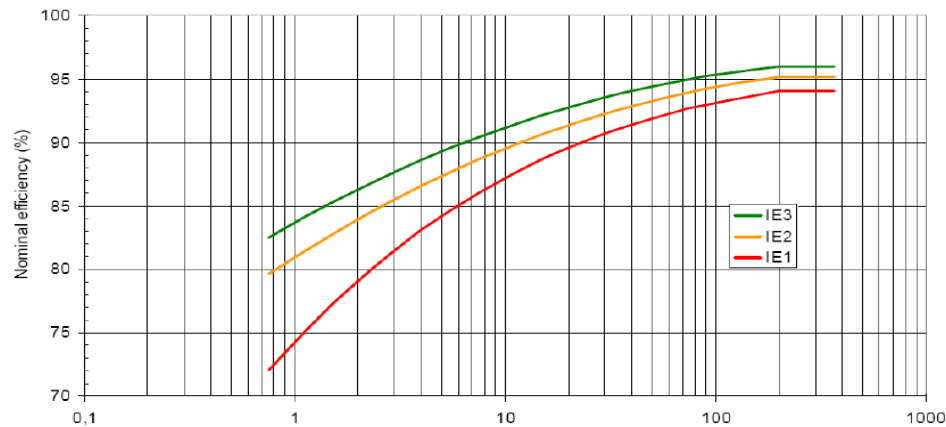


“Grape reception phase improvement, by means of speed drivers”



- There is a great potential to save energy and money, and to decrease CO2 emissions, by using speed drivers.
- Nowadays, only 10% of all motors are equipped with speed drivers. Energy savings depends on motors: power, load, motor operation profile and yearly operation hours. However, several wine cooperatives have already incorporated this system with successful results.
- As an example (and in order to present some figures) potential savings achieved by installing this system may be up to 50 % of energy, compared with motors without speed drivers installed.

“Grinding and pelleting phase improvement”



- A typical motor used in this process can have 110 kW. With this power, energy performance in IE3, 4 poles and 50 Hz motors is 95,8 %.
- Considering the change of old 4 poles motor with a performance of 85 % that operates 2.500 hours.
- The annual energy savings achieved would be around 29.700 kWh, which means economic savings of more than 5.000 €/yr.

Thanks for your attention



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