

#### **Energy-Saving Opportunities in the Forestry Sector**

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#### Forestry's Energy Demand

#### **Overview of Energy Consumption in Forestry:**

Consumption ~600PJ/year (Pulp & Paper Canada, 2023)
 Logging, Paper, Paperboard Mills, Other Wood Products
 Footprint: Steam, Electricity Generation, HVAC etc.



#### **Energy Use by Sector**

**Energy Use Distribution in the Forest Products Industry** 

#### Why Focus on Energy Efficiency?

- □ Economic Benefits and Cost Savings
- □ Improved Grid Reliability



Aerial View of a Pulp and Paper Mill





#### Save on Energy Business Programs

Save on Energy's programs are available to help Ontario businesses in forestry to implement retrofits and other energy-efficiency projects that lower their energy costs, including:

**Retrofit Program** 

Industrial Energy Efficiency ProgramExpanded Energy Management Program



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#### Case Study: Plant Air Project

**Project:** Compressed Air System Upgrade at a Forest Products Plant.

**Issue:** Unmodulated, High System Pressure with reduced Efficiency creating significant Energy Loss.

**Upgrade:** Compressor retrofit with high-efficiency VSD Units; New Dryer Install.

**Impact:** Lower pressure, Improved Efficiency, and Electricity Savings (~2GWh annually)



**Compressed Air System** 



Main Compressor Room





#### Thank you!

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### **Energy-saving Opportunities in the Forestry Sector**

Amanda Galusha - Energy Skills Coach Shannon Fehr- Stand Consulting Nick Dalziel- Goldfin Consulting





## Today's objective: to help you find opportunities!





## Practices to identify opportunities

Data analysis

- Energy baseline models
- Interval data analysis
- Benchmarking

#### Site investigation

- Energy audit
- Energy hunt
- Discussions with operators

Employee strategies

- Energy training sessions
- Suggestion box
- Reviewing capital plans



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## How do you find your energy-saving opportunities?

What strategies do you currently use at your facility and what future strategies you would like to implement.

#### SAVE DELIVERY

#### HOW DO YOU FIND YOUR ENERGY-SAVING OPPORTUNITIES?

The "how" of identifying savings opportunities can be divided into general practices and specific items.

#### GENERAL ENERGY OPPORTUNITY IDENTIFICATION PRACTICES

Check off or highlight the practices you currently use to identify energy-saving opportunities.

| Data Analysis   | Site Investigation   | <b>Employee Strategies</b>   |
|---|--|--|
| <ul> <li>Energy Baseline Models</li> <li>Interval Data Analysis</li> <li>Energy Benchmarking</li> </ul> | <ul> <li>Energy Audits</li> <li>Energy Hunt</li> <li>Discussions with<br/>Operators</li> </ul> | Energy Training<br>Sessions     Suggestion Box     Reviewing Capital Plans |

In the space below, write down any practices to identify energy waste listed above or that were discussed in the workshop that you aren't currently doing, and you would like to implement.



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## Nine types of energy wastes review



As we go through this next section, take notes on where this type of waste is likely occurring in your facility.

| Type of Waste                    | Examples of Opportunities  | Opportunities within your Facility |
|----------------------------------|--|------------------------------------|
| UNNECESSARY<br>RUNNING OR IDLING | <ul> <li>Equipment and lights on during non-<br/>operating periods.</li> <li>Running pumps, conveyors or operating heat<br/>treat furnace at full temperature during idle<br/>periods</li> </ul> |                                    |
| LEAKS                            | <ul> <li>Compressed air leaks, uninsulated steam<br/>pipes, water valve leaks, broken duct work</li> </ul>   |                                    |
| FRICTION LOSS                    | <ul> <li>Clogged filters, obstructed blower discharge,<br/>restricted flow due to damper settings, dirty<br/>heat and cold transfer services.</li> </ul>   |                                    |
| SUB-OPTIMAL<br>EFFICIENCY        | <ul> <li>Replace existing equipment with higher<br/>efficiency models.</li> <li>Ensure proper installation of equipment and<br/>set to run at peak efficiency.</li> </ul>                        |                                    |
| MALFUNCTIONS                     | Broken or stuck actuators, valves and<br>switches.     Malfunction/broken equipment.     Bearing failure.     Broken or uncalibrated sensors and gauges.   |                                    |
| SUSTERA INABALANCE               | <ul> <li>Improper set points (overrides,<br/>bypass/manual)</li> </ul>   |                                    |





## Nine types of energy waste



Unnecessary running or idling



Leaks



**Friction loss** 



Sub-optimal efficiency



Malfunctions



System imbalance



Misapplication



Underutilization



Traditional lean waste





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## Energy waste examples



Unnecessary running or idling

Conveyor systems, kilns, large motors (chippers, refiners) during interruptions and downtime.



**Sub-optimal efficiency** Fouled heat exchangers



**Misapplication and over pressurizing compressed air system** Using compressed air for cleaning or personal cooling





## Energy waste examples



#### Leaks

Packing on centrifugal pumps and agitators, mechanical seals, steam traps and compressed air



#### Malfunctions

Passing valves and dampers or failed instrumentation (temperature, pressure, and consistency)



#### Underutilization

Operating below design production rate or multiple lines at partial load, underutilization of kiln space





### Energy waste examples



#### **Friction loss**

Product build-up on pipe interiors, conveyor belts and chains dragging or seized bearings, and throttling values in pumping systems



#### System imbalance

Excess exhaust leading to negative building pressure



### Traditional lean waste



Traditional lean wastes are actions or steps in a process that do not add value to the customer. In many situations, these lean waste often have a significant energy component.

#### Traditional lean waste examples:

- Reducing amount of scrap products or materials
- Reducing product overwork
- Reducing unnecessary transportation of materials



## Managing your SEUs

- Identify SEUs
- Identify variables and people affecting it
- Submeter SEUs
- Establish KPIs
- Establish SOPs
- Monitor and pursue corrective action when needed







#### Shannon and Nick on potential opportunities

# **Shannon Fehr,** Principal at Stand Consulting



#### **Nick Dalziel,** Managing Partner at Goldfin Consulting







Moderated discussion with Nick and Shannon

# Use the chat function if you have questions during the discussion.



Feel free to turn on your camera to ask questions as well!



### Non-production opportunities: water chilling

- Chiller loads high (summer)
  - Re-spec HEXs for raw water supply
- Chiller loads not production related
   > Interlock process cooling applications





### Non-production opportunities: aerobic effluent treatment

- Blowers and aerator loads that are not production related
  - > Install controls



Photo credit: https://invent-uv.com



Moderated discussion with Nick and Shannon (cont'd 1)

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Feel free to turn on your camera to ask questions as well!



## Bring everyone to the table

 Decisions and management systems outside of the mills

>Woodyard and forestry operations

- Examples of collaboration:
  - Communication helped to prevent unusable logs from ending up on site leading to reduced chipping
  - Trials for new sorting/debarking processes to reduce energy for drying





# Efficiency through intermittency: maximize use of installed equipment

- ✓ Operational center-lining (single rate)
- ✓ Creates regular maintenance windows
- Allows operation at low power pricing in wholesale markets (i.e. off peak)





| Specific energy<br>(kW/BDMT) | Run Line A<br>Idle Line B<br>20 BDMTPH | Run Line A & B<br>30 BDMTPH | Run A & B<br>40 BDMTPH |
|------------------------------|--|-----------------------------|------------------------|
| Base Load                    | 87.5                                   | 33.3                        | 25                     |
| Refining Energy              | 750                                    | 800                         | 750                    |
| Total Energy                 | 837.5                                  | 833.3                       | 775                    |

Moderated discussion with Nick and Shannon (cont'd 2)

# Use the chat function if you have questions during the discussion.



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## HVAC and building envelope

- Air balance too negative (winter)
  - Complete envelope air balance
- Heating load is high/buildings are cold
  - > Building not insulated
  - > Perforations in envelope
- Use of natural gas space heating
   Explore waste heat as alternative





## Kilns

- Building structure
  - > Doors, seals for function and fit
  - > Repair holes and gaps
  - > Roof should have protective coating
- Fan maintenance
  - Proper mounting and alignment
  - > Not slipping on shafts
  - Check air passageways





Moderated discussion with Nick and Shannon (cont'd 3)

# Use the chat function if you have questions during the discussion.



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## Benefits of a real-time electrical SLD

- A tool for awareness and troubleshooting
- Highlights metering gaps
- Effective for generation/load management
- Allows for active management of electricity as a <u>key input.</u>







## Multi-line equipment failure: centrifugal pumping

#### The issue:

- Chronic loss of packing on power ends
- When line is down it creates process bottleneck

#### What should you look for:

- Pumps are significantly discharge throttled to meet a pressure setpoint (VO < 30%)
- Motors operate at a fraction of FLA
- Pump operation is near deadhead pressure
- Power ends are running hot, discharge pressure is variable
- Pumps are oversized



## Centrifugal pumping: the solution

#### The solution:

- Operate one pump to feed two lines
- Reliability issue resolved
- Now have an in-line spare
- Energy consumption is decreased





Moderated discussion with Nick and Shannon (cont'd 4)

# Use the chat function if you have questions during the discussion.



Feel free to turn on your camera to ask questions as well!



## Reframing the opportunity: a systems approach

#### The challenge:

- Cleaner systems are energy intensive
- Clears often plug causing operational headaches

#### **Options:**

- Are both lines of cleaners needed?
- Can a lower energy technology like screens be used?
- Can cleaners be minimized through process reconfiguration?



#### Q&A with Nick and Shannon

## Use the Q&A function to type out your questions.

Feel free to turn on your camera to ask questions as well!







## Energy opportunity implementation



Note down commitments you will make to improve your energy performance at your facility.

#### ENERGY OPPORTUNITY IMPLEMENTATION

Make a commitment to 3 actions you will take to improve energy performance at your facility, and list more than 3 if you are inspired to do so.

| Action | Timeframe |  |
|--------|-----------|--|
|        | Next week |  |
|        |           |  |
|        |           |  |

Summarize other items, whether they are your significant energy users, general practices or specific techniques for finding new opportunities, or new potential energy-saving projects that you learned about today and want to act on <u>in the near future</u>.



## Join the energy management community!

- Peer learning opportunities
- **Spark** bulletin with news, events, and community updates
- Access to the Energy Manager
   Learning Platform
  - Online courses
  - Resources
  - Discussion forum
- Free expert support on improving energy management practices and energy efficiency projects

#### **Registration is free!**



# For more information: trainingandsupport@ieso.ca





### Stay connected with resources from Save on Energy

- Virtual one-on-one coaching: <u>post-webinar support intake form</u> for tailored support for organizations to manage energy resources effectively
- Monthly bulletin: <u>sign up</u> to receive monthly training updates on all Save on Energy training and support new tools and resources
- <u>Live training calendar</u>: visit this page to easily register for upcoming events and workshops
- <u>Training and support webpage</u>: visit this page to access all training and support materials



#### Upcoming survey: We want your feedback!



As someone who recently participated in the *What It Means to Become Net-Zero and How to Achieve It* as part of the **Save on Energy | Capability Building Program**, we'd like to know more about your experience. The IESO uses this feedback to monitor the success of the program and improve the offering over time. The survey should take about five minutes to complete.

This survey is conducted by Forum Research, a leading market research company, on behalf of the Independent Electricity System Operator (IESO). Be assured that all answers are completely anonymous and will have no impact on customer incentives.

\*\*\*\*Please send any and all inquiries about the Capability Building Program sessions to trainingandsupport@ieso.ca. \*\*\*



# The survey will be sent from: surveyinfo@forumresearch.com

- Check your email! A survey is coming your way soon.
- Why? Help us improve our training programs.
- Who? Conducted by Forum Research on behalf of the IESO.
- Time? Takes only 5 minutes to complete.
- Confidentiality: Your responses are anonymous and won't impact participation or incentives.



### Thank you!

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