



**NORA Board Meeting**  
Harrah's Resort Atlantic City Avalon Ballroom  
May 19<sup>th</sup>, 2025 3:30 pm

Join Zoom Meeting  
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## Agenda

- I. Introduction – Chairman Kate Duffey
- II. Approval of Minutes
- III. Financial Information
  - Preliminary 2024 Financials
  - Q1 2025 Financials
  - Method Integration
- IV. Research & Development – Dr. Thomas Butcher, Director of Laboratory
- V. Education & Training – Bob O'Brien, Director of Education
- VI. NORA 2025 Activities – President Michael Devine
  - NORA & Chevron Renewable Diesel/Biodiesel Blend Study
  - HVOEC – NORA Programs
  - Eurofuel Membership
  - CFAA Collaboration
  - NORA Video's
- VII. Executive Committee & Officers for 2025
- VIII. Old Business
- IX. New Business
- X. Adjournment

NORA Board Meeting  
Newport Marriott  
Salon II Ballroom  
September 23rd, 2024  
10:00 am

I. **Introduction** – Chairman Kate Duffey called the meeting to order.

The following members of the NORA Board of Directors were in attendance and constituted a Quorum.

Roger Marran	Kate Duffey
Michael Devine	Eric DeGesero
Allison Heaney	Matt Cota
Dan Mattice	Jacqueline Hart
Carter Vaillancourt	Claudette Townsend
Steve Oehlert	Dan Singer
Bobby Parlett	Scott Vandino
Kristyn Schweitzer	John McCusker
Katie Foster	Mark Caspers
Hal Johnson	Rick Bologna
Dr. Thomas Butcher	Robert O'Brien

II. **Approval of Minutes** – Chairman Kate Duffey asked the NORA Board of Directors if they had any comments or changes to the previous meeting minutes. There being no changes, Kate Duffey asked for a motion to approve, which was made by Roger Marran and the motion was seconded by Jacqueline Hart, all approved.

III. **Financial Information** –

**2023 NORA Audit** – The 2023 NORA Audit was presented by Natasha Perkins, who is a Principal with UHY Advisors. Natasha took the NORA Board of Directors through the 2023 NORA audit in great detail and provided the Board of Directors with a synopsis of the NORA audit, including the audit process and the overall financial health of the organization. During this audit process UHY found no significant issues with the financial standing of the organization and the overall management of NORA.

A motion was called on by chairman Duffey to approve the 2024 NORA audit, a motion was made by Dan Mattice to accept the NORA audit as presented and the motion was seconded by Rick Bologna, all were in favor.

**August 2024 Financials** - NORA operated at a deficit of \$379K for the first eight months of the year. This is the result of recording the state program expenses (Consumer Ed & Training, Research & Development and Home Efficiency) and state rebates in their entirety up front. Whereas the revenue/collections are recorded throughout the year. We expect this to smooth out as we continue to receive collections.

During April 2024, NORA reduced the 2024 budget by 10% due to the decrease in collections during the first quarter of 2024. Collections were approximately \$4.6M for the first eight months

of the year. This represents 65% of budgeted annual collections. The annual escrow is calculated at year end and will continue to be reflected as a variance throughout the year.

Central program expenses of \$1.1M are behind budget by \$354K through August 31st as the expenses were not incurred. States and Rebates program expenses of \$3 million and \$508K, respectively, are over/under budget by \$236K and \$43K, respectively, due to the \$2 million additional Research & Development funds allocated in 2021 and 2022, respectively.

The unallocated or non-programmatic expenses are approximately \$177K as compared to an annual budget of \$356K. We expect the expenses to be incurred in the remainder of the year which will result in reducing the variance.

As of August 31, 2024, the NORA Statement of Financial Position continues to be very strong with \$10.3 million in available cash and \$8.4 million in escrow. This is offset by \$4.8 million in grants payable to the participating states and \$934K in other liabilities. Accounts payable is current as are the other accrued expenses. Net assets are in excess of \$13 million. Assessments Receivable of \$333K represents amounts due from customers. The uncollected balance as of September 18th is \$224K, which is expected to be collected.

- IV. **Research and Development** – Dr. Butcher prepared a PowerPoint presentation to the NORA Board, which highlighted the current activities that the research and development team have been actively engaged in. Some of the projects discussed included, high biodiesel blend field testing, in-lab head coking studies with renewable fuels, EL testing, heated outside fuel storage tanks, the renewable diesel-biodiesel blend field study plans, updates on the NORA teams participation in industry meetings, our technical report submissions in recent publications and the work being conducted by the Summer research interns.
- V. **Education and Training** - Bob O'Brien provided an overview through a PowerPoint presentation that highlighted the current NORA Education initiatives and the projects that we have been engaged in. The education briefing included updates pertaining to the BPI Test Center at NORA, developing micro-credentials for CEU credits, an update on new schools that are offering the NORA certification programs, including the exciting collaboration with SUNY Morrisville. Bob also provided new updates from our work within the various IECC committees.
- VI. **NORA 2024 Activities** - President Michael Devine
- **Chevron – REG Renewable Diesel- Biodiesel Blend Field Study / 2024 - 2025 heating season:** The NORA – Chevron / Renewable Diesel Project Update- The NORA renewable diesel project is progressing well. We have 5 retail distributors in Massachusetts and 9 retail distributors in Pennsylvania who have expressed strong interest in participating in the field study. At present, we are identifying the RD80-B20 rail distribution locations in Massachusetts and Pennsylvania and each of the retail distributors are identifying their customers who will participate in the field study. Over the next 30 days, we hope to have these customer lists finalized, the distribution sites identified and schedule the first rail cars into MA and PA.
  - **NORA Technical Workshop / Tuesday, September 24:** The NORA Technical Workshop will be held on November 24<sup>th</sup>, Newport, Rhode Island. The NORA has actively to promoted our Technical Workshop which will be held in conjunction with the SNEC. We are very pleased to have Frederica Miano and Dr. Moritz Bellinghen from

Eurofuel join us at the workshop.

- **SUNY Morrisville SUNY Morrisville Event / Friday, October 4<sup>th</sup> - Event:** As part of the last day's activities of the Empire State Energy Conference, the NORA team will be inviting all of the conference participants to the Agricultural and Clean Energy Technology Center at SUNY Morrisville. We have planned a tour of the facility, including a live fire demonstration of the NORA quartz cylinder. We will be meeting with the students and providing an interactive discussion between our industry and how we tie in well with their renewable energy curriculum.
- **NORA Plainview Video Shooting / November 11<sup>th</sup> – 13<sup>th</sup>:** Following an initial outreach and discussion with NYOHA and UNYEA, NORA Central funding will be paying for the production of several videos that can be utilized by the state associations and NORA to promote the advancements in the liquid heating industry. Proposed videos include capturing the activities in the Chemical Lab, Combustion Lab, as Dr. Butcher narrates our R&D activities. Also included is a live classroom in session as we highlight the NORA education programs and the new BPI classes.
- **Conferences Participation / Reporting on upcoming events in 2024 -** Michael Devine provided a rundown of NORA's participation and activities that are upcoming this fall. The following conferences and workshops are as follows:
  - SNEC – September 23<sup>rd</sup> – 24<sup>th</sup>, Newport, RI
  - Empire State Energy Conference – October 2<sup>nd</sup> - 4<sup>th</sup>, Turning Stone Casino, NY
  - EMA Conference October 5<sup>th</sup> – 7<sup>th</sup> Las Vegas, Nevada
  - XBx – October 15<sup>th</sup>, Lancaster, PA
  - PPA Fall Energy Conference – October 15<sup>th</sup> – 17<sup>th</sup>, Lancaster PA
  - Biodiesel Technical Workshop October 29<sup>th</sup> – 30<sup>th</sup> Kansas City, Missouri

VII. Old Business – None

VIII. New Business – None

IX. Adjournment – A motion to adjourn the meeting was made by Roger Marran and was seconded by John McCusker, all were in favor and the meeting was concluded.



**Internal Financial Statements  
For the Year Ended December 31, 2024**

These Financial Statements omit substantially all disclosures and the statement of cash flows ordinarily included in the financial statements prepared in accordance with the accrual basis of accounting and have not been subjected to an audit, review, or compilation engagement, and no assurance is provided on them.

National Oilheat Research Alliance, Inc.  
Internal Financial Statements  
December 31, 2024

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National Oilheat Research Alliance, Inc.  
Financial Summary  
For the Year Ended December 31, 2024

NORA ended the year with a net surplus of \$2.3M. The annual escrow is calculated as part of the audit and will continue to be reflected as a variance until the audit is finalized.

During April 2024, NORA reduced the 2024 budget by 10% due to the decrease in collections during the first quarter of 2024.

Collections were approximately \$8.4M as of December 31st.

Central program expenses of \$1.7M are greater than budget by \$241K through December 31st.

States and Rebates program expenses of \$3.1 million and \$508K, respectively, are over/under budget by \$285K and \$43K, respectively, due to the \$2 million additional Research & Development funds allocated in 2021 and 2022, respectively.

The Unallocated or non-programmatic expenses are approximately \$261K as compared to an annual budget of \$356K.

As of December 31, 2024, the NORA Statement of Financial Position continues to be very strong with \$8.3 million in available cash and \$10.3 million in escrow. This is offset by \$3.2 million in grants payable to the participating states and \$2.3M in other liabilities. Accounts payable is current as are the other accrued expenses. Net assets are in excess of \$16 million.

Assessments Receivable of \$2.4M represent amounts due from customers, which is expected to be collected.

During July 2023, NORA entered into a \$450,000 contract with Clean Fuels Alliance America (“CFAA”) for Research Development. NORA received the first installment of \$236,500 during August 2023 and the second installment of \$213,500 during October 2023. During April 2024 NORA entered into an additional \$550,000 contract with CFAA for Research Development. NORA received the first installment of \$243,500 during June 2024 and the second installment of \$306,500 during September 2024. As of December 31, 2024, NORA has incurred \$614,708 in expenses; \$74,510 in 2023 and \$540,198 in 2024. The remaining balance of \$385,292 is classified as deferred contract revenue on the Statement of Financial Position.

National Oilheat Research Alliance, Inc.  
Statement of Financial Position  
December 31, 2024

ASSETS

CURRENT ASSETS:	
Cash	\$ 8,309,500
Cash Held in Escrow	10,303,314
Assessments Receivable	2,420,212
Security Deposit	24,514
Other Receivables	12,780
Due from NAORE	11,254
Other Receivable- Mimeo	1,525
Prepaid Assets	28,758
Operating right-of-use asset	575,689
Total Curent Assets	<u>21,674,767</u>
PROPERTY AND EQUIPMENT:	
Office Furniture and Equipment	80,076
Website	45,450
Computer Equipment	3,819
Less: Accumulated Depreciation	(83,358)
Less: Accumulative Amortization (Web Site)	(45,450)
Total Property and Equipment	<u>537</u>
TOTAL ASSETS	<u><u>\$ 21,675,304</u></u>

LIABILITIES AND NET ASSETS

LIABILITIES:	
Grants Payable:	
State Rebate Obligations - Education	\$ 525,153
State Rebate Obligations - R&D	735,974
State Rebate Obligations - Energy Efficiency	229,084
State Rebate Obligations - Rebates	1,697,784
Total Grants Payable	<u>3,187,995</u>
Other Liabilities:	
Accounts Payable	1,057,189
Accrued Expenses	-
Accrued Salaries & Benefits	84,851
Deferred Contract Revenue	385,292
Refunds Payable	210,000
Operating lease liability	603,003
Total Other Liabilities	<u>2,340,334</u>
Total Liabilities	<u>5,528,329</u>
NET ASSETS:	
Unrestricted Net Assets	2,107,718
Pre-2014 Reauthorization Net Assets	55,933
Unavailable for Obligation until 10/01/2028	9,962,430
National Spending Not Yet Incurred:	
Research, development, and demonstration - not yet obligated	3,457,129
Research, development, and demonstration - obligated under contract	67,594
Heating oil efficiency and upgrade - not yet obligated	230,025
Consumer education, safety, and training - not yet obligated	266,147
Total Net Assets	<u>16,146,975</u>
TOTAL LIABILITIES AND NET ASSETS	<u><u>\$ 21,675,304</u></u>

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National Oilheat Research Alliance, Inc.  
Statement of Activities  
Budget vs. Actual  
For the Year Ended December 31, 2024

	YTD Actual 12/31/24	Percentage	Annual Budget 2024	Variance
<b>REVENUE:</b>				
Collections and Assessments:				
Collections	\$ 8,361,303	117.75%	\$ 7,100,773	\$ 1,260,530
Refunds	(971,922)		-	(971,922)
Escrow	-		(1,775,193)	1,775,193
Net Collections	<u>7,389,381</u>		<u>5,325,580</u>	<u>2,063,801</u>
<b>EXPENSES:</b>				
Program Expenses:				
Consumer Education and Training (Max. 30%)	1,394,798		1,544,418	(149,620)
Education and Training (Central)	196,182		252,000	(55,818)
Education and Training (States)	1,198,616		1,292,418	(93,802)
Research Development and Demonstration (Min. 30%)	2,442,372		1,845,158	597,214
Research Development and Demonstration (Central)	1,437,684		1,143,000	294,684
Research Development and Demonstration (States)	1,004,688		702,158	302,530
Home Energy Efficiency Program (Min. 15%)	922,074		843,867	78,207
Home Energy Efficiency Program (Central)	60,495		58,500	1,995
Home Energy Efficiency Program (States)	861,579		785,367	76,212
Total Central	<u>1,694,362</u>	116.57%	<u>1,453,500</u>	<u>240,862</u>
Total States	<u>3,064,883</u>	110.25%	<u>2,779,943</u>	<u>284,940</u>
State Rebates	<u>508,395</u>	92.24%	<u>551,137</u>	<u>(42,742)</u>
Office Unallocated Expenses:				
Salaries and Consulting	95,894		165,000	(69,106)
Accounting	25,211		35,000	(9,789)
Insurance	18,569		15,000	3,569
Taxes	3,154		3,000	154
Postage	1,152		1,500	(348)
Web Pages	13,440		15,000	(1,560)
Rent and Telephone	3,819		7,500	(3,681)
Travel	-		7,500	(7,500)
Meeting Expenses	-		5,000	(5,000)
Office Supplies	-		2,500	(2,500)
Dues & Memberships	11,197		5,000	6,197
Bank Fees	1,418		3,000	(1,582)
Legal Expense	84,000		84,000	-
Professional Fees	-		-	-
Payroll Processing Fees	3,299		4,000	(701)
Misc. Expense	178		-	178
Advertising Expense	-		-	-
Equipment Maintenance	248		3,000	(2,752)
Total Office Unallocated Expenses	<u>261,403</u>	73.43%	<u>356,000</u>	<u>(94,597)</u>
General and Special Projects:				
Assessment and Collection Costs	218,993		230,000	(11,007)
Annual Report	79,837		55,000	24,837
Total General and Special Projects	<u>298,830</u>		<u>285,000</u>	<u>13,830</u>
Other Expenses/(Income):				
Interest Income	(687,515)		(100,000)	587,515
Contract Revenue (CFAA)	(540,198)		(225,000)	315,198
Other Income-Technicians Manual	(79,698)		-	79,698
Other Income	(14,616)		-	14,616
Contract Expenses (CFAA)	540,198		225,000	(315,198)
Cost of Goods Sold-Technicians Manual	49,390		-	(49,390)
Total Other Expenses/(Income)	<u>(732,440)</u>		<u>(100,000)</u>	<u>632,440</u>
Net Surplus	<u>\$ 2,293,949</u>		<u>\$ -</u>	<u>\$ 2,293,949</u>

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**Internal Financial Statements**  
**For the Three Months Ended March 31, 2025**

National Oilheat Research Alliance, Inc.  
Internal Financial Statements  
March 31, 2025

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National Oilheat Research Alliance, Inc.  
Financial Summary  
For the Three Months Ended March 31, 2025

NORA operated at a deficit of \$1.4 million for the three months ended March 31, 2025. This is the result of recording the state program expenses (Consumer Ed & Training, Research & Development and Home Efficiency) and state rebates in their entirety up front. Whereas the revenue/collections are recorded throughout the year. We expect this to smooth out as we continue to receive collections.

Collections were approximately \$2.6M as of March 31st. This represents 34% of budgeted annual collections.

The annual escrow is calculated at year end and will continue to be reflected as a variance throughout the year.

The Unallocated or non-programmatic expenses are approximately \$68K as compared to an annual budget of \$369K.

As of March 31, 2025, the NORA Statement of Financial Position continues to be very strong with \$8.9 million in available cash and \$10.4 million in escrow. This is offset by \$5.9 million in grants payable to the participating states and \$1.6M in other liabilities. Accounts payable is current as are the other accrued expenses. Net assets are in excess of \$14 million.

Assessments Receivable of \$2.3M represent amounts due from customers, which is expected to be collected.

During April 2024 NORA entered into a \$550,000 contract with CFAA for Research Development. NORA received the first installment of \$243,500 during June 2024 and the second installment of \$306,500 during September 2024. As of March 31, 2025, NORA has incurred \$291,684 in expenses; \$164,708 in 2024 and \$126,976 in 2025. The remaining balance of \$258,316 is classified as deferred contract revenue on the Statement of Financial Position.

National Oilheat Research Alliance, Inc.  
Statement of Financial Position  
March 31, 2025

ASSETS

CURRENT ASSETS:	
Cash	\$ 8,942,239
Cash Held in Escrow	10,371,976
Assessments Receivable	2,292,985
Security Deposit	28,419
Other Receivables	14,931
Prepaid Assets	31,635
Operating right-of-use asset	553,147
Total Curent Assets	<u>22,235,332</u>
PROPERTY AND EQUIPMENT:	
Office Furniture and Equipment	80,076
Website	45,450
Computer Equipment	3,819
Less: Accumulated Depreciation	(83,420)
Less: Accumulative Amortization (Web Site)	(45,450)
Total Property and Equipment	<u>475</u>
TOTAL ASSETS	<u><u>\$ 22,235,808</u></u>

LIABILITIES AND NET ASSETS

LIABILITIES:	
Grants Payable:	
State Rebate Obligations - Education	\$ 1,629,562
State Rebate Obligations - R&D	1,234,909
State Rebate Obligations - Energy Efficiency	835,835
State Rebate Obligations - Rebates	2,252,519
Total Grants Payable	<u>5,952,824</u>
Other Liabilities:	
Accounts Payable	457,062
Accrued Expenses	29,335
Accrued Salaries & Benefits	36,356
Deferred Contract Revenue	258,316
Refunds Payable	210,000
Operating lease liability	580,916
Total Other Liabilities	<u>1,571,985</u>
Total Liabilities	<u>7,524,809</u>
NET ASSETS:	
Unrestricted Net Assets	671,741
Pre-2014 Reauthorization Net Assets	55,933
Unavailable for Obligation until 10/01/2028	9,962,430
National Spending Not Yet Incurred:	
Research, development, and demonstration - not yet obligated	3,457,129
Research, development, and demonstration - obligated under contract	67,594
Heating oil efficiency and upgrade - not yet obligated	230,025
Consumer education, safety, and training - not yet obligated	266,147
Total Net Assets	<u>14,710,999</u>
TOTAL LIABILITIES AND NET ASSETS	<u><u>\$ 22,235,808</u></u>

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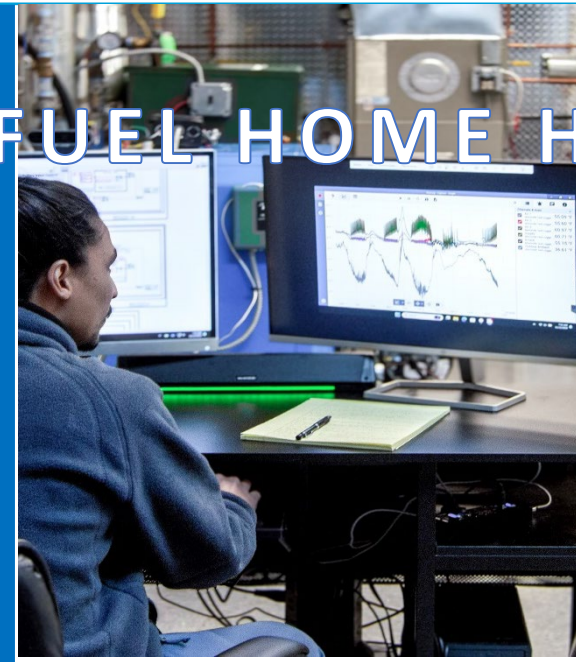
National Oilheat Research Alliance, Inc.  
Statement of Activities  
Budget vs. Actual  
For the Three Months Ended March 31, 2025

	YTD Actual 3/31/25	Percentage	Annual Budget 2025	Variance
<b>REVENUE:</b>				
Collections and Assessments:				
Collections	\$ 2,574,114	33.64%	7,653,055	\$ (5,078,941)
Refunds	(173,726)		-	(173,726)
Escrow	-		(1,913,264)	1,913,264
Net Collections	<u>2,400,388</u>		<u>5,739,791</u>	<u>(3,339,403)</u>
<b>EXPENSES:</b>				
Program Expenses:				
Consumer Education and Training (Max. 30%)	1,412,383		1,664,539	(252,156)
Education and Training (Central)	27,844		280,000	(252,156)
Education and Training (States)	1,384,539		1,384,539	-
Research Development and Demonstration (Min. 30%)	1,035,049		1,996,937	(961,888)
Research Development and Demonstration (Central)	308,112		1,270,000	(961,888)
Research Development and Demonstration (States)	726,937		726,937	-
Home Energy Efficiency Program (Min. 15%)	857,232		910,969	(53,737)
Home Energy Efficiency Program (Central)	16,263		70,000	(53,737)
Home Energy Efficiency Program (States)	840,969		840,969	-
Total Central	<u>352,218</u>	21.74%	<u>1,620,000</u>	<u>(1,267,782)</u>
Total States	<u>2,952,444</u>	100.00%	<u>2,952,445</u>	<u>-</u>
State Rebates	<u>563,346</u>	100.00%	<u>563,346</u>	<u>-</u>
Office Unallocated Expenses:				
Salaries and Consulting	24,462		165,000	(140,538)
Accounting	6,401		35,000	(28,600)
Insurance	4,054		20,000	(15,946)
Taxes	890		3,000	(2,110)
Postage	261		1,500	(1,239)
Web Pages	2,880		18,000	(15,120)
Rent and Telephone	600		8,000	(7,400)
Travel	1,140		8,000	(6,860)
Meeting Expenses	-		6,000	(6,000)
Office Supplies	-		2,500	(2,500)
Dues & Memberships	4,684		5,000	(316)
Bank Fees	691		4,000	(3,309)
Legal Expense	21,000		84,000	(63,000)
Payroll Processing Fees	1,217		4,000	(2,783)
Misc. Expense	30		-	30
Equipment Maintenance	62		5,000	(4,938)
Total Office Unallocated Expenses	<u>68,342</u>	18.52%	<u>369,000</u>	<u>(300,658)</u>
General and Special Projects:				
Assessment and Collection Costs	39,845		230,000	(190,155)
Annual Report	3,174		55,000	(51,826)
Total General and Special Projects	<u>43,019</u>		<u>285,000</u>	<u>(241,981)</u>
Other Expenses/(Income):				
Interest Income	(127,941)		(50,000)	77,941
Contract Revenue (CFAA)	(126,976)		(225,000)	(98,024)
Other Income-Technicians Manual	(11,368)		-	11,368
Other Income	(3,695)		-	3,695
Contract Expenses (CFAA)	126,976		225,000	98,024
Total Other Expenses/(Income)	<u>(143,004)</u>		<u>(50,000)</u>	<u>93,004</u>
Net Deficit	<u>\$ (1,435,977)</u>		<u>-</u>	<u>\$ (1,435,977)</u>

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# ADVANCING LIQUID FUEL HOME HEATING

# NORA



## NORA Research Update

Board of Directors Meeting  
Eastern Energy Expo  
Atlantic City, N.J. May 19, 2025

Tom Butcher, Technical Director

- Outside Tanks for High Blends
- B100 Field Tests
- Head Coking with High Blends
- Field Trials of Renewable Diesel/Biodiesel Blends
- EL



# Outside Tank Test Morrisville, NY



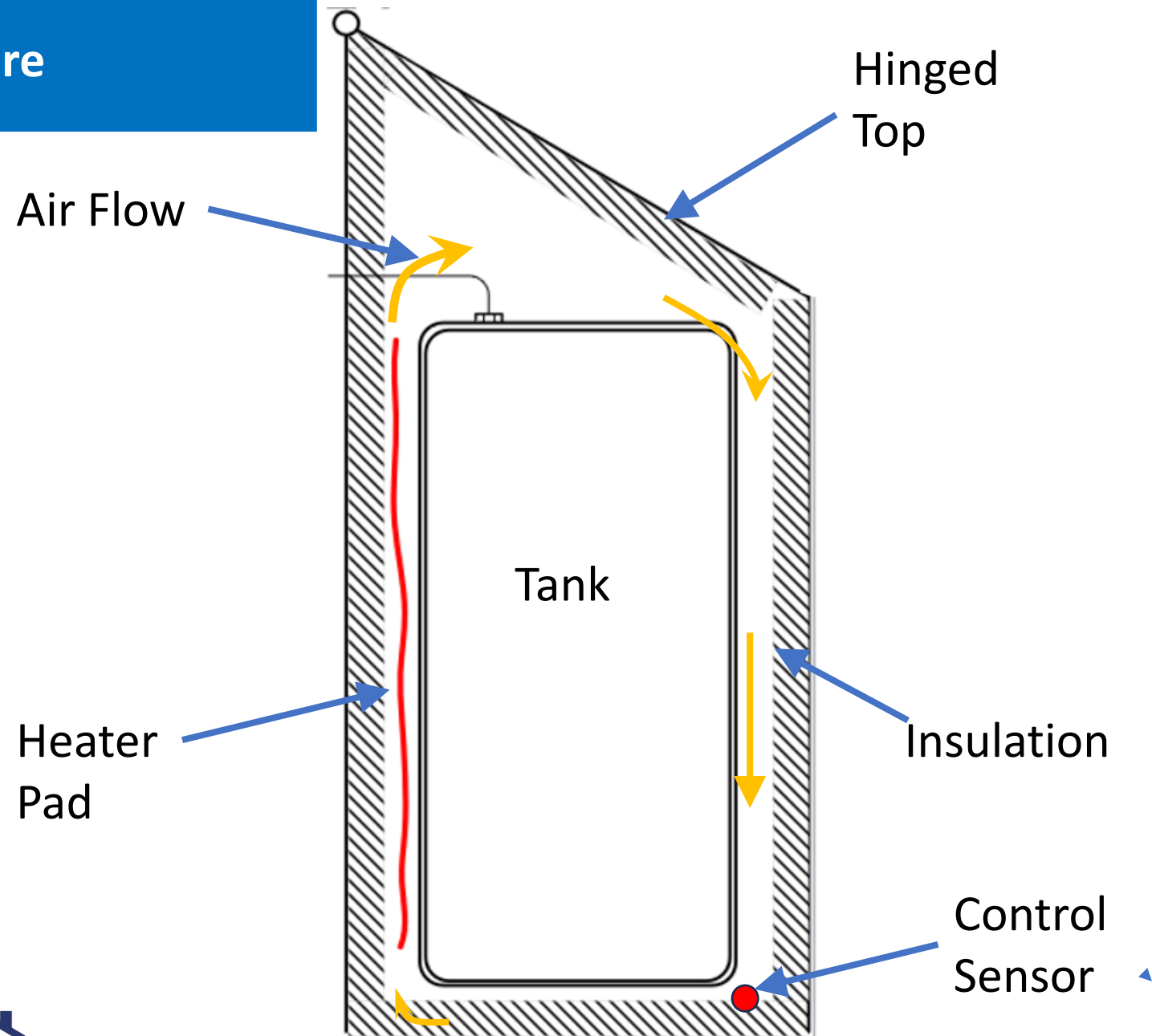
# Heated Tank Enclosure



- 3" foam board insulation
- 2 X 100-watt heating blankets in air space
- Thermostat control

Limited testing has been done to date. Temperature as low as 12 °F.  
Very good performance. To be continued next heating season.

# Heated Tank Enclosure

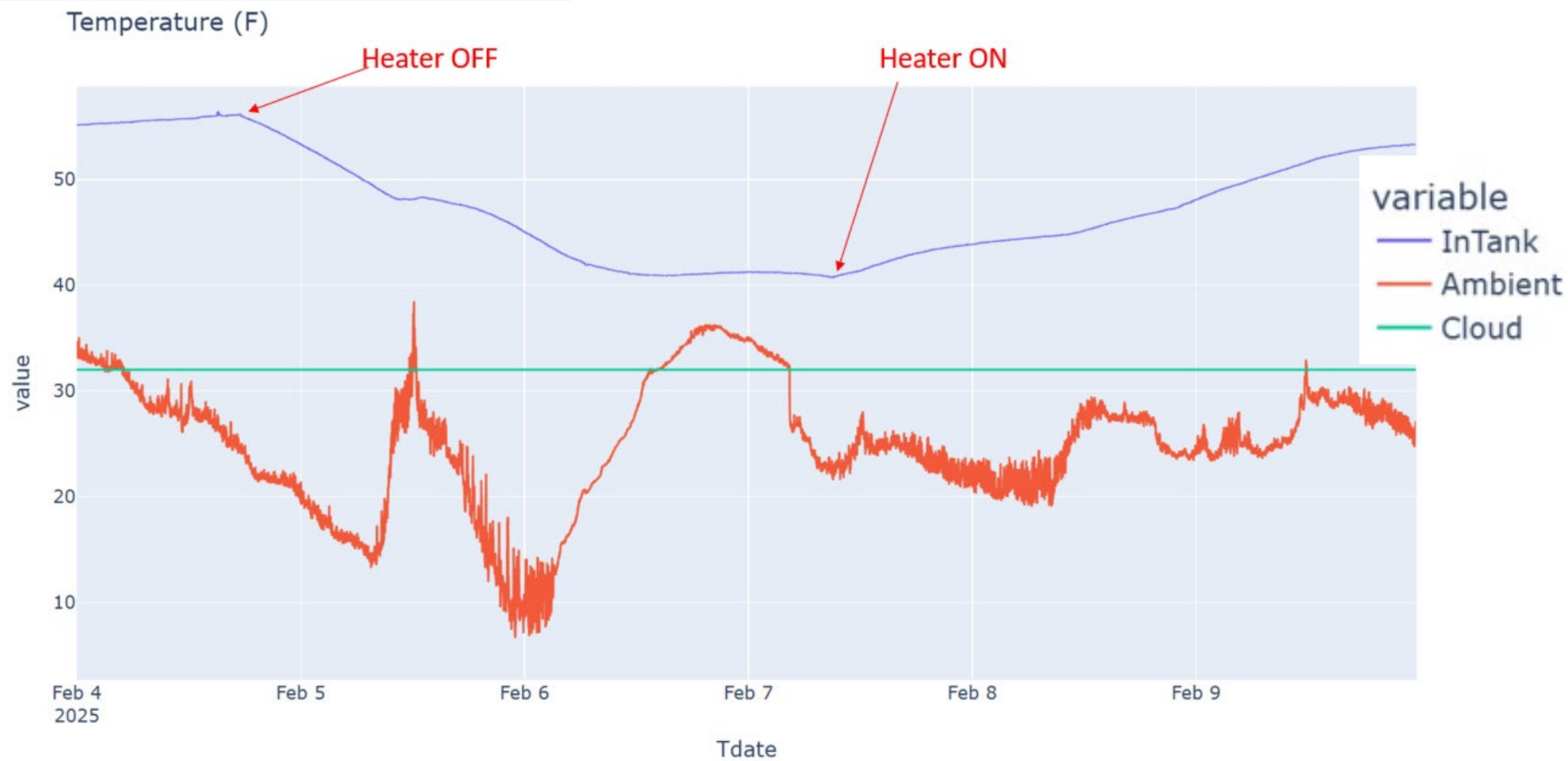




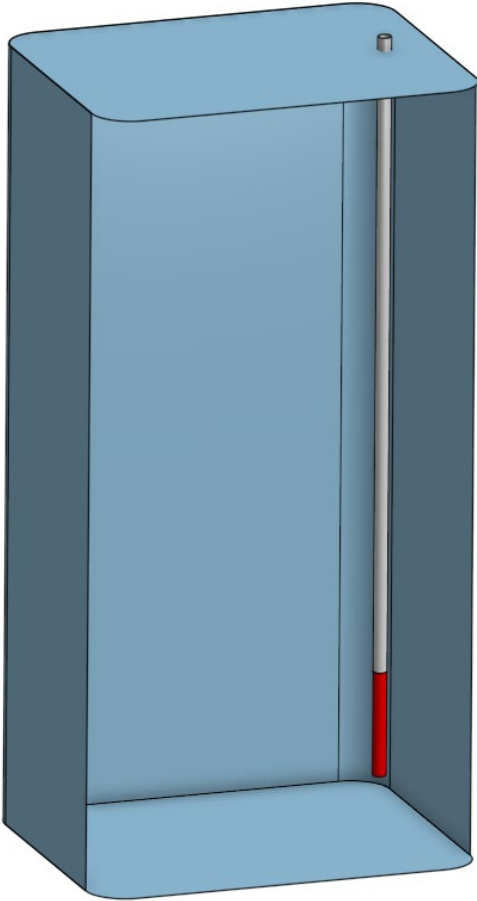
# Heated Tank Enclosure



# Heated Tank Enclosure



## CEMA Tank Test 2024-2025



- Changed setup for remote monitoring
- Reduced to 2 tanks
- In-tank heaters 250 watts
- Line heaters





### Some Issues

- In-tank heater failures
- High fuel particulates/pump seizing
- Tank run-out: Fuel level lower than heater element, leading to “cooking” of the fuel

### **Cubby Oil and Energy – 9 B100 sites**

*This winter sites converted to RD50/B50 blends*

### **Hart Home Comfort – 10 B100 sites**

*Testing is on-going*

#### **Field Tests Include:**

- Evaluation of impact on equipment and failure rates
- Changes on service required
- Fuel property changes over winter and summer seasons
- Burner head conditions
- A platform for evaluation of emerging technologies with manufacturers



### **What have we seen from the field:**

Biodiesel remains fairly stable over time, more changes over summer idle periods

Filtration efficiency poor

Head coking with B100 still an area of work in some systems

### **What have we NOT seen from the field:**

High filter change rates

Changes in flue gas CO<sub>2</sub> associated with biodiesel use

Pump leaks or elevated failure rates for other reasons.

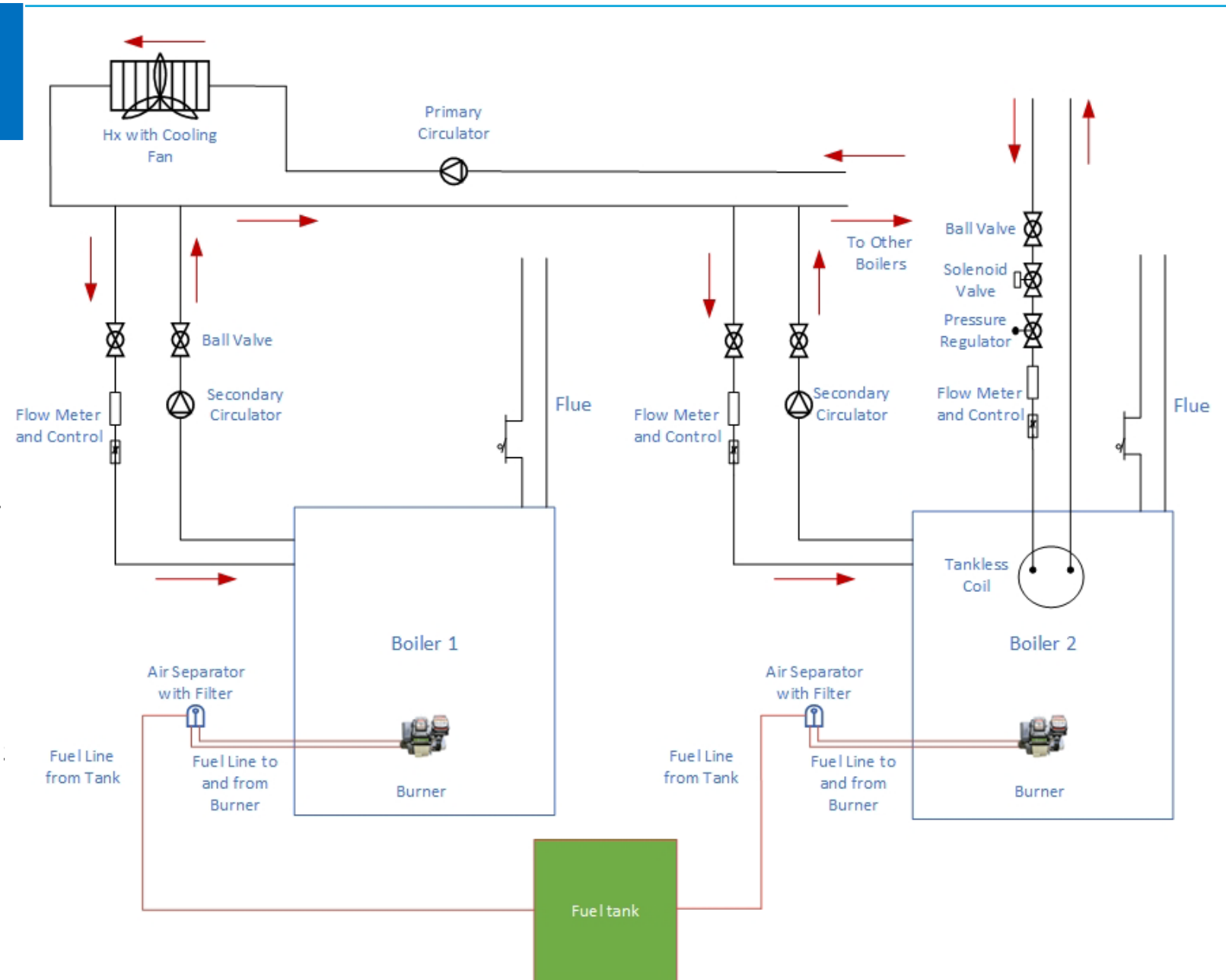
## Carbon Buildup

- Some sites in the test showed a buildup of carbon on the burner head or in the air tube
- Investigations into the root cause and preventative measures for this issue are ongoing



# Rapid Head Coking Tests

- Field studies have shown, in some cases, elevated head coking with B100
- In-lab test developed to understand and resolve head coking
- 3,000 cycles at 1 min on/1 min off – designed to promote rapid onset of head coking
- 86 tests performed on 2 test stands
- Various boiler, burner, fuel and operational parameter combination tested

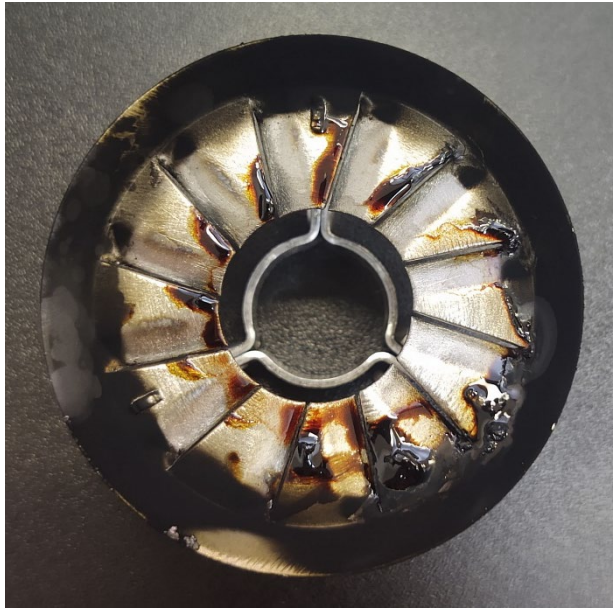


## Key Findings To-Date In-Lab Coking

- Cold chamber boilers with rapid cycling most challenging
- Distillation curves seen as important factor
- Adding refractory and minimizing post purge can strongly increase measured head temperature and reduce head coking
- Burner manufacturers are making progress in burner changes for high blends
- Blending lighter components (RD, Kero) dramatically reduces head coking
- European blue flame, low NOx burner did not show coking
- Higher pump pressure and other adjustments help



## Example Results



B100



B80/RD20



RD50/B50



RD100

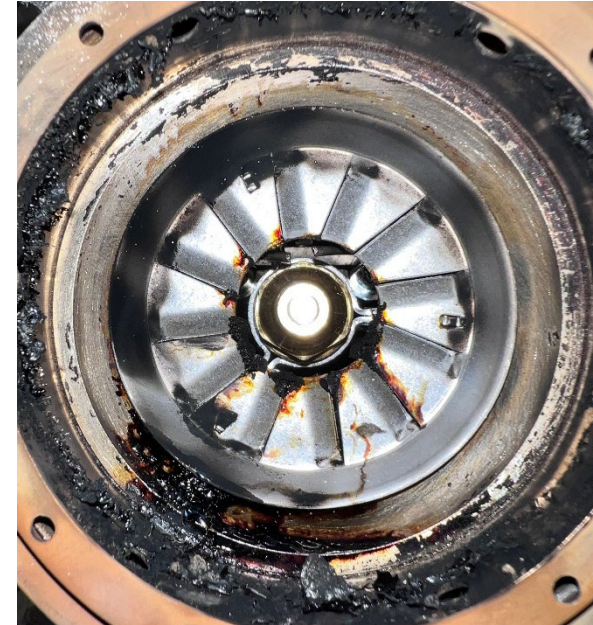
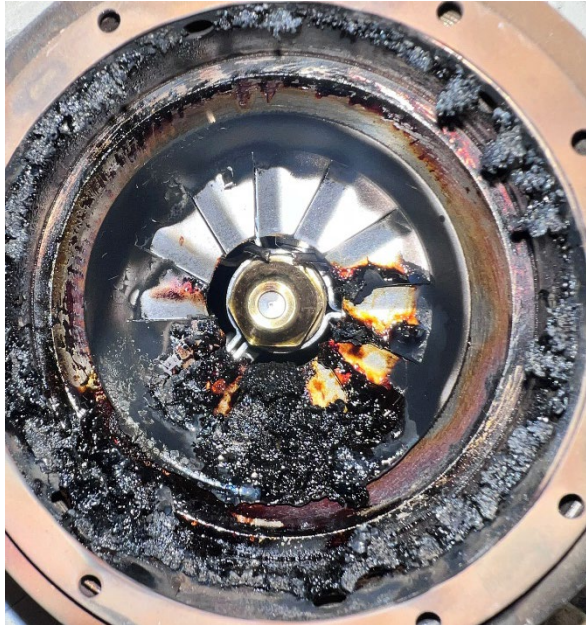
## In-Lab Long-Term Testing

- **Cycle burners until a failure point is reached**
- **Failure defined as:**
  - High CO
  - Smoke # > 0
  - Lockout due to high cad cell resistance
- **Data collection 2-3 times week**
  - CO<sub>2</sub>, CO, cad cell resistance, smoke number, pressure difference between airtube and chamber
- **Picture of head taken once a week to document progression of head coking**



## Test Comparison

- Pin-type, refractory
- 1 min on/1 min off
- 332 runtime hours
- Failed after 332 runtime hours



- Pin-type, refractory
- 5 min on/5 min off
- 329 runtime hours
- Still operating after 541 runtime hours

## Fuels Cycling Analysis

- Flue gas temperatures logged at seven Long Island sites from December 2024 to February 2025
- Better understand field cycling behavior
- Average on time
- Amount of short cycling (<3 minute on time)
- Select cycle times in long-term head coking tests based on field data

Site	Data Collection Period	Average On Time (minutes)	Average Off Time (minutes)
1	12/19/24 to 2/7/25	3.12	8.95
2	12/19/24 to 2/7/25	7.83	8.47
3	12/19/24 to 2/7/25	3.62	12.95
4	12/19/24 to 2/7/25	9.23	8.98
5	12/28/24 to 1/9/25	3.87	12.20
6	12/28/24 to 1/8/24	5.38	15.31
7	12/30/24 to 2/18/25	6.08	21.46
Average		5.59	12.62



## Short Cycling

Site	Number of Short Cycles	Short Cycles as a Percentage of Total Cycles
1	4150	68.7
2	18	0.4
3	970	22.1
4	0	0
7	2	3.5

## Planned RD/BD Blend Field Test

- Goals:**
- Demonstrate RD80/B20 and RD50/BD50 blends can be used reliably
  - Identify any equipment adjustments needed

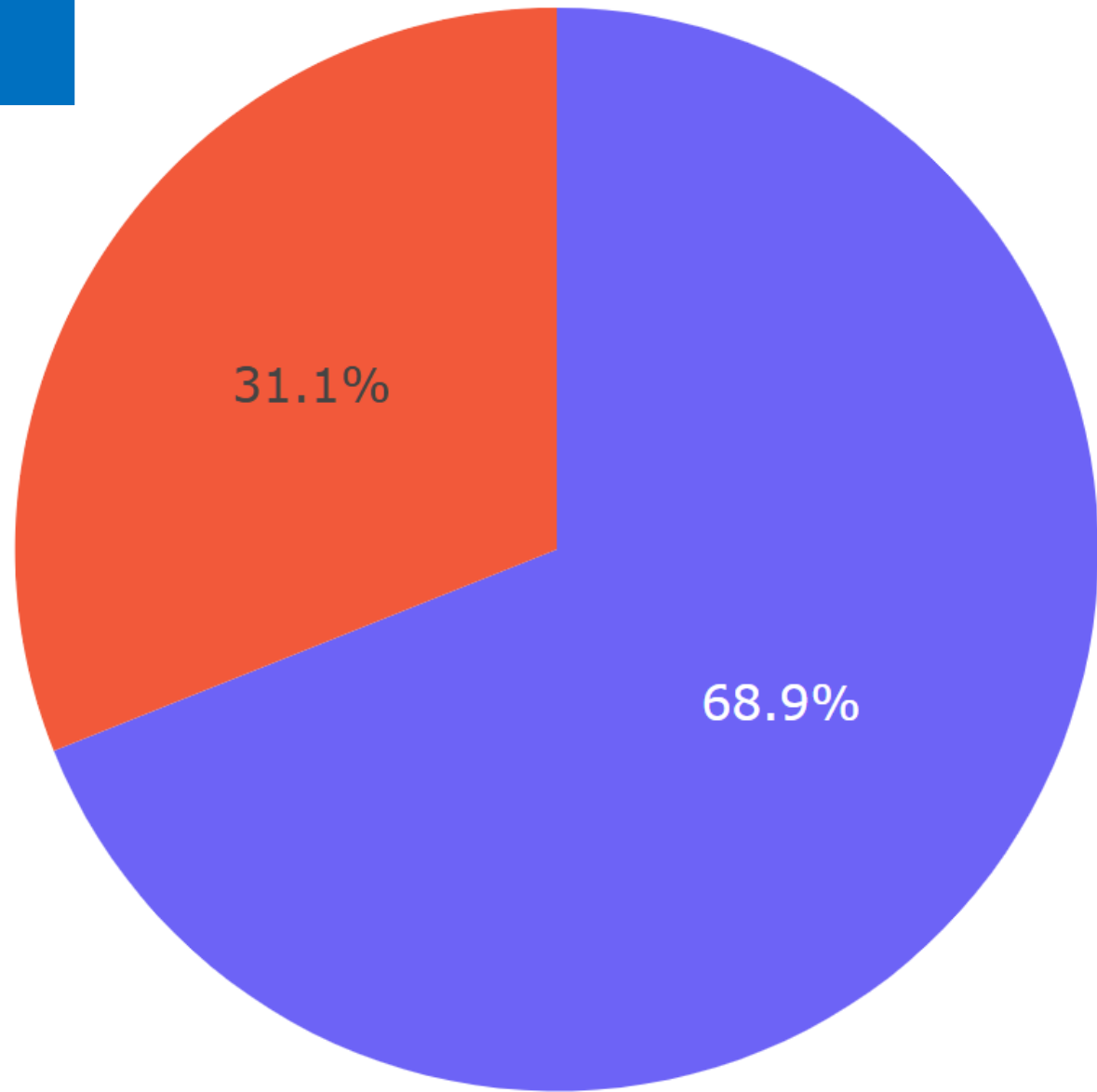
- Plans:** (track service only)
- 135 sites in MA & PA (+NH)
  - Chevron REG will supply the fuel
  - Sites will be divided into Level 1 (intense monitoring) & Level 2
  - Through the 2024/2025 heating season
  - Target a wide variety of equipment types and manufacturers
  - Detailed report on results and future potential

- Level 1:**
  - Visit, detailed characterization
  - At some sites – replace tank
  - Sampling to evaluate changes in fuel quality over the year
  - Check combustion performance each visit
  - Head inspection each visit
  - Track service history
- Level 2:**
  - Check combustion performance as needed
  - Track service history

- Basic combustion
- Transition testing (e.g. B100 to RD80/B20)
- Fuel Pump Testing – B100 pumps and “legacy” pumps

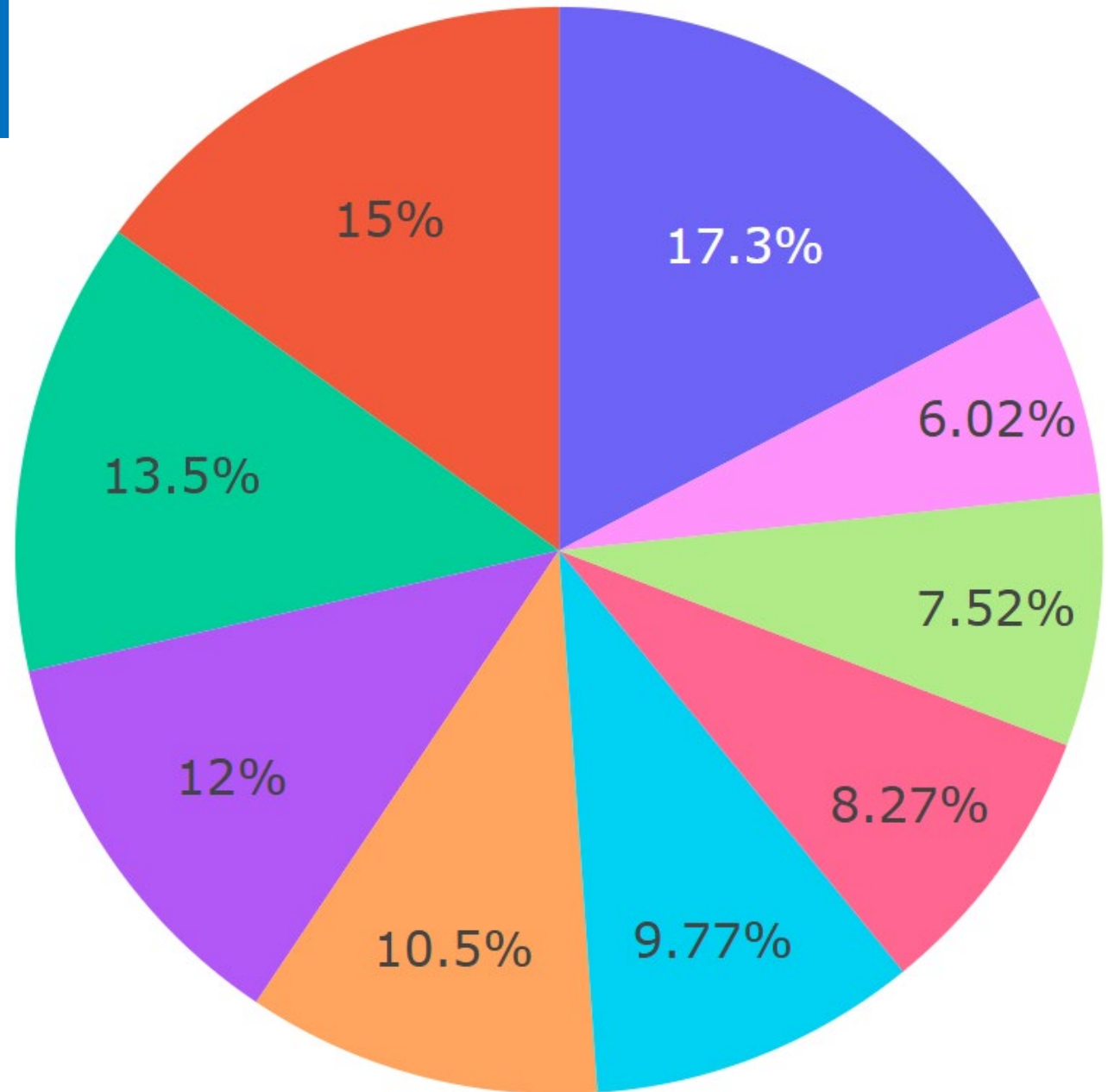
## States

■ PA  
■ MA



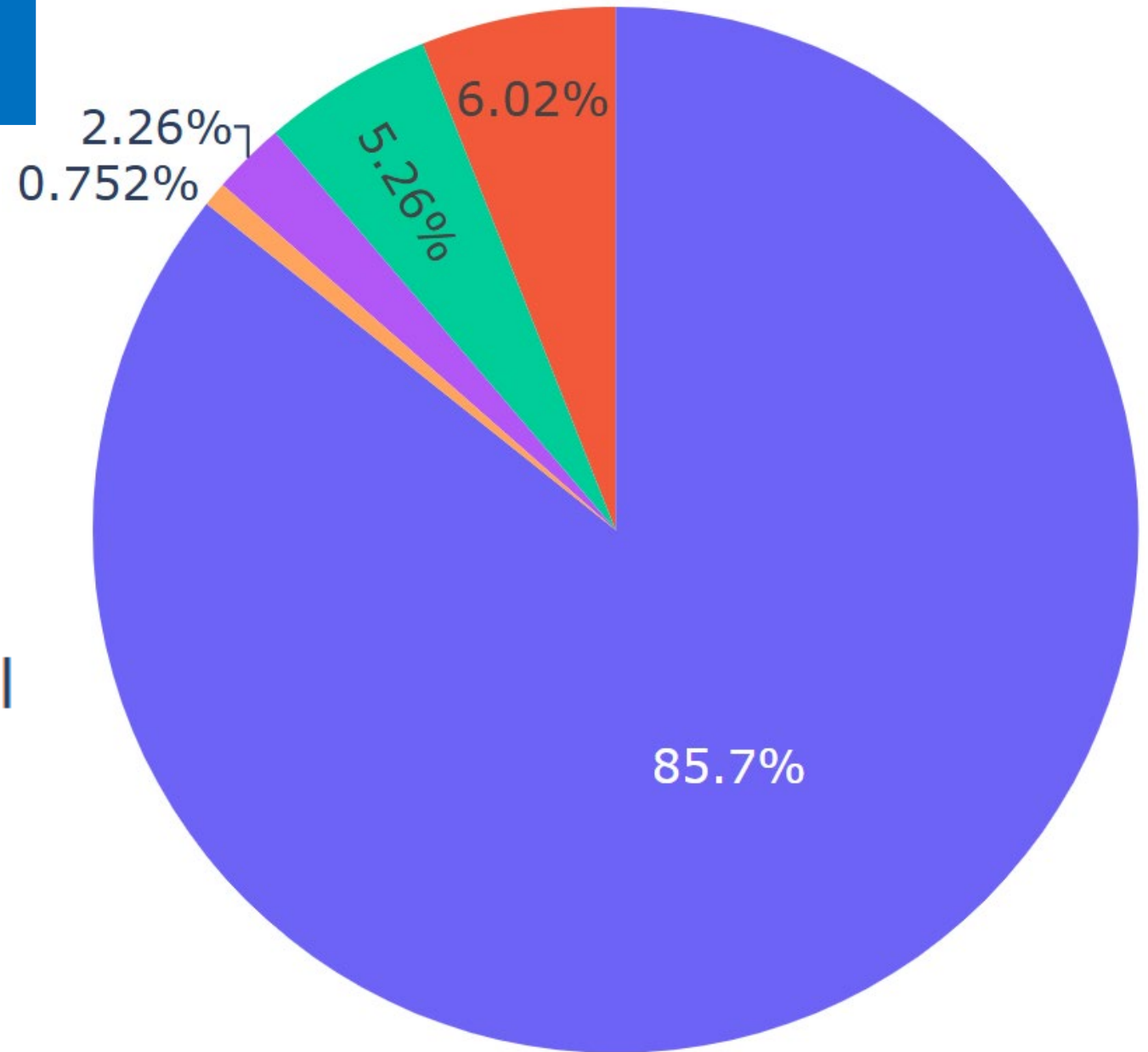
## Companies

- Rhoads
- Wilson
- Cubby
- Oehlert
- Moyer
- Noonan
- Shipley
- Broco
- Duffey



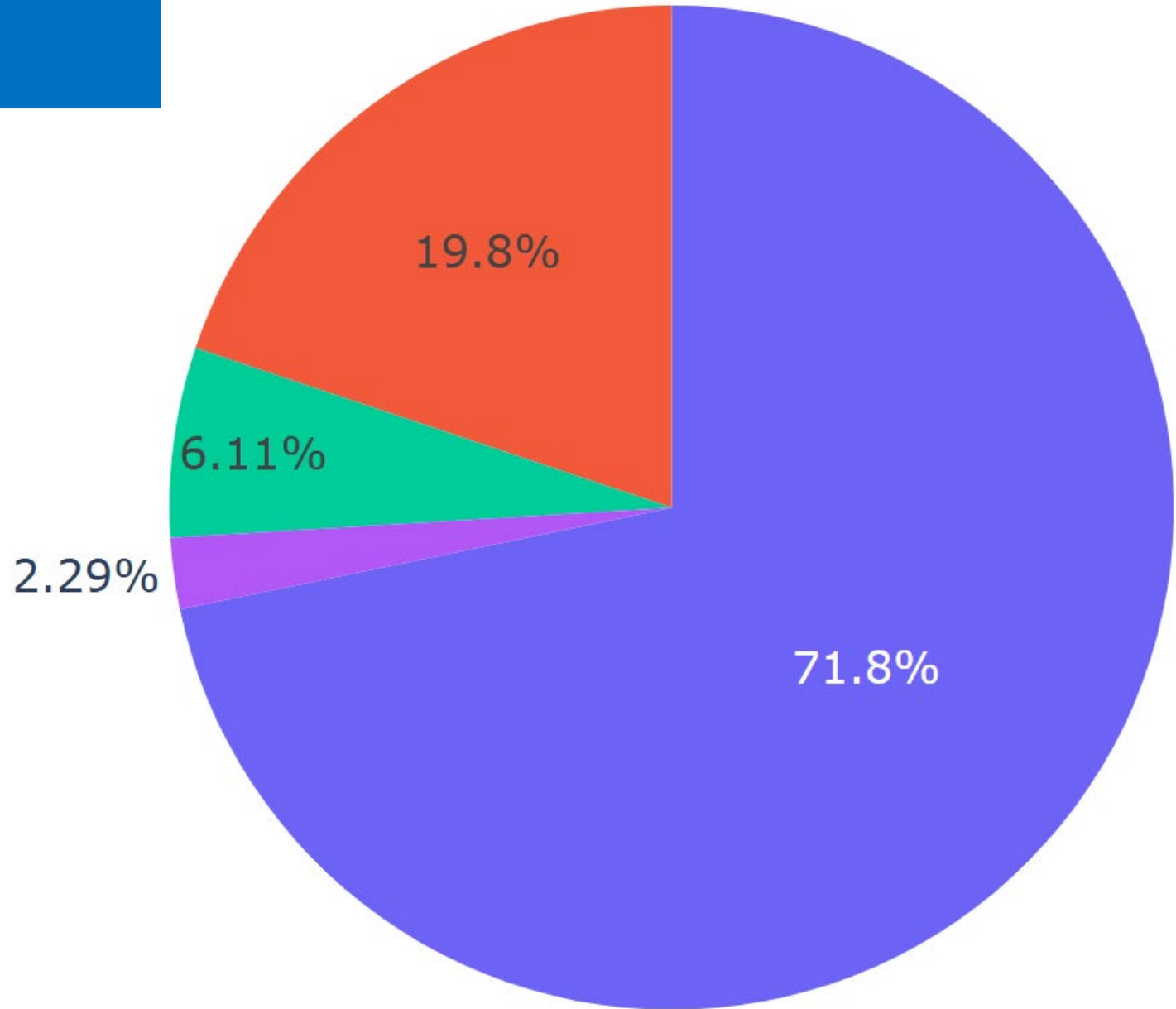
## Type

- Home
- College
- Office
- Terminal
- Other



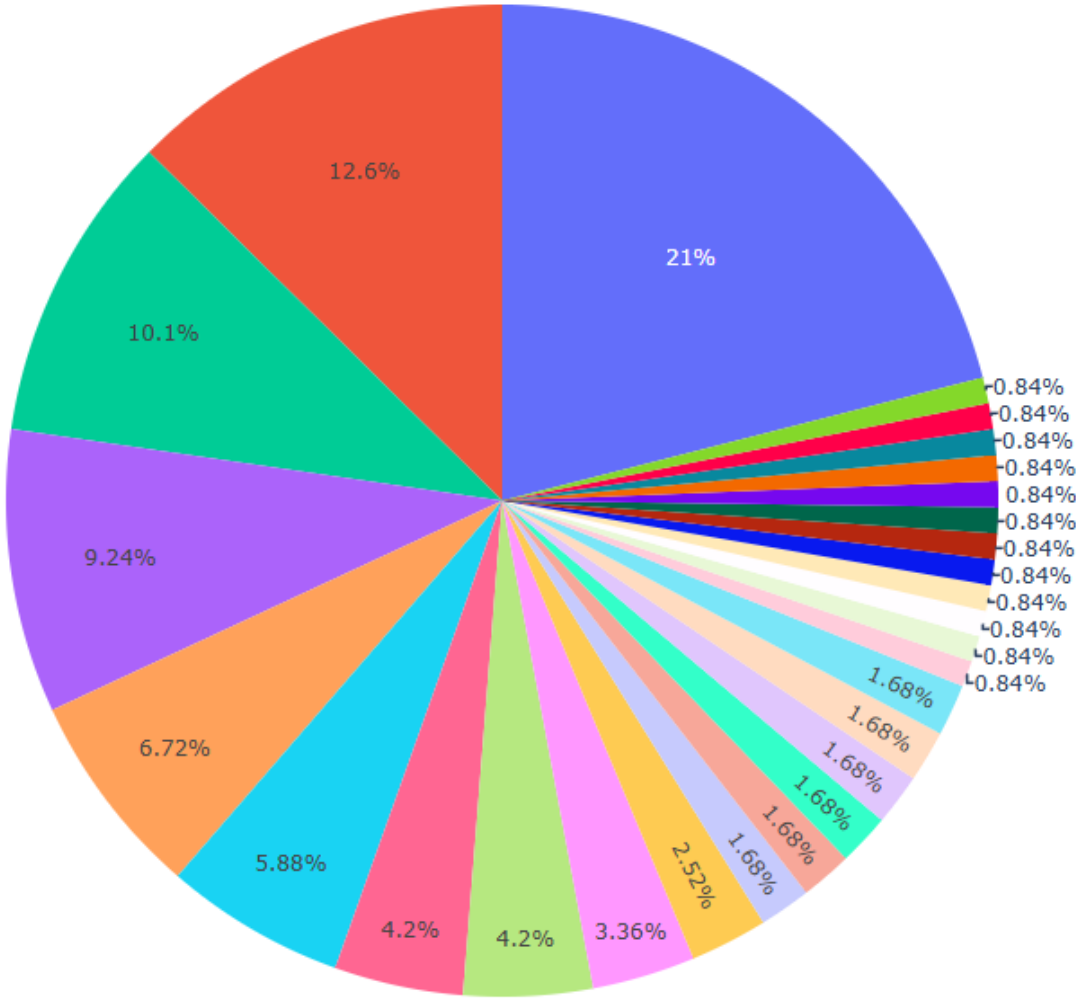
## Unit Type

- Boiler
- Furnace
- Unknown
- Water Heater





# Manufacturer Distribution



- NewYorker
- Unknown
- Weil
- EK
- Burnham
- Peerless
- Crown
- Carrier
- Buderus
- EFM
- Columbia
- Williamson
- Armstrong
- Utica
- Ducane
- ThermoPride
- Rheem
- Nordyne
- Bryant
- Furnace
- Bock
- Airco
- SlantFin
- Concord
- Bard
- Magic Chef
- Thermodynamics
- Boyertown

## Schedule Update

**October 24, 2024:** Pre-start visits to Massachusetts, Level 1 Sites

**November 20-21, 2024:** Pre-start visits to Pennsylvania, Level 1 Sites

**November 2-3, 2024:** Pre-start visits to Pennsylvania, Level 1 Sites

### *DELIVERIES START*

**March 12-13, 2025:** Post-start visits to Massachusetts Level 1 Sites

**April 15-16, 2025:** Post-start visits to Pennsylvania Level 1 Sites

### *NEXT*

**Early Fall 2025:** Site Visits

**January-February 2026:** Site Visits

**April 2026:** End of Test Site Visits



## Summary of Testing

- **Prior to the delivery of RD/BD blends, most of the sites had fuel quality within acceptable parameters**
  - Small number of sites had water at the bottom of the tank
  - Two sites had very high level of biological content at bottom of the tank
  - Average biodiesel content before test: MA 61.2, PA 7.5
- **After delivery of fuel, fuel quality continues to be good at nearly every site**
  - One site has an elevated acid number content
- **No issues have been reported at the sites fuels the RD/BD blends**
  - Visits to the sites show an increase in CAD cell resistance ~ 1000 ohms typical. Could be a concern with older primary controls. To date OK.

## Ethyl Levulinate (EL)

- Focus is on development of an ASTM Fuel Specification
- An ASTM Working Group has been formed
- Currently have a working draft of the specification
- Dr. Butcher to present at ASTM meeting in June
- This will be followed with a Ballot on the specification

# Questions?

Tom Butcher

[tbutcher@noraweb.org](mailto:tbutcher@noraweb.org)

(571) 234 7756

ADVANCING LIQUID FUEL HOME HEATING

# NORA



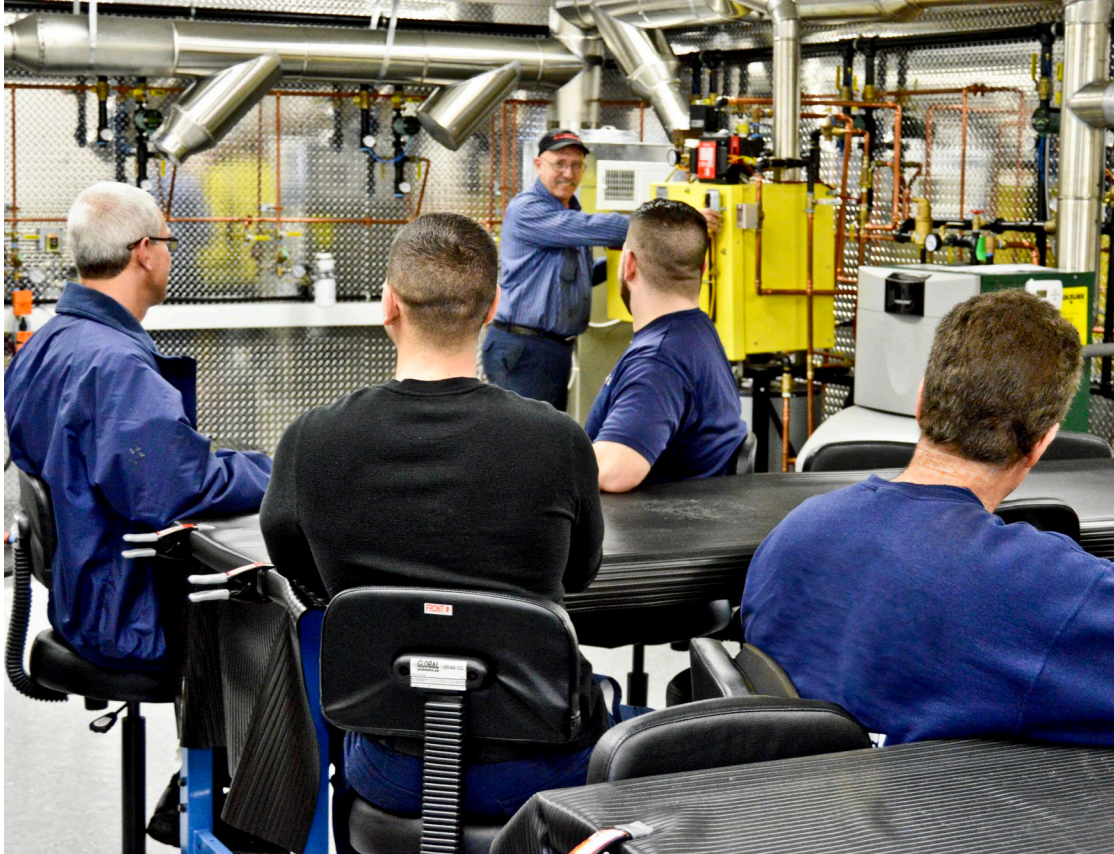
## Education Update

May 19th, 2025

Bob O'Brien  
Atlantic City NJ



## Expanding Education



- HVAC Techs
- CSR's
- Instructors
- Building Performance

- Where should we be going?
- Two Roundtable Discussions Conducted:  
Service Managers & Teachers  
(College, High School, Trade Schools, Associations)
- Ongoing Process to keep current





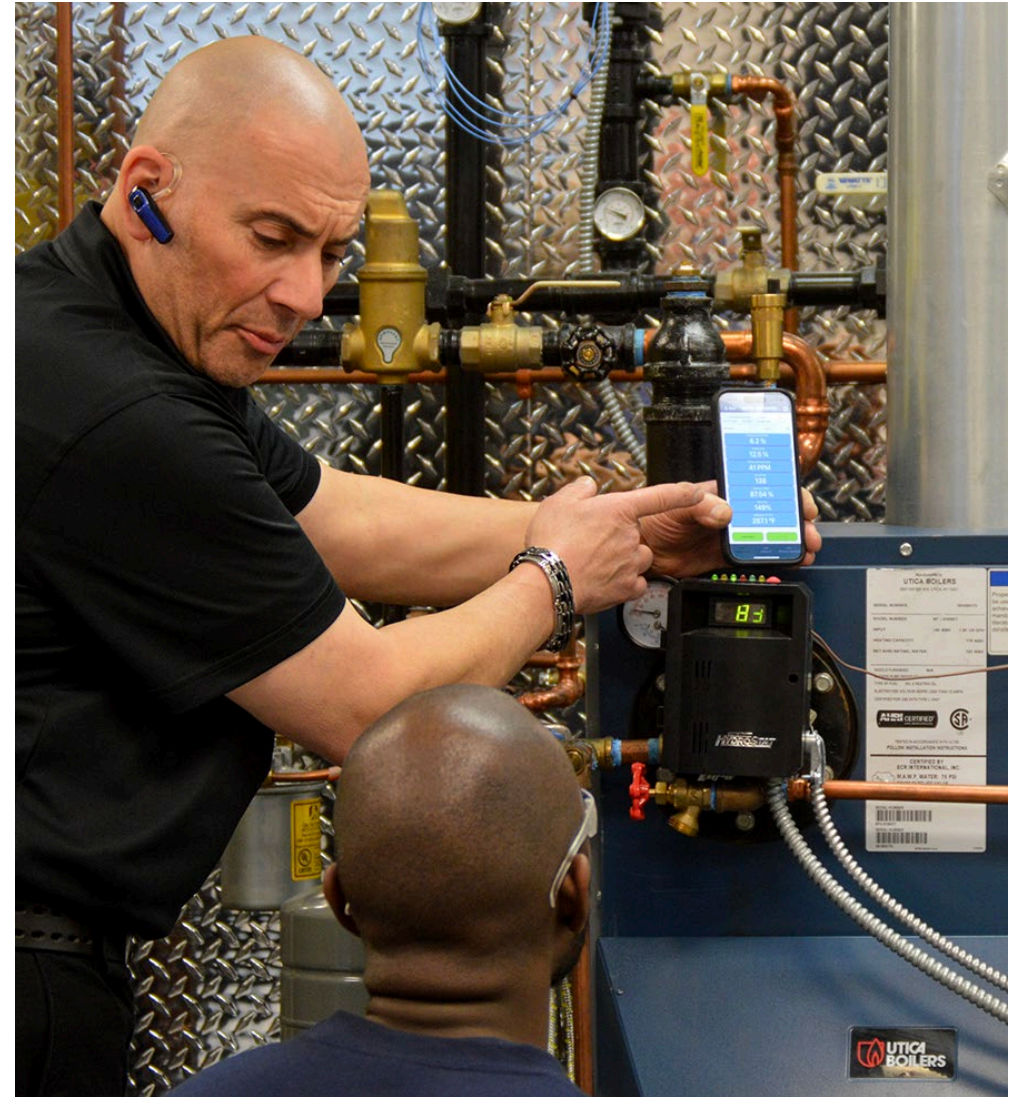
## Alternate Programs



- Bronze- 80 Hours
- Non-Oil Dealer Service
- Non-Core Areas
- HVAC & PHC Techs
- Two-Five Day Programs

## Practical Focus

- Combustion
- Fuel Pumps
- Electrical
- Troubleshooting
- Hands-On Emphasis
- First Session- 6/10-12



## Not Just HVAC Techs



- Existing Techs
- Troubleshooting
- Callback Reduction



- Collaboration w/ Alan Mercurio
- Live Webinar/Podcast Hybrid
- Monthly Guests
- Kickoff – Tuesday @11AM EEE





- HVAC/P&H communities aren't familiar with renewable fuels
- Nationwide conference for HVAC educators
- 2023-Introducing Technicians to Liquid Renewable Fuels
- 2024-Decarbonizing Hydronic Systems

## Accredited Instructor Program



- Outcome & objective based education
- Three-day program
- Improve classroom & teaching skills
- 3 Sessions completed
- Next session in June w/ 9 students

## NEW NORA Accredited Schools



- Greenfield Community College, MA
- DF Richard, NH
- Keefe Technical HS, MA
- Palmer Oil & Gas, NH
- Advanced Trade School, NH



- Four-year college in NYS University system
- NORA Bronze curriculum & certification
- Two semesters
- May 2025 first testing



## Biodiesel Tech Training

- OESP Chapter meetings  
18 of 22 Fall 2023- Date
- Wholesaler location training  
is unreached segment
- RD training
- OEM Training

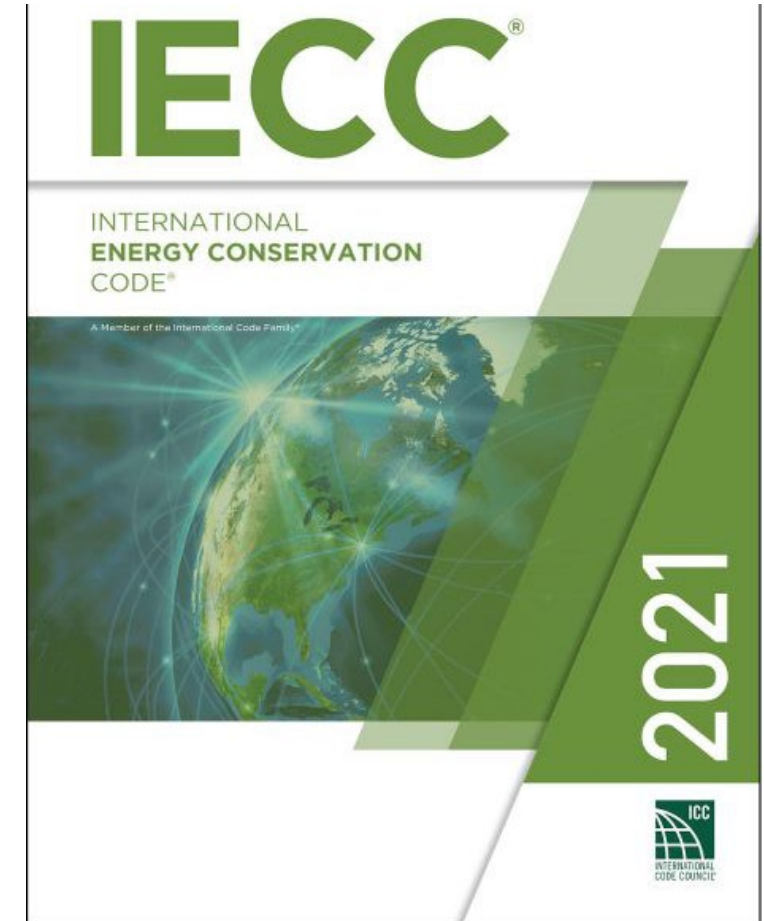




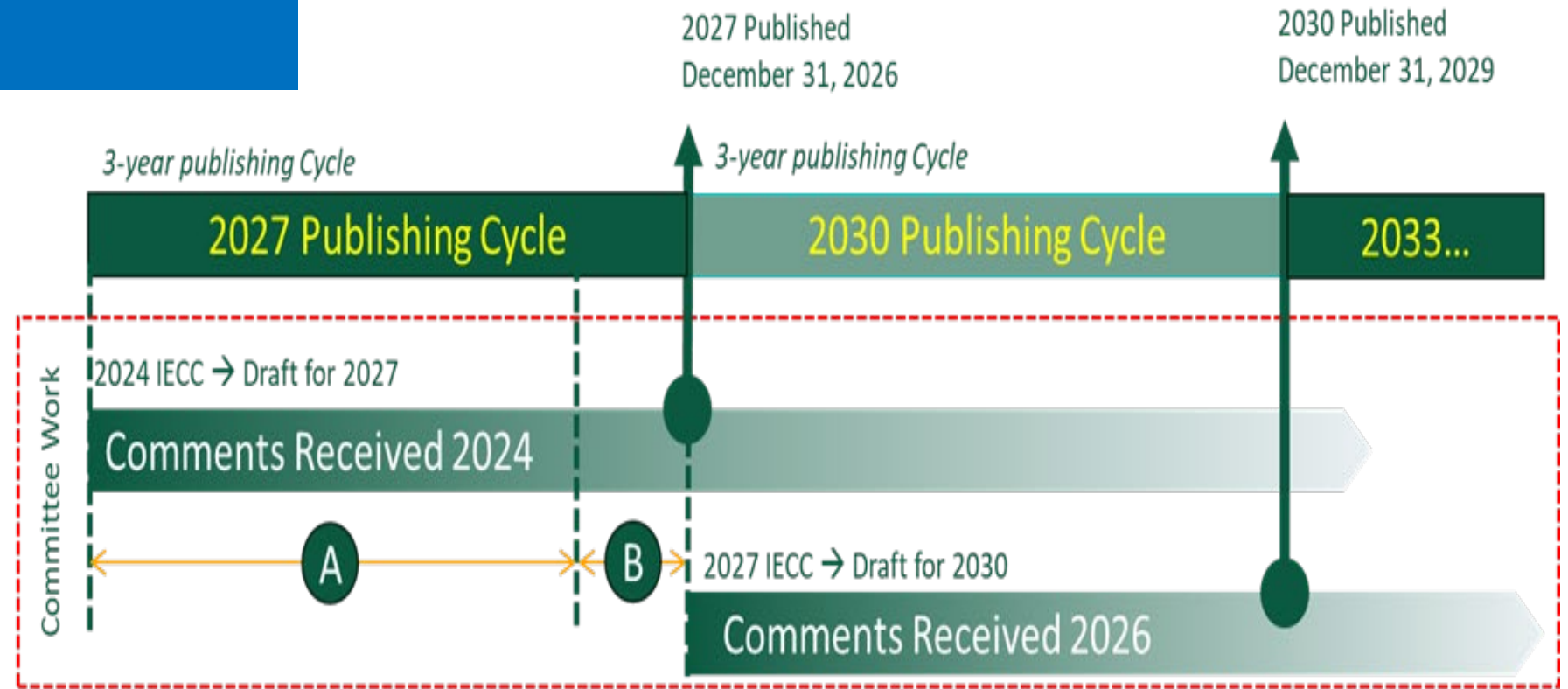
- Adopted in whole or part by 49 states, including every oil-heat state
- Main Code & Appendix

# NORA Code Committee

- Reps from across industry
- Formulate plan to promote renewable liquid fuels as a decarbonization option
- Organize a defensive strategy against anti-combustion and anti-renewable fuel proposals
- Member of R- HVAC subgroup & C-Administrative subgroup



# Code Cycle





### Liquid fuel boiler

- **Greater than or equal to 90 % AFUE**
- Rated by the manufacturer for **use with fuel blends at least 50% of an eligible fuel** (biodiesel or renewable diesel)

NORA Boiler Proposal

# Liquid fuel furnace & cooling

- **Greater than or equal to 95% AFUE**
- Rated by the manufacturer for **use with fuel blends at least 50% of an eligible fuel** (biodiesel or renewable diesel)
- 15.2 SEER2 & 12.0 SEER2 air conditioner



# Liquid fuel furnace & heat pump

- **Greater than or equal to 95% AFUE**
- Rated by the manufacturer for use with fuel blends  
**at least 50% of the volume of which consists of an eligible fuel**  
(biodiesel or renewable diesel)
- 8.1 HSPF2 & 15.2 SEER2 air source heat pump capable of meeting a capacity ratio  $\geq 70\%$  of heating capacity at 5°F (-15°C) versus rated heating capacity at 47°F (8.3°C)

**Biodiesel**: A fuel comprised of Mono alkyl esters of long chain fatty acids, meeting the specifications contained within the latest version of *ASTM D6751*

**Liquid fuel**: A fuel oil, biodiesel or renewable diesel blend in any proportion

**Renewable diesel**: A hydrocarbon liquid fuel made exclusively from sustainable biomass having a carbon intensity score of less than 50% of a baseline petroleum distillate when calculated using the Argonne GREET LCA, or similar lifecycle analysis and intended for use as a fuel meeting *ASTM D975* or *D396*, respectively

- NORA is a BPI Approved Testing Center
- Offering Training and Testing
- Building Science Principles
- Building Analyst- Technician
- Building Analyst- Professional
- Field & Written Testing

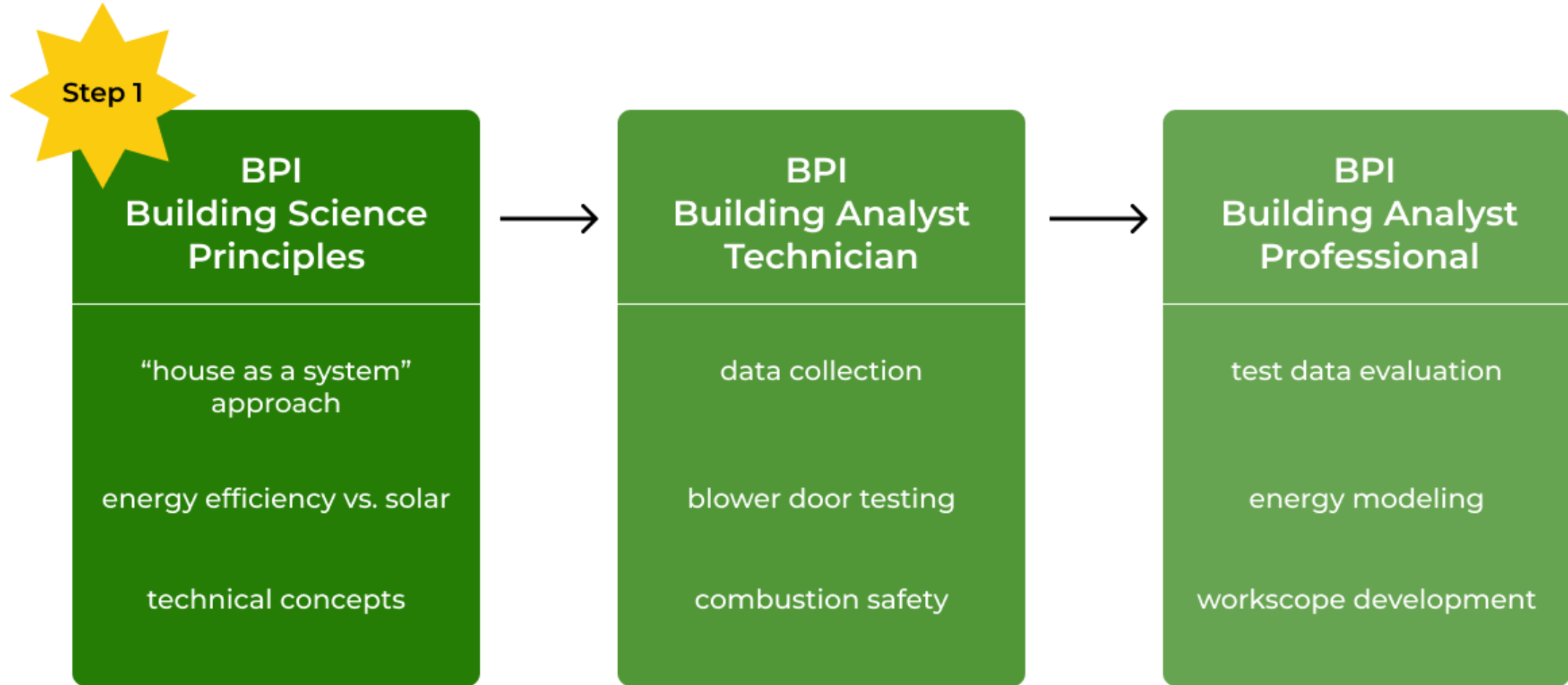


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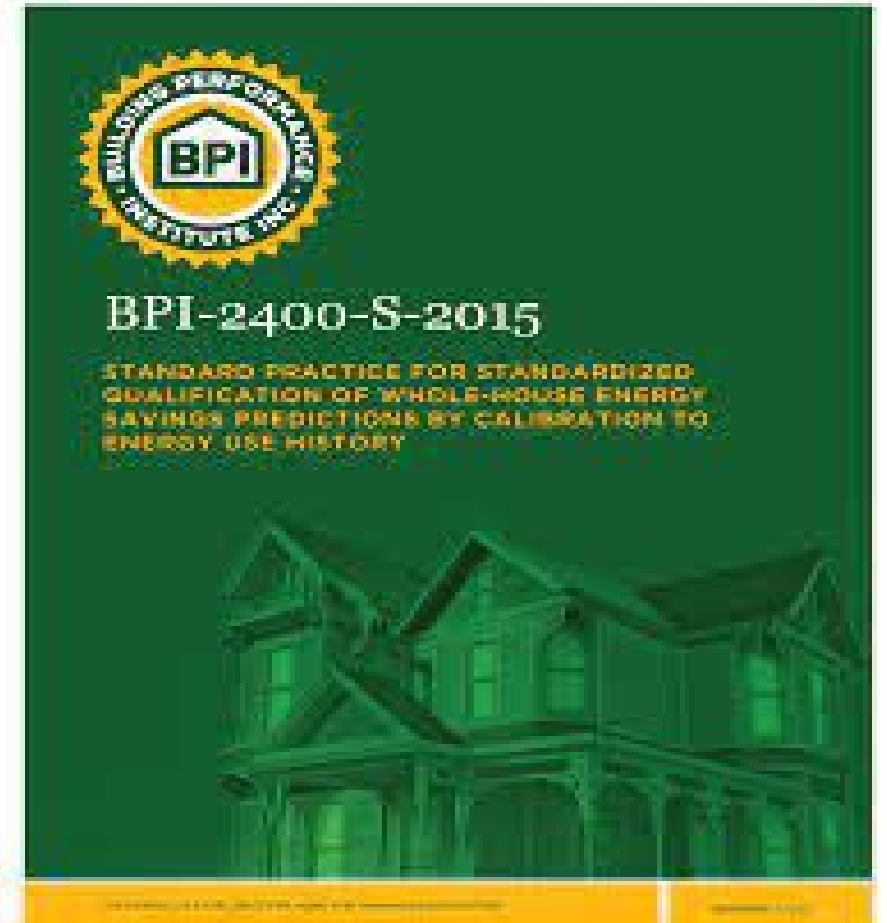
**TEST CENTER**

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# Skill Increase With Each BPI Certification



- Protocol to predict energy savings for various upgrades
- Audit Procedures
- Chair Single Family Technical Standard Committee





First Session  
July 14-18 2025

## Continuing Education

### Changing technology requires constant learning



1920's



2020's



## Short Form Videos



- Task Oriented
- Sub 2 Minutes
- Programming
- Testing
- Troubleshooting
- YouTube 88K views

- All renewals & upgrades are triggered via CEU's, not testing
- Adding new video classes continually
- OEM & NORA generated



0% COMPLETED

START COURSE

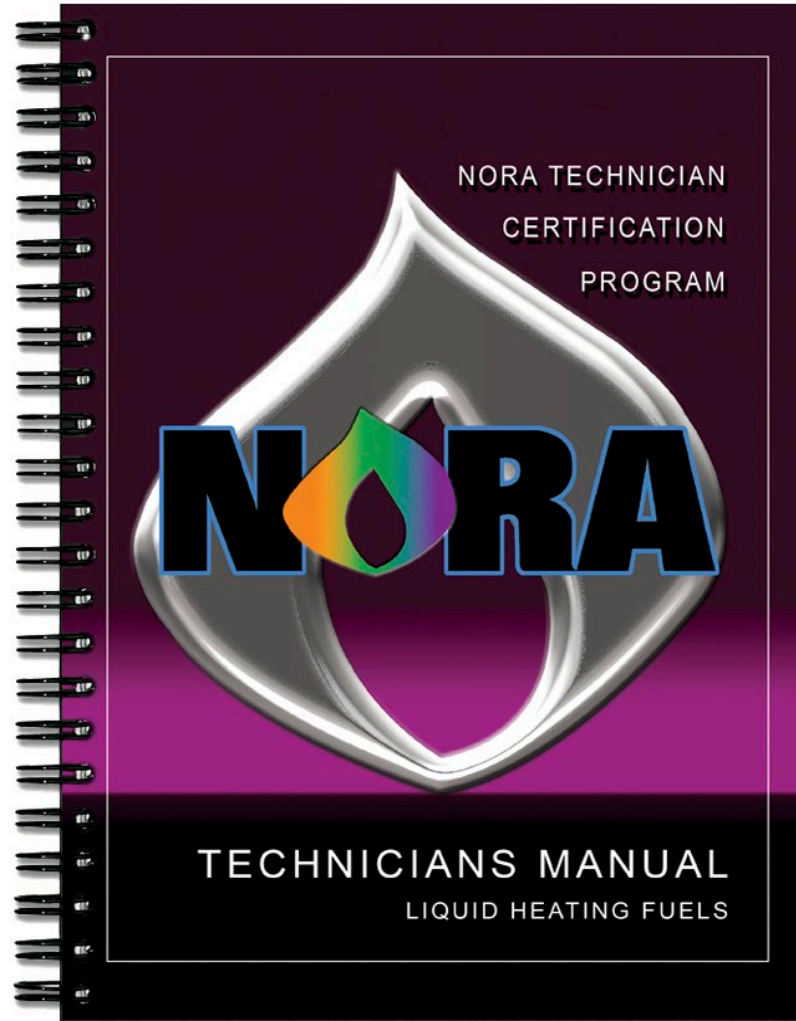
VIDEO COURSES

## Expanding Your Knowledge of Expansion Tanks

Successfully completing this course will add 2 NORA CEUs to your account. This course is part of Caleffi Hydronic System's Coffee With Caleffi™ webinar series. NORA thanks Caleffi for allowing the use of this video. Curious about the How-To's of ex...

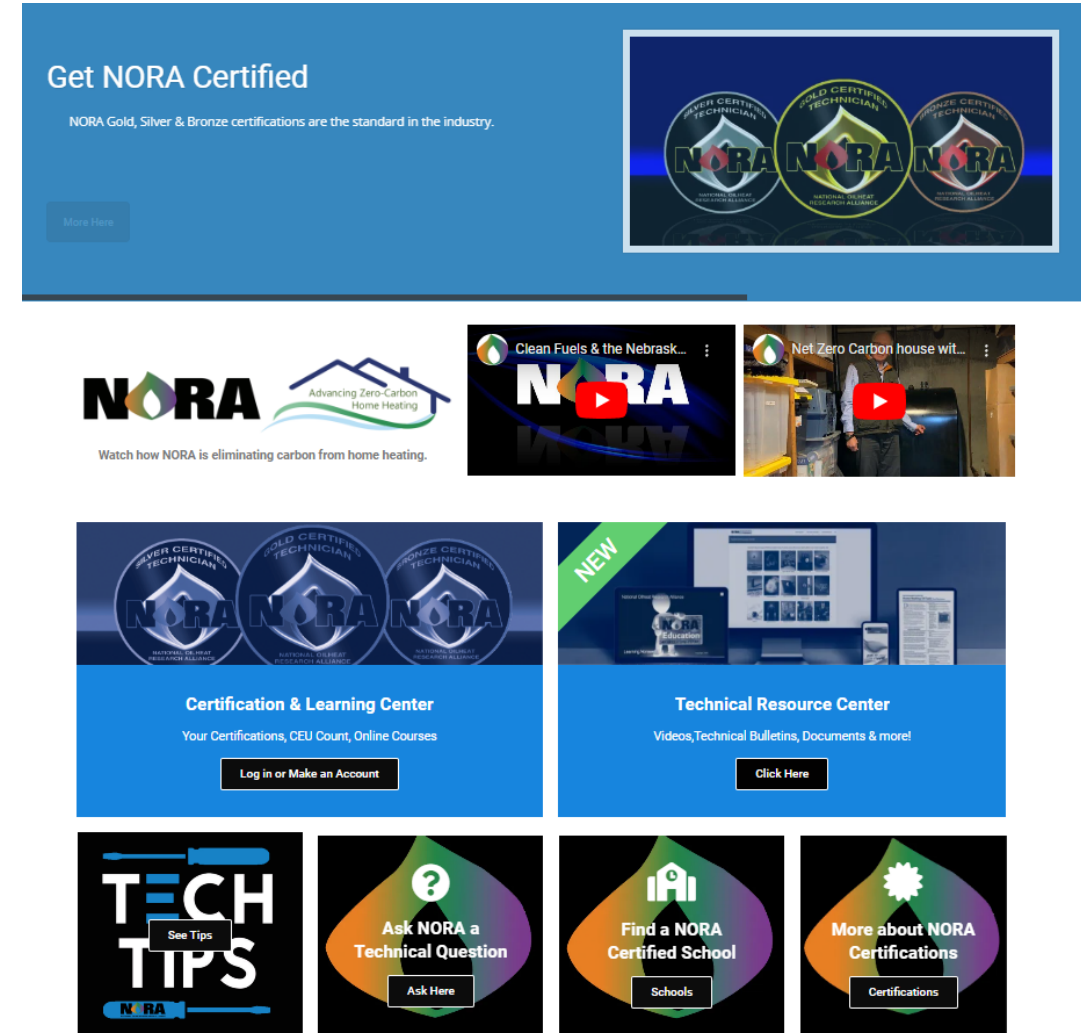
## Curriculum Updates

- E-book
- Audiobook
- Power points
- Quizzes
- 4000+ sales
- Biofuels update
- Alternate fulfillment?



# Technical Resource Center

- Continually updateable
- OEM bulletins & guides
- OEM videos
- NORA generated content
- Short task-oriented videos
- “Living addendum”
- Social Media





2025 NORA Directors	2025 Executive Committee	2025 Officers
<input type="checkbox"/> Kate Duffey	Executive Committee	Chair
<input type="checkbox"/> Jacqueline Hart	Executive Committee	Vice Chair
<input type="checkbox"/> Roger Marran	Executive Committee	Past Chair
<input type="checkbox"/> Eric DeGesero	Executive Committee	Treasurer
<input type="checkbox"/> Michael Devine	Executive Committee	President
<input type="checkbox"/> Charles Uglietto	Executive Committee	
<input type="checkbox"/> Allison Heaney	Executive Committee	
<input type="checkbox"/> Claudette Townsend	Executive Committee	
<input type="checkbox"/> Leann Pannebianco	Executive Committee	
<input type="checkbox"/> Jason Lawrence	Executive Committee	
<input type="checkbox"/> Sandra Farrell	Executive Committee	
<input type="checkbox"/> Chris Herb	Executive Committee	
<input type="checkbox"/> Daniel Mattice	Executive Committee	
<input type="checkbox"/> Steve Clark	Executive Committee	
<input type="checkbox"/> Gary Sippin	Executive Committee	
<input type="checkbox"/> John McCusker	Executive Committee	
<input type="checkbox"/> Ted Noonan	Executive Committee	
<input type="checkbox"/> Kristyn Schweitzer	Executive Committee	
<input type="checkbox"/> Carter Vallancourt	Executive Committee	
<input type="checkbox"/> Steve Powers		
<input type="checkbox"/> Bill Reichert Jr.		
<input type="checkbox"/> Justin Jeffers		
<input type="checkbox"/> David Coyne		
<input type="checkbox"/> Steve Oehlert		
<input type="checkbox"/> Brent Moore		
<input type="checkbox"/> Katie Foster		
<input type="checkbox"/> Peter Russell		
<input type="checkbox"/> Doug Fredericks		
<input type="checkbox"/> Bobby Parlett		
<input type="checkbox"/> Chris Fazio		
<input type="checkbox"/> Hal Johnson		
<input type="checkbox"/> Micahel Lamperelli		
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<input type="checkbox"/> Mike Deberdine		
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<input type="checkbox"/> Dan Singer		
<input type="checkbox"/> Peter Russell		