Ecoinflow
SawEnMS

Night Owl Walk

A quick guide for finding low-hanging energy fruits

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Night Owl Walk – a quick guide for finding low-hanging energy fruits

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This guide is a part of the Ecoinflow SawEnMS handbook and is intended to provide useful extra information for sawmills that want to perform a Night Owl Walk.

In this context, Night Owl Walk means to walk around the sawmill to find unnecessary energy use. The main purpose of this guide is to help identify what has been left on after production hours that can easily be turned off. Additionally, when the production areas are still and quiet it is easier to find pneumatic air leakages as well as getting a sense of the order and tidiness at the plant.

Preparations

Team up with someone else

Two pair of eyes find much more than one pair. Bringing along someone who is responsible for production or maintenance might make change happen faster.

New eyes are more curious than old ones, and curiosity is not to be underestimated. To increase the likelihood of finding unexpected savings, swapping with a person from another site/unit or bringing a newly employed person might help during the walk.

Hush!

Do not tell anyone about the Night Owl Walk in advance. People like to be good and can start switching off things they normally never touch if they know you are going to check these things. Keep the information within the nearest involved managers. This is not to point fingers towards someone or find “bad guys”, it is only a way of not tampering with the workplace that is being examined – you want to examine the situation as real as possible.

Bring handy tools for the walk

Besides pen and paper, a flashlight, a stopwatch and a (mobile-) camera might be useful, as well as a copy of the floor plan to write and mark where you do your findings. If you are ambitious, bring a thermometer and a mobile electricity meter.

Walking the walk

Start the walk after the production has stopped, either late at night or during the weekend.

Keep in mind that during the weekend more lighting could be switched off since the last shift for the week might have other routines before leaving than a regular mid-week shift.

Make the tour along a logical path:

1. Do not skip small spaces like electricity rooms! These areas are overrepresented when it comes to leaving things running.
2. Do not forget basements, attics or the roofs (where fans and other equipment are located).
3. Do not skip the boiler station, kiln attics and other miscellaneous areas.

Be curious and questioning

Try not to limit yourself, write down all the “stupid” questions you may think of:

- Why is it so warm in this area?
- Where does the cold draft come from?
- Are doors left open between heated and non-heated zones?
- Is the air-conditioning turned on? Which set point is used?
- Is all timber yard lighting needed after work hours or can some of it be switched off?
- Is all lighting needed in storage rooms, even where the lighting is blocked by the goods?
- Do you hear leakage from the pneumatic air system?
- Where is that humming sound coming from?

Write protocol

The protocol should work as a log book containing:

- Time.
- Where you are (mark it on the floor plan).
- What object(s) you have identified (model number, rating, etc.).
- Take photos, this is also good for showing managers and in the report.
- How the energy use is controlled (manual switch, timer, thermostat, interlocking, etc.) and its set-point.

If you do all this it will be easier to do the after work the next day.

Especially important checks

Heating, ventilation and air-conditioning equipment

Check how it is controlled, regardless if it is in operation or not.

Thermostat: Is it in a good representative location for controlling the equipment? Is the set point OK? Is it equipped with clock-timer?

Process exhaust air fans

Exhaust air fans in operation also means loss of indoor air. The evacuated (warm) indoor air is replaced by (cold) outdoor air through an air handling unit, or more probably as cold draught from door openings and leaks in the building envelope. The heat energy loss is only relevant during the part of the year when the heating system is used night time. Air heat loss calculations can be made by following this equation:

$$\mathbf{Heat}\left(\frac{\mathbf{MWh}}{\mathbf{y}}\right) = \mathbf{AirFlow}\,(\mathbf{m^3/s}) \cdot \left[\mathbf{T_{indoor}} - \mathbf{T_{average\ outdoor}}\right]℃ \cdot \mathbf{Hours/year} \cdot \frac{\mathbf{1}}{\mathbf{3000}}$$

$T_{average\ outdoor}$ (°C):	average outdoor temperature for the cold part of the year, when there is a comfort heat demand during night time. For example, it could be average temperature from October to April. Nights are also colder than days. Average outdoor night temperature is probably 1-3°C colder than average temperature depending on your climatic conditions.
Hours/year:	avoidable hours of operation during the cold part of year when the building is heated.

Compressors (compressed air)

Compressors are important to check. They are known for their avoidable energy consumption. This can in most cases either be checked with a stopwatch or by reading displays. More or less all pneumatic air consumption at night is leakage and leakage occurs all year round, 8760 h/year. Compressors are either on/off or VSD (variable speed drive) controlled

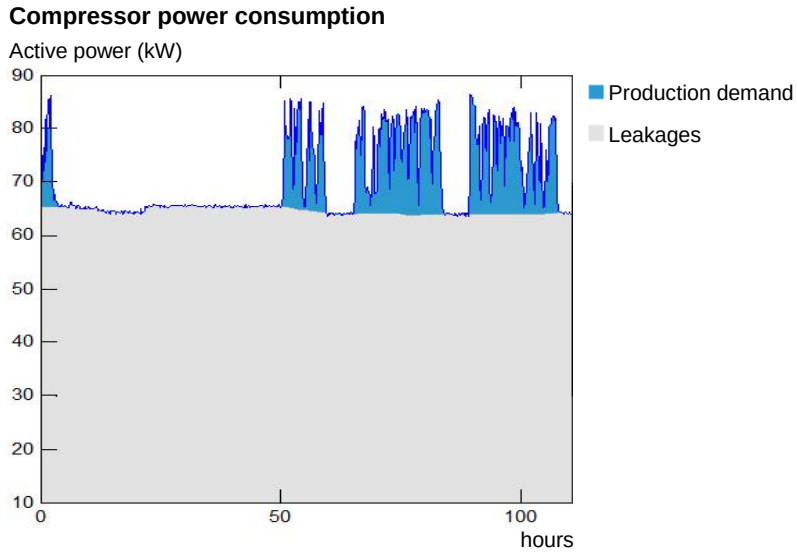

Figure 1. *Example of measured electricity use for compressor (90 kW). The measurements started Friday afternoon and show the consumed power during the weekend and beginning of the week.*

Clock ON/OFF-compressor with a stopwatch. For example, 30 seconds ON followed by 90 seconds OFF gives a cycle time of 120 seconds. Clock several cycles to get an average cycle time. In the example above, leakage level is 25% (30/120) of the compressors' specified capacity (Nl/s, litres per minute). A compressor rated at 20 kW will use 20 kW during on-load, and about 15-30% of this when off-loaded (idling). In the example used above, the average power at night is $\frac{(30\text{s x } 20\text{ kW})+(90\text{s x } 20\%\text{ x } 20\text{ kW})}{(30\text{s}+90\text{s})}=8\text{ kW}$.

VSD compressors in most cases have a display where you will find a lot of needed information.

Daytime the specific power will be different. Do repeated checks during daytime to find out approximate leakage level of total production and total kWh used for producing leaking air. Daytime several compressors can be in operation simultaneously, but only one will go on/off or change speed (VSD). Reading the meters for total hours of operation and load hours at beginning and end of day is another way to find average workday consumption.

Remember, the leakage level found at night is also present when plant is in operation.

You can find a guide to compressed air calculations here:
http://www.seai.ie/Your_Business/Resources/Technology_Assessment_Tools/

Compilation work after the Night Owl Walk

Transfer the protocol to Excel

Calculate avoidable energy consumption

Make assumptions for avoidable power consumption and avoidable load hours. For most equipment, this is straight forward:

Energy saving (kWh/y) = Power (kW) x avoidable hours/year

- Electric motors:
  Real active power is probably about 85% of rated power for standard applications.
  Fans and pumps are probably about 80-90%. If the equipment is unloaded, like an empty conveyer, it probably uses about 25-50% of rated power. Wood chippers and other free-spinning equipment can be as low as 5-10% of rated power.

- Lighting equipment:
  The older type of fluorescent tubes (T8) consume slightly more than the rating on the tube. For example, a 58 W tube is actually about 65 W if the ignition/ballast is included. A more advanced guide can be found here:
  http://www.seai.ie/Your_Business/Resources/Technology_Assessment_Tools/

Make changes – Execute and adjust

After the Night Owl Walk, you most likely have a set of ideas for improvements, some of which should be easy, quick and cheap to implement.

1. Add your ideas to your Energy Action Plan. It is important to document all ideas and actions; regardless of whether you perform them, save them for later or discard them (they may become interesting again in the future, under different circumstances).

2. Using the Energy Action Plan, prioritise which actions you should perform first, e.g. by comparing estimated savings and investments. Often, ideas from Night Owl Walks can be implemented quite quickly and at low costs.

3. Act! Implement the changes and adjustments you have decided upon, whether it's technical adjustments, changes of routines, etc.

Follow up – do a new Night Owl Walk

If there are electricity meters that make it possible to separate electricity used by kilns from total electricity, you should be able to see a night time reduction of used electricity. Otherwise, do a new Night Owl Walk.


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