WEBINAR MODERATOR

Chad Weikel
Education and Workforce Manager
American Water Works Association

Mr. Weikel is currently the Education and Workforce Manager at the American Water Works Association. He is tasked with enhancing the educational outcomes of AWWA Conferences, Webinars, and eLearning programs. He has also served as staff liaison for the Small Systems Division and Workforce Strategies Committee. He is an experienced instructional designer, specializing in adult learning with blended delivery. Before AWWA, Mr. Weikel designed and delivered programs of instruction for national audiences such as the National Guard Family Program, Big Brothers Big Sisters of America, and the U.S. Anti-Doping Agency. Mr. Weikel holds a Bachelor of Science degree in Health and Exercise Science from Colorado State University, and a Master of Arts degree in Education, Curriculum and Instruction from the University of Phoenix.

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PANEL OF EXPERTS

Dr. Carol Miller, PhD PE  
Co-Founder & Research Director  
Energy Emissions Intelligence(E2I)

Stephen S. Miller, PE  
Co-Founder & CEO  
Energy Emissions Intelligence(E2I)

Sean Reed, MUP MSW  
Director of Sales & Marketing  
Energy Emissions Intelligence(E2I)

Christopher C. Steary  
Manager, Lake Huron Water Plant  
Great Lakes Water Authority(GLWA)

Balvinder Sehgal,  
LSSBB PMP  
Manager, Special Projects  
Great Lakes Water Authority(GLWA)

AGENDA

I. LEEM Technology for plant operations
II. Use cases & Value proposition
III. LEEM PLANT implementation – OPERATOR EXPERIENCE
IV. SPEAKER & PANELIST Q&A
V. CONCLUSION
LEEM TECHNOLOGY
FOR PLANT OPERATIONS

Dr. Carol Miller, Co-Founder & Research Director, E2i

ABOUT US: E2i

• E2i = ENERGY EMISSIONS INTELLIGENCE
• ESTABLISHED IN 2015 IN ANN ARBOR, MI
• 3 PRINCIPALS
• LICENSED IP WITH WAYNE STATE UNIVERSITY FOR LEEM
• BUSINESS MODEL: DAAS (DATA AS A SERVICE)
WUEC
(WATER UTILITY ENERGY CHALLENGE)

Water Utility Emissions Champion
City of Ann Arbor, Michigan

Water Utility Green Challenge
City Bayfield, Wisconsin

Best Pilot Project
Great Lakes Water Authority, Detroit, Michigan

Technical Leader
City of Highland Park, Illinois

Carbon Reduction Leader
Onondaga County Water Authority, North Syracuse, New York

OUR “WHY”?
THE ANSWER TO “WHY”? IS “WHEN”?  

DATA TRANSPARENCY TO ACHIEVE SUSTAINABILITY
LEEM

- **Locational Emissions Estimation Methodology**
- Delivers a stream of emission intensity data specific to time and location
- Allows users to **shift or shed electricity** when emission intensities are high or **store or use electricity** when emission intensities are low.

**HOW LEEM WORKS**

- **LMPs (Locational Marginal Prices)**
- **Marginal Generating Unit Type**
- **Real-Time Emissions**
AI For Plant Management: Leverage Big Data + Algorithms To Reduce Your Carbon Footprint & Energy Costs
December 4, 2020

GEOGRAPHIC MARKET

MISO STATES
(all or portions of)
Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Manitoba, Michigan, Minnesota, Missouri, Montana, North Dakota, South Dakota, Texas, & Wisconsin

PJM STATES
(all or portions of)
Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, District of Columbia

NYISO

TARGETED POLLUTANTS

CO₂
Carbon Dioxide

Hg
Mercury

NOₓ
Nitrogen Oxides

SOₓ
Sulfur Oxides

Pb
Lead

Please consider the environment before printing
LEEM DAY-AHEAD CO2 EMISSION FORECASTS PROVIDED TO OPERATOR

Higher Emission Periods
(10/9/17)

Lower Emission Periods

EACH DAY CAN BE VERY DIFFERENT

9/21/17

9/28/17
Al For Plant Management: Leverage Big Data + Algorithms To Reduce Your Carbon Footprint & Energy Costs

December 4, 2020

FORECASTING

CO2 Emissions Intensity (lb/MWh)

IMPACTS

Ex. Water Utility Filter Washing → 30% Less CO2

<table>
<thead>
<tr>
<th>Month</th>
<th>CO2 Emissions (Lbs.)</th>
<th>Hg Emissions ($10^4$ Lbs.)</th>
<th>NOx Emissions (Lbs.)</th>
<th>SO2 Emissions (Lbs.)</th>
<th>Pb Emissions ($10^4$ Lbs.)</th>
<th>Filter Washes</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2017</td>
<td>7,684</td>
<td>1.2</td>
<td>6.4</td>
<td>16.4</td>
<td>6.0</td>
<td>176</td>
</tr>
<tr>
<td>June Control</td>
<td>11,647</td>
<td>2.1</td>
<td>10.5</td>
<td>28.5</td>
<td>10.4</td>
<td>242</td>
</tr>
<tr>
<td>Change</td>
<td>-3,963</td>
<td>-0.9</td>
<td>-4.1</td>
<td>-12.1</td>
<td>-4.4</td>
<td>-66</td>
</tr>
<tr>
<td>% Change</td>
<td>-34.0%</td>
<td>-42.9%</td>
<td>-39.0%</td>
<td>-42.5%</td>
<td>-42.3%</td>
<td>-27.3%</td>
</tr>
</tbody>
</table>
### CUSTOMER’S “WHY”?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My organization believes in the triple bottom line.</td>
</tr>
<tr>
<td>2.</td>
<td>My organization has made sustainability commitments to address our role in #1.</td>
</tr>
<tr>
<td>3.</td>
<td>I am responsible for #2.</td>
</tr>
<tr>
<td>4.</td>
<td>I have very little budget or expertise to address #3.</td>
</tr>
</tbody>
</table>
**LEEM UVP**

Zone Of Dreams (AKA “The Sweet Spot”)

- **CHEAP ($)**
- **FAST (time)**
- **GOOD (quality)**

**LEEM UVP:** The Cheapest, Fastest, & Best Way To Reduce Your Carbon Footprint

---

**TYPICAL OPTIONS**

<table>
<thead>
<tr>
<th>#</th>
<th>OPTION</th>
<th>INITIAL COST</th>
<th>SPEED</th>
<th>+ IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do Nothing</td>
<td></td>
<td>⚡⚡ISP</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Install New Equipment</td>
<td>$$$</td>
<td>⚡ISP</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Implement LEEM/Behavioral</td>
<td>$</td>
<td>⚡ISP</td>
<td></td>
</tr>
</tbody>
</table>
LEEM OPPORTUNITIES

TIER 1: CRITICAL
• Mission Critical & Life Sustaining
• Usually 10% of Total Load

TIER 2: PRIORITY
• Loads To Be Maintained As Long As there is No Threat to Tier 1
• Usually 15% Of Total Load

TIER 3: DISCRETIONARY/FLEXIBLE
• Loads To Be Maintained When There Is No Threat to Tier 1 & Tier 2
• Usually 75% of Total Load

Target: Flexible Loads

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Critical</th>
<th>Priority</th>
<th>Discretionary/Flexible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Case 1</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Use Case 2</td>
<td>80%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Use Case 3</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
</tr>
</tbody>
</table>

USE CASES

OPERATIONS
• Water Pumping
• Electric Vehicle Charging
• Energy Storage: Batteries, Flywheels, Pumped Water, Thermal, Cooling

PLANNING
• Climate Action Planning
• GHG Reporting
• Capital Improvement Planning
• LEED Reporting
INITIAL TASKS

1. Identify Load:
   • to shift, shed, or store
2. Identify Constraints:
   • demand charges
   • operating needs
3. Create a Baseline:
   • Past year’s data
   • Direct meter data is best
   • Derive from other usage data: nameplate, capacity, start/stop, flow, circuit monitor

ANNUAL SUBSCRIPTION OF ACTIONABLE INTEL: DELIVERED DAILY

Day-Ahead LEEM Email:

Org & Location Info:
Organization: GLWA
Facility: Northeast Water Plant
Address: 11000 East 8-mile Road
City: Detroit
State (Province): MI
Zip (Postal Code): 48205
Time: 04/21/20
Latitude: 42.448056
Longitude: -83.014444
Nearest LMP Node Location: Northeast, Michigan
Operations Personnel: User Experience

1. **Review** the day-ahead LEEM emission forecast

2. **Schedule** discretionary activities for times when **BOTH** emissions and prices are low

3. **Report** schedule monthly to E2i

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ANNUAL SUBSCRIPTION OF ACTIONABLE INTEL: DELIVERED MONTHLY

3 LEEM PLANT IMPLEMENTATION: OPERATOR EXPERIENCE

Christopher C. Steary, Manager, Lake Huron Water Plant, GLWA
Balvinder Sehgal, Manager, Special Projects, GLWA
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GLWA SERVICE AREA

SPEAKER & PANELIST QUESTION & ANSWER

Moderator: Chad Weikel, Education & Workforce Manager, AWWA
CONCLUSION

Chad Weikel, Education & Workforce Manager, AWWA
THANK YOU FOR ATTENDING OUR WEBINAR!

Chad Weikel, Education & Workforce Manager, AWWA
cweikel@awwa.org
Sean Reed, Director of Sales & Marketing, E2i
sean@e2intel.com

LEARN MORE ABOUT LEEM: E2INTEL.COM
UPCOMING WEBINARS

11:00 AM - 11:45 AM

Dec 15, 2020 FREE Webinar from GrayMatter: How Akron Water Built One KPI to Rule Them All
11:00 AM - 12:00 PM

Dec 16, 2020 2020 Regulatory Update
11:00 AM - 12:00 PM

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THANK YOU FOR JOINING TODAY’S WEBINAR

- As part of your registration, you are entitled to an additional 30-day archive access of today’s program.

- Until next time, keep the water safe and secure.
PRESENTER BIOGRAPHY INFORMATION

• Sean Reed is the Director of Sales for E2Intel. He has worked in the clean tech industry for over 20 years primarily as a convener of advanced technology companies and public agencies.

• Carol Miller is a Co-Founder and Partner of Energy Emissions Intelligence. She is a professor of Civil and Environmental Engineering at Wayne State University in Detroit and U.S. Chair of the Great Lakes Science Advisory Board at the International Joint Commission.

• Stephen Miller is Co-Founder and CEO of Energy Emissions Intelligence. He is also Section Manager at Commonwealth Associates and Secretary of the Analytic Methods for Power Systems committee of the Institute of Electrical and Electronics Engineers.

• Belvinder Sehgal is the Manager of Special Projects at the Great Lakes Water Authority’s North East Plant. GLWA is one of the largest water utilities in the United States serving 125 Southeast Michigan communities.

• Chris Steary is the Manager of the Great Lakes Water Authority’s Lake Huron Plant. GLWA is a proud member of AWWA.

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