NORA Board Meeting

Gurney Resort – Vanderbilt Room

1 Goat Island, Newport, RI

12.30 -2.30 Eastern Time

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United States: +1 (571) 317-3122
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I. Introduction – Chairman Tom Santa and President John Huber

II. Approval of Minutes

III. Financial Information – Treasurer Eric Degesero

a. Review of Audit Letter
b. July Statement of Activity and Statement of Financial Position
c. 2018 and 19 Budget and New State Allocations
d. State Reports

IV. Research and Development – Director of Laboratory Dr. Thomas Butcher

a. Review of Lab Operations
b. Review of Outside Projects
c. Technology Conference
d. NFPA Activities Regarding Biofuels

VI. Education and Training Activities – Don Farrell and John Levey

a. Online Education
b. Learning Module for Hydronics

VII. Energy Efficiency

VIII. Executive Committee and Officers

IX. Old Business

X. New Business

XI. Adjournment

NORA Board Meeting Minutes
Hershey Lodge, Hershey Pennsylvania
12.30PM -2.30PM Eastern Time
https://global.gotomeeting.com/join/404102421
United States: +1 (646) 749-3112 Access Code: 404-102-421

I. Introductions – 1st Vice Chairman Mr. Charles Uglietto and President Mr. John Huber

Mr. Huber called roll and announced that a quorum was met by the members listed below either attending in person or via phone.

Greg Andersen	Justin Andres
Peter Aziz	Jay Buehler
Kate Childs	Steve Clark
John Combs	Kevin Conti
Kirk Darby	Tom Devino
Dan Donovan	Mike Estes
Susan Hammond	Bruce Harris
Allison Heaney	Joe Keenan
Bob Long	Quincy Longacre
Steve McCracken	John McCusker
George McQueeney	Natalie Mondsini
David Neil	Ted Noonan
Joe Philips	Ken Russ
Susan Santopietro	Ed Scott
Daniel Singer	Charles Ugiletto

Mr. Charles Uglietto, Chairman, called the meeting to order at 12:49 p.m. eastern standard time.

II. Approval of Minutes

A motion was made by Mr. David Neil and Mr. Roger Marran seconded, and after discussion, the submitted minutes were approved by voice.

III. Financial Information–Treasurer Eric Degesero

Mr. Degesero discussed three primary reports. The first was the distribution of the annual report for 2015, the second was the audit report and closeout of 2016 and lastly the proposed budget framework for 2018 and 2019.

a. Release of 2015 Annual Report

Mr. Degesero discussed that the 2015 Annual report combines both a review of the central office operations, the state operations and our audited financials. It should be noted that for purposes of the law, the annual report is only the audited material in this report. It should be further noted that this audit covers both the central and state financial information. Thus, actual activities in the states has not been evaluated by the auditor for effectiveness or activity levels.

b. 2016 Year End Financials- Internal and Audited Statements

Mr. Degesero discussed that last year, the budget was downgraded for 2016 in two offsetting resolutions, the first lowered the income for the year by 978 thousand dollars. The second injected the same amount into the budget as a surplus from 2015. Thus, the state accounts for 2016 were not touched. And the budget essentially remained the same. However, that change sharply reduced the budget for 2016 to 8.4 million. The final revenue from assessments was 8,604,725. The net revenue for the year is highlighted in yellow, and as you will see next to it in red is the year end surplus of 200,638.

Mr. Degesero discussed the 2016 closeout. As for "other revenue items", sales revenue is down. NORA sees this as a permanent adjustment as these items are distributed over the internet, or through a third-party vendor. Largely offsetting reduction in cost of goods sold which leaves this item as insignificant. In fact, we have indications that 900 technician manuals have been downloaded.

The other revenue item that is significant is NYSERDA with 47,399; essentially is a wrapping up of several projects that have been underway for several years. We have two new projects underway now for 50K each, and the National Biodiesel Board has indicated they will be making a contribution of 80K to research.

At a previous presentation, we booked the contracts that NORA had entered into as part of the research and development as an expense. Thus, it should be noted that the expense line item for the central research and development has been substantially reduced in December by $1,453,515, as the auditor preferred that these transactions be reflected in the balance sheet, not the income statement. So, yearend for central research and development is 891,551.

Mr. Degesero discussed salaries is over budget, but it is not consequential and just indicates a need to better allocate all resources, and this item is composed of Traci who works in a number of areas on a part time basis, NORA's legal firm and some of John's time.

Accounting, is under budget, but the annual report is over budget. These functions are done by the internal and external firms, and reflects increased emphasis on the annual report.

Mr. Degesero discussed the year-end balance sheet. Assessments and other receivables total 2,818,768.29. This money has been received, and is included in the income statement. Those assessments have been received, but had not received at year end.

The movement of the 465,397 to 0 from 2015 to 2016 was consumer education outreach, which is also noted on the income statement.

There was an increase in accounts payable. Those are largely state rebates, and refunds. In net assets, the first is the 233,173 and the 177,028 which add to 410,202.24. This reflects the surplus revenue of 200,639, and then the final number of 209,563 reflects the difference between fund designated for central operations in 2014-2016. 55,933 is a sharp departure from the 472,266 from the prior year and reflects the payment for the consumer education campaign. Essentially this leaves NORA with 55,933 of old law money.

Net assets consist of 3,816,412. Under the law these funds are required to be spent in these areas. A substantial obligation to R and D contracts. These contracts are in force currently. However, they have not had the work completed or evaluated.

Would someone move to accept this report and the audited financials.

Mr. Charlie Uglietto made a motion to accept the financial report, Mr. David Neil seconded and it was approved by voice.

The budget for 2016 was 8,404,086. Thus, as we were entering 2017 with a surplus revenue of 200,639. We also downgraded the 2017 budget in the fall from 9,195,000 to 8,895,000. Unfortunately, the first Quarter of this year underperformed expectations. First quarter is expected to deliver 44 percent of all revenue to NORA. Thus, without the downgrade for this year, we anticipated this quarter would deliver $4,045,000, after refunds or a total of $4.3 million. The collections year to date, a back of the envelope calculation, as of May which is part of first quarter collections is still open, indicate collections of 3.5 million, assuming a normal year going forward, the expectation is that the quarter will thus be short by about 800,000. Given a surplus of 200,639 from 2016 and the downgrade of 300K for this year, that is about 300K short of budget for Q1. This assumes that continue like we did in 2016 and match a reduced budget 2017 with the surplus from 2016. To that end, I would recommend the following resolution.

RESOLUTION

Whereas: The First Quarter of 2017 was unusually warm, that the revenue in the budget for 2017 be revised downward by 200,639 and the surplus of revenue from 2016 be rolled forward to accommodate this downgrade, thus allowing the program activities to be largely unaffected.

Whereas: The NORA statute prescribes strict requirements for allocating funds between project areas, NORA must allocate these funds in accordance with the required percentages between the prescribed areas.

Whereas: The President should release an updated budget with these funds and should try to minimize the impact on the state accounts.

Now therefore be it Resolved: That the budget surplus and its resultant increases in funds for specified accounts be brought forward into 2017 and be used to increase the accounts that were downgraded due to the poor weather.

Mr. Ken Russ made a motion to accept the resolution, it was seconded by Mr. Bruce Harris and it was approved by voice.

The draft audit follows. Journal entries to conform the audit and these financials were made last week, so we will not review the audit. However, I would like to highlight the long-term lease for the research facility in New York. These rents are shared between NORA and the two local groups.

c. 2018 and 2019 Budget Preparation

Mr. Degesero discussed the preparation of the 2018 and 19 budgets. The law requires NORA to prepare a biennial budget, submit if for comment, submit to the Secretary of Energy and then finalize. That created some issues, as we have to do revenue estimates years in advance. Additionally, we have an issue related to reauthorization which creates a set of challenges.

Under the direction of Mr. Uglietto a Finance Committee meeting was held two weeks ago. The first item was revenue. To project revenue for 2018, a review of the income for 2016, which was 8,598,568. 2016 was 12 percent warmer than normal, so that number was adjusted to normalize for weather, which was then discounted by 2 percent to reflect conservation and conversions. The 2019 number was then reduced by 2 percent for similar reasons. Since NORA's status in 2019 is uncertain, the 2019 revenue and adjusted it by 20 percent.

In light of concerns regarding state spending rates, the committee discussed whether we should amend the model which is dependent on states. After discussion, it was agreed that the Budget presented would continue to model. Thus, through the rest of this you will see that the ratio between the central and state spending is roughly the same.

The auditor noted that we might be better to ensure that we meet our consumer education spending in years where funds are tight if we discount what is available to the states in this budget. Mr. Huber stated that he believes this can be managed with cash flow and grants, but the Finance Committee will evaluate that recommendation.

A motion was made to accept the recommendation of the Finance Committee and direct the President to continue preparation of the budget for distribution and comment by Mr. Peter Aziz, seconded by Mr. David Neil and duly approved by voice.

d. State Reports and Expenditures

Mr. Huber discussed the finance meeting and that there was a concern and discussion about state spending. The executive committee recommended that we recommend plans for the low spending states at year-end. This will initiate a plan for the state and use of the money. Mr. Huber stated that as for the allocation of funds, some states have done a great job of spending

Education & Training funds but not Research & Development funds. He also stated that Maryland and Delaware funds need to be reallocated due to in balanced spending of the money.

Mr. Huber discussed the what states do. Consumer Education and Training covers the following: Technician Training, Maintaining School Facilities, Professional Education, Radio Advertising, Real Estate Programs, Home Inspector Programs, Internet Advertising and Print Advertising.

Mr. Huber read the actual language from the statute regarding how funds are to be allocated.

Mr. Huber stated that "he wanted states to focus on spending monies in the following areas. Energy Efficiency Equipment, Training on Fuel Saving Calculator, Training on Sizing Equipment, Training on Equipment Sales focused on Energy Efficient Equipment, Giveaway of Setback Thermostats and Rebate Program for Furnaces and Boiler. The rebate money to the states is for R&D and Energy Efficiency programs, "so that we are aggressively fulfilling the mission of NORA" Mr. Huber said.

IV. Petition for Recognition of NYSEC as New York State Qualified State Organization

Mr. Huber discussed that the last meeting in the fall NORA received a petition from the New York State Energy Coalition (NYSEC) that requested that we recognize NYSEC as the qualified state organization instead of the Empire State Energy Association (ESEA). The Board spent a substantial amount of time on this issue and several members of the Board recommended that the individuals in New York should resolve this issue. Due to the statute the Board is required to make the decision and decided that it would be done in the May Board meeting (this meeting).

Matt Meehan moved that we reallocate the funds per the spreadsheet in the packet and not change the state chapter This was seconded by Charlie Uglietto. The motion carried, There was

One abstention,Dan Singer.

V. Research and Development–Director of Laboratory Dr. Thomas Butcher

Dr. Butcher discussed that the NORA lab is fully up and functional there are three test bays – only one currently in use. Tests are going well but not up to the standards that we were expecting. The goal is to get ultra-high efficiency.

Dr. Butcher is also working with Biofine to produce a fuel that is renewable and has the ability of being combined to create a home heating fuel. There was a general discussion about this topic.

a. Update on Laboratory, Staffing, Overview

Dr. Butcher state that the lab is fully functional with two interns since March. Brian Gainey is studying Mechanical Engineer at Stony Brook University and Mike McCutcheon studying Chemical Engineer at Stony Brook University. Both students will be working with us through July and then leaving for their next steps. Currently seeking next interns.

b. Projects Underway at Laboratory

Dr. Butcher discussed that there are both current and completed projects at the lab. The Bioheat User Online Survey is completed and published. It addresses mechanical issues related to biodiesel blending.

There are several other projects underway included but not limited to:

1.) Field Survey of Fuel Quality that discuses both biodiesel and non-biodiesel users. The sampling occurred in fall of 2016 a revisit sampling was conducted in Spring 2017 and analysis is currently in progress.

2.) A study of the impact of biodiesel type on cad cell response has been completed. A draft report is currently in review and will be published soon.

3.) Tankless Coil Performance is a co-sponsored NYSERDA project studying the actual performance of coils over a wide range of conditions. To date actual performance has been found to fall below ratings. HI standard test procedure. Some novel approaches will also be tested.

4.) Integration of oil hydronic systems with heat pumps is another NYSERDA co-sponsored project. Six field studies planned within New York State, there had been challenges with finding good sites. Six sites have been selected and proposed to NYSERDA. At each site monitoring of temperature trends and interaction between hydronic heating and minisplits will be done. At one home data logging has started. Dr. Butcher stated that, "generally, we have found mini-splits installed to add cooling and/or improve comfort in one part of the home". Use for heat is an afterthought or curiosity. Control of switchover mostly manual. After field tests an analysis of optimized energy use and cost planned. The end goal is a Best Practices Guide.

c. NORA's Funded Research–Richard Sweetser

Mr. Sweetser discussed the Project Opportunity Notice (PON) research progress. Below is the information that Mr. Sweetser provided on the projects.

Advanced Combustion Chamber PON-Energy Kinetics(EK) began this project in April of 2016. EK began work on the project in the fall of 2016. EK has developed and laboratory tested an 18SR stainless steel cylindrical combustion chamber design and tested one unit the week of 1/16/2017. This new chamber is now commercialized and is incorporated in EK's new tankless boiler product.

High Efficiency Tankless Coil/Oilheat PON- This project began in December of 2016. EK has developed and laboratory tested 5 prototype combi designs and was tested the week of 1/16/2017 to examine control strategy between maintaining temperature to on-off strategies for instantaneous hot water.

BP100 Burner Value Engineering Testing for Pre-Commercialization PON-The burner development effort has achieved four key milestones. First, a 0.75 gph burner has been developed. First, milestone is the successful prove out of the operability map and plug-and-play

capability of the FlexFire control on the EK 90+R boiler. Second, after an analysis was performed on the burner using computational fluid dynamics (CFO) - plus key geometry modifications made to the atomizing hardware - a technical pathway to achieving a 1.0 GPH high firing rate has been found. Third, three biodiesel burner test rigs were fabricated and installed with Airtronic burners using the same combustion components as the FlexFire. Formal baseline testing has begun with B20, B50 and B100 blends at different temperatures to analyze the combustion chamber performance.

B50 Compatible Boiler with Automatic Modulating Control PON- This project began in October of 2016. The EK R90+ is installed and detailed test firing happened the week of January 16, 2017, after modifications were made from the preliminary test fire, which took place in New Jersey. Peerless and Slant/Fin cast iron boilers followed the EK testing, then NORA Lab testing. Building additional burners for these units. Interface plates have been made and Babington did not anticipate any installation issues with the boilers. Babington plans to field install three EK 0.74 gph 90+ resolute boilers in the field early this fall.

Novel Oil-Vaporizing Technology Applied to Gas-fired Instantaneous Water Heaters PON- This project began in May of 2015. After completing the first four tasks applying this novel vaporizing technology to a gas-fired instantaneous water heater, it was determined that this application was too difficult for a proof of concept. The project has been redirected in October of 2016 to run basic combustion testing on a retention head burner to demonstrate that a stable flame can be established, to determine the minimum nozzle temperature required, the potential modulation range, and the exhaust gas composition.

Oil Fired Absorption Heat Pump PON- This project began in October of 2016. The fundamental nature of the research is to determine how to redesign the absorption system desorber and perhaps the burner to accommodate a modulating biodiesel capable burner. This initial burner approach was to work with Babington Technologies to examine their new biodiesel modulating burner design. Both a horizontal and vertical burner chamber design has been completed and appear feasible. Prototype will be completed by July 31, 2017.

Oil-Fired Condensing Heat Exchanger/Boiler PON- This project began in April of 2016. Burner Feasibility Analysis: Sent PF-80 (80,000 Btu/hr) condensing boilers (with Sermeta Heat Exchangers) in November to Babington, Beckett, Carlin & Riello. Each burner manufacturer is attempting to fire the cold-walled, compact combustion chamber using their current technology. Based on a variety of technical and business issues, PB Heat has decided to terminate this project.

There was a general discussion about the financial disbursement of funds from the project.

VI. Education and Training Activities –Mr. John Levey

Mr. Levey discussed the NORA Gold Hydronics online course. Currently the following programs are active, efficiency, venting, airflow, and hydronics. Advance controls and steam is in the final stage of completion and expected to be introduced this summer. A new manual is

being created and some changes and edits are being made with underground tank storage as those are not as common as they once were. NORA is working to provide online gold courses for interested attendees who cannot make it to a NORA facility or trainers who cannot get to a location to train (Alaska and VT are two examples) expected completion for this new offering is late summer. In addition, NORA has moved to an online training certification program. This includes interactive demos, award winning video series, the Fuel Savings Analysis calculator and more.

NORA now offers Bronze and Silver Certification Test online with online proctoring. NORA has partnered with RPNow, a leading provider of online proctoring services. This system allows for you to take your exams at a convenient time while proctoring your exam by recording the visual, audio, and desktop aspects of your exam and exam environment. The test requires: an activated video camera on your computer and microphone on your computer, a driver's license or other non-military photo ID; Windows Vista, 7, 8, 8.1 or 10; MAC 10.8, 10.9, 10.10, 10.11, 10.12 and the latest version of Flash player.

VII. Outreach and Communications –Mr. Don Farrell

Mr. Farrell discussed the communication that NORA has had with its audiences and that NORA is consistently working to improve digital communication by adding different offerings and ways to communicate. There is the NORAweb.org website that has 4,200 visitors/month on average. This website offers: news, rebate forms, information on events, technical reports, education materials and information on state activities. NORA has a website dedicated strictly to education, that website is Learning.NORAweb.org. This website is an education portal and a source for education materials. It also provides information on new course announcements and allows for technicians to stay connected and to be connected with industry professionals. NORA puts out press release every month to inform NORA audiences about new and continuing developments. On average, there are two press releases published per month and those are generally viewed more than 10,500 times (2017). Press releases include information from or about industry personnel, press, trade press and information from association executives. NORA has also worked to provide technical bulletins and reports, interviews and education updates. Mr. Farrell discussed that NORA puts out industry articles to keep the industry abreast of current trends. Mr. Farrell invited interested participants the opportunity to create or assist in the creation of articles on NORA and/or oilheat.

VIII. Energy Efficiency and Rebates

Mr. Huber discussed that NORA has energy efficiency goals and has always and will continue to strive to engage a broad spectrum of fuel companies to build their futures by embracing energy efficiency solutions as a pathway to help improve customers' comfort, efficiency and safety. Mr. Huber discussed the state rebates and how they can use money for the equipment. Vendors are helping with providing equipment to help with efficiency testing. This will be tested with the FSA calculator so that NORA could get a sense of how successful the programs are in regards to efficiency. NORA will provide guidance, education and support to help dealers achieve success.

IX. Old Business

NONE

X. New Business

NONE

XI. Adjournment

Motion for adjournment was made by Mr. Eric Degesero, seconded by Mr. Charles Ugilietto, and approved by voice; adjournment was at 2:06pm

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June 11, 2017

National Oilheat Research Alliance
Board of Directors
600 Cameron Street, Suite 206
Alexandria, Virginia 22314

Dear Board Members:

In planning and performing our audit of the financial statements of the National Oilheat Research Alliance (the Alliance) as of and for the year ended December 31, 2016, in accordance with generally accepted auditing standards in the United States of America, we considered the Alliance's internal control over financial reporting (internal control) as a basis for designing our audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Alliance's internal control. Accordingly, we do not express an opinion on the effectiveness of the Alliance's internal control.

Our consideration of internal control was for the limited purpose described in the preceding paragraph and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and, therefore, material weaknesses or significant deficiencies may exist that were not identified. In addition, because of inherent limitations in internal control, including the possibility of management override of controls, misstatements due to error or fraud may occur and not be detected by such controls. However, as discussed below, we identified a certain deficiency in internal control that we consider to be a material weakness and other deficiencies that we consider to be significant deficiencies.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A material weakness is a deficiency, or combination of deficiencies in internal control, such that there is a reasonable possibility that a material misstatement of the Alliance's financial statements will not be prevented, or detected and corrected, on a timely basis. We consider the following deficiency in the Alliance's internal control to be a material weakness:

- The Alliance enters into contracts to conduct national R&D activities as specified in the NORA Act. When it enters into these contracts, management needs a mechanism to track the obligated amounts in the financial statements. To do this, the contracts were recorded as liabilities at the time they were approved. However, most of the work on these contracts had not yet been incurred and therefore, no liability should have been recorded per generally accepted accounting principles in the United States of America. This resulted in an overstatement of liabilities that was adjusted through a journal entry proposed by us and made by management during the audit. We recommend that these obligations be tracked as a designated net asset rather than a liability until they are incurred by the contractors.

  Management's Response
  Management concurs with this comment, and believes the journal entry and presentation provides a clear view of the status of projects and obligations. These changes are now incorporated into the Alliance's periodic financials.

A significant deficiency is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance. We consider the following deficiencies in the Alliance's internal control to be significant deficiencies:

- The Alliance has significantly improved its tracking of refunds payable at year-end. However, the refunds payable recorded only equals the amounts paid after year-end through the closing date. Refund requests are sometimes not received for many months after year-end. Management had not recorded an accrual for refunds to be requested and paid. This resulted in a journal entry proposed by us using inputs from the Alliance and made by management to record a refunds reserve for refunds not yet requested as of the closing date.

  Management's Response
  Refunds have been a source of confusion since inception. This is due to the fact that under the law, NORA is not entitled to the refund fees that are requested, and thus is obligated to pay when appropriate. Thus, refunds come in from a variety of parties and the amounts are variable. Prior to the audit, NORA paid a significant amount of refunds for 2016 in 2017. Also, as indicated in last year's management response, management determined the 10 largest refund collectors receivers had been paid or included in the 2016 accrued liability. Additionally, by the conclusion of the audit, further refunds have been processed, which helps to ensure that the released audited financials are accurate. To develop an accrual account would require NORA to estimate refunds based on past years, and would be unlikely to be accurate. This account would then require periodic adjustments. As a result, this would not provide useful information to readers of these statements. However, management believes this should be noted annually to highlight this issue.

- Management made improvements to its recordkeeping and recognition of payroll allocations in 2016. However, during the audit, we noted payroll expenses were still incorrectly allocated among the programs based on time reports. This resulted in a reclassification entry proposed by us and made by management during the audit. We recommend the salary allocation be reconciled to actual payroll expense in total, including benefits, taxes, and accrued vacation.

  Management's Response
  The allocation of salaries, which the auditor had commented on previously, appeared to be directed at a full allocation of employment expenses. However, it is now better understood, that two employees who received limited compensation in 2016 should have a more accurate allocation and not one based on the President's time allocation. This is now being done.

The Alliance's written responses to the significant deficiencies and material weakness identified in our audit have not been subjected to the audit procedures applied in the audit of the financial statements and, accordingly, we express no opinion on them.

This communication is intended solely for the information and use of management, the Board of Directors, and others within the Alliance, and is not intended to be, and should not be, used by anyone other than these specified parties.

Sincerely,

ROSS, LANGAN & MCKENDREE, L.L.P.

Mark D. Myers, Partner
Certified Public Accountant

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National Oilheat Research Alliance
Statement of Financial Position
July 31, 2017

	2017	2016
ASSETS		
CURRENT ASSETS:		
Cash and Cash Equivalents	$12,152,770.21	$11,369,671.52
Accounts Receivable	521.02	459.01
Assessments and Other Receivables	76,348.89	125,458.48
Security Deposit	21,146.10	21,146.10
Prepaid Assets	16,833.68	11,223.86
Total Current Assets	12,267,619.90	11,527,958.97
PROPERTY AND EQUIPMENT		
Office Furniture and Equipment	73,847.15	61,891.15
Website	45,450.00	45,450.00
Computer Equipment	10,723.64	10,723.64
Less: Accumulated Depreciation	(44,337.27)	(23,359.99)
Less: Accumulative Amortization (Web Site)	(25,682.49)	(16,592.50)
Total Property and Equipment	60,001.03	78,112.30
TOTAL ASSETS	$12,327,620.93	$11,606,071.27
LIABILITIES AND NET ASSETS		
CURRENT LIABILITIES:		
State Rebate Obligations (Pre 2014)	0.00	462,472.37
State Rebate Obligations 2014	138,238.59	711,663.18
State Rebate Obligations 2015	1,292,372.15	3,707,219.37
State Rebate Obligations 2016	3,504,818.88	5,759,838.93
State Rebate Obligations 2017	5,146,515.01	0.00
Total Grants Payable	10,081,944.63	10,641,193.85
Accrued Salaries & Benefits	14,469.80	13,095.20
Reserve for BIO Diesel Testing	764.35	764.35
Accounts Payable	60,179.36	50,031.89
Contracts Payable	37,157.50	367,066.00
Accrued Expenses	28,717.64	8,242.48
Total Current Liabilities	$10,223,233.28	$11,080,393.77
NET ASSETS:		
Unrestricted Net Assets	(934,416.92)	(393,232.81)
Pre-2014 Reauthorization Net Assets	55,933.05	472,266.37
National Spending Not Yet Incurred		
Research, Development, and Demonstration - net yet obligated	3,269,568.71	3,771,099.71
Research, Development, and Demonstration - obligated under contract	1,585,410.50	0.00
Heating Oil Efficiency and Upgrade - net yet obligated	154,198.32	113,728.68
Consumer Education, Safety, and Training - net yet obligated	151,854.46	141,657.20
Net Income (Loss)	(2,178,160.47)	(3,579,841.65)
Total Net Assets	2,104,387.65	525,677.50
TOTAL LIABILITIES AND NET ASSETS	$12,327,620.93	$11,606,071.27

Restricted for Management's Use Only
See Accountants' Compilation Report

National Oilheat Research Alliance
Statement of Activities
For the Seven Months Ending July 31, 2017

	July 2017	YTD 2017	2017 Budget	Remaining	YTD 2016
INCOME					
Collections and Assessments					
Collections	$1,494,552.43	$5,538,954.93	$8,894,868.00	$3,355,913.07	$5,493,305.18
Remittance Accrual	0.00	0.00	0.00	0.00	0.00
Refunds	(177,676.37)	(481,340.33)	0.00	481,340.33	(467,335.41)
Collection Costs	(9,161.57)	(54,132.56)	(170,000.00)	(115,867.44)	(71,611.04)
Net Collections	***1,307,714.49***	***5,003,482.04***	***8,724,868.00***	***3,721,385.96***	***4,954,358.73***
In Kind Contributions					
Sales Revenue	0.00	3,690.21	100,000.00	96,309.79	30,290.85
Other Revenue (Grants, etc)	47,600.00	47,590.00	100,000.00	52,410.00	47,399.50
Total Income	***1,355,314.49***	***5,054,762.25***	***8,924,868.00***	***3,870,105.75***	***5,032,049.08***
PROGRAM EXPENSES					
Consumer Education and Training (Max. 30%)	***31,779.71***	***2,622,014.34***	***2,733,459.54***	***111,445.20***	***2,656,004.87***
Education and Training (Central)	31,779.71	188,554.80	300,000.00	111,445.20	194,360.64
Education and Training (States)	0.00	2,433,459.54	2,433,459.54	0.00	2,461,644.23
Research Development and Demonstration (Min. 30%)	***46,782.97***	***1,305,846.83***	***2,668,461.59***	***1,362,614.76***	***1,384,570.25***
Research Development and Demonstration (Central)	46,782.97	747,385.24	2,110,000.00	1,362,614.76	797,924.16
Research Development and Demonstration (States)	0.00	558,461.59	558,461.59	0.00	586,646.09
Home Energy Efficiency Program (Min. 15%)	***5,274.74***	***1,273,666.48***	***1,334,230.18***	***60,563.70***	***1,354,323.93***
Home Energy Efficiency Program (Central)	5,274.74	39,436.30	100,000.00	60,563.70	59,821.91
Home Energy Efficiency Program (States)	0.00	1,234,230.18	1,234,230.18	0.00	1,294,502.02
Total Central	***83,837.42***	***975,376.34***	***2,510,000.00***	***1,534,623.66***	***1,052,106.71***
Total States	***0.00***	***4,226,151.31***	***4,226,151.31***	***0.00***	***4,342,792.34***
State Rebates	***16,472.83***	***1,873,681.38***	***1,818,717.03***	***(54,964.35)***	***1,996,442.22***
Old Grant Advertising	***0.00***	***0.00***	***0.00***	***0.00***	***1,015,000.00***
Office Unallocated Expenses					
Salaries and Consulting (Admin)	9,946.72	68,564.06	75,000.00	6,435.94	64,893.88
Accounting (Admin)	2,370.50	16,602.85	100,000.00	83,397.15	25,349.91
Insurance (Admin)	1,619.45	10,175.73	16,000.00	5,824.27	5,986.30
Taxes	130.19	2,017.64	7,000.00	4,982.36	1,582.17
Postage	4.97	139.15	1,000.00	860.85	2,199.19
Web Pages	1,168.70	9,250.88	50,000.00	40,749.12	15,921.72
Annual Report	1,251.52	36,988.16	15,000.00	(21,988.16)	27,654.58
Rent and Telephone	1,400.89	8,358.16	20,000.00	11,641.84	11,972.61
Travel	0.00	0.00	12,000.00	12,000.00	90.72
Meeting Expenses	0.00	83.64	15,000.00	14,916.36	6,903.55
Office Supplies	0.00	826.69	0.00	(826.69)	878.99
Dues & Memberships	69.99	69.99	0.00	(69.99)	0.00
Bank Fees	429.50	3,238.21	0.00	(3,238.21)	3,359.27
Legal Expense	0.00	0.00	30,000.00	30,000.00	0.00
Professional Fees	0.00	1,586.00	0.00	(1,586.00)	0.00
Misc Expense	0.00	0.00	15,000.00	15,000.00	69.42
Advertising Expense	0.00	0.00	0.00	0.00	0.00
Fixed Assets <$1,000	0.00	0.00	0.00	0.00	789.59
Equipment Maintenance	0.00	3,738.75	0.00	(3,738.75)	2,532.40
Bad Debts	0.00	0.00	0.00	0.00	0.00
Total Unallocated Expenses	***18,392.43***	***161,639.91***	***356,000.00***	***194,360.09***	***170,184.30***
Other Expenses/(Income)					
Cost of Goods Sold	325.83	2,291.49	80,000.00	77,708.51	36,011.63
Interest Expense	0.00	0.00	0.00	0.00	170.02
Interest	(4,604.02)	(6,217.71)	0.00	6,217.71	(816.49)
Total Other Expenses/(Income)	***(4,278.19)***	***(3,926.22)***	***80,000.00***	***83,926.22***	***35,365.16***
Net Revenue/(Expense)	***1,240,890.00***	***(2,178,160.47)***	***(66,000.34)***	***2,112,160.13***	***(3,579,841.65)***

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Budget 2018 - 2019

July 2017

The National Oilheat Research Alliance Act of 2000 (Public Law 106-469) as amended by P.L. 113-79 requires the National Oilheat Research Alliance (the Alliance) to publish a biennial budget for public comment before August 1st of 2014 and every two years thereafter. That budget shall include the probable costs of all programs, projects, and contracts and other agreements.

Following public review and comment, the Alliance is required to submit a proposed budget to the Secretary of Energy and to the Congress.

Part I. Assessment Rate and Income

The Alliance has one primary sources of income. The federally authorized assessment on Oilheat sold in the states participating in NORA at $.002 per gallon. The Alliance also receives interest income on the investment of assessment funds. Additionally, the Alliance realizes revenue from the sale of books and other educational resources. Further, NORA periodically enters into contracts with other research organizations to conduct studies.

Assessment Collections

The Alliance estimates that revenues from assessments will be **$9,380,256 in 2018.** Similarly, the 2019 revenue from collections was placed at **$9,192,651**. These calculations are based on normalizing the most recent year's collections for weather, and then reducing by 2 percent per annum to accommodate conservation and loss of customers. The 2019 budget is based on a full year of operation. However, at this time the statutory collection authority expires in 2019, so NORA is presenting an alternative revenue number of $1,838,530 to accommodate a partial year. To ensure the appropriate allocations to the accounts established by Congress are in line with actual collections, NORA adjusts the rebates to the states at the conclusion of the audit. Reductions or overages are generally made to the state rebates in the next year. This ensures that with the central budget and the state budget, Congressional allocations are followed.

The Alliance expects to receive interest of $1,000 in 2018 and $1,000 in 2019. NORA expects no continuing revenue from book sales as the publications are now printed and distributed independently and NORA distributes the materials with no expectation of revenue.

NORA will also be making it a priority to work with other organizations and provide services that benefit the oilheating industry. NORA anticipates that partnerships with organizations such as the National Biodiesel Board and New York State Energy Research and Development Authority (NYSERDA) may provide as much as $100,000 per year in 2018 and 2019. However, these funds are uncertain, and generally lead to higher costs, so they are not included in this budget document.

Part II. General Expenditures and Capital Investments

Administrative Expenses in 2018 are anticipated to be $ 242,000 and include salaries and other expenses related to administering the program, insurance, accounting fees and rent. This figure will rise by $2,000 in 2019. It should be noted that several of the overhead expenses could be allocated, but NORA believes this presentation is the most appropriate. The expenditures will thus be approximately 2.4% and 2.5% of the program's collections in those years. Thus, they will be within the statutory cap of 5%.

Assessments and Collections.

The Alliance anticipates expenditures of **$115,000** for collection expenses in 2018 and 2019. These costs include processing of collections, publicizing the collection system, maintaining lists, and providing attorney's fees to ensure that the system is effective. It also includes expenses associated with refunds, and audit costs. These expenses reflect actual costs in previous years. If NORA collections are suspended, these costs will be reduced to $23,000.

Part III. State Rebates

The Alliance has endeavored to ensure that the funds generated benefit consumers and the oilheat industry. The limitation on Administration contained in the Act and the current status of the industry also indicates that allowing local decision-making is the best way to maximize value. To that end, the Alliance therefore intends to return a substantial portion of the funds for use in the state where they are generated. In 2018, this is anticipated to be $6,448,156, and in 2019, it will be $6,258,551. If the year is abbreviated, it will be reduced to $1,245,710. The states will use these funds to accomplish many of the goals described herein, and will be within the statutory directives and their spending will match congressional allocations.

Part IV. Program and Project Expenditures

The Act requires the Alliance to develop programs, and projects and enter into contracts or other agreements with other persons and entities for implementing this title.

The Act is designed to benefit consumers of Oilheat by allowing the industry to develop appropriate programs of consumer education, energy efficiency, research and development and education and training to benefit consumers.

This budget document will determine all spending. The Executive Committee of the Alliance and the Alliance will be responsible for reviewing contracts and approving them as appropriate and implementing this budget.

Education and Training and Consumer Education.

The Act requires the Alliance to enhance consumer and employee safety and training and provide consumer education. The total expenses available for these activities are $2,814,076 in 2018 and $2,757,795 in 2019. In a reduced year, these would 551,559. Of these expenditures, the Alliance is proposing to budget $355,000 to be administered by the national office in each year. The national office will be producing and maintaining an online training center with these funds. In-person training is often the preferred method of training; however, many technicians are in remote areas and have limited access to training. Having a training center that can provide training, maintain student records and outreach to students is critical. NORA transitioned its existing learning site in 2015, and will enhance and add content in the next two years. NORA is working to bring its advanced Gold program into an on-line learning regime.

The states affiliated with NORA will be provided with $2,464,076.80 for 2018 and $2,407,795.26 in 2019. In a shortened year, this will be 481,559. The states will develop internal budgets based on these allocations. The states will focus most of their funding on basic technician education. Extended management training to improve overall service and improve the oilheat consumer experience will also be developed and used.

Technician Certification Program

The Alliance will continue to improve its Technician Certification program. Recognizing excellence is a vital part of improving employee training which leads to improved consumer value and safety. To this end, the Alliance assumed the Technician Certification Program previously operated by the Petroleum Marketers Association of America.

This program is operated in house, and will be maintained and continuously improved as part of website, learning.noraweb.org

New Training Materials.

The Alliance will continue to develop training materials and course materials for the industry. NORA will continue to conduct Train-the-Trainer programs for the Gold and Silver program. NORA is working on online presentations of the subject areas of its expanded gold program, steam, hydronics, venting, advanced controls, air flow for warm air systems, and energy efficiency.

State Rebates

A significant portion of the Alliance generated funds will be returned to the states in conformance with the law to accomplish the objectives of the Act. The states will implement many of the programs described above. Providing in field training for technicians is critical.

Several of the states operate full time training facilities used by the industry. These include Maine, Vermont, Connecticut, New York, and Pennsylvania. The remaining states use the funds to do periodic training at temporary facilities.

Additionally, the states may allocate a portion of this to traditional consumer education activities using traditional media such as broadcast television and radio, and a limited amount of internet communications. Using broadcast media allows the industry to provide a small bit of information to consumers which might help them make decisions regarding oilheat fuel. These consumer education activities will also provide information on energy efficiency and improvements to the equipment.

Research and Development

The Act requires the Alliance to provide for research, development, and demonstration of clean and efficient oilheat utilization equipment. The Alliance anticipates expending approximately $2,814,077 being directly allocated to research and development activities in 2018, and $2,757,795 in 2019. Of this, $2,100,000 will be directly funded by the central office. Additionally, there will be rebates to the states of $714,077 in 2018 and $657,795 that can be used by the states for either research and development or transitioning equipment to higher efficiency, or support of biofuels. At a minimum, the research and development program will be 30% of the budget, and may approach 45 percent of total collections.

NORA is now operating a research and development laboratory in New York. Staffing for that lab will include a full time director, as well as 1.5 full time equivalent laboratory employees. Additionally, NORA will continue to fund and develop new projects based on its research review meeting which established priorities for the industry, including biofuels, controls, novel burner technologies, and new appliances.

Under the revised statute, there are additional responsibilities which include the transition and facilitation of the entry of energy efficient heating systems into the marketplace. A report on biofuels in oilheat fuel utilization equipment, and the development of consumer education materials describing the benefits of using biofuels in oilheat fuel is also a core function of research and development in the act. It is likely that the states will use their funds to facilitate these two objectives.

NORA anticipates that the core of its fundamental research will occur at the NORA laboratory in Plainview New York, while more product development projects will occur through funded projects. NORA will continue to work with the New York State Energy Research and Development Authority and the National Biodiesel Board.

Energy Efficiency

The Act also includes a requirement on "Heating Oil Efficiency and Upgrade Program. The Alliance has budgeted $1,407,038 in 2018 and $1,379,897 in 2019. In a shortened year, these funds will be reduced to $275,779 This program allocates $80,000 for development of the program at the central level in both years.

There are three main tasks under this section, and at least 15 percent of the assessments shall be used to assist consumers to

1) Make cost effective upgrades to more fuel efficient modifications to an existing heating system or otherwise make cost-effective modifications to an existing heating system to improve the efficiency of the system.
2) To improve energy efficiency or reduce energy consumption through cost-effective energy efficiency programs for consumers, or
3) To improve the safe operation of the system

In carrying out this section, the Alliance shall to the maximum extent practicable coordinate, develop and implement the programs and activities of the Alliance in conjunction with an existing state energy efficiency program administrator.
The amount of funding in states will limit the amount of planning that is likely to occur. NORA believes that developing a series of programs that meets the goals of this section will be essential, and then each state affiliate will be able to work to the maximum extent practicable with its state energy efficiency administrator to develop the best plan for that state. Preliminary discussion have indicated that better understanding of efficiency and appropriate tools to measure and improve efficiency in the home, tune-ups of existing equipment, and setback thermostats may all be invaluable in fulfilling this task.

State Rebates

NORA's Board has indicated a continued desire to utilize the state resources to implement the program. Thus, funds not specifically allocated to programs in accordance with this budget will be subject to the decision making of the states. Currently, $1,942,964 in 2018, and $1,894,063 in 2019. In a shortened year, these will be reduced to 372,812 These funds will only be available for research, development and demonstration and home energy efficiency.

Central Office Expenses

The budget provides for $287,100 to be spent on the management of the Alliance and compliance with specific program objectives in 2018, and $289,100 in 2019. These include the provision of the Annual report, and the verification of said report.

NORA has allocated $162,000 to all accounting, salaries, insurance, and rent, as expenses that may not be allocated to specific programs in 2018 and $164,000 in 2019.

NORA would note that OMB Circular A-122 would allow a percentage of these expenses to be allocated to program categories. However, as this budget is developed, these expenses will be preliminarily described as administrative.

Part V. Budget Summary

The following pages provides an income statement for 2018 and 2019 as well as a shortened 2019, and also provide the appropriate state allocations for 2018 and 2019. The board has directed that the allocations to the states be adjusted annually based on the collections in the prior year. This is a formulaic adjustment and will occur in the spring of 2018, which will be implemented in 2019. This adjustment has occurred for 2018, and will occur in 2018 prior to final allocations to the states in 2019.

	2018	2019 Full Year	2019 Partial Year
INCOME			
Collections and Assessments			
Collections	$9,380,256.00	$9,192,650.88	$1,838,530.18
Remittance Accrual			
Refunds		0.00	
Collection Costs	-115000	-115,000	-23000
Net Collections	**$9,265,256.00**	**$9,077,650.88**	**1,815,530.18**
In Kind Contributions			
Sales Revenue			
Other Revenue (Grants, etc)			
Total Income			
PROGRAM EXPENSES			
Consumer Education and Training (Max. 30%)	**$2,814,076.80**	**$2,757,795.26**	**$551,559.05**
Education and Training (Central)	$350,000.00	$350,000.00	$70,000.00
Education and Training (States)	$2,464,076.80	$2,407,795.26	$481,559.05
Research Development and Demonstration (Min. 30%)	**$2,814,076.80**	**$2,757,795.26**	**$551,559.05**
Research Development and Demonstration (Central)	$2,100,000.00	$2,100,000.00	$420,000.00
Research Development and Demonstration (States)	$714,076.80	$657,795.26	$131,559.05
Home Energy Efficiency Program (Min. 15%)	**$1,407,038.40**	**$1,378,897.63**	**$275,779.53**
Home Energy Efficiency Program (Central)	$80,000.00	$80,000.00	$16,000.00
Home Energy Efficiency Program (States)	$1,327,038.40	$1,298,897.63	$259,779.53
Total Central	$2,530,000.00	$2,530,000.00	$506,000.00
Total States	$4,505,192.00	$4,364,488.16	$872,897.63
State Rebates	$1,942,964.00	$1,894,062.72	$372,812.54
Old Grant Advertising			

Office Unallocated Expenses			
Salaries and Consulting (Admin)	$75,000.00	$75,000.00	$15,000.00
Accounting (Admin)	$50,000.00	$50,000.00	$10,000.00
Insurance (Admin)	$15,000.00	$15,000.00	$3,000.00
Taxes	$3,000.00	$3,000.00	$600.00
Postage	$3,000.00	$3,000.00	$600.00
Web Pages	$30,000.00	$30,000.00	$6,000.00
Annual Report	$45,000.00	$45,000.00	$15,000.00
Rent and Telephone	$22,000.00	$24,000.00	$4,800.00
Travel	$1,000.00	$1,000.00	$200.00
Meeting Expenses	$8,000.00	$8,000.00	$1,600.00
Office Supplies	$2,000.00	$2,000.00	$400.00
Dues & Memberships	$100.00	$100.00	$20.00
Bank Fees	$6,000.00	$6,000.00	$1,200.00
Legal Expense	$15,000.00	$15,000.00	$3,000.00
Professional Fees	$3,000.00	$3,000.00	$600.00
Misc Expense	$1,000.00	$1,000.00	$200.00
Advertising Expense	$1,000.00	$1,000.00	$200.00
Fixed Assets <$1,000	$1,000.00	$1,000.00	$200.00
Equipment Maintenance	$5,000.00	$5,000.00	$1,000.00
Bad Debts	$1,000.00	$1,000.00	$200.00
Total Unallocated Expenses	$287,100.00	$289,100.00	$63,820.00
Other Expenses/(Income)			
Cost of Goods Sold			
Interest Expense	1,000	1,000	1,000
Interest			
Total Other Expenses/(Income)			

2018

	Education and Training	Research and Development	Energy Efficiency	Rebate to State
	$2,464,074.00	$714,078.00	$1,327,039.00	$1,942,964.00
Connecticut	$303,065.71	$87,827.13	$163,217.51	$238,972.43
District of Columbia	$782.14	$226.66	$421.22	$616.73
Delaware	$15,391.64	$4,460.43	$8,289.24	$12,136.56
Idaho	$1,782.18	$516.47	$959.80	$1,405.28
Indiana	$3,127.72	$906.40	$1,684.45	$2,466.26
Kentucky	$34,334.88	$9,950.10	$18,491.21	$27,073.63
Massachusetts	$312,427.69	$90,540.19	$168,259.45	$246,354.51
Maryland	$78,648.03	$22,791.86	$42,356.28	$62,015.30
Maine	$168,096.18	$48,713.55	$90,529.01	$132,546.68
Michigan	$52,482.58	$15,209.23	$28,264.75	$41,383.40
Norh Carolina	$82,945.10	$24,037.13	$44,670.48	$65,403.61
New Hampshire	$110,092.56	$31,904.35	$59,290.88	$86,809.85
New Jersey	$142,181.51	$41,203.59	$76,572.54	$112,112.52
Nevada	$646.97	$187.49	$348.43	$510.14
New York	$448,861.59	$130,078.15	$241,736.59	$353,934.95
NYOHA	$144,084.38	$41,755.04	$77,597.58	$113,613.14
OHILI	$125,232.22	$36,291.76	$67,444.62	$98,747.87
Hudson	$66,431.43	$19,251.54	$35,777.08	$52,382.38
UNYEA	$113,112.97	$32,779.66	$60,917.72	$89,191.62
Ohio	$66,084.91	$19,151.12	$35,590.35	$52,109.07
Pennsylvania	$330,391.50	$95,746.03	$177,933.95	$260,519.28

Rhode Island	$66,771.98	$19,350.23	$35,960.38	$52,650.84
South Carolina	$34,663.01	$10,045.19	$18,667.93	$27,332.37
Virginia	$77,230.04	$22,380.93	$41,592.61	$60,897.19
		$-	$-	$-
Vermont	$64,926.15	$18,815.32	$34,966.29	$51,195.36
Washington	$12,074.09	$3,499.02	$6,502.56	$9,520.63
Wisconsin	$57,065.89	$16,537.45	$30,733.11	$44,997.42

2019

	Ed and Train	R and D	En Efficiency	Rebate
	$2,407,793.00	$657,797.00	$129,898.00	$1,894,063.00
Connecticut	$296,143.50	$80,904.92	$15,976.64	$232,957.92
District of Columbia	$764.27	$208.80	$41.23	$601.21
Delaware	$15,040.08	$4,108.87	$811.40	$11,831.11
Idaho	$1,741.47	$475.76	$93.95	$1,369.91
Indiana	$3,056.28	$834.96	$164.88	$2,404.19
Kentucky	$33,550.65	$9,165.87	$1,810.02	$26,392.24
Massachusetts	$305,291.64	$83,404.15	$16,470.18	$240,154.20
Maryland	$76,851.65	$20,995.49	$4,146.07	$60,454.48
Maine	$164,256.76	$44,874.12	$8,861.49	$129,210.71
Michigan	$51,283.85	$14,010.49	$2,766.71	$40,341.85
Norh Carolina	$81,050.58	$22,142.61	$4,372.60	$63,757.52
New Hampshire	$107,577.98	$29,389.77	$5,803.72	$84,625.00
New Jersey	$138,934.00	$37,956.07	$7,495.35	$109,290.85
Nevada	$632.19	$172.71	$34.11	$497.30
New York	$438,609.31	$119,825.87	$23,662.53	$345,027.03
	$140,793.49	$38,464.15	$7,595.82	$110,753.67
	$122,371.91	$33,431.45	$6,601.98	$96,262.53
	$64,914.13	$17,734.25	$3,502.12	$51,064.00
	$110,529.47	$30,196.15	$5,963.08	$86,946.80
Ohio	$64,575.49	$17,641.70	$3,483.78	$50,797.58
Pennsylvania	$322,845.15	$88,199.68	$17,417.17	$253,962.47

Rhode Island	$65,246.87	$17,825.12	$3,520.00	$51,325.71
South Carolina	$33,871.29	$9,253.47	$1,827.32	$26,644.46
Virginia	$75,466.05	$20,616.95	$4,071.32	$59,364.51
Vermont	$63,443.19	$17,332.36	$3,422.70	$49,906.87
Washington	$11,798.31	$3,223.24	$636.51	$9,281.01
Wisconsin	$55,762.47	$15,234.03	$3,008.33	$43,864.91

		2019 Partial Year		
Connecticut	$59,228.75	$16,180.94	$31,951.32	$45,853.67
District of Columbia	$152.86	$41.76	$82.46	$118.34
Delaware	$3,008.02	$821.77	$1,622.69	$2,328.75
Idaho	$348.29	$95.15	$187.89	$269.64
Indiana	$611.26	$166.99	$329.75	$473.22
Kentucky	$6,710.14	$1,833.17	$3,619.82	$5,194.85
Massachusetts	$61,058.38	$16,680.78	$32,938.32	$47,270.13
Maryland	$15,370.34	$4,199.08	$8,291.63	$11,899.40
Maine	$32,851.38	$8,974.80	$17,721.88	$25,432.86
Michigan	$10,256.78	$2,802.09	$5,533.08	$7,940.58
Norh Carolina	$16,210.13	$4,428.51	$8,744.66	$12,549.55
New Hampshire	$21,515.61	$5,877.94	$11,606.73	$16,656.94
New Jersey	$27,786.82	$7,591.19	$14,989.77	$21,511.98
Nevada	$126.44	$34.54	$68.21	$97.89
New York	$87,721.94	$23,965.10	$47,322.14	$67,912.50
NYOHA	$28,158.44	$7,692.77	$15,190.36	$21,799.75
OHILI	$24,474.16	$6,686.24	$13,202.84	$18,947.45
Hudson	$12,982.71	$3,546.82	$7,003.66	$10,050.98
UNYEA	$22,105.69	$6,039.18	$11,925.14	$17,113.82
Ohio	$12,915.11	$3,528.33	$6,967.14	$9,998.61
Pennsylvania	$64,569.08	$17,639.88	$34,832.19	$49,988.05
Rhode Island	$13,049.38	$3,565.01	$7,039.57	$10,102.56

South Carolina	$6,774.26	$1,850.69	$3,654.42	$5,244.49
Virginia	$15,093.22	$4,123.38	$8,142.13	$11,684.86
Vermont	$12,688.65	$3,466.46	$6,844.97	$9,823.29
Washington	$2,359.66	$644.65	$1,272.94	$1,826.80
Wisconsin	$11,152.50	$3,046.80	$6,016.29	$8,634.04

National Oilheat Research Alliance

For the Eight Months Ending August 31, 2017

	Total Budget	Actual 2014	Actual 2015	Actual 2016	Actual 2017	Total Actual	Remaining		
CT 14 E&T	$116,634.40		$116,634.40			$116,634.40			0.44482
CT 15 E&T	227,946.61		190,577.89	37,368.72		227,946.61			
CT 16 E&T	256,780.56			256,780.56		256,780.56			
CT 17 E&T	276,684.35			5,045.00	244,708.76	249,753.76	26,930.59		
TOTAL CT E&T	878,045.92		307,212.29	299,194.28	244,708.76	851,115.33	26,930.59	0.030671	
CT 14 R&D	23,177.73			23,177.73		23,177.73			
CT 15 R&D	68,833.01			3,318.64	25,236.93	28,555.57	40,277.44		
CT 16 R&D	61,194.59						61,194.59		
CT 17 R&D	63,497.08						63,497.08		
TOTAL CT R&D	216,702.41			26,496.37	25,236.93	51,733.30	164,969.11	0.76127	
CT 14 EE	62,991.10		46,620.38	16,370.72	(300.00)	62,691.10	300.00		
CT 15 EE	118,657.03			91,120.34	26,536.69	117,657.03	1,000.00		
CT 16 EE	134,909.87				112,122.53	112,122.53	22,787.34		
CT 17 EE	140,331.97						140,331.97		
TOTAL CT EE	456,889.97		46,620.38	107,491.06	138,359.22	292,470.66	164,419.31	0.359866	
CT 14 REBATE	84,766.95			84,766.95		84,766.95			
CT 15 REBATE	164,494.99			110,626.04	53,868.95	164,494.99			
CT 16 REBATE	213,059.19						213,059.19		
CT 17 REBATE	206,788.12						206,788.12		
TOTAL CT REBATE	669,109.25			195,392.99	53,868.95	249,261.94	419,847.31	0.627472	
DC 14 E&T	985.31						985.31		1
DC 15 E&T	1,925.62						1,925.62		
DC 16 E&T	1,271.60						1,271.60		
DC 17 E&T	1,703.42						1,703.42		
TOTAL DC E&T	5,885.95						5,885.95	1	
DC 14 R&D	195.80						195.80		
DC 15 R&D	581.48						581.48		
DC 16 R&D	303.04						303.04		
DC 17 R&D	390.92						390.92		
TOTAL DC R&D	1,471.24						1,471.24	1	
DC 14 EE	532.13						532.13		
DC 15 EE	1,002.38						1,002.38		
DC 16 EE	668.09						668.09		
DC 17 EE	863.96						863.96		
TOTAL DC EE	3,066.56						3,066.56	1	
DC 14 REBATE	716.08						716.08		
DC 15 REBATE	1,389.60						1,389.60		
DC 16 REBATE	1,055.09						1,055.09		
DC 17 REBATE	1,273.10						1,273.10		
	4,433.87						4,433.87	1	
DE 14 E&T	10,282.37		10,282.37			10,282.37			0.739773
DE 15 E&T	20,095.20		2,470.11	17,625.09		20,095.20			
DE 16 E&T	15,879.15			1,010.45		1,010.45	14,868.70		
DE 17 E&T	14,844.10						14,844.10		
TOTAL DE E&T	61,100.82		12,752.48	18,635.54		31,388.02	29,712.80	0.486291	
DE 14 R&D	2,043.29						2,043.29		
DE 15 R&D	6,068.15						6,068.15		
DE 16 R&D	3,784.24						3,784.24		
DE 17 R&D	3,406.62						3,406.62		
TOTAL DE R&D	15,302.30						15,302.30	1	
DE 14 EE	5,553.14		2,510.44	3,042.70		5,553.14			
DE 15 EE	10,460.51			5,354.24	750.00	6,104.24	4,356.27		
DE 16 EE	8,342.74						8,342.74		
DE 17 EE	7,528.80						7,528.80		

TOTAL DE EE	31,885.19		2,510.44	8,396.94	750.00	11,657.38	20,227.81	0.634395	
DE 14 REBATE	7,472.84			7,472.84		7,472.84			
DE 15 REBATE	14,501.47						14,501.47		
DE 16 REBATE	13,175.45						13,175.45		
DE 17 REBATE	11,094.17						11,094.17		
TOTAL DE REBATE	46,243.93			7,472.84		7,472.84	38,771.09	0.838404	
ID 14 E&T	1,121.74						1,121.74		1
ID 15 E&T	2,192.26						2,192.26		
ID 16 E&T	894.57						894.57		
ID 17 E&T	973.38						973.38		
TOTAL ID E&T	5,181.95						5,181.95	1	
ID 14 R&D	222.91						222.91		
ID 15 R&D	662.00						662.00		
ID 16 R&D	213.19						213.19		
ID 17 R&D	223.38						223.38		
TOTAL ID R&D	1,321.48						1,321.48	1	
ID 14 EE	605.81						605.81		
ID 15 EE	1,141.17						1,141.17		
ID 16 EE	470.00						470.00		
ID 17 EE	493.69						493.69		
TOTAL ID EE	2,710.67						2,710.67	1	
ID 14 REBATE	815.24						815.24		
ID 15 REBATE	1,582.02						1,582.02		
ID 16 REBATE	742.25						742.25		
ID 17 REBATE	727.49						727.49		
TOTAL ID REBATE	3,867.00						3,867.00	1	
IN 14 E&T	2,792.20		1,925.58	610.00		2,535.58	256.62		0.731559
IN 15 E&T	5,456.90						5,456.90		
IN 16 E&T	4,308.49						4,308.49		
IN 17 E&T	3,406.84						3,406.84		
TOTAL IN E&T	15,964.43		1,925.58	610.00		2,535.58	13,428.85	0.841173	
IN 14 R&D	554.86						554.86		
IN 15 R&D	1,647.82						1,647.82		
IN 16 R&D	1,026.78						1,026.78		
IN 17 R&D	781.85						781.85		
TOTAL IN R&D	1,388,486.55		63,808.88	337,999.37	192,978.17	594,786.42	793,700.13	0.57163	
IN 14 EE	1,507.97		1,507.97			1,507.97			
IN 15 EE	2,840.57			1,221.53		1,221.53	1,619.04		
IN 16 EE	2,263.63						2,263.63		
IN 17 EE	1,727.92						1,727.92		
TOTAL IN EE	8,340.09		1,507.97	1,221.53		2,729.50	5,610.59	0.672725	
IN 14 REBATE	2,029.27		417.62	1,507.97		1,925.59	103.68		
IN 15 REBATE	3,937.91						3,937.91		
IN 16 REBATE	3,574.89						3,574.89		
IN 17 REBATE	2,546.20						2,546.20		
TOTAL IN REBATE	12,088.27		417.62	1,507.97		1,925.59	10,162.68	0.840706	
KY 14 E&T	20,596.48	4,226.56	16,369.92			20,596.48			0.224358
KY 15 E&T	40,252.45		16,179.49	20,659.64	3,413.32	40,252.45			
KY 16 E&T	27,204.92				1,152.53	1,152.53	26,052.39		
KY 17 E&T	32,608.36						32,608.36		
TOTAL KY E&T	120,662.21	4,226.56	32,549.41	20,659.64	4,565.85	62,001.46	58,660.75	0.486157	
KY 14 R&D	4,092.89	3,846.00	246.89			4,092.89			
KY 15 R&D	12,155.03		11,797.76	357.27		12,155.03			
KY 16 R&D	6,483.33			6,237.61	245.72	6,483.33			
KY 17 R&D	7,483.39				7,483.39	7,483.39			
TOTAL KY R&D	30,214.64	3,846.00	12,044.65	6,594.88	7,729.11	30,214.64		0	
KY 14 EE	11,123.42	8,865.93	2,257.49			11,123.42			
KY 15 EE	20,953.31		16,687.63	4,265.68		20,953.31			
KY 16 EE	14,293.19			7,266.03	4,156.24	11,422.27	2,870.92		

KY 17 EE	16,538.68				76.14	76.14	16,462.54		
TOTAL KY EE	62,908.60	8,865.93	18,945.12	11,531.71	4,232.38	43,575.14	19,333.46	0.307326	
KY 14 REBATE	14,968.76		14,968.76			14,968.76			
KY 15 REBATE	29,047.71			29,047.71		29,047.71			
KY 16 REBATE	22,572.81			22,200.28	372.53	22,572.81			
KY 17 REBATE	24,370.81				14,915.64	14,915.64	9,455.17		
TOTAL KY REBATE	90,960.09		14,968.76	51,247.99	15,288.17	81,504.92	9,455.17	0.103949	
MA 14 E&T	138,514.41		138,514.41			138,514.41			0.435715
MA 15 E&T	270,703.73		59,543.18	201,124.58	10,035.97	270,703.73			
MA 16 E&T	301,645.43				234,703.33	234,703.33	66,942.10		
MA 17 E&T	294,691.96						294,691.96		
TOTAL MA E&T	1,005,555.53		198,057.59	201,124.58	244,739.30	643,921.47	361,634.06	0.359636	
MA 14 R&D	27,525.30		24,539.52	2,985.78		27,525.30			
MA 15 R&D	81,744.37		1,230.20	80,514.17		81,744.37			
MA 16 R&D	71,886.55				18,726.65	18,726.65	53,159.90		
MA 17 R&D	67,629.70						67,629.70		
TOTAL MA R&D	248,785.92		25,769.72	83,499.95	18,726.65	127,996.32	120,789.60	0.485516	
MA 14 EE	74,806.66		69,076.57	5,730.09		74,806.66			
MA 15 EE	140,914.14			68,127.19	72,786.95	140,914.14			
MA 16 EE	158,481.41				158,481.41	158,481.41			
MA 17 EE	149,465.28						149,465.28		
TOTAL MA EE	523,667.49		69,076.57	73,857.28	231,268.36	374,202.21	149,465.28	0.28542	
MA 14 REBATE	100,667.12			100,667.12		100,667.12			
MA 15 REBATE	195,350.17			100,801.33	94,548.84	195,350.17			
MA 16 REBATE	250,285.04				1,184.33	1,184.33	249,100.71		
MA 17 REBATE	220,246.63						220,246.63		
TOTAL MA REBATE	766,548.96			201,468.45	95,733.17	297,201.62	469,347.34	0.612286	
MD 14 E&T	37,071.13	41,165.68	(4,094.55)			37,071.13			0.295066
MD 15 E&T	72,449.46		67,231.81	5,217.65		72,449.46			
MD 16 E&T	84,888.96			84,888.96		84,888.96			
MD 17 E&T	75,923.94				34,165.00	34,165.00	41,758.94		
TOTAL MD E&T	270,333.49	41,165.68	63,137.26	90,106.61	34,165.00	228,574.55	41,758.94	0.154472	
MD 14 R&D	7,366.70	1,700.00		5,666.70		7,366.70			
MD 15 R&D	21,877.56			643.30		643.30	21,234.26		
MD 16 R&D	20,230.29						20,230.29		
MD 17 R&D	17,424.00						17,424.00		
TOTAL MD R&D	66,898.55	1,700.00		6,310.00		8,010.00	58,888.55	0.880266	
MD 14 EE	20,020.79	15,400.00	4,620.79			20,020.79			
MD 15 EE	37,713.38		1,087.81	36,625.57		37,713.38			
MD 16 EE	44,599.79			44,599.79		44,599.79			
MD 17 EE	38,507.98				38,507.98	38,507.98			
TOTAL MD EE	140,841.94	15,400.00	5,708.60	81,225.36	38,507.98	140,841.94		0	
MD 14 REBATE	26,941.92		26,941.92			26,941.92			
MD 15 REBATE	52,282.30			52,282.30		52,282.30			
MD 16 REBATE	70,435.13			70,435.13		70,435.13			
MD 17 REBATE	56,743.97				26,707.02	26,707.02	30,036.95		
TOTAL MD REBATE	206,403.32		26,941.92	122,717.43	26,707.02	176,366.37	30,036.95	0.145526	
ME 14 E&T	70,733.00		38,206.01	32,526.99		70,733.00			0.594805
ME 15 E&T	138,236.06			138,236.06		138,236.06			
ME 16 E&T	153,735.76			49,747.76	103,988.00	153,735.76			
ME 17 E&T	180,319.35				18,247.82	18,247.82	162,071.53		
TOTAL ME E&T	543,024.17		38,206.01	220,510.81	122,235.82	380,952.64	162,071.53	0.298461	
ME 14 R&D	14,055.92		14,055.92			14,055.92			
ME 15 R&D	41,743.13			24,644.38	17,098.75	41,743.13			
ME 16 R&D	36,637.49						36,637.49		
ME 17 R&D	41,382.00						41,382.00		
TOTAL ME R&D	133,818.54		14,055.92	24,644.38	17,098.75	55,799.05	78,019.49	0.583025	
ME 14 EE	38,200.35		26,410.67	11,789.68		38,200.35			
ME 15 EE	71,958.43			715.80	32,070.83	32,786.63	39,171.80		

ME 16 EE	80,771.19						80,771.19		
ME 17 EE	91,456.46						91,456.46		
TOTAL ME EE	282,386.43		26,410.67	12,505.48	32,070.83	70,986.98	211,399.45	0.748618	
ME 14 REBATE	51,406.11		18,498.23	32,907.88		51,406.11			
ME 15 REBATE	99,756.43			4,355.64	47,975.59	52,331.23	47,425.20		
ME 16 REBATE	127,559.56						127,559.56		
ME 17 REBATE	134,766.93						134,766.93		
TOTAL ME REBATE	413,489.03		18,498.23	37,263.52	47,975.59	103,737.34	309,751.69	0.749117	
MI 14 E&T	38,065.57		25,865.00	12,200.57		38,065.57			0.511189
MI 15 E&T	74,392.92			36,907.43	37,485.49	74,392.92			
MI 16 E&T	49,072.79				17,472.51	17,472.51	31,600.28		
MI 17 E&T	77,384.01						77,384.01		
TOTAL MI E&T	238,915.29		25,865.00	49,108.00	54,958.00	129,931.00	108,984.29	0.456163	
MI 14 R&D	7,564.31			7,564.31		7,564.31			
MI 15 R&D	22,464.42			11,385.29	11,079.13	22,464.42			
MI 16 R&D	11,694.77						11,694.77		
MI 17 R&D	17,759.08						17,759.08		
TOTAL MI R&D	59,482.58			18,949.60	11,079.13	30,028.73	29,453.85	0.495168	
MI 14 EE	20,557.85			10,722.49	9,835.36	20,557.85			
MI 15 EE	38,725.04			4,277.51	34,447.53	38,725.04			
MI 16 EE	25,782.34						25,782.34		
MI 17 EE	39,248.52						39,248.52		
TOTAL MI EE	124,313.75			15,000.00	44,282.89	59,282.89	65,030.86	0.523119	
MI 14 REBATE	27,664.64			27,664.64		27,664.64			
MI 15 REBATE	53,684.77				49,637.98	49,637.98	4,046.79		
MI 16 REBATE	40,717.29						40,717.29		
MI 17 REBATE	57,835.20						57,835.20		
TOTAL MI REBATE	179,901.90			27,664.64	49,637.98	77,302.62	102,599.28	0.570307	
NC 14 E&T	39,441.56	20,209.84	19,231.72			39,441.56			0.065635
NC 15 E&T	77,082.07		60,632.40	16,449.67		77,082.07			
NC 16 E&T	75,862.48			73,589.90	2,272.58	75,862.48			
NC 17 E&T	78,357.40				46,870.02	46,870.02	31,487.38		
TOTAL NC E&T	270,743.51	20,209.84	79,864.12	90,039.57	49,142.60	239,256.13	31,487.38	0.1163	
NC 14 R&D	7,837.75	3,962.48	3,875.27			7,837.75			
NC 15 R&D	23,276.46		4,085.44	12,191.02	7,000.00	23,276.46			
NC 16 R&D	18,079.15			18,079.15		18,079.15			
NC 17 R&D	17,982.46				17,982.46	17,982.46			
TOTAL NC R&D	67,175.82	3,962.48	7,960.71	30,270.17	24,982.46	67,175.82		0	
NC 14 EE	21,300.97	21,920.00	(619.03)			21,300.97			
NC 15 EE	40,124.88		39,020.00	104.88	1,000.00	40,124.88			
NC 16 EE	39,857.37			39,857.37		39,857.37			
NC 17 EE	39,742.21				39,742.21	39,742.21			
TOTAL NC EE	141,025.43	21,920.00	38,400.97	39,962.25	40,742.21	141,025.43		0	
NC 14 REBATE	28,664.66		28,664.66			28,664.66			
NC 15 REBATE	55,625.37			60,625.37	(5,000.00)	55,625.37			
NC 16 REBATE	62,945.57			30,183.67	32,761.90	62,945.57			
NC 17 REBATE	58,562.69				28,466.65	28,466.65	30,096.04		
TOTAL NC REBATE	205,798.29		28,664.66	90,809.04	56,228.55	175,702.25	30,096.04	0.14624	
NH 14 E&T	60,173.75		60,173.75			60,173.75			0.803789
NH 15 E&T	117,599.73		102,721.25	14,878.48		117,599.73			
NH 16 E&T	105,519.06			81,373.06	20,545.46	101,918.52	3,600.54		
NH 17 E&T	109,749.03						109,749.03		
TOTAL NH E&T	393,041.57		162,895.00	96,251.54	20,545.46	279,692.00	113,349.57	0.288391	
NH 14 R&D	11,957.60						11,957.60		
NH 15 R&D	35,511.58						35,511.58		
NH 16 R&D	25,146.75						25,146.75		
NH 17 R&D	25,186.62						25,186.62		
TOTAL NH R&D	97,802.55						97,802.55	1	
NH 14 EE	32,497.68				15,000.00	15,000.00	17,497.68		

NH 15 EE	61,216.24						61,216.24		
NH 16 EE	55,438.63						55,438.63		
NH 17 EE	55,663.78						55,663.78		
TOTAL NH EE	204,816.33				15,000.00	15,000.00	189,816.33	0.926764	
NH 14 REBATE	43,732.04						43,732.04		
NH 15 REBATE	84,864.47						84,864.47		
NH 16 REBATE	87,552.60						87,552.60		
NH 17 REBATE	82,024.14						82,024.14		
TOTAL NH REBATE	298,173.25						298,173.25	1	
NJ 14 E&T	106,379.25	76,697.13	29,682.12			106,379.25			0.256245
NJ 15 E&T	207,900.82		180,244.43	27,656.39		207,900.82			
NJ 16 E&T	183,364.89			183,364.89		183,364.89			
NJ 17 E&T	141,870.69			10,819.12	24,464.31	35,283.43	106,587.26		
TOTAL NJ E&T	639,515.65	76,697.13	209,926.55	221,840.40	24,464.31	532,928.39	106,587.26	0.166669	
NJ 14 R&D	21,139.47		21,139.47			21,139.47			
NJ 15 R&D	62,779.79			25,000.00	37,779.79	62,779.79			
NJ 16 R&D	43,698.55			29,885.41	13,620.21	43,505.62	192.93		
NJ 17 R&D	32,558.31						32,558.31		
TOTAL NJ R&D	160,176.12		21,139.47	54,885.41	51,400.00	127,424.88	32,751.24	0.20447	
NJ 14 EE	57,451.61		57,451.61			57,451.61			
NJ 15 EE	108,222.25		85,832.49	22,389.76	(300.00)	107,922.25	300.00		
NJ 16 EE	96,338.03			25,418.91	70,919.12	96,338.03			
NJ 17 EE	71,955.62						71,955.62		
TOTAL NJ EE	333,967.51		143,284.10	47,808.67	70,619.12	261,711.89	72,255.62	0.216355	
NJ 14 REBATE	77,312.48		77,312.48			77,312.48			
NJ 15 REBATE	150,029.18			144,129.18	5,900.00	150,029.18			
NJ 16 REBATE	152,143.82				45,769.13	45,769.13	106,374.69		
NJ 17 REBATE	106,031.20						106,031.20		
TOTAL NJ REBATE	485,516.68		77,312.48	144,129.18	51,669.13	273,110.79	212,405.89	0.437484	
NV 14 E&T	598.47						598.47		1
NV 15 E&T	1,169.61						1,169.61		
NV 16 E&T	418.70						418.70		
NV 17 E&T	973.38						973.38		
TOTAL NV E&T	3,160.16						3,160.16	1	
NV 14 R&D	118.93						118.93		
NV 15 R&D	353.19						353.19		
NV 16 R&D	99.78						99.78		
NV 17 R&D	223.38						223.38		
TOTAL NV R&D	795.28						795.28	1	
NV 14 EE	323.21						323.21		
NV 15 EE	608.84						608.84		
NV 16 EE	219.98						219.98		
NV 17 EE	493.69						493.69		
TOTAL NV EE	1,645.72						1,645.72	1	
NV 14 REBATE	434.95						434.95		
NV 15 REBATE	844.04						844.04		
NV 16 REBATE	347.41						347.41		
NV 17 REBATE	727.49						727.49		
TOTAL NV REBATE	2,353.89						2,353.89	1	
									0
NYOHA 14 E&T	82,431.97	22,767.05	59,664.92			82,431.97			0.330676
NYOHA 15 E&T	146,546.55		63,985.22	82,561.33		146,546.55			
NYOHA 16 E&T	138,579.36			138,494.20	(361.68)	138,132.52	446.84		
NYOHA 17 E&T	142,948.71			31,311.39	87,119.03	118,430.42	24,518.29		
TOTAL NYOHA E&T	510,506.59	22,767.05	123,650.14	252,366.92	86,757.35	485,541.46	24,965.13	0.048903	
NYOHA 14 R&D	16,380.71		6,390.96	9,365.17	624.58	16,380.71			
NYOHA 15 R&D	49,167.90			14,989.94	34,177.96	49,167.90			
NYOHA 16 R&D	36,693.42				36,693.42	36,693.42			
NYOHA 17 R&D	32,805.71						32,805.71		
TOTAL NYOHA R&D	135,047.74		6,390.96	24,355.11	71,495.96	102,242.03	32,805.71	0.242919	

NYOHA 14 EE	49,016.65	13,357.50	31,161.05		4,498.10	49,016.65			
NYOHA 15 EE	84,757.55			35,194.43	5,200.62	40,395.05	44,362.50		
NYOHA 16 EE	80,894.49				42,596.67	42,596.67	38,297.82		
NYOHA 17 EE	72,502.39				14,330.00	14,330.00	58,172.39		
TOTAL NYOHA EE	287,171.08	13,357.50	31,161.05	35,194.43	66,625.39	146,338.37	140,832.71	0.490414	
NYOHA 14 REBATE	64,037.64		25,301.38	34,607.11	4,129.15	64,037.64			
NYOHA 15 REBATE	117,499.92			50,707.18	66,792.74	117,499.92			
NYOHA 16 REBATE	127,754.28				9,686.34	9,686.34	118,067.94		
NYOHA 17 REBATE	106,836.89						106,836.89		
TOTAL NYOHA REBA	416,128.73		25,301.38	85,314.29	80,608.23	191,223.90	224,904.83	0.540469	
UNYEA 14 E&T	58,846.62	(26,154.05)	85,000.67			58,846.62			0.583383
UNYEA 15 E&T	114,600.41		76,428.89	38,171.52		114,600.41			
UNYEA 16 E&T	108,791.27			101,491.84	7,299.43	108,791.27			
UNYEA 17 E&T	112,221.42				93,332.36	93,332.36	18,889.06		
TOTAL UNYEA E&T	394,459.72	(26,154.05)	161,429.56	139,663.36	100,631.79	375,570.66	18,889.06	0.047886	
UNYEA 14 R&D	11,693.88	(5,197.28)	5,197.28	11,693.88		11,693.88			
UNYEA 15 R&D	38,464.58			10,198.76	1,213.39	11,412.15	27,052.43		
UNYEA 16 R&D	28,806.05						28,806.05		
UNYEA 17 R&D	25,754.01						25,754.01		
TOTAL UNYEA R&D	104,718.52	(5,197.28)	5,197.28	21,892.64	1,213.39	23,106.03	81,612.49	0.779351	
UNYEA 14 EE	35,312.17	(14,124.87)	14,124.87	31,780.95	3,531.22	35,312.17			
UNYEA 15 EE	66,306.75			5,750.00	23,074.14	28,824.14	37,482.61		
UNYEA 16 EE	63,505.95				13,769.60	13,769.60	49,736.35		
UNYEA 17 EE	56,917.76						56,917.76		
TOTAL UNYEA EE	222,042.63	(14,124.87)	14,124.87	37,530.95	40,374.96	77,905.91	144,136.72	0.64914	
UNYEA 14 REBATE	46,009.10			42,767.53	3,241.57	46,009.10			
UNYEA 15 REBATE	91,921.46						91,921.46		
UNYEA 16 REBATE	100,293.08						100,293.08		
UNYEA 17 REBATE	83,871.96						83,871.96		
TOTAL UNYEA REBA	322,095.60			42,767.53	3,241.57	46,009.10	276,086.50	0.857157	
HVOHC 14 E&T	27,088.13		27,088.13			27,088.13			0.510542
HVOHC 15 E&T	67,441.84		34,167.61	33,274.23		67,441.84			
HVOHC 16 E&T	63,893.28			39,119.76	24,773.52	63,893.28			
HVOHC 17 E&T	65,907.82				41,702.44	41,702.44	24,205.38		
TOTAL HVOHC E&T	224,331.07		61,255.74	72,393.99	66,475.96	200,125.69	24,205.38	0.1079	
HVOHC 14 R&D	5,382.90			3,261.50		3,261.50	2,121.40		
HVOHC 15 R&D	22,631.62						22,631.62		
HVOHC 16 R&D	16,917.84						16,917.84		
HVOHC 17 R&D	15,125.38						15,125.38		
TOTAL HVOHC R&D	60,057.74			3,261.50		3,261.50	56,796.24	0.945694	
HVOHC 14 EE	16,703.21		14,192.35	436.97	2,073.89	16,703.21			
HVOHC 15 EE	39,013.29			35,106.68	3,906.61	39,013.29			
HVOHC 16 EE	37,297.14				37,297.14	37,297.14			
HVOHC 17 EE	33,427.89						33,427.89		
TOTAL HVOHC EE	126,441.53		14,192.35	35,543.65	43,277.64	93,013.64	33,427.89	0.264374	
HVOHC 14 REBATE	21,590.42		1,593.05	18,093.59	1,903.78	21,590.42			
HVOHC 15 REBATE	54,084.37			22,408.76	2,471.01	24,879.77	29,204.60		
HVOHC 16 REBATE	58,902.29				4,231.57	4,231.57	54,670.72		
HVOHC 17 REBATE	49,258.13						49,258.13		
TOTAL HVOHC REBA	183,835.21		1,593.05	40,502.35	8,606.36	50,701.76	133,133.45	0.7242	
OHILI 14 E&T	65,151.61	36,719.05	29,810.79	(1,378.23)		65,151.61			0.110619
OHILI 15 E&T	127,784.53		118,379.75	9,404.78		127,784.53			
OHILI 16 E&T	120,447.48			120,442.29	5.19	120,447.48			
OHILI 17 E&T	124,245.14			8,014.38	93,317.90	101,332.28	22,912.86		
TOTAL OHILI E&T	437,628.76	36,719.05	148,190.54	136,483.22	93,323.09	414,715.90	22,912.86	0.052357	
OHILI 14 R&D	12,946.80	7,714.78	5,232.02			12,946.80			
OHILI 15 R&D	42,859.22		8,137.30	27,449.78	7,272.14	42,859.22			
OHILI 16 R&D	31,892.41			28,703.17	3,189.24	31,892.41			
OHILI 17 R&D	28,513.38			11,514.57	14,147.47	25,662.04	2,851.34		
TOTAL OHILI R&D	116,211.81	7,714.78	13,369.32	67,667.52	24,608.85	113,360.47	2,851.34	0.024536	

OHILI 14 EE	39,095.61	30,427.37	4,758.68		3,909.56	39,095.61			
OHILI 15 EE	73,882.40		12,135.27	54,382.65	7,364.48	73,882.40			
OHILI 16 EE	70,310.15			63,279.14	6,605.50	69,884.64	425.51		
OHILI 17 EE	63,016.09			23,406.25	13,315.00	36,721.25	26,294.84		
TOTAL OHILI EE	246,304.25	30,427.37	16,893.95	141,068.04	31,194.54	219,583.90	26,720.35	0.108485	
OHILI 14 REBATE	50,938.66		47,349.77		3,588.89	50,938.66			
OHILI 15 REBATE	102,423.64			92,214.21	10,209.43	102,423.64			
OHILI 16 REBATE	111,038.77			99,934.89	7,380.76	107,315.65	3,723.12		
OHILI 17 REBATE	92,858.23				4,730.03	4,730.03	88,128.20		
TOTAL OHILI REBATE	357,259.30		47,349.77	192,149.10	25,909.11	265,407.98	91,851.32	0.2571	
ESPA 14 E&T	25,946.48		25,946.48			25,946.48			
ESPA 15 E&T	50,708.15		45,906.39	4,801.76		50,708.15			
ESPA 16 E&T	47,947.28		469.86	43,697.42	3,780.00	47,947.28			
TOTAL ESPA E&T	124,601.91		72,322.73	48,499.18	3,780.00	124,601.91		0	
ESPA 14 R&D	5,156.03			5,156.03		5,156.03			
TOTAL ESPA R&D	5,156.03			5,156.03		5,156.03			
ESPA 14 REBATE	5,993.55			5,993.55		5,993.55		0	
TOTAL ESPA REBATE	5,993.55			5,993.55		5,993.55		0	
OH 14 E&T	35,311.81		35,311.81			35,311.81			0.741433
OH 15 E&T	69,011.16		31,033.56	37,977.60		69,011.16			
OH 16 E&T	73,734.81			18,265.62	28,615.60	46,881.22	26,853.59		
OH 17 E&T	60,836.49						60,836.49		
TOTAL OH E&T	238,894.27		66,345.37	56,243.22	28,615.60	151,204.19	87,690.08	0.367066	
OH 14 R&D	7,017.09		7,017.09			7,017.09			
OH 15 R&D	20,754.20			570.00		570.00	20,184.20		
OH 16 R&D	17,572.09						17,572.09		
OH 17 R&D	13,961.54						13,961.54		
TOTAL OH R&D	59,304.92		7,017.09	570.00		7,587.09	51,717.83	0.872066	
OH 14 EE	19,070.64			19,070.64		19,070.64			
OH 15 EE	35,923.58						35,923.58		
OH 16 EE	38,739.51						38,739.51		
OH 17 EE	30,855.76						30,855.76		
TOTAL OH EE	124,589.49			19,070.64		19,070.64	105,518.85	0.846932	
OH 14 REBATE	25,663.31		8,416.47	2,079.36	11,418.40	21,914.23	3,749.08		
OH 15 REBATE	49,801.09						49,801.09		
OH 16 REBATE	61,180.17						61,180.17		
OH 17 REBATE	45,467.93						45,467.93		
TOTAL OH REBATE	182,112.50		8,416.47	2,079.36	11,418.40	21,914.23	160,198.27	0.879667	
PA 14 E&T	168,801.05		168,801.05			168,801.05			0.698572
PA 15 E&T	329,894.00		8,996.53	302,777.13	18,120.34	329,894.00			
PA 16 E&T	341,369.79				147,337.00	147,337.00	194,032.79		
PA 17 E&T	341,657.73						341,657.73		
TOTAL PA E&T	1,181,722.57		177,797.58	302,777.13	165,457.34	646,032.05	535,690.52	0.453313	
PA 14 R&D	33,543.41			21,864.92	11,678.49	33,543.41			
PA 15 R&D	99,211.29				14,338.53	14,338.53	84,872.76		
PA 16 R&D	81,353.45						81,353.45		
PA 17 R&D	78,408.01						78,408.01		
TOTAL PA R&D	292,516.16			21,864.92	26,017.02	47,881.94	244,634.22	0.83631	
PA 14 EE	91,162.35			87,943.79	3,218.56	91,162.35			
PA 15 EE	171,725.49				129,765.47	129,765.47	41,960.02		
PA 16 EE	179,352.19						179,352.19		
PA 17 EE	173,285.92						173,285.92		
TOTAL PA EE	615,525.95			87,943.79	132,984.03	220,927.82	394,598.13	0.641075	
PA 14 REBATE	122,676.94			75,110.06	47,566.88	122,676.94			
PA 15 REBATE	238,064.14						238,064.14		
PA 16 REBATE	283,245.63						283,245.63		

PA 17 REBATE	255,347.87						255,347.87		
TOTAL PA REBATE	899,334.58			75,110.06	47,566.88	122,676.94	776,657.64	0.863591	
RI 14 E&T	38,991.77	31,620.00	7,371.77			38,991.77			0.324935
RI 15 E&T	76,203.03		71,436.78	4,766.25		76,203.03			
RI 16 E&T	64,057.01			45,493.75	18,139.47	63,633.22	423.79		
RI 17 E&T	66,433.45						66,433.45		
TOTAL RI E&T	245,685.26	31,620.00	78,808.55	50,260.00	18,139.47	178,828.02	66,857.24	0.272126	
RI 14 R&D	7,748.36		7,748.36			7,748.36			
RI 15 R&D	22,917.06		42,016.54		(19,099.48)	22,917.06			
RI 16 R&D	15,265.73			2,164.81	12,850.92	15,015.73	250.00		
RI 17 R&D	15,246.00						15,246.00		
TOTAL RI R&D	61,177.15		49,764.90	2,164.81	(6,248.56)	45,681.15	15,496.00	0.253297	
RI 14 EE	21,058.06		21,058.06			21,058.06			
RI 15 EE	39,667.29		13,415.88	26,251.41		39,667.29			
RI 16 EE	33,654.90			5,417.50	26,502.22	31,919.72	1,735.18		
RI 17 EE	33,694.48						33,694.48		
TOTAL RI EE	128,074.73		34,473.94	31,668.91	26,502.22	92,645.07	35,429.66	0.276633	
RI 14 REBATE	28,337.77		28,337.77			28,337.77			
RI 15 REBATE	54,991.02			24,450.54	30,540.48	54,991.02			
RI 16 REBATE	53,150.19			135.19	10,032.33	10,167.52	42,982.67		
RI 17 REBATE	49,650.97						49,650.97		
TOTAL RI REBATE	186,129.95		28,337.77	24,585.73	40,572.81	93,496.31	92,633.64	0.497683	
SC 14 E&T	6,063.62				1,363.65	1,363.65	4,699.97		0.995595
SC 15 E&T	11,850.35						11,850.35		
SC 16 E&T	29,548.64						29,548.64		
SC 17 E&T	29,931.55						29,931.55		
TOTAL SC E&T	77,394.16				1,363.65	1,363.65	76,030.51	0.98238	
SC 14 R&D	1,204.95						1,204.95		
SC 15 R&D	3,563.84						3,563.84		
SC 16 R&D	7,041.88						7,041.88		
SC 17 R&D	6,869.08						6,869.08		
TOTAL SC R&D	18,679.75						18,679.75	1	
SC 14 EE	3,274.74						3,274.74		
SC 15 EE	6,168.67						6,168.67		
SC 16 EE	15,524.55						15,524.55		
SC 17 EE	15,181.03						15,181.03		
TOTAL SC EE	40,148.99						40,148.99	1	
SC 14 REBATE	4,406.81						4,406.81		
SC 15 REBATE	8,551.67						8,551.67		
SC 16 REBATE	24,517.47						24,517.47		
SC 17 REBATE	22,370.25						22,370.25		
TOTAL SC REBATE	59,846.20						59,846.20	1	
VA 14 E&T	35,296.90		20,378.87	14,918.03		35,296.90			0.537186
VA 15 E&T	68,982.01			43,441.21	20,016.97	63,458.18	5,523.83		
VA 16 E&T	83,982.86						83,982.86		
VA 17 E&T	78,357.40						78,357.40		
TOTAL VA E&T	266,619.17		20,378.87	58,359.24	20,016.97	98,755.08	167,864.09	0.629602	
VA 14 R&D	7,014.13			7,014.13		7,014.13			
VA 15 R&D	59,105.43			50,223.32	8,882.11	59,105.43			
VA 16 R&D	20,014.35				5,804.00	5,804.00	14,210.35		
VA 17 R&D	17,982.46						17,982.46		
TOTAL VA R&D	104,116.37			57,237.45	14,686.11	71,923.56	32,192.81	0.3092	
VA 14 EE	19,062.59		13,860.76	5,201.83		19,062.59			
VA 15 EE	35,908.41			35,908.41		35,908.41			
VA 16 EE	44,123.73				3,300.00	3,300.00	40,823.73		
VA 17 EE	39,742.21						39,742.21		
TOTAL VA EE	138,836.94		13,860.76	41,110.24	3,300.00	58,271.00	80,565.94	0.580292	
VA 14 REBATE	25,652.48		2,000.00	23,652.48		25,652.48			
VA 15 REBATE	49,780.06			9,191.59	40,588.47	49,780.06			

VA 16 REBATE	69,683.31						69,683.31		
VA 17 REBATE	58,562.69						58,562.69		
TOTAL VA REBATE	203,678.54		2,000.00	32,844.07	40,588.47	75,432.54	128,246.00	0.629649	
VT 14 E&T	24,615.68		24,615.68			24,615.68			0.697386
VT 15 E&T	48,107.32		10,414.83	37,692.49		48,107.32			
VT 16 E&T	57,747.34			8,744.07	47,193.57	55,937.64	1,809.70		
VT 17 E&T	59,376.41						59,376.41		
TOTAL VT E&T	189,846.75		35,030.51	46,436.56	47,193.57	128,660.64	61,186.11	0.322292	
VT 14 R&D	4,891.58		4,891.58			4,891.58			
VT 15 R&D	14,467.64			2,221.50	4,950.00	7,171.50	7,296.14		
VT 16 R&D	13,762.04						13,762.04		
VT 17 R&D	13,626.46						13,626.46		
TOTAL VT R&D	46,747.72		4,891.58	2,221.50	4,950.00	12,063.08	34,684.64	0.741954	
VT 14 EE	13,294.05	3,319.42	8,795.22	1,179.41		13,294.05			
VT 15 EE	25,042.14			1,646.66		1,646.66	23,395.48		
VT 16 EE	30,339.86						30,339.86		
VT 17 EE	30,115.22						30,115.22		
TOTAL VT EE	98,791.27	3,319.42	8,795.22	2,826.07		14,940.71	83,850.56	0.848765	
VT 14 REBATE	17,889.76		9,735.67	8,154.09		17,889.76			
VT 15 REBATE	34,716.08						34,716.08		
VT 16 REBATE	47,914.85						47,914.85		
VT 17 REBATE	44,376.69						44,376.69		
TOTAL VT REBATE	144,897.38		9,735.67	8,154.09		17,889.76	127,007.62	0.876535	
WA 14 E&T	7,612.55		7,612.55			7,612.55			0.617308
WA 15 E&T	14,877.47		14,877.47			14,877.47			
WA 16 E&T	6,621.65		137.86	6,483.79		6,621.65			
WA 17 E&T	18,980.98				17,000.00	17,000.00	1,980.98		
TOTAL WA E&T	48,092.65		22,627.88	6,483.79	17,000.00	46,111.67	1,980.98	0.041191	
WA 14 R&D	1,512.75			1,512.75		1,512.75			
WA 15 R&D	4,474.20			3,470.94		3,470.94	1,003.26		
WA 16 R&D	1,578.04						1,578.04		
WA 17 R&D	4,356.00						4,356.00		
TOTAL WA R&D	11,920.99			4,983.69		4,983.69	6,937.30	0.58194	
WA 14 EE	4,111.26						4,111.26		
WA 15 EE	7,744.43						7,744.43		
WA 16 EE	3,478.94						3,478.94		
WA 17 EE	9,627.00						9,627.00		
TOTAL WA EE	24,961.63						24,961.63	1	
WA 14 REBATE	5,532.52			5,532.52		5,532.52			
WA 15 REBATE	10,736.15						10,736.15		
WA 16 REBATE	5,494.20						5,494.20		
WA 17 REBATE	14,185.99						14,185.99		
TOTAL WA REBATE	35,948.86			5,532.52		5,532.52	30,416.34	0.8461	
WI 14 E&T	23,325.39		3,350.00	19,975.39		23,325.39			0.832347
WI 15 E&T	45,585.65			45,585.65		45,585.65			
WI 16 E&T	64,076.10			619.96	39,020.66	39,640.62	24,435.48		
WI 17 E&T	43,072.23						43,072.23		
TOTAL WI E&T	176,059.37		3,350.00	66,181.00	39,020.66	108,551.66	67,507.71	0.383437	
WI 14 R&D	4,635.17						4,635.17		
WI 15 R&D	13,709.28						13,709.28		
WI 16 R&D	15,270.28						15,270.28		
WI 17 R&D	9,884.77						9,884.77		
TOTAL WI R&D	43,499.50						43,499.50	1	
WI 14 EE	12,597.20				4,963.62	4,963.62	7,633.58		
WI 15 EE	23,729.49						23,729.49		
WI 16 EE	33,664.93						33,664.93		
WI 17 EE	21,845.87						21,845.87		
TOTAL WI EE	91,837.49				4,963.62	4,963.62	86,873.87	0.945952	
WI 14 REBATE	16,952.02						16,952.02		

WI 15 REBATE	32,896.35					32,896.35	
WI 16 REBATE	53,166.03					53,166.03	
WI 17 REBATE	32,191.29					32,191.29	
TOTAL WI REBATE	135,205.69					135,205.69	1

Report on NORA Internal R&D
NORA Board of Directors
September 18, 2017

T. Butcher

NORA Lab Status

Two interns since March, 2017 have graduated

Brian Gainey – Mechanical Engineer, Stony Brook University

Mike McCutcheon – Chemical Engineer, Stony Brook University

New interns have joined us:

Neehad Islam – Mechanical Engineer, Stony Brook University

Ryan Kerr – Chemical Engineer, Stony Brook University

Current Projects Overview

- Tankless Coil Best Practices (NORA/NYSERDA)
- Oil Hydronic / Heat Pump Integration (NORA/NYSERDA)
- Fuel Quality Field Evaluation
- Impact of Biodiesel on Cad Cell Response
- Evaluation of EL / Petroleum oil blends

More detailed presentations at NORA Technical Workshop!

Project Overview – Tankless Coils

- Background – Tankless coils represent ~ 50% of the new boilers sold currently. They represent an economical oil-heat option.
- Goal – Evaluate output performance and efficiency of selected systems and develop a Best-Practices Guide.
- Completed to Date

  Units to be studied selected and approved;
  Studies with cast iron boiler and different coils completed
  Studies with steel boiler completed;
  Studies with external plate exchanger ("Combi") started

Project Overview – Tankless Coils

- Key Findings
  - Rated output capacity not reached
  - Idle losses high due to high jacket temperatures
  - Summer DHW delivery efficiency low (34-41%)
  - External plate (Combi) system shows improved performance

Draw	Gallons	gpm	Time
1	15	1.7	0:00
2	2	1.0	0:30
3	9	1.7	1:40
4	9	1.7	10:30
5	5	1.7	11:30
6	1	1.0	12:00
7	1	1.0	12:45
8	1	1.0	12:50
9	1	1.0	16:00
10	2	1.0	16:15
11	2	1.7	16:45
12	7	1.7	17:00

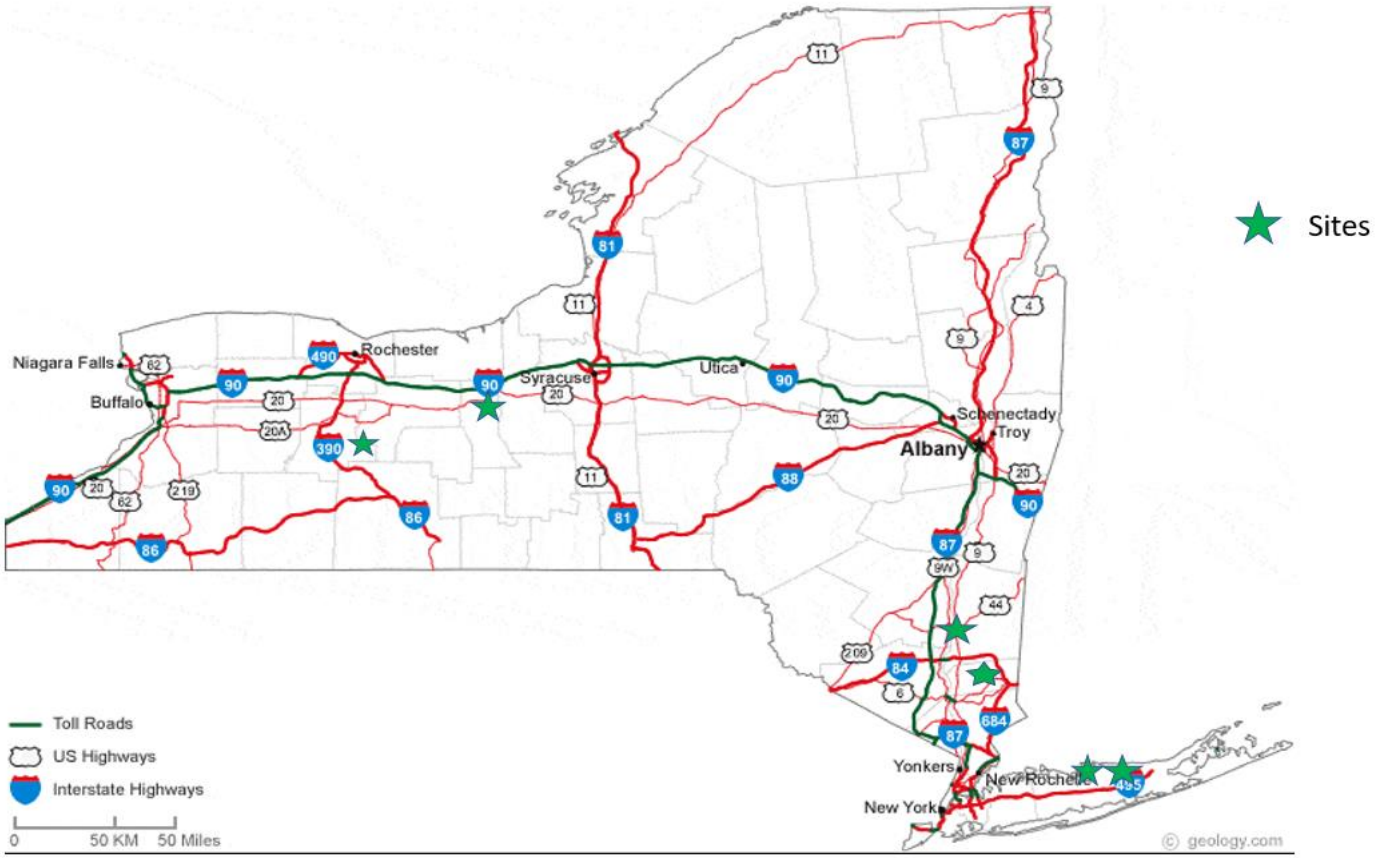
Project Overview – Tankless Coils

- Planned Work
  - Completion of Combi studies
  - Tests with another cast iron boiler
  - Analysis and preparation of best practices report
  - Potential presentation at ACEEE Water Heater Forum

Project Overview – Heat Pump Integration

- Background – There is interest in the use of new, cold climate mini-split heat pumps for cooling and supplemental heat.
- Goal – Develop best practices guide for the efficient integration of this technology with oil-fired hydronic systems
- Completed to Date
  - Field testing plan developed;
  - Six sites identified and approved;
  - Logging instrumentation installed at one site.

Project Overview – Heat Pump Integration



Project Overview – Heat Pump Integration

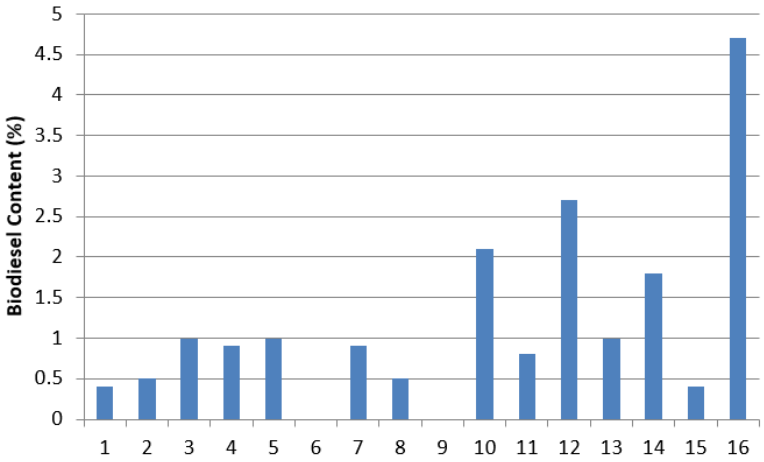
- <u>Planned Work</u>
  - Complete installation of monitoring equipment at all sites;
  - Review performance after fall/winter/spring seasons;
  - Annual performance model/evaluation;
  - Best practices guide.

Project Overview – Field Evaluation of Fuel Quality

- Background – Over the past decade heating oil has changed – this includes ULS and increased use of biodiesel.
- Goal – Evaluate impact of fuel changes on fuel quality in the field. Planned 20 homes at B20 (nominal) and 20 at B0 with different sulfur levels.
- Completed to Date
  - Field sampling and analysis protocol developed and reviewed;
  - Sampling at field sites completed;
  - Planned analyses completed – some at NORA lab and some at commercial lab;
  - Additional in-lab studies of selected findings completed;
  - Followup field sampling and analysis at selected sites completed.

Project Overview – Field Evaluation of Fuel Quality

- Key Findings
  - Measured biodiesel content can vary from nominal values;
  - Generally fuel quality good;
  - Interference between copper exposure in fuel lines and measured oxidative reserve (Rancimat);
  - At some sites high filterable particulates found.



Project Overview – Field Evaluation of Fuel Quality

- Planned Work
  - Long term storage stability evaluation studies underway for comparison with Rancimat;
  - Additional field sampling and analysis to better understand the impact of summer idle periods;
  - Field evaluation of ultrafiltration in progress;
  - Impact of metal deactivators in progress.

Project Overview – Impact of Biodiesel on Cad Cell Response

- Background – At higher biodiesel blend levels the light intensity at the cad cell is reduced. Prior studies have indicated the biodiesel source can affect this and there could be concerns even at B20.
- Goal – Evaluate response of one typical burner at different blend levels and excess air with a soy and tallow-sourced biodiesel
- Completed to Date

  Testing completed

  Report completed and released.

Project Overview – Impact of Biodiesel on Cad Cell Response

- Key Findings
  - Effect most important at very high excess air levels.

Fuel	Average cad cell resistance at 11% CO_2
B0	145
B20 Soy	167
B20 Tallow	163
B100 Soy	391
B100 Tallow	843

- Planned Work
  - Review with Bioheat Technical Steering Committee.

Project Overview – Ethyl Levulinate (EL) Field Evaluation

- Background – EL is a biofuel produced from wood waste which offers the potential to displace petroleum-sourced heating oil. Biofine is developing a pilot plant for this fuel in Maine.
- Goal – Evaluate the field performance of a 10% blend to obtain initial experience with this fuel.
- Completed to Date
  - Plan developed for 20 service technician homes organized by Dead River Company;
  - Combustion testing completed at NORA lab for basic performance;
  - Elastomer swell testing completed;
  - Cycling pump tests started at NORA lab;
  - Low temperature storage testing in progress at NORA lab.

Project Overview – Ethyl Levulinate (EL) Field Evaluation

- Key Findings
  - Combustion performance same as #2 petroleum oil;
  - Seal swelling can occur at higher blend levels;
  - Pump performance acceptable in tests to date;
  - Separation of 10% blends at 15 F not observed but can occur at high blend levels. A cosolvent planned to ensure separation is avoided.

Project Overview – Ethyl Levulinate (EL) Field Evaluation

- Planned Work
  - Fuel for test being produced both in Maine and in a plant in Europe;
  - Dead River Company has arranged a dedicated storage tank and logistics plan;
  - Participant briefing and tank sampling planned;
  - Fuel deliveries to start in November.


BOARD OF DIRECTORS MEETING
SEPTEMBER 18, 2017
National Oilheat Research Alliance

Energy Kinetics (2015 PON)

Proposal Title:	Advanced Combustion Chamber	**Duration (months)**	18
Primary Contact:	Roger Marran		
	Project Cost	**Project Status**	
NORA Cost:	**$50,000**	This project began in April of 2016. EK began work on the project in the fall of 2016. EK has developed and laboratory tested an 18SR stainless steel cylindrical combustion chamber design and will field test one unit the week of 1/16/2017. This new chamber is now commercialized and is incorporated in EK's new tankless boiler product. (see Tankless Boiler Project for details)	
Cost Share:	**$129,800**		
Total Cost:	**$179,800**		

Brief Project Description

Energy Kinetics intends to develop a comparably effective combustion chamber or burning environment from a very durable high temperature material. This project will endeavor to successfully apply .75, .85, and 1 GPH firing rates in alloy combustion chambers, replacing a more conventional refractory design. The initial focus is for a 1 GPH firing rate to establish the minimum area successful for all (3) firing rates listed.

Energy Kinetics (2016 PON)

Proposal Title:	High Efficiency Tankless Coil/Oilheat	**Duration (months)**	18
Primary Contact:	Roger Marran		
	Project Cost	**Project Status**	
NORA Cost:	**$310,818**	This project began in December of 2016. EK has developed and laboratory tested 5 prototype combi designs and will field test one unit the week of 1/16/2017 to examine control strategy between maintaining temperature to on-off strategies for instantaneous hot water. This product has been developed and is on exhibit at this Eastern Energy Expo.	
Cost Share:	**$496,342**		
Total Cost:	**$807,160**		

Brief Project Description

Energy Kinetics intends to leverage the technology of its existing high efficiency boilers to produce a low cost boiler capable of providing “instant” hot water for new construction and to replace existing tankless coil boilers with improved efficiency and lower idle loss. Significant decreases in idle loss will be achieved through better insulation and through operating the boiler at significantly lower idle temperatures than employed by existing tankless coil designs.

The Ascent™ Combi High Efficiency Combi Boiler

No Tank Required!

- Plate Heat Exchanger (Clean in Place)
- Proven 30 Year Spiral Boiler Design
- 0.85 GPH to 1.25 GPH replaces up to 4 section boilers
- Up to nearly 4 GPM hot water at high fire (77°F Rise)
- Pre-installed Mixing Valve (CIP)
- Limit-LWCO only boiler control
- Stainless Alloy Combustion Chamber
- Swing Down Door

Simple Operating Modes (easy select)
1) Always Ready Instantaneous Hot Water
2) On Demand… hot water is ready in about 2 minutes from cold start
3) Smart Learning – no delay based on prior usage

Pre-mounted stand

Babington Burner (2015 PON)

Proposal Title:	BP100 Burner Value Engineering Testing for Pre-Commercialization	**Duration (months)**	24
Primary Contact:	Andy Babington		

	Project Cost	**Project Status**
NORA Cost:	**$319,650**	The burner development effort has achieved four key milestones. First, a 0.75 gph burner has been developed. First, milestone is the successful prove out of the operability map and plug-and-play capability of the FlexFire control on the EK 90+R boiler. Second, after an analysis was performed on the burner using computational fluid dynamics (CFO) - plus key geometry modifications made to the atomizing hardware - a technical pathway to achieving a 1.0 GPH high firing rate has been found. Third, three biodiesel burner test rigs were fabricated and installed with Airtronic burners using the same combustion components as the FlexFire. Formal baseline testing has begun with B20, B50 and B100 blends at different temperatures to analyze the combustion chamber performance.
Cost Share:	**$342,150**	
Total Cost:	**$661,800**	

Brief Project Description

Develop a B100 SmartBurner can burn both hydrocarbon and up to B100 fuels at high efficiency and automatic variable firing rates without parts change.

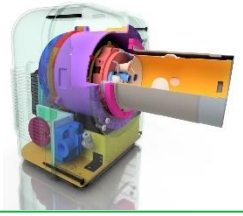
B100 Multi-Fuel Smart Burner Design—Development—Testing

Babington

2015 - 2016

✓Completed

✓ Stage 1: Value Eng & Component Eval



✓ Stage 2: Prototype Fabrication

Key Burner Attributes:

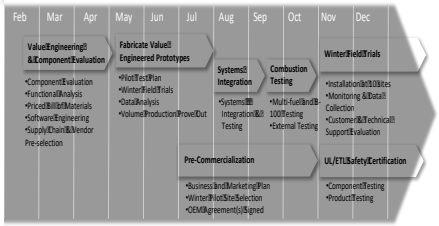
- Variable Low Firing Rate (0.2 to 0.75 GPH)
- Self-Modulation
- Plug-and-Play Compatibility
- B100 Multi-fuel Compatibility

Q2 2017 | Q3-Q4 2017 | Q4 2017 – Q1 2018

✓ Stage 3: Prototype Testing

✓ Stage 4: B100 Performance Testing

✓ Stage 5: Commercialization



Hurricane Harvey

500 National Guard Burners

NORA NATIONAL OILHEAT RESEARCH ALLIANCE

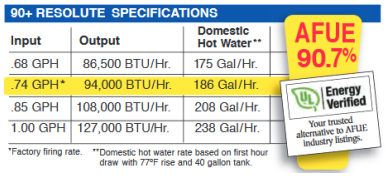
NORA-Oilheat.org

Babington Burner (2016 PON)

Proposal Title:	B50 Compatible Boiler with Automatic Modulating Control	**Duration (months)**	18
Primary Contact:	Andy Babington		
	Project Cost	**Project Status**	
NORA Cost:	**$425,687**	This project began in October of 2016. The EK R90+ is installed and detailed test firing begins the week of January 16, 2017, after modifications were made from the preliminary test fire, which took place in New Jersey. Peerless and Slant/Fin cast iron boilers will follow the EK testing, scheduled to begin after Feb 3NORA Lab testing. Building additional burners for these units. Interface plates have been made and Babington does not anticipate any installation issues with the boilers. Babington plans to field install three EK 0.74 gph 90+ resolute boilers in the field early this fall.	
Cost Share:	**$338,987**		
Total Cost:	**$764,674**		

Brief Project Description

Design, fabricate, test and deliver three self-modulating B50 Compatible Plug and Play Burner prototypes matched with EK, PB Heat and Slant Fin boilers for NORA to test and evaluate. Our design concept and approach is to integrate the existing B100 FlexFire prototype, currently being developed under PON 2014.



B50 Compatible Self-Modulating Boiler Joint Development Agreement

2016 - 2017 … In Process

Stage 1: Product Characterization & Perf Baseline

Q2 2017

Stage 2: Design & Interface

Q3-Q4 2017

Stage 3 Boiler Installation

Q4 2017 – Q1 2018

Babington/Energy Kinetics: Have Committed to Developing Three Self-Modulating Prototype Boilers for 2017-2018 Winter Field Test

Stage 4: Prototype Testing

Stage 5: Fabrication & Production Prove Out

Winter Field Trials w/ three 90+R Boilers

… Scheduled for 2017-2018 Season

NOVATIO Engineering (2015 PON)

Proposal Title:	Novel Oil-Vaporizing Technology Applied to Gas-fired Instantaneous Water Heaters	**Duration (months)**	18
Primary Contact:	Mimmo Elia		

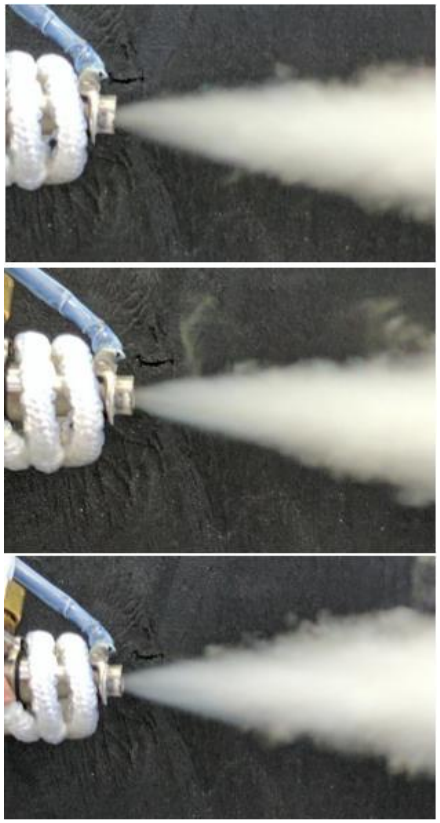
	Project Cost	**Project Status**
NORA Cost:	**$336,407**	This project began in May of 2015. After completing the first four tasks applying this novel vaporizing technology to a gas-fired instantaneous water heater, it was determined that this application was too difficult for a proof of concept. The project has been redirected in October of 2016 to run basic combustion testing on a retention head burner to demonstrate that a stable flame can be established, to determine the minimum nozzle temperature required, the potential modulation range, and the exhaust gas composition.
Cost Share:	**$84,101**	
Total Cost:	**$420,508**	

Brief Project Description

A patented Capillary Aerosol Generator (CAG) will be utilized to condition fuel oil prior to combustion. The CAG system generates a mixture of fuel vapor and extraordinarily-small fuel droplets. It incorporates a low-cost automotive flow control device to achieve continuously-variable firing rates. And, a low-pressure fuel pump can be utilized.

Performance of the retention heat burner system during startup will be evaluated. This transient performance will include time to start, CO emission transients, and smoke number during startup. Initial testing and commissioning of boiler to be performed at Novatio's facility, performance testing to be performed in Plainview with Novatio's participation. Will be completed in November 2017.

Spray angle measurements, 0.009” diameter orifice, heater set point 4.5



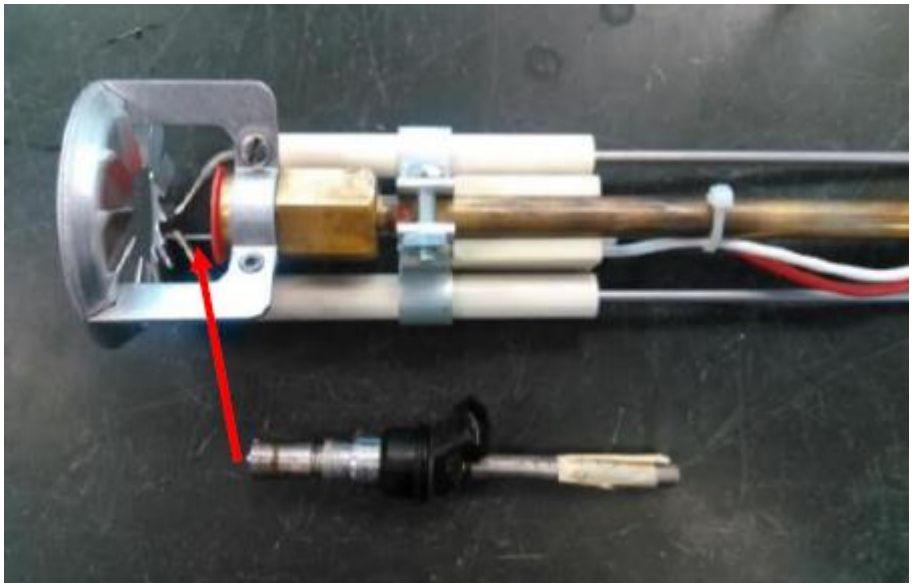
CAG set point: 4.50 V Flow Rate: 0.449 g/s, 66,000

Btu/h Average Cone Angle: 42.5 Degrees

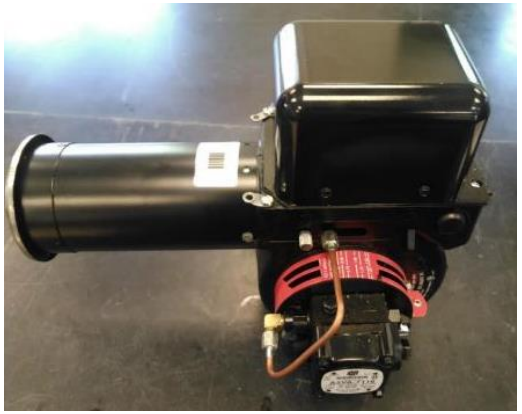
Orifice Diameter: 0.009”

(Duty Cycle: 67%)

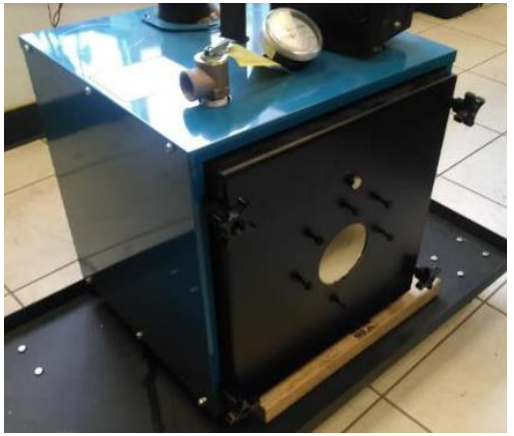
Next Steps - add CAG to EZ1



Nozzle replacement with fuel injector



Carlin EZ1



Axemann Boiler
(combustion chamber)

Undergoing basis combustion testing and optimization. Expect boiler testing to begin soon.

Stone Mountain (2016 PON)

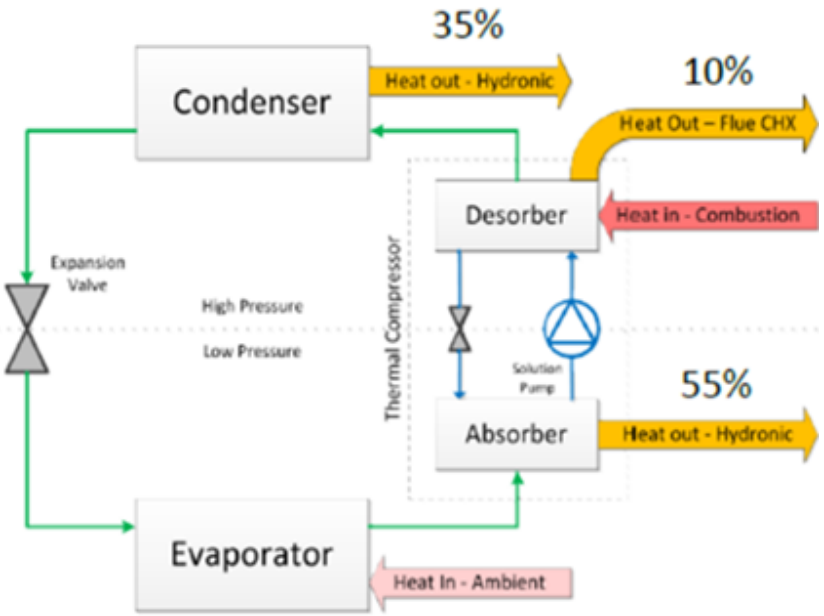
Proposal Title:	Oil Fired Absorption Heat Pump	**Duration (months)**	14
Primary Contact:	Michael Garrabrant		

	Project Cost	**Project Status**
NORA Cost:	**$280,847**	This project began in October of 2016. The fundamental nature of the research is to determine how to redesign the absorption system desorber and perhaps the burner to accommodate a modulating biodiesel capable burner. This initial burner approach was to work with Babington Technologies to examine their new biodiesel modulating burner design. Both a horizontal and vertical burner chamber design has been completed and appear feasible. Prototype will be completed by July 31, 2017.
Cost Share:	**$70,662**	
Total Cost:	**$351,509**	

Brief Project Description

Stone Mountain Technologies, Inc. (SMTI), with the support of The Department of Energy, Gas Technology Institute (GTI), and the Oak Ridge National Laboratory, is developing a natural gas-fired absorption heat pump designed to provide space and water heating COPs greater that 1.0 at low temperatures. This technology is designed to compete against cold climate electric heat pumps, condensing furnaces-boilers, and water heaters. Unlike the Robur technology, the SMTI technology can accommodate several retention head combustion designs and can be manufactured for substantially less cost. This proposal will develop an oil-fired prototype based on the Babington Modulating Oil burner technology, performance tested at SMTI using #2 heating oil and then delivered to the NORA laboratory for additional fuels testing. NORA wanted to consider a heating and cooling version recognizing the lower cooling efficiency. The modified proposal includes a parametric design study on the best option for adding cooling while delivering the heating only prototype for proof of concept for testing.

SMTI Status

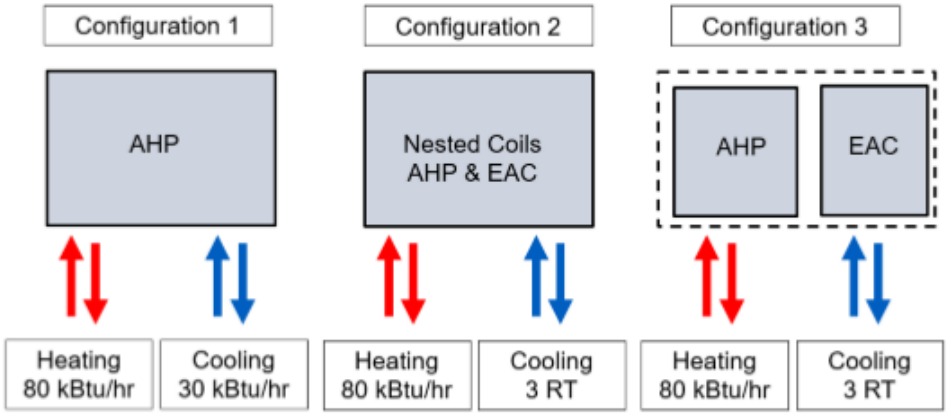


Absorption Cycle

Horizontal burner proof test with desorber

Vertical burner proof test

SMTI Status



Prototype Construction Underway

		2016		2017											2018			
		Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Task		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Cooling Feasibility Study																		
2	Heating Project Definition																		
3	Bench Testing																		
4	Prototype Construction																		
5	SMTI Testing																		
6	NORA Testing																		
7	OEM Discussions																		

NATIONAL OILHEAT RESEARCH ALLIANCE

NORAweb.org

Future Research

NORA intends to build upon is history of corroboration with industry partners through an outreach program focusing on research that will benefit products and the oilheat industry. This will involve NORA research team holding one-on-one meetings with oilheat manufacturers to define next generation product research.

MEETING #1 AGENDA – TG SCOPE and FUELS

TASK GROUP DETAILS (20-30 min Roland w TG questions/discussion)**:**
Roll Call – Brief self intro & representation. Substitutes, knowledge gaps, special guests…
Scope – Brief review of initial TG scope & deliverables. Proposed changes?
Basics – Operating rules, participation & balance, notes & reports, shared information…
Timeline – Anticipate 4-5 teleconferences approximately 4 week apart & 1 FTF mtg?
Process – Get facts, identify problems, propose solutions, open discussion, get consensus, take action.

FUEL SPECS & PRODUCTION:

ASTM Fuel Specs from D02 TC (30-40 min - Roland intro w Ted & Scott details) – Summary of recent/future grade & blend changes:
D396 Heating Fuel Spec (5-10 min):

- Grades #1 & #2 (S15-S5k) @ B0-B5.
- Grades B6-B20 (S15-S5k) @ B6-B20.
- Grades #4, #5 & #6 @ B0.

D6751 Biodiesel Spec(5-10 min):

- Changes in feedstocks, processing methods & property specs.
- Required/Optional Additives (diesel, stabilizers, anti-oxidants, anti-microbials…)
- Identification of feedstocks & additives.

Misc. ASTM Burner Fuel Specs briefings (1-2 min):

- D7666 Triglyceride Fuels.
- D6823 & D6448 Use Lube Oils.
- D7467 B6-B20 Spec change.

Discussion of potential problems & solutions related to ASTM Fuel Specs (15-20 min):

- ASTM Fuel Spec reference updates in NFPA 31 & other Codes/Regs?
- D396 clarifications to prohibit SVO, TriGly, recycled, renewables… to reduce unacceptable fuel components?
- Better identification of BX% level and type/% of additives from sources to reduce over/under blending?
- Other ASTM Fuel Spec problems & solutions?

FUELS DOWNSTREAM

Common Blending & Delivery Practices (35-45 min - Roland intro w Ted & Scott details) – Summary fuel changes downstream:
Bulk & Rack Blending & Fuel Delivery (10-15 min)

- Verification of fuel specs, BX% & additives from sources.
- Counterchecks before acceptance/after blending.
- Rack blend methods & quality controls to truck.

Fuel Delivery to Customers (10-15 min)

- Customer knowledge of B0-B5 or B6-B20 range deliveries?
- Who gets higher blends? By request or random, w/wo service contract?
- Customer feedback methods on blends, quality & other fuel issues?

Discussion of potential problems & solutions related to downstream blending & delivery (15-20 min):

- What are practical & effective ways to reduce downstream addition of unacceptable fuel components:

Increased measurements or quality controls? Traceable records? Increased training & education? New regulations?

- What are practical & effective ways to reduce downstream over/under blending of biodiesel in each grade range, and critical additives:

Increased measurements or quality controls? Traceable records? Increased training & education? New regulations?

Next Meeting Topics & Schedule

Assignments & Action Items

Also - Start thinking of ideas outside the box to resolve the most difficult issue (Remaining Time)
NFPA 31 Sec 4.5 for Acceptable Liquid Fuels says only the type & grade for which the unit is listed & approved or stipulate by the manufacturer shall be used, so how can this be practically achieved, especially for older units not rated for >B5?

? Sufficient research
? New services/New partnerships
? Customer outreach & education
? Funding sources

NFPA 31 TG on Burner Fuels & Equipment Compatibility

Scope - Develop or recommend new/revised Code, Standard and/or Specifications, training & education programs, markings or other proposed solutions to practically address various integrated problems between heating fuels and system equipment (tank to burner):

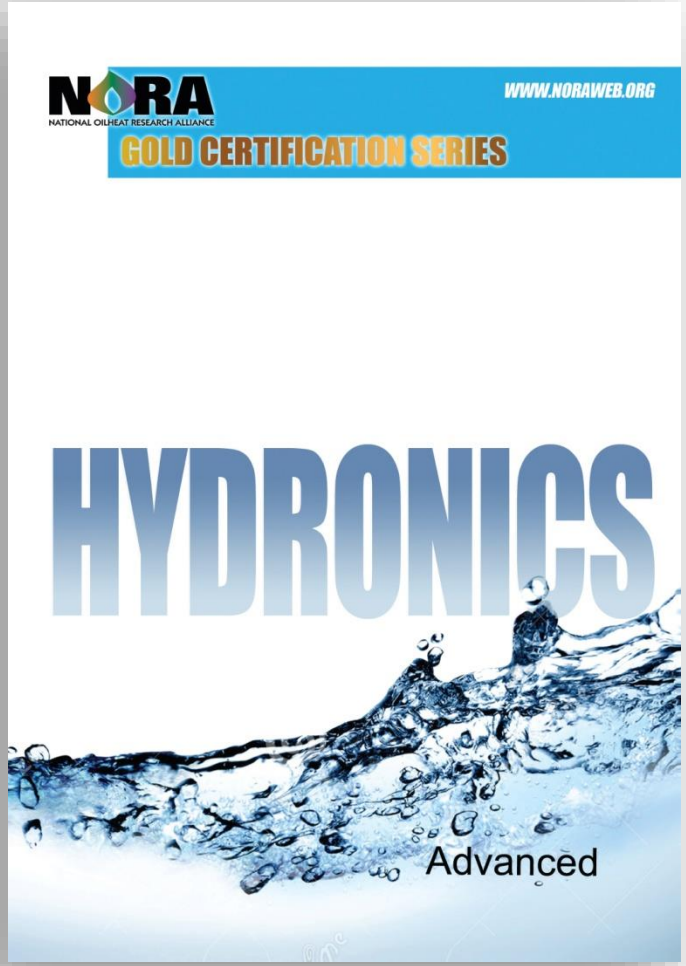
Heating fuels produced under the current ASTM D396 (16) Fuel Oil Spec include different types (refined petroleum distillates w/wo bio-diesel) and blends (max B5 for grades #1 or #2 only, and a separate B6-B20 grade), and sulfur

content (S15, S500 & S5000). Each grade has different properties, and the bio-diesel used in all blends must meet the ASTM D6751 Spec. It is unknown if “renewable" or "recycled" petroleum or feed stocks & processes are used (such as motor oils), but they must meet all the ASTM D396 properties. However, “triglyceride” type fuels & blends (such as processed cooking oils & grease) have their own ASTM D7666 Spec for commercial/industrial burners, and are currently not allowed in the ASTM D396 spec, so are not a subject of this Task Group.

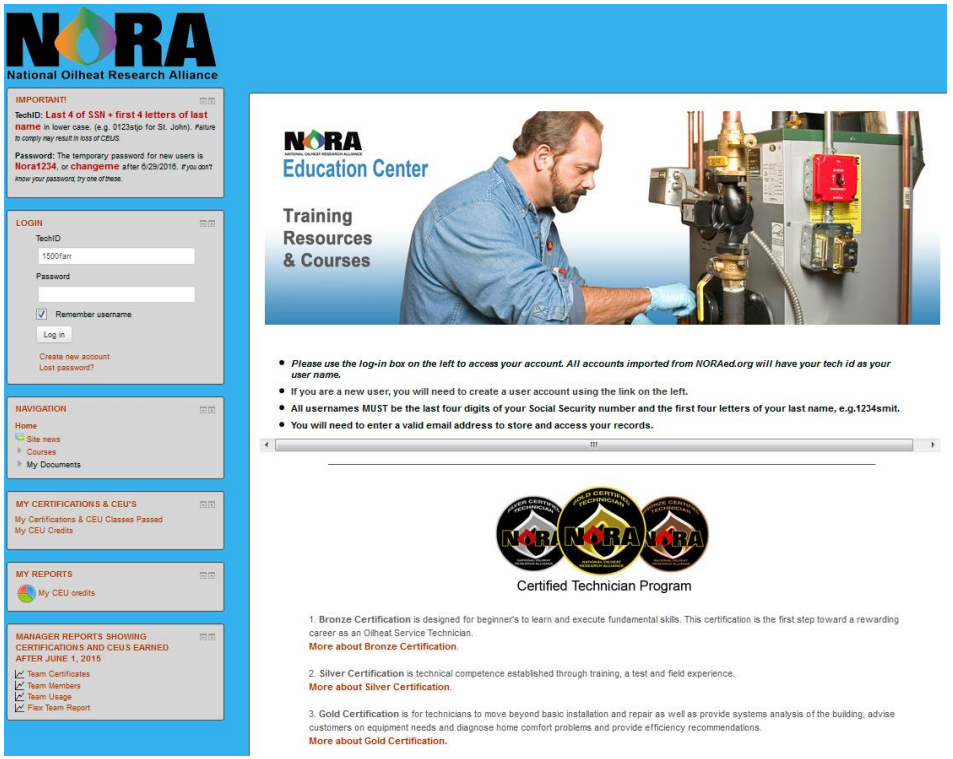
As these original fuels go downstream through the distribution chain, it is unknown if more bio-diesel is added to increases the blends above their original levels, and if so, how they are identified (for example, if 5% biodiesel is added to grade #2 @ max B5, the new blend could be B5 to B10). The end point fuel supplier typically does not know if the specific fuel delivered is suitable for each the system, as the equipment ratings (pipes, filters, valves, burner) are unknown or not accessible. The customer is typically not informed of the blends delivered, and is not aware of either equipment ratings or potential incompatibility issues. In addition, the fuel can go out of spec, especially after delivery, due to stagnation times in tanks that may contain water and microbes which produce acids and other byproducts that may be harmful to the tank and other connected equipment.

Although most equipment Standards now permit higher bio-diesel blend evaluations (UL Standards up to B20 with FB25a aggressive test fuel), few manufacturers are getting Certifications to them, and is some cases none yet (burners, filters, valves). Even if available, the majority of existing equipment has not been evaluated or rated for blends >B5. The combined result of supplying higher bio fuel blends to heating systems that are not rated for it, is a potential increase in equipment problems, service calls, and compromised safety.

ONLINE COURSE

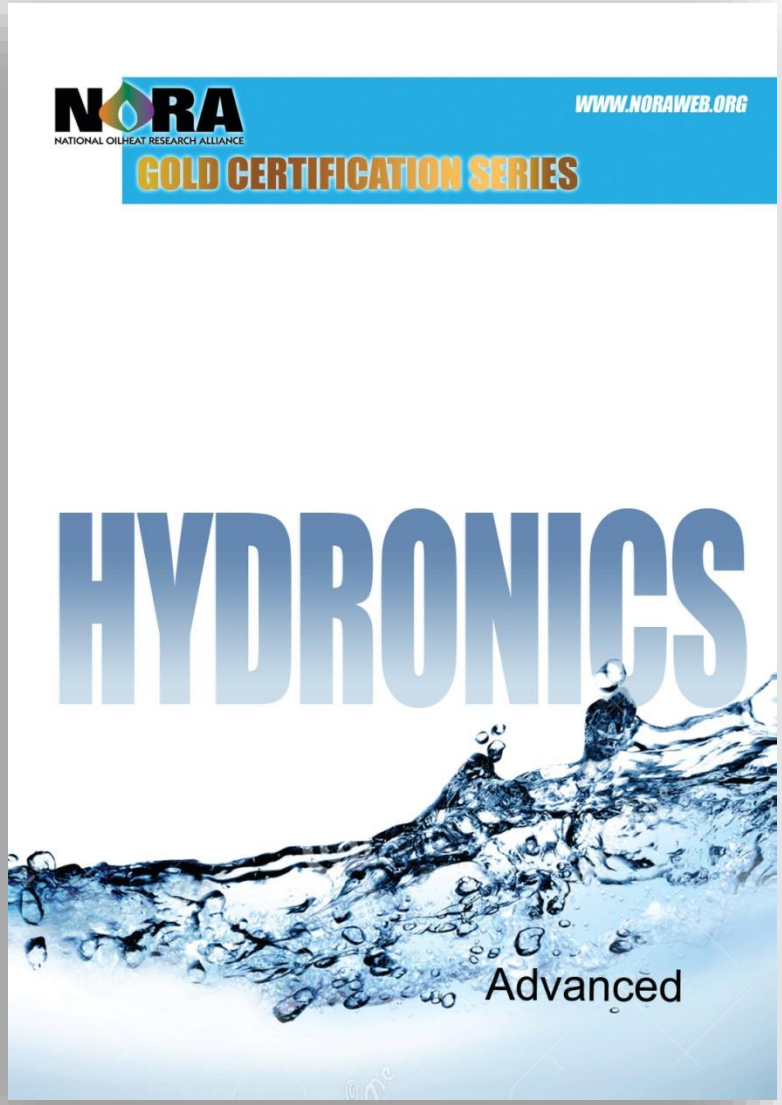


NORAweb.org gives us the opportunity to create online courses with testing



NORA Education
NATIONAL OILHEAT RESEARCH ALLIANCE

Advanced Hydronics will be NORA's first full-length course available online.

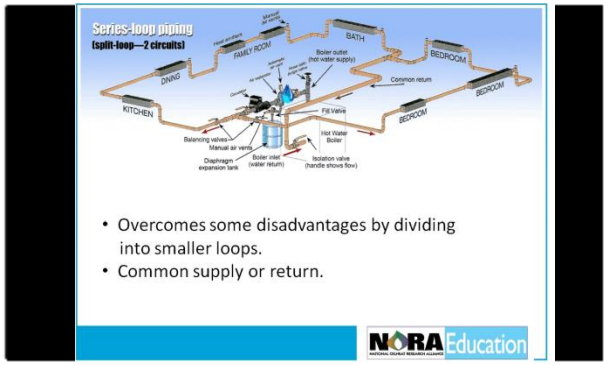


1 Watch

2 Test

3 Credit

Watch the Video



Take the Test

Click on the link below to take the test.

A passing grade is 80%. You may take the test as many times as you need to receive a passing grade. At the end of each attempt you will see a review of your answers and correct and incorrect ones will be marked.

Action Approach to a No Heat Call Test

Get your Certificate

After you have watched the video and passed the test 2 CEUs will be added to your account.

Click on the link below to download your certificate.

V1: Action Response To A No Heat Call

Not available unless: You achieve a particular score in **Action Approach to a No Heat Call Test**. (Retry)

Learning.NORAweb.org

NORA Education
NATIONAL OILHEAT RESEARCH ALLIANCE

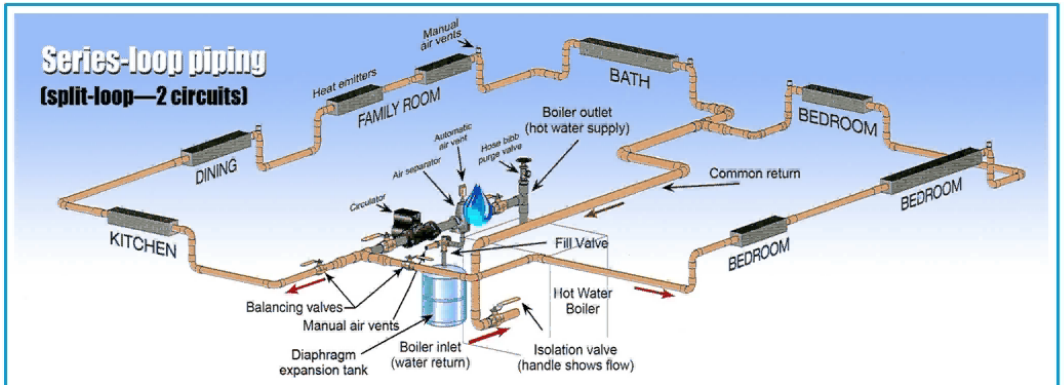
Advanced Hydronics

5 chapters presented with animations and narration

Enhanced content…

Series of videos from Taco Hydronics, Inc.

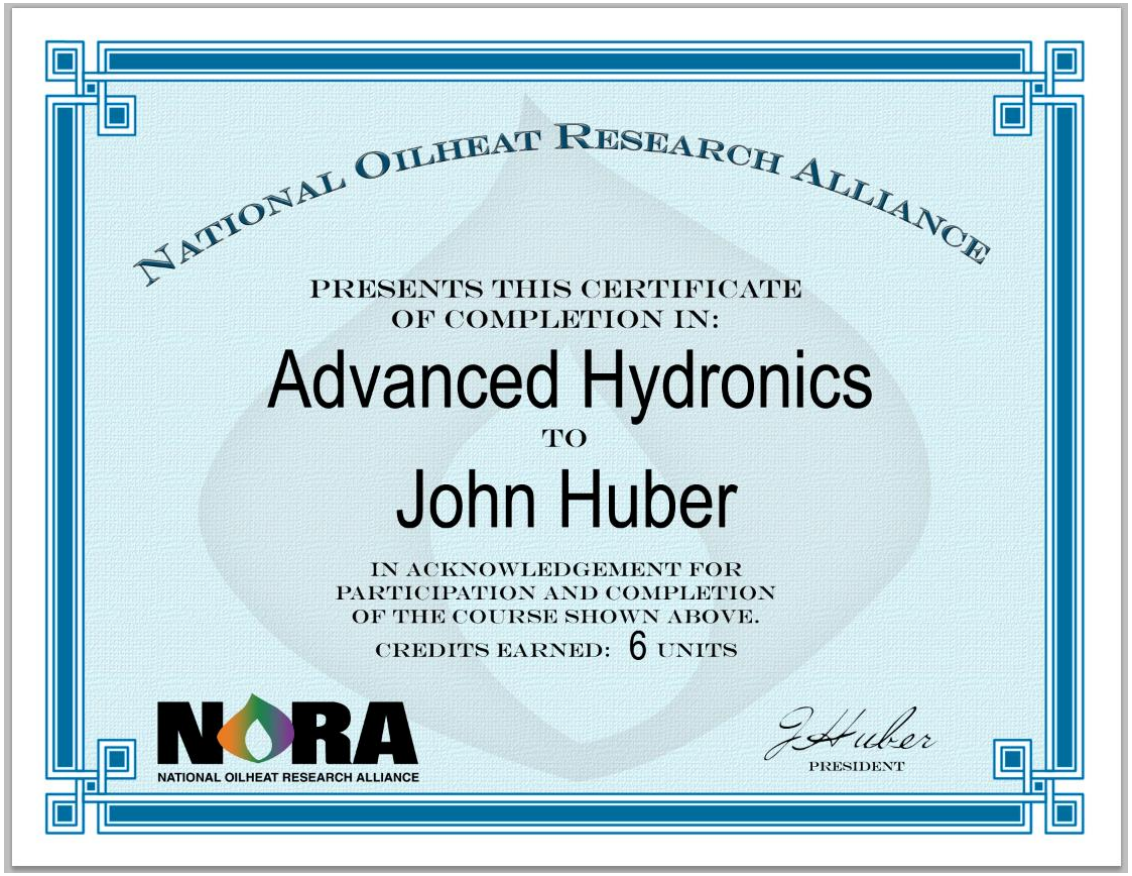
Culminating with a 25 question on-line quiz providing instant grading and grade tracking

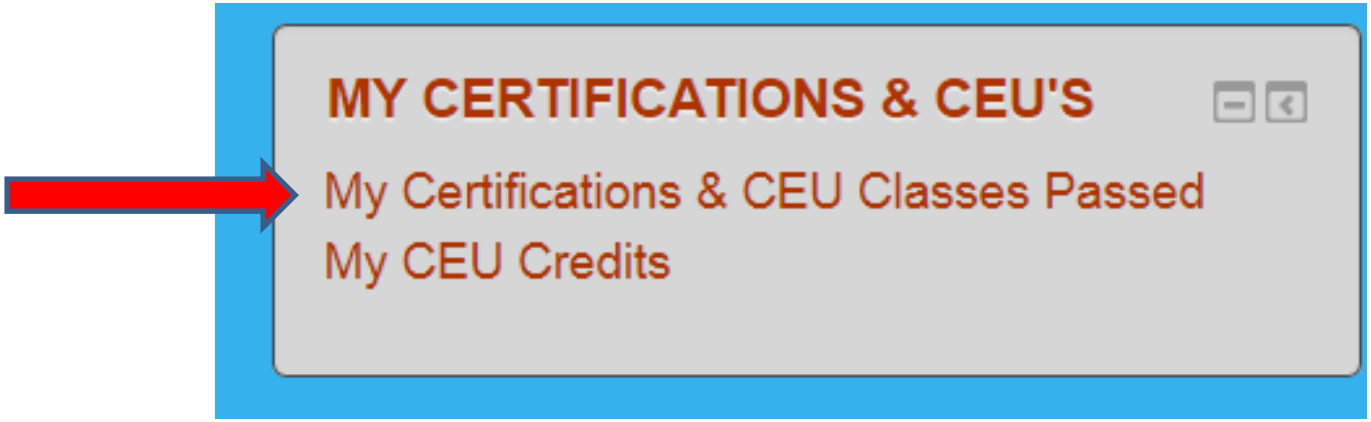


- Overcomes some disadvantages by dividing into smaller loops.
- Common supply or return.

Upon Completion

Six CEUs are added to account and certificate delivered by email.





Permanent Record

CEU's, certifications and classes passes are part of user's permanent NORA record and accessible anytime

Officers and Executive Committee

Immediate Past Chairperson	– Allison Heaney
Chairman	- Tom Santa
First Vice-Chairman	- Charlie Uglietto
Second Vice-Chairman	-
Treasurer	- Eric DeGesero
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John McCusker	Global
Ted Noonan	Noonan Energy
Tom Santa	Santa Energy
Steve Clark	Genessee Fuel
~~Jeff Lykins~~	~~Lykins Oil Company~~
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~~Jeff Jenkins~~	~~Jenkins Fuel Oil Company~~
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