JULY 24–27, 2018

ISBBB 2018 Circular Economy for Bioproducts Innovation

15th International Symposium on Bioplastics, Biocomposites and Biorefining

Guelph, Canada

varroc EXCELLENCE

Addressing & Minimizing Environmental Impact in Automotive Supplier Operations



Jennifer Meier

Global EH&S Director

July 25, 2018

SHIPS Values



Our values are the foundation of everything that we do.

They guide relationships with customers and colleagues and define our culture.

Benefits of Sustainability Initiatives

Sustainability goals are in line with business goals:

- Reduce operational costs



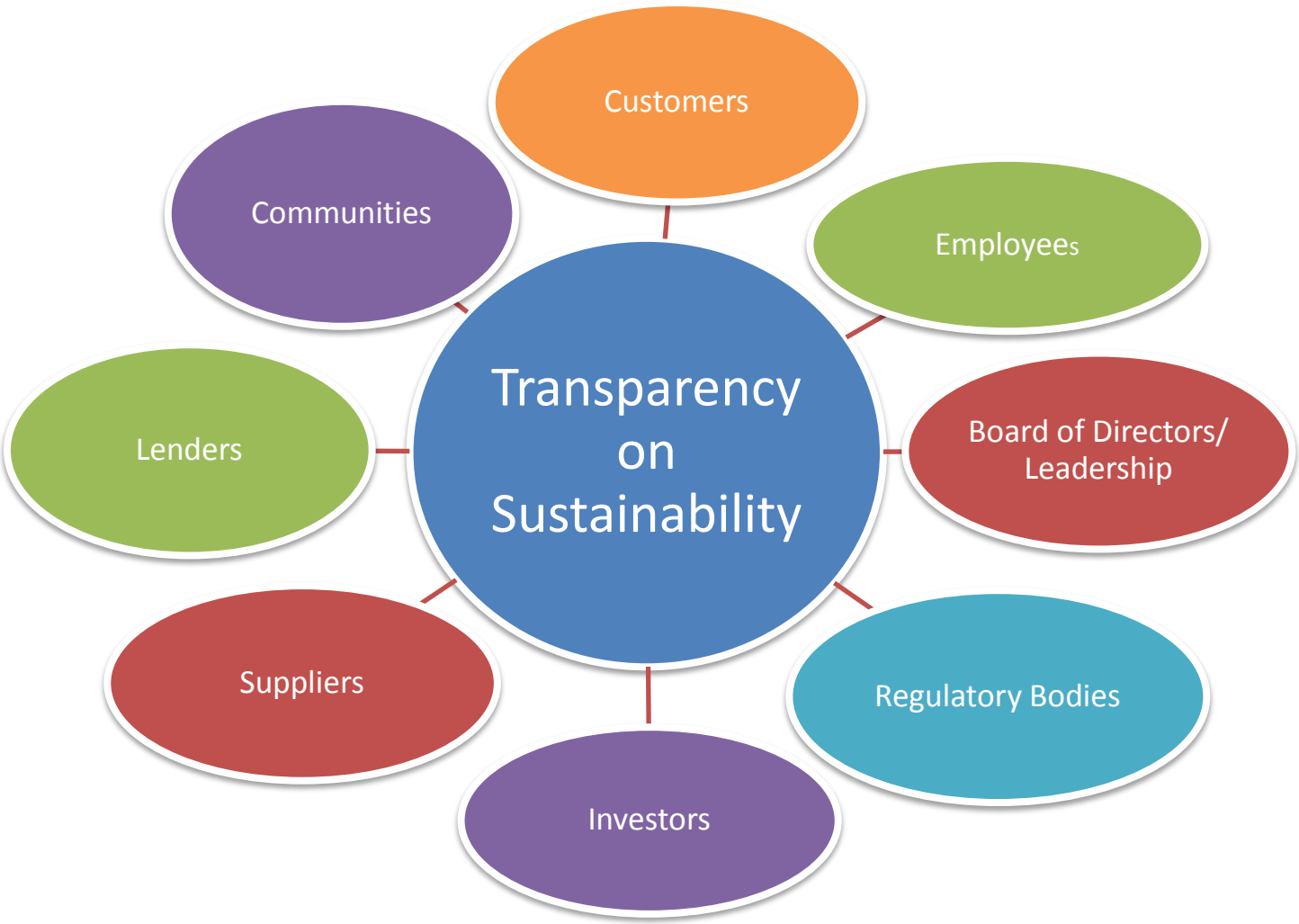
- Increase revenue, productivity, quality, and profitability



- Strengthen employee engagement
- Minimize environmental, social, and resulting reputational risks
- Establish reliable supply chains, enhance relationships, and increase levels of trust



Sustainability Stakeholders



Key Elements to Sustainability Program



Environmental Aspects



Social Responsibility Considerations



Governing Ethics

Varroc Environmental Aspects

- Operations and Logistics Energy Use
  - Fossil Fuel Consumption
  - Electricity/Steam Consumption
  - Renewable Energy Consumption
- Greenhouse Gas Emissions
  - Scope 1, Scope 2, Scope 3
- Carbon Footprint of the Product
- Consumer Demand for Fuel Efficiency
- Operations Water Use
  - Water Consumed
  - Water Re-Used/Recovered
- Community Impacts of Water Use
- Land Use and Biodiversity/Ecosystem Protection
- Materials Management
  - Chemicals of Concern
- Environmental Management
- Process Innovation
- Process Emissions
- Air Quality
- Waste Management
  - Total Hazardous waste v. Nonhazardous waste
  - Disposal Method for Hazardous v. Nonhazardous
  - Percentage Disposed v. Recycled

Varroc Social Responsibility Considerations

To Employees:

- Occupational Wellness, Health, and Safety
- Talent Acquisition/Retention
- Training/Education/Mobility
- Opposing Discrimination
- Social Protection
- Labor Relations
- Diversity/Inclusion
- Freedom of Association/Collective Bargaining

To Others:

- Customer Privacy/Safety
- Customer Satisfaction
- Customer Expectations
- Subcontractor and Supplier Relations
- Relationship with Local Communities
- Shareholder Expectations



Varroc Governing Ethics

- Ethical Business Practices
- Disclosure/Transparency
- Stakeholder Engagement
- Regulatory Compliance
- Voluntary Standards
- Certifications
- Human Rights Compliance
  - United Nations Worker Policies
  - Child Labor Laws
  - International Labor Organization Considerations



Customer Sustainability Surveys

- Customer surveys and audits are becoming increasingly complex
- Reporting demonstrates accountability and transparency to customers



























- Central system required to manage reporting across global company

Global 2019FY EH&S Objectives & Targets

- 0.09 Lost Time Case Rate (*goal is always zero accidents)*
- 3.2 Severity Rate
- 0.42 Recordable Case Rate

- 5% energy usage efficiency improvement (normalize with value add)
- 5% waste generation and water consumption reduction
- 2% recycling improvement

- 10% reduction of carbon footprint (GHG) over 3 years
- 0 fines, fires, spills
- 0 notices of regulatory non-compliance
- 0 major non-conformances during ISO certification audits

Global Manufacturing Footprint Complexity

- Global reporting complicated with international footprint
- Multiple currencies, units of measure, languages
- Global EHS webtool allows for efficient data gathering and analysis

Update Metric

Metric	*	Metals Waste ▾
	*	Iron And Steel Containers - With Residues ▾ *M4150*
Status		Active ▾ **Required Monthly:** ☐
Display Prompt		
Person Responsible	*	Salinas, Erika ▾
Invoice Type	*	Credited Amount ▾
Billing Currency	*	Mexico Peso (MXN) ▾
Regulatory Status	*	Hazardous ▾
UN Disposal Code	*	R4 ▾ *Recycling/reclamation of metals and metal compounds*
Country Waste Code		
Invoice UOM	*	Kilogram ▾

Cancel Save Metric

Monthly Datacard completed by each location

EH&S And Quality Management

Jennifer Meier Logout

Varroc Lighting Systems, Plymouth HQ: **1,997** days without a lost time case

Home | Organization | Quality | Environmental, Health & Safety | Documents: Application References

Data Input

Enter quantities and costs for energy usage and waste disposal for this business location.

Business Location	Reporting Month	Due Date	Input Status	Last Update
VTYC Changzhou	June, 2018	7/28/2018	1 of 1 Required Metrics Entered CNY Exchange Rate Recorded On 6/30/2018	7/9/2018 Jonathan Lv

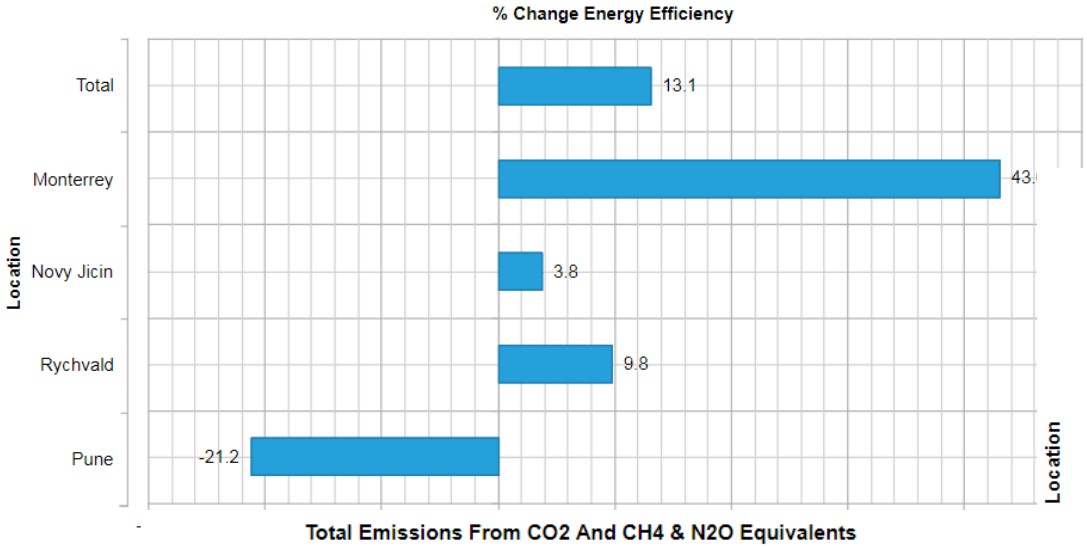
Local Approval: Meier, Jennifer 7/9/2018

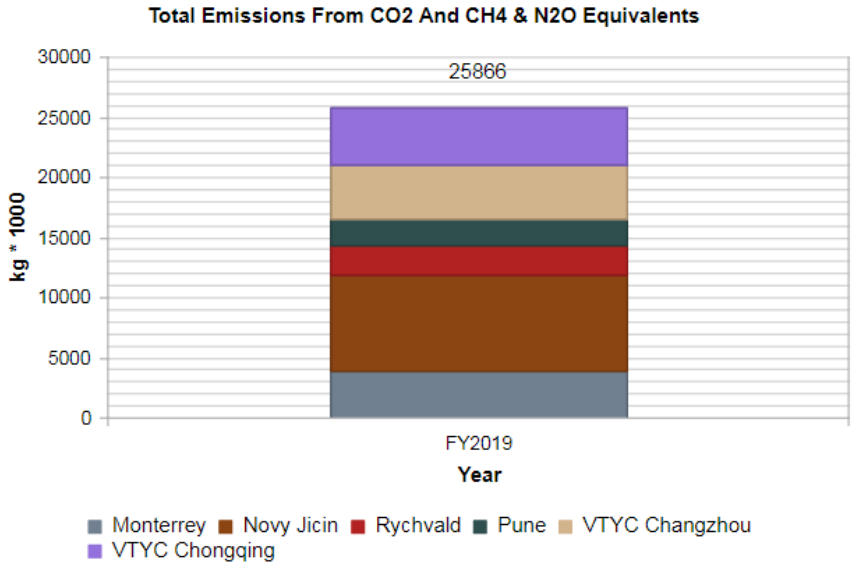
Save | Cancel

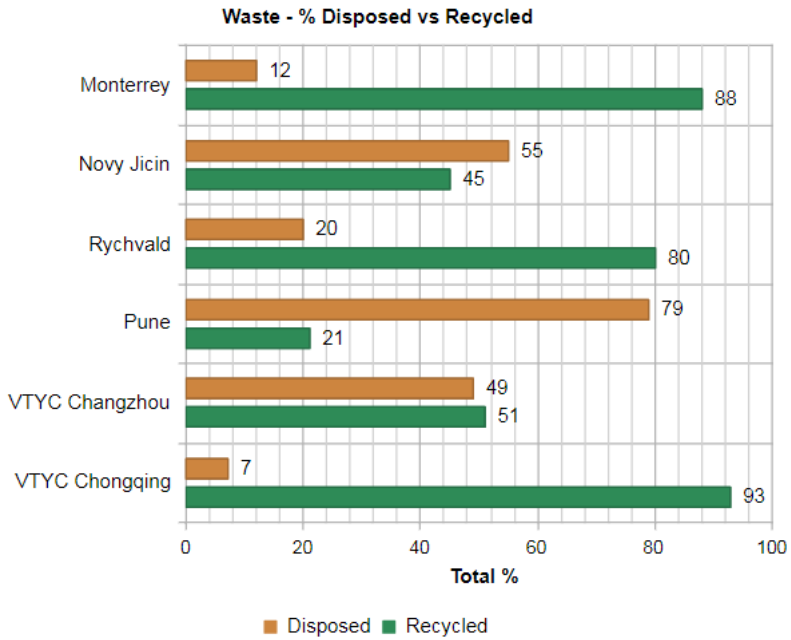
Metrics assigned to you. Please complete the required (*) inputs by the due date.

Metrics	Invoice Period (from / to)		Quantity		Cost	or Credit Amount		Del
Hours Worked *M10041*	6/1/2018	6/30/2018	250,481.50					
Electricity *M1100*	6/1/2018	6/30/2018	2,334,931.00	KWH	1,867,944.79		CNY	
LP Gas *M1210*				KWH			CNY	
Purchased Water *M1400*	6/1/2018	6/30/2018	5,509.00	M3	23,192.89		CNY	
Demolition / Construction Debris, Clean *M2310*				KG			CNY	
Iron And Steel Scrap *M4110*	6/1/2018	6/30/2018	2,900.00	KG		2,900.00	CNY	
Alkaline Solutions *M6220*				KG			CNY	
IMM Waste Hydraulic Oils *M6310*				KG			CNY	
Waste Paint/Water Mixtures *M6540*				KG			CNY	
Thermoplastic Plastic Residues Not Impacted By Noxious Substances *M6610*	6/1/2018	6/30/2018	66,692.00	KG		459,252.01	CNY	
BMC Waste *M6630*	6/1/2018	6/30/2018	10,832.00	KG	0.00		CNY	

Dashboard – Track trends, anomalies, etc.



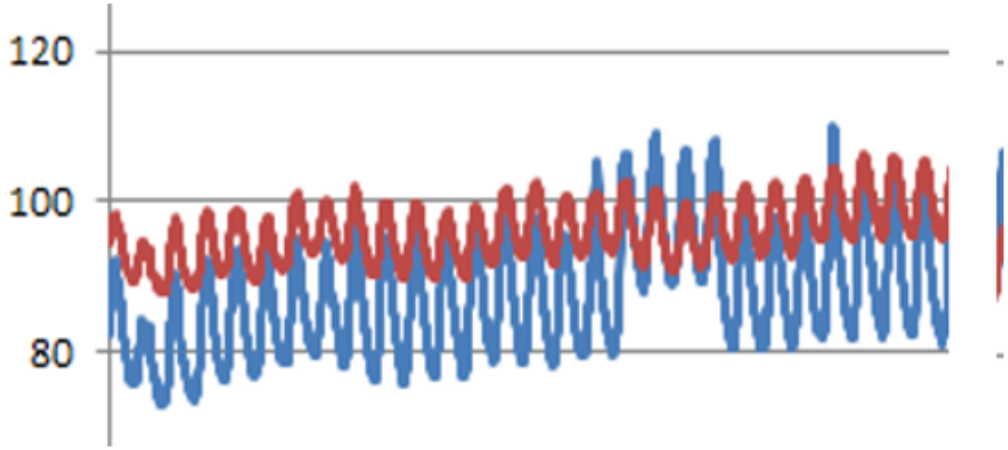




Social & Environmental Improvement Project
Improved Ventilation System at Varroc Mexico Plant

- High plant temperatures – temperatures inside greater than outside temperatures
- Open doors allowing influx of dust and debris
- South Plant chillers beyond design life, lower efficiency and reliability



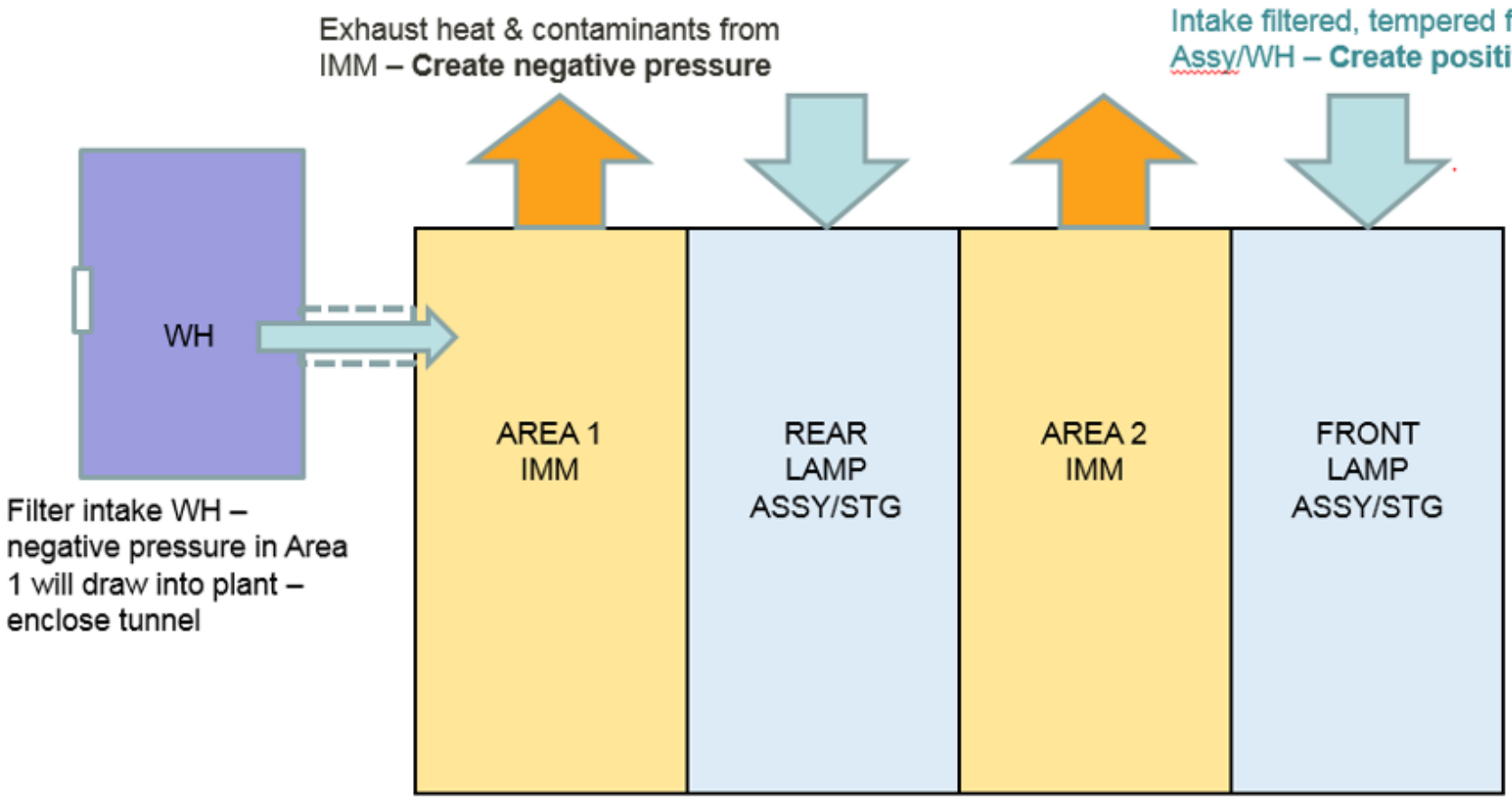


Mezzanine Temperature
Outside Temperature

>15 year old air cooled chillers in South side



New Air Flow Management Strategy



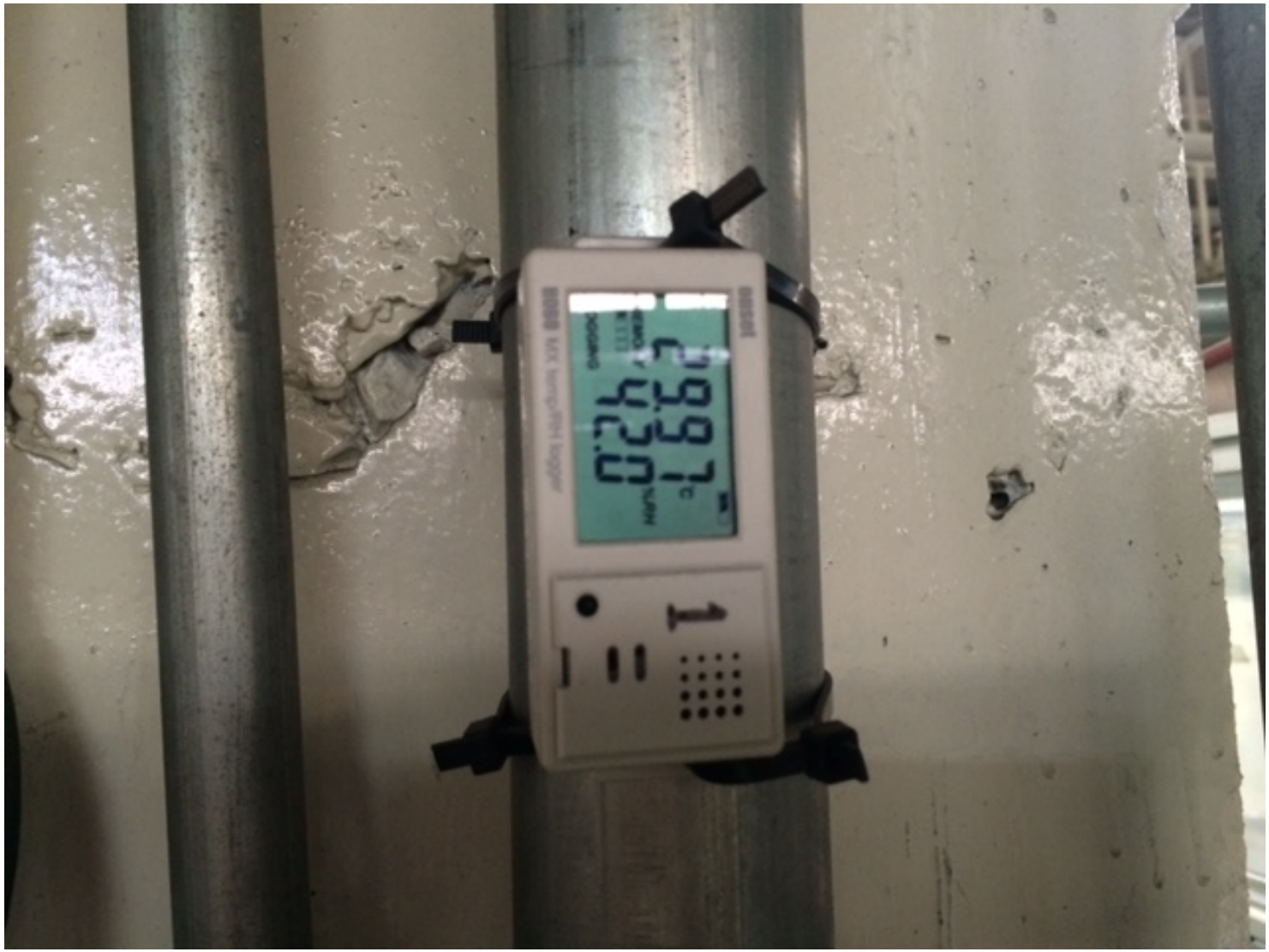
Tempered drier air blowing into assembly areas is at least 10 degrees C cooler than outside air

Cool Air Pushed In Through Fabric Ducts





Dataloggers throughout plant recording inside & outside temperatures



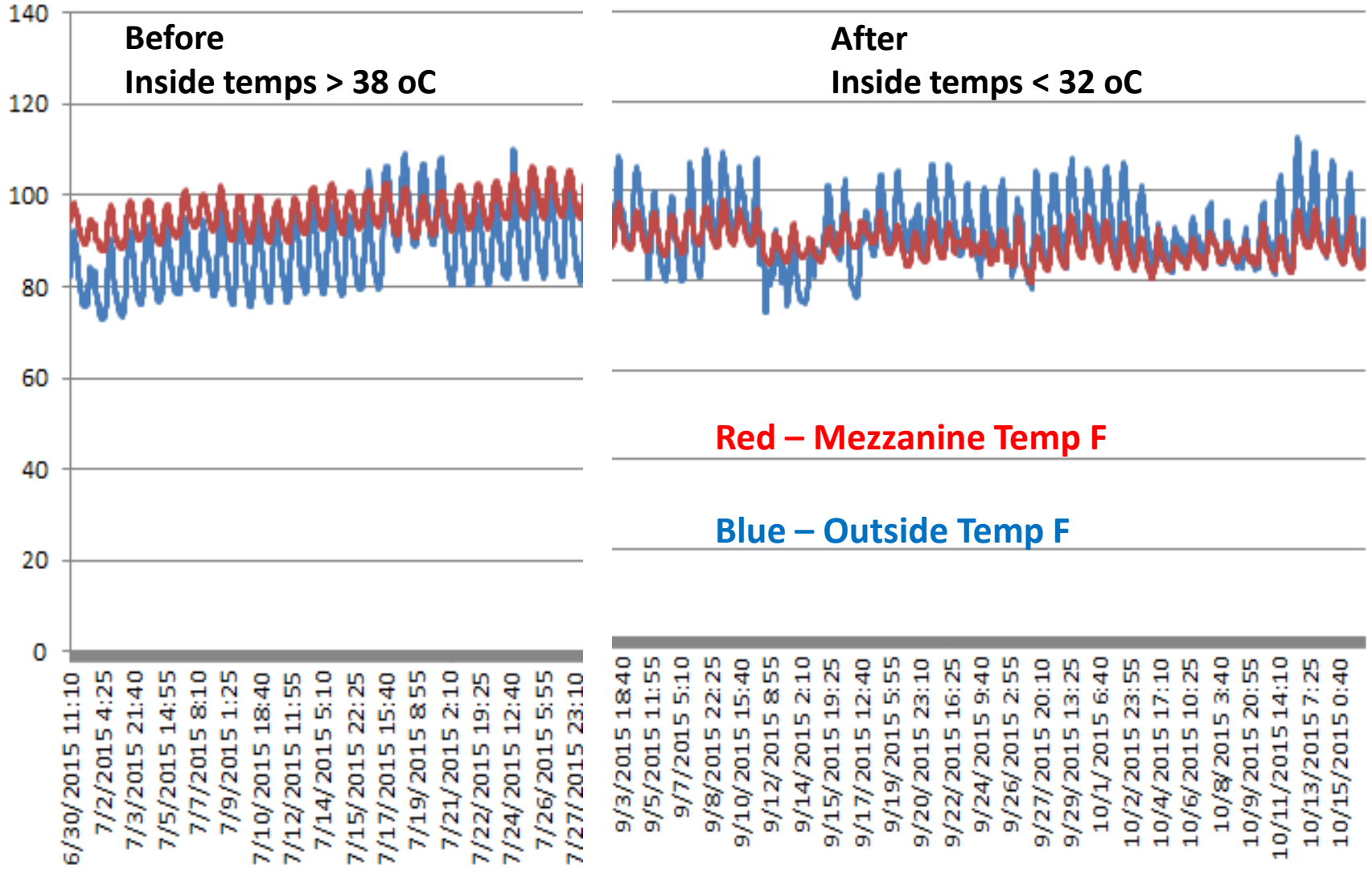
Chiller house and generator



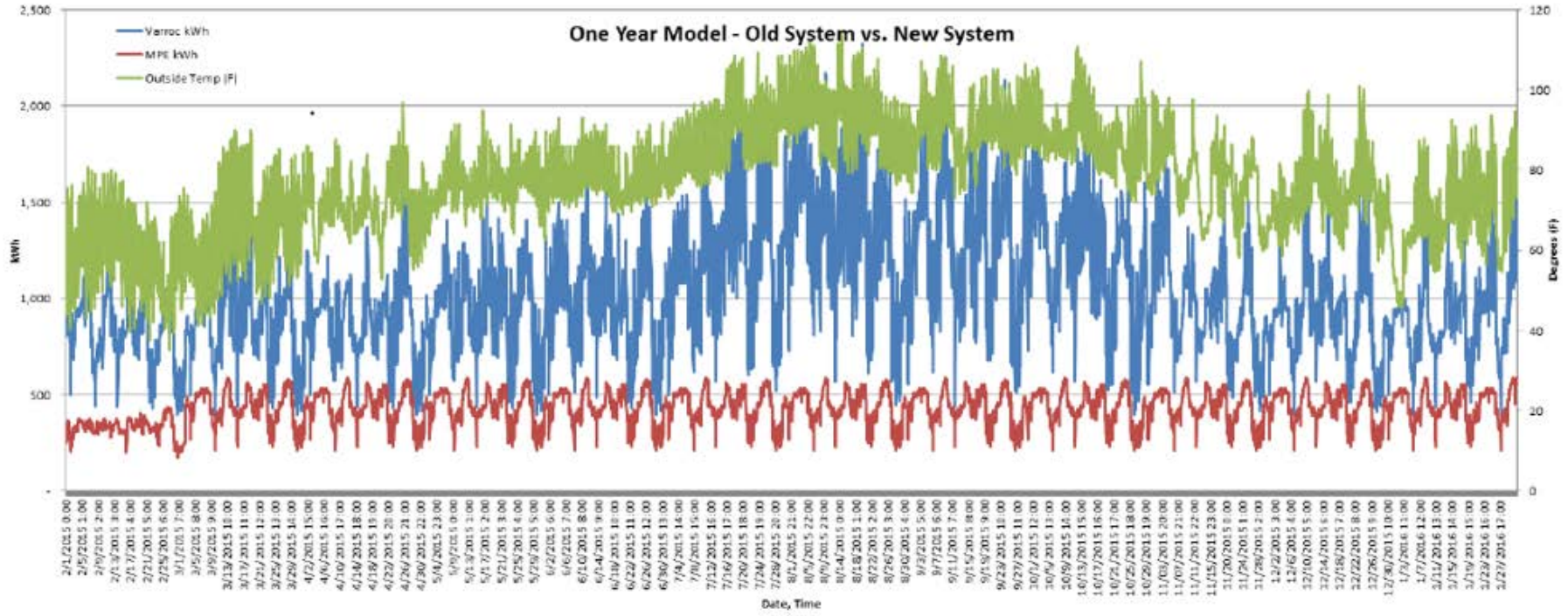
High-Efficiency AHUs using chilled water from chiller



Improved Work Environment!



Electricity Consumption Modeling – Old vs. New



Old Varroc Chilled Water System Total (one year) = 8,900,000 kwh
New Chilled Water System Total (one year) = 4,000,000 kwh

Net reduction of CO2-equiv = 2200 tons (indirect emissions)

Bio-carbon Filled PP Initiative
Led by Ayse Ademuwagun, Materials Tech Professional

- **Enough stiffness to carry sub-parts such as reflector, light guides, brackets, wires**
- **Good bonding adhesion to lens material with hot-melt adhesives**
- **Good heat aging, heat cycle & vibration resistance**
- **No fogging or outgassing**
- **Good dimensional stability**









How is bio-PP Headlamp Housing made?



Miscanthus or Coffee Chaff

1



2



Carbonized Fiber

3



Foliation and particle size reduction

4



5

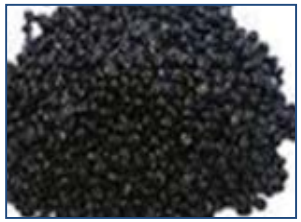


Blend of Carbonized Fiber & PP

6



7



8



9



Step 1: Heat fiber at very elevated temps under inert conditions
Step 2: Foliation of fiber via chemical treatment
Step 3: Reduce particle size of carbonized fiber and format
Step 4: Dry carbonized fiber at 80^0C for 4 hours
Step 5: Mix the dried formatted fiber with base PP
Step 6: Using twin screw extruder, compound the material.
Step 7: Using injection molding machine, make headlamp parts

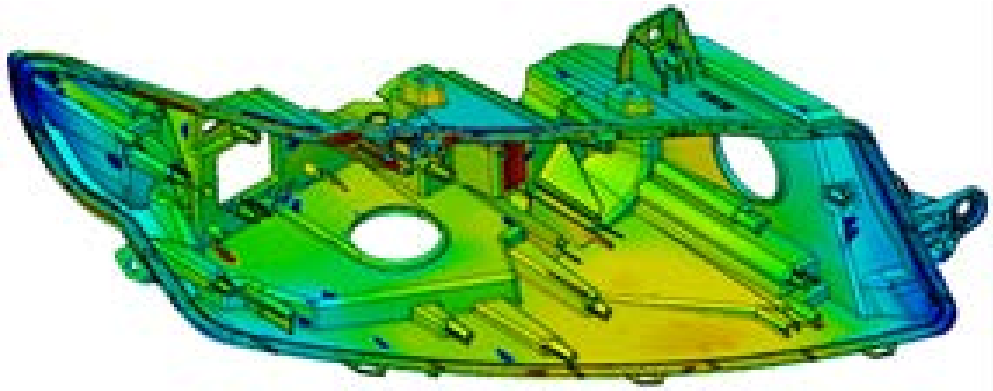
Coffee Chaff

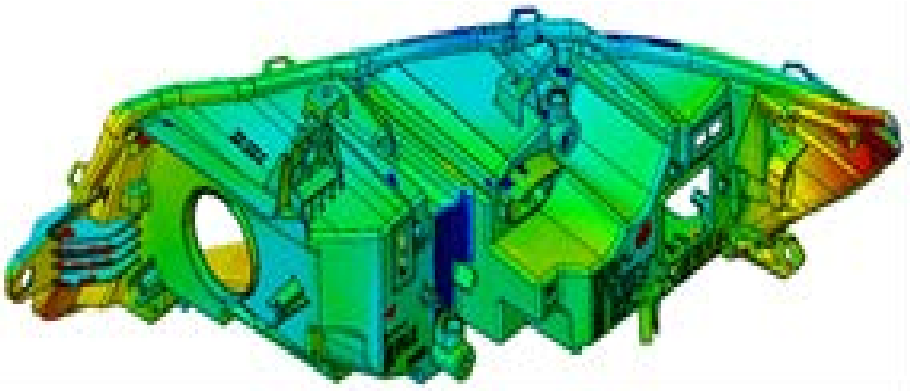


- Globally scalable as it’s available in all parts of the world where coffee is produced
- Excellent mechanical capabilities

Test Results – Bio-carbon Filled PP

- 30 sets headlamp housings were molded using HMS2040 bio PP
- Bio-carbon reinforced PP were molded at 420F compared to 500F (power savings of 80F= 27C).
- Faster cycle compare to talc PP composites (4 sec)
- Parts made with Bio-carbon filled PP were 19% lighter than talc PP
- There were no odor with the parts with bio-carbon PP





Summary of Findings

- By using 20%-30% bio-carbon, similar mechanical properties with 14-19% light weighting is possible.
- Positive photometric fogging and low outgassing results indicates that this resin is suitable for automotive lighting
- Proof of principles is done and bioPP can be used as alternative to talc PP.
- The molding trials were successful with dimensional in spec with faster cycle time.
- Bio-carbon PP passed heat aging requirements
- Water absorption was low after 7 days submerging the part with water which did not cause any condensation issues.
- Preliminary part testing showed good structural endurance and thermal resistance


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Hindi
Buíochas
Irish
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Hindi
Спасибо
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多謝
Traditional Chinese
Gracias
Spanish
شكرا
Arabic
Thank You
Obrigado
Brazilian Portuguese
Grazie
Italian
Danke
German
Merci
French
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