



national fuel

December 27, 2022

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
P.O. Box 3265
North Office Building
Harrisburg, Pennsylvania 17105-3265

Re: National Fuel Gas Distribution Corporation
Delta Fund for Research and Development Projects Report

Dear Secretary Chiavetta;

Pursuant to R-00061493 Settlement paragraph 18 A.3 "Distribution will file with the Commission and serve upon other Parties on or before December 31 an annual report for the preceding twelve month period ended September 30, setting forth revenues for the Delta Fund for research and development projects and expenditures for such projects. In addition, Distribution will describe in the annual report projects that have been funded". The enclosed report is submitted under this settlement agreement.

Very truly yours,

Robert D. Eck
General Manager
Energy Services Department

Encl.

Cc: Office of Special Assistants (E-Mail)
Office of Consumer Advocate (E-Mail)
Office of Small Business Advocate (E-Mail)

I. INTRODUCTION/BACKGROUND

The provisions of R-00061493 Settlement paragraph 18 A.3 were adopted on November 30, 2006 and effective January 1, 2007. Paragraph 18 A.3 states:

“3. The Joint Petitioners agree to \$526,466 to fund the Delta research and development program pursuant to the Statement of Scott E. Swartzfager No. 14. The deferral treatment and review process outlined in R-00049656 will continue. The company will not expend these dollars on additional customer outreach for enhanced energy efficiency.

Distribution will be permitted to record a regulatory asset or liability for differences between the annual rate allowance and annual expenditures. However, Distribution will not be permitted to retroactively recover in a future proceeding any expenditures in excess of the annual rate allowance and any deferred balance from the previous year's Delta funding. Distribution will provide for review of research projects as described in its testimony. In order to implement this Settlement, the Joint Petitioners request that the Commission's Final Order in this proceeding include the following language to allow Distribution to qualify for deferred accounting under SFAS 71:

“National Fuel Gas Distribution Corporation's accounting policies conform to the Statement of Financial Accounting Standards No. 71 'Accounting for the Effect of Certain Type of Regulations' which are in accordance with the accounting requirements and ratemaking practices of regulatory authorities. The application of these accounting policies allows the Company to defer expenses and income on the balance sheet as regulatory assets and liabilities when it is probable that those expenses and income will be allowed in the rate-setting process in a period different from the period in which they would have been reflected in the income statement by an unregulated Company.

“Because research and development projects often require a commitment over multiple years and because the expenditures for such projects may not match on an annual basis revenues for funding of research and development projects, deferred accounting is appropriate and is approved. The regulatory deferral treatment sought for the Research and Development expenditures and rate relief requested in the case are in accordance with SFAS No. 71.

“The Company will manage the costs of the Research and Development expenditures to match revenues deferred pursuant to this Order to eliminate any differences between deferred costs and deferred revenues at the end of a five-year period commencing on the day after the R-00049656 Order was entered.”

Distribution will file with the Commission and serve upon other Parties on or before December 31 an annual report for the preceding twelve month period ended September 30, setting

forth revenues for the Delta Fund for research and development projects and expenditures for such projects. In addition, Distribution will describe in the annual report projects that have been funded.”

The provisions of R-00049656 Settlement paragraph 44 were adopted on March 23, 2005 and effective April 15, 2005. Paragraph 44 states:

"44. Distribution's proposal to fund the Delta research and development program pursuant to the Supplemental Statement of Ruth Friedrich-Alf No. 102 S2 is approved. Increased rates in this proceeding provide for recovery of \$526,466 in Delta research funds. Distribution will be permitted to record a regulatory asset or liability for differences between the annual rate allowance and annual expenditures. However, Distribution will not be permitted to retroactively recover in a future proceeding any expenditures in excess of the annual rate allowance and any deferred balance from the previous year's Delta funding. Distribution will provide for review of research projects as described in its testimony. In order to implement this agreement, the Parties request that the Commission's Final Order in this proceeding include the following language to allow Distribution to qualify for deferred accounting under SFAS 71:

'National Fuel Gas Distribution Corporation's accounting policies conform to the Statement of Financial Accounting Standards No. 71 'Accounting for the Effect of Certain Type of Regulations' which are in accordance with the accounting requirements and ratemaking practices of regulatory authorities. The application of these accounting policies allows the Company to defer expenses and income on the balance sheet as regulatory assets and liabilities when it is probable that those expenses and income will be allowed in the rate-setting process in a period different from the period in which they would have been reflected in the income statement by an unregulated Company.

'Because research and development projects often require a commitment over multiple years and because the expenditures for such projects may not match on an annual basis revenues for funding of research and development projects, deferred accounting is appropriate and is approved. The regulatory deferral treatment sought for the Research and Development expenditures and rate relief requested in the case are in accordance with SFAS No. 71.

'The Company will manage the costs of the Research and Development expenditures to match revenues deferred pursuant to this Order to eliminate any differences between deferred costs and deferred revenues at the end of a five-year period commencing on the day after this Order is entered.'

Distribution will file with the Commission and serve upon other Parties on or before December 31 an annual report for the preceding twelve month period ended September 30, setting forth

revenues for the Delta Fund for research and development projects and expenditures for such projects. In addition, Distribution will describe in the annual report projects that have been funded."

As presented in R-00049656 Statement No. 102 (page 15);

"On an annual basis coming off of September 30, a reconciliation of revenues and expenditures with a description of projects funded will be on file on or before December 31 with the Office of Trial Staff, Office of Consumer Advocate and the office of Small Business Advocate. At the fifth reconciliation, Distribution will file a five year report."

As presented in R-00049656 Statement No. 102 S2 (page 7)

"Annual revenues will be deferred to offset the costs of the Research and Development expenditures (expenses) to both the Gas Technology Institute ("GTI") fund and local projects.

The Company will manage the cost of the Research and Development expenditures to match revenues deferred pursuant to this Order to eliminate any differences between deferred costs and deferred revenues at the end of a five-year period commencing on the day after this Order is entered."

It is under these guidelines and agreements that Distribution files the following report for the period ended September 30, 2022.

National Fuel Gas Distribution Corporation
Pennsylvania Division

**II. Annual Filing of Delta Fund Revenues and Expenditures
For the period ended September 30, 2022**

Year Ended	Annual		Cumulative		Balance
	Expenditures	Revenues	Expenditures	Revenues	
Sept. 2005	\$92,300	\$113,927	\$92,300	\$113,927	(\$21,627)
Sept. 2006	\$376,800	\$526,466	\$469,100	\$640,393	(\$171,293)
Sept. 2007	\$596,800	\$526,466	\$1,065,900	\$1,166,859	(\$100,959)
Sept. 2008	\$526,493	\$526,466	\$1,592,393	\$1,693,325	(\$100,932)
Sept. 2009	\$376,368	\$526,466	\$1,968,761	\$2,219,791	(\$251,030)
Sept. 2010	\$455,911	\$526,466	\$2,424,672	\$2,746,257	(\$321,585)
Sept. 2011	\$721,800	\$526,466	\$3,146,472	\$3,272,723	(\$126,251)
Sept. 2012	\$280,300	\$526,466	\$3,426,772	\$3,799,189	(\$372,417)
Sept. 2013	\$626,800	\$526,466	\$4,053,572	\$4,325,655	(\$272,083)
Sept. 2014	\$278,891	\$526,466	\$4,332,463	\$4,852,121	(\$519,658)
Sept. 2015	\$276,800	\$526,466	\$4,609,263	\$5,378,587	(\$769,325)
Sept. 2016	\$458,404	\$526,466	\$5,067,667	\$5,905,053	(\$837,386)
Sept. 2017	\$500,530	\$526,466	\$5,568,197	\$6,431,519	(\$863,322)
Sept. 2018	\$362,547	\$526,466	\$5,930,744	\$6,957,985	(\$1,027,241)
Sept. 2019	\$445,438	\$526,466	\$6,376,182	\$7,484,451	(\$1,108,269)
Sept. 2020	\$452,883	\$526,466	\$6,829,065	\$8,010,917	(\$1,181,852)
Sept. 2021	\$468,422	\$526,466	\$7,297,487	\$8,537,383	(\$1,239,896)
Sept. 2022	\$865,588	\$526,466	\$8,163,075	\$9,063,849	(\$900,774)

Note 1: Rates were effective April 15, 2005 therefore the report ended September 30, 2005 does not represent a 12 month period of revenue collection.

III. DESCRIPTION OF ACTUAL EXPENDITURES - PERIOD ENDED SEPTEMBER 2022

A. GTI Utilization Technology Development Program

\$129,500 was submitted to Utilization Technology Development, NFP (UTD) for the April 1, 2022 through March 31, 2023 dues. \$124,456 has been allocated to specific projects as listed below.

UTD Payments, Fees, Credits, Carryover

Payments to UTD	129,500.00
Administration Fees	-12,950.00
Carryover of Unallocated Funds from Prior Year	10,078.58
Funds Available for Allocation	126,628.58
Large Commercial and Industrial Customers	
2.12.M Ribbon Burner Improvements	-222.00
2.16.A.3 Next Generation Infrared Burner - Phase 3	-2,220.00
2.16.A.4 Next Generation Infrared Burner - Phase 4	-2,220.00

2.20.A.2 Low Emission Efficient Burner for Ovens and Dryers – Phase 2	-1,850.00
2.20.B Sub-Dew Point Cooling Technology	-2,960.00
2.20.C High Efficiency Low Emission Commercial Baking Oven Field Demonstration	-1,110.00
2.20.D.2 Recovering Water and Energy from Industrial Furnace Exhaust - Phase 2	-1,480.00
2.20.E.2 Energy Source Options for Industrial Users - Phase 2	-3,645.61
2.21.A High Hydrogen Burner for Commercial and Industrial Applications	-2,590.00
2.21.B Energy Recovery from Brewing/Distilling Operations: Field Demo	-888.00
2.21.C Zero Emissions Processes with Carbon Recovery	-2,590.00
2.21.D.2 High-Efficiency Crop Drying Process – Phase 2	-740.00
2.22.B Ribbon Burner Performance with Hydrogen-Blended Gases	-2,590.00
2.22.D High Performance Adjustable Port Burner	-2,590.00
2.22.E Mitigating Methane Emissions from Large Commercial and Industrial End Use Eqpt.	-2,220.00
2.22.F Tecogen Hybrid Gas/Electric Chiller Laboratory Evaluation	-1,480.00

Food Preparation and Service Customers

1.17.H.3 Residential Cooking Pollutants and IAQ - Phase 3	-2,487.26
1.17.H.4 Residential Cooking Pollutants and IAQ - Phase 4	-1,850.00
1.19.A.2 High Efficiency Smart Convection Oven - Phase 2	-1,315.72
1.20.K.2 Field Evaluation of Indoor Air Quality in Residential Kitchens - Phase 2	-740.00
1.21.G.2 Technical Support to Address Gas Foodservice Technologies - Phase 2	-2,220.00
1.21.H.2 CFS Burner Technology Carbon Reduction Including Hydrogen Blending – Phase 2	-1,850.00

Residential and Light Commercial Customers

1.11.H.6 Residential Gas Absorption Heat Pump Water Heater - Phase 6	-1,110.00
1.16.H.4 EnergyPlus Models for Advanced Gas Heating Systems - Phase 4	-2,220.00
1.17.B.4 Thermoelectric Generator for Self-Powered Water Heater - Phase 4	-2,960.00
1.18.C.2 Advanced Nozzle Burner for Commercial Water Heaters - Phase 2	-4,440.00
1.18.F.3 Mitigating Methane Emissions from ResCom End Use Equipment – Phase 3	-1,517.00
1.18.I Gas Heat Pump RTU Cold Climate Performance Assessment	-1,968.03
1.19.E.2 Sequestering Non-Condensable Gases for Enhanced Gas Abs. HP Reliability - Phase 2	-2,421.65
1.19.F Yanmar 3-Pipe GHP Cold Climate Case Study	-1,043.40
1.20.E Gas-Fired Binary Fluid Ejector Heat Pump Water Heater	-1,110.00
1.20.G.2 High-Efficiency Combi System Integrating PV and Self-Power - Phase 2	-4,492.17
1.20.H.2 Hydrogen-Blended Gas in Residential/Commercial Combustion Equipment - Phase 2	-1,295.00
1.20.H.3 Hydrogen-Blended Gas in ResCom Comb. Eqpt. - Phase 3	-2,960.00
1.20.I Membrane Based Ionic Liquid Absorption Heat Pump for Commercial HVAC	-986.79
1.20.J.2 Integrated CHP System for Multi-Family Buildings - Phase 2	-4,465.57
1.21.A HeatAmp Adsorption Thermal Heat Pump	-851.00
1.21.A.2 HeatAmp Adsorption Thermal Heat Pump – Phase 2	-1,480.00
1.21.B.2 Technical Support for ResCom Gas Equipment Testing, Perf. and Safety – Phase 2	-2,590.00

1.21.C CleanO2 CarbonX Carbon Capture	-2,072.00
1.21.E Gas Engine Heat Pump Modeling, Testing and Implementation	-1,813.00
1.21.E.2 Gas Engine Heat Pump Modeling, Testing and Implementation - Phase 2	-740.00
1.21.F Commercial Heat Pump Water Heater Field Performance Comparison	-2,177.45
1.22.A Hydrogen Blending End-Use Performance and Safety Field Demonstration	-4,440.00
1.22.B Modern Electron Thermionics for Self-Powered Furnaces and Boilers	-2,590.00
1.22.C Fuel-flexible Ultra-Low NOx Catalytic Burners for ResCom Appliances	-740.00
1.22.E Deep Energy Customized Affordable Retrofits of Bldg. Envelopes and Mechanicals	-2,220.00
1.22.G Safe Use of Hydrogen in Buildings	-3,330.00
1.22.H Hybrid Fuel-fired and Electric-driven ResCom HVAC Systems	-2,960.00

Clean Transportation and Advanced Energy System Customers

2.20.G.2 Smart CNG Station Field Demonstration - Phase 2	-2,590.00
2.21.G Distributed RNG Production and Cleanup	-3,700.00
2.21.H Improved Hydrogen Fueling for Heavy-Duty Vehicles	-1,973.21
2.21.I.2 Technical Support for Clean Transportation Testing, Perf., and Safety - Phase 2	-2,220.00
2.22.G Cost-Effective Pre-Cooling for High-Flow Hydrogen Vehicle Fueling	-4,070.00
2.22.H Heavy-duty Hydrogen Vehicle Development and Deployment	-2,590.00

Memberships/Other

6.Veritas Gas Measurement and Verification Initiative	-5,550.00
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Adjustments and Miscellaneous Refunds

Board Designated Net Assets 2022	42.39
G&A Refund 2022	1,046.24

Funds Allocated to Projects	124,456.23
Unallocated Funds	2,172.35

B. GTI Operations Technology Development Program

\$184,500 was submitted to Operations Technology Development, NFP (OTD) for the 2022 membership fee. \$172,481 has been allocated to specific projects as listed below.

Payments to OTD, Fees, Carryover

Payments to OTD	184,500.00
Administration Fees	14,391.00
Carryover of Unallocated Funds from Prior Year	80,295.66
Funds Available for Allocation	257,784.66

Allocations to Projects

(5) Construction/ Infrastructure Techniques

5.07.p (GTI) GNSS (GPS) Consortium	-5,535.00
5.15.a.3 Cyber Security Working Group	-225.83
5.19.k.2 Utonomy Smart Regulator - Phase 2	-4,687.04
5.20.e Single-Path Ultrasonic Meter Long-Term Performance Testing and Monitoring	-138.38
5.20.k Smart Shutoff Technology for Commercial and Residential Buildings	-796.30
5.21.a Meter Removal Tool - Commercialization Phase	-1,128.40
5.21.e Evaluation of the CoSMiC Eye Satellite Based Pipeline Right-of-Way Monitoring System	-704.05
5.21.j Hydrogen Blending Impact on Aldyl-A nad HDPE Pipes	-3,690.00
5.21.k.2 Assessment of FFS Performance Envelope Reduction from Hydrogen Embrittlement	-343.91
5.21.n Advanced Training Technologies Consortium 2021	-1,540.58
5.21.q Development of a MDPE and HDPE Allowable Pull Load calculator	-903.31
5.21.s Gap Identificaion Between Hydrogen and Natural Gas Pipeline Standards and Practices	-185.24
5.21.t Effect of hydrogen blended natural gas on the performance of gas meters and diaphragm type service regulators- Phase 1	5,478.91
5.22.d Evaluation of Micro-Thermal Gas Metering Technology	-3,690.00
5.22.e Tracking/Reporting Aggregated Methane Emission Reductions	-3,690.00
5.22.g Pressure Monitoring and Alert Device for the Replacement of Token Reliefs	-3,690.00
5.22.i Gas Engineer Training Program Development	-5,535.00
5.22.j Design and Placement of Compact Service Regulators	-1,845.00
5.22.k Gas Monitoring Safety Device	-182.29
5.22.m Hydrogen Blend Measuring Devices	-1,845.00
Remotely Deployed Double Balloon Stopper – Design Refinement	-1,845.00
5.22.p Hydrogen Blending Program -	-1,845.00
5.22.q NPT-F Threaded and Other Alternative Joint Connections for Meter Sets	-1,107.00
5.22.r Hydrogen Leak Tape Evaluation	-1,107.00
5.22.s H2 Steel Compatibility	-1,845.00
5.22.t Market Study of 100% H2 Compatible Distribution Equipment	-1,107.00
5.22.v Update to ASTM F2897	-1,107.00

(6) Memberships/Other

6.08.a (GTI) Carbon Management Information Center	-11,070.00
6.11.a PRCI Membership	-1,845.00
6.14.a Quality Audit Program	-7,380.00
6.16.a Center for Methane Research	-9,225.00
6.a (GTI) SMP	-36,900.00

(7) Methane Emissions/Detection and Gas Quality

7.10.b.3 Odor Fade and Odor Masking from H2 Blends	-571.21
7.16.a.3 Leak Repair Prioritization - Ph 3	-3,690.00
(7.16.e.3) Biomethane On-Line Monitoring Phase III	-825.08
7.18.h.2 Gas Quality Resource Center (7.11.a and 7.18.h)	-1,845.00
7.19.b.2 Advanced Leak Detection Technologies for Grading Leaks Phase 2	-3,690.00
7.20.a Develop Remote Sensing and Leak Detection Platform with Multiple Sensors	-723.61
7.20.b Validation of Remote Sensing Leak Detection Technologies under Realistic Conditions	-563.83
7.21.f Developing a Framework for Certifying Responsible Natural Gas	-1,727.29
7.21.j Assessing Performance Impacts and Leak Rates of System Components	-922.50
7.22.e Emissions Quantification and Reduction Strategies Report	-3,690.00
7.22.f Carbon Monoxide Sensor Interference from Hydrogen	-1,845.00
7.22.h Veritas Gas Measurement and Verification Initiative	-5,535.00
7.22.j Evaluation of Current Advanced Mobile Leak Detection Systems	-1,845.00
7.22.k Optical Gas Imaging (OGI) and handheld laser methane detectors for large leak identification	-1,845.00
7.22.n Predictive Corrosion-Rate Risk Model from Soil and Environmental Conditions	-1,845.00

(8) Intelligent Utilities

8.17.b.4 T and T - GS1 barcode standardization, counterfit protection, and two way communication.	-2,835.03
8.20.l Enhanced Locating Technologies for Underground Pipelines with Better Accuracy	-1,885.22
8.20.m 3D Visualization Software for Mapping Underground Pipelines and Improving Pipeline Asset Management	-3,690.00
8.21.g GNSS Testing in an Urban Environment	-1,742.42
8.21.h Tracking Software Development for Pipeline Safety Management Systems	-1,454.97
8.22.d Standardized Utility and Supplier Comanaged Inspection and Test Record Storage	-7,380.00
8.22.g Work Zone Intrusion Detection and Warning System	-3,690.00
8.22.i Pipe Bridge Inspection/Design using LiDAR drone-based inspection	-1,845.00
8.22.j Augmented Reality (AR) Technology to Enhance Field Operations	-1,845.00
9.22.a Reserve Strain Capacity Determination- PHMSA cost share	-3,690.00

Adjustments and Miscellaneous Refunds

Board Designated Net Assets 2022	4,539.65
G&A Refund	4,007.49

Funds Allocated to Projects

-

Unallocated Funds

172,480.56

93,851.23

C. SUMMARY OF EXPENDITURES - 2022

Utilization Technology Development Program - GTI	\$ 129,500
Operations Technology Development Program - GTI	\$ 184,500
Emerging Technology Program - GTI	\$ 9,230
Low-Carbon Resources Initiative – GTI	\$ 111,500
Guidehouse – Hydrogen Consortium	\$ 12,500
North American Gas Heat Pump Collaborative – RI LLC	\$ 16,552
Ingevity Corporation – ANG Vehicles	\$ 56,268
Hybrid Heat Pumps	\$ 345,499
CNG Vehicle	\$ 39
Total Pennsylvania Delta Funds Program Expenditures	\$ 865,588

IV. PROJECTED EXPENDITURES - PERIOD ENDING SEPTEMBER 2023

Expenditures for National Fuel Gas Distribution Corporation's Pennsylvania Delta Funds RD&D Program are projected to be between \$600,000 and \$900,000 of which \$526,466 is collected on an annual basis. The balance will be covered by unutilized funds from prior years. In 2023 the following planned charges are projected:

1. **Utilization Technology Development (UTD)** membership fees of approximately \$129,500. Specific projects to be determined.
2. **Operations Technology Development (OTD)** membership fees of approximately \$184,500. Specific projects to be determined.
3. **Emerging Technology Program (ETP)** membership fees of approximately \$9,230.
4. **Low-Carbon Resources Initiative (LCRI)** membership fees of approximately \$111,500.
 - a. LCRI is an effort lead by the Electric Power Research Institute (EPRI) and the Gas Technology Institute (GTI) to collaborate on addressing the need to accelerate development and demonstration of low carbon energy technologies.
5. **North American Gas Heat Collaborative** membership fees of approximately \$50,000
 - a. The North American Gas Heat Collaborative is membership-based collaborative to accelerate the commercialization and market acceptance of gas heat pumps in North America. The goal of this collaboration is to enhance market share of gas heat pump technologies and energy efficient gas technologies.
6. **Local Opportunity Projects** spending estimate of approximately \$450,000 (see below). Funds not used for the development of qualified local technology projects in National Fuel territory may be allocated to the national Gas Technology Institute programs described above.
 - 1) \$60,000 – Hybrid HVAC & Cold Climate Air Source Heat Pumps Demos
 - 2) \$20,000 – Combined Heat and Power (CHP) Feasibility Assessments
 - 3) \$250,000 – CHP Incentive Program
 - 4) \$70,000 – Zero Net Energy (ZNE) Home
 - 5) \$50,000 -- Natural Gas Vehicle (NGV) Technology Demonstration

V. STATUS UPDATE OF LOCAL OPPORTUNITY PROJECTS – 2022

Funding of gas industry research through the Gas Technology Institute (GTI), as an example, returns many benefits, including ensuring continued improvement and availability of energy-efficient, low emissions and cost-effective gas technologies, while leveraging the funding resources of gas utilities across North America. The Local Opportunity Projects portion of this program intends to identify projects for direct local support offering equal, or better, benefits than GTI. This is challenging, but National Fuel endeavors to identify and develop these opportunities. Funds available through this portion of the program, beyond the minimum commitments to GTI, may be used for qualified local projects. Funds not used locally are sent to GTI to be allocated to suitable projects, as shown in the previous supported project listings.

Summaries for Local Opportunity Projects active or completed in 2022 are provided below.

1. **Hybrid HVAC Demonstrations.** National Fuel is investigating the operating costs and impact on greenhouse gases that contribute to climate change associated with utilizing an electric Air Source Heat Pump (ASHP) in combination with a high efficiency natural gas furnace for heating (and cooling), as compared to a traditional furnace only and central A/C. National Fuel plans to further test and analyze this hybrid system by working collaboratively with contractors who installed 12 hybrid systems in our Pennsylvania service territory.
2. **Cold Climate Air Source Heat Pump Demonstrations.** National Fuel installed 2 cold climate air source heat pumps (ccASHP) in our Pennsylvania service territory. We will conduct a study to determine the monthly energy cost and usage changes, cold climate equipment performance, as well as the associated GHG emissions, associated with utilizing a ccASHP as the sole energy source for the residences heating and cooling needs.
3. **Natural Gas Vehicle (NGV) Technology Demonstration.** National Fuel purchased a Ford F-250 pickup which would be modified to include the Adsorbed Natural Gas (ANG) technology. ANG is a low-pressure technology which reduces tank pressure from 3,600 to 900 psi. Low pressure enables private, daily fueling with the use of low-cost and small fueling device that can be installed wherever a natural gas line is available, thereby eliminating the lack and high cost of high pressure/fast-fill stations. The cost of the vehicle modification and the fueling device will be shared with an Alternative Fuels Incentive Grant and National Fuel.

VI. PROSPECTIVE LOCAL OPPORTUNITY PROJECTS – 2023

1. **Hybrid HVAC Demonstrations.** National Fuel installed 12 hybrid systems in our Pennsylvania service territory. National Fuel is investigating the operating costs and impact on greenhouse gases that contribute to climate change associated with utilizing an electric Air Source Heat Pump (ASHP) in combination with a high efficiency natural gas furnace for heating (and cooling), as compared to a traditional gas furnace only and central electric A/C.
2. **Cold Climate Air Source Heat Pump Demonstrations.** National Fuel installed 2 cold climate air source heat pumps (ccASHP) in our Pennsylvania service territory. We are conduct a study to determine the monthly energy cost and usage changes, cold climate equipment performance, as well as the associated GHG emissions, associated with utilizing a ccASHP as the sole energy source for the residences heating and cooling needs.

- 3. Combined Heat and Power (CHP) Feasibility Assessments.** In accordance with the PUC CHP Policy Statement and as an extension of previous initiatives in support of market development for CHP, National Fuel will continue to implement an active prospecting program to identify prospective candidates for siting of CHP technology. Following initial pre-screening activities, it is strongly anticipated that Delta Funds will support formal technical and economic feasibility assessment studies for those projects that demonstrate initial attractive deployment opportunities.
- 4. Combined Heat and Power (CHP) Incentive Program.** In accordance with the PUC CHP Policy Statement, National Fuel intends to institute an incentive program to promote the implementation of CHP projects in its service territory. An initial industrial laundry operation has been identified and is expected to pursue the necessary public and private funding for a potential 875 KW CHP project in FY2022. The proposed incentive would be approximately \$250,000 (\$285/KW).
- 5. Natural Gas Vehicle (NGV) Technology Demonstration.** National Fuel plans to participant in purchasing a Ford F-250 pickup which would be modified to include the Adsorbed Natural Gas (ANG) technology. ANG is a low-pressure technology which reduces tank pressure from 3,600 to 900 psi. Low pressure enables private, daily fueling with the use of low-cost and small fueling device that can be installed wherever a natural gas line is available, thereby eliminating the lack and high cost of high pressure/fast-fill stations. The cost of the vehicle modification and the fueling device will be shared with an Alternative Fuels Incentive Grant and National Fuel. There is a fueling device at Oil City Service Center and one at Erie Service center. Three more trucks due to arrive in FY23. There will be two at each service center. AFIG funding and Delta funds paid for two trucks and fueling devices, Operations is purchasing additional two trucks.
- 6. Zero Net Energy (ZNE Home).** National Fuel is working with the Sisters of St. Joseph Neighborhood Network (SSJNN) to take a property owned by the SSJNN and located at 513 West 17th Street, Erie, PA and retrofit the home in an attempt to achieve ZNE rating of 1.0, where overall annual solar energy production is greater than overall annual energy usage. National Fuel will be providing a grant of approximately \$50,000 so that the SSJNN can purchase a gas dryer, gas stove, tankless water heater, and solar panels as well as upgrade some windows and insulation. Wilson Engineering Services will conduct a two-year study at a cost of \$20,000.

National Fuel intends to continue efforts to identify other beneficial Local Opportunity Projects for development which may provide direct benefit to our Pennsylvania consumers, businesses, and industries.