Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

1. Provide up to date California Standard Tests – the Participant Test, the Program Administrator Test, the Ratepayer Impact Measure, and the Total Resource Cost Test individually for the Furnace Rebate Program, the Water Heater Program, and the Energy Audit Program, and for Delta's Demand Side Management program as a whole. If the test results are less than one, explain why Delta believes the program should be continued.

Response:

See the attached exhibits to this item for California Standard Tests related to the Furnace Rebate Program (Exhibit A), the Water Heater Program (Exhibit B), and Conservation/Efficiency Program (CEP) as a whole (Exhibit C), respectively. Delta did not perform the California Standard Tests on the Energy Audit Program, as due to lack of participation, the Company does not wish to continue the Energy Audit Program. Delta has always considered and operated this suite of programs singularly as one program. The following summarizes the results of the California Standard Tests:

	Benefit Cost Ratio		
	Furnace Rebate Program	**Water Heater Program**	**CEP as a Whole**
Participant Test	1.49	0.57	1.08
Program Administrator Cost Test	1.06	1.26	1.11
Ratepayer Impact Measure	3.62	3.43	3.58
Total Resource Cost Test	0.36	0.07	0.27

Delta believes the most important test in determining if the CEP rates are fair, just and reasonable is the Ratepayer Impact Measure. Both individually and collectively, Delta's Ratepayer Impact Measure yields benefit cost ratios greater than one which illustrates the long-term benefits outweigh the costs of the program.

Delta considers promotion of energy efficiency and conservation to be an important part of its corporate strategic plan, and a key component of achieving this strategic objective is our CEP. With the Ratepayer Impact Measure yielding a benefit cost ratio greater than one, the program does not disadvantage any class of customers, and Delta believes the CEP program should be allowed to continue as designed. However, if the Commission orders that the CEP rate be

reduced or eliminated prospectively, the Company requests the option, at its discretion, to continue a similar rebate program on its own.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

2. Aside from the Home Energy Assistance Program, explain whether any of the other Conservation/Energy Efficiency Programs are targeted specially towards low-income customers.

Response:

Delta offers an Energy Assistance Program (EAP), in which residential customers contribute $0.20 per month and Delta contributes $30,000 annually and such proceeds, totaling approximately $102,000, fund a bill credit to enrolled low-income customers. The EAP is available to eligible residential customers in the Company's service territory subject to enrollment through local community action agencies and depending upon available funding. Delta also has a WinterCare program where customers may voluntarily contribute amounts which go towards assisting low-income customers.

While the CEP does not target any particular segment of Delta's customer base, the CEP does give low-income customers a tool that they might not otherwise have to reduce their monthly bills. Higher efficiency appliances will reduce consumption, and thus lower gas bills. Higher income customers can afford to buy these more expensive higher efficiency appliances, and thus receive the future benefit of lower gas bills. The rebates received by CEP may make the difference as to whether a low-income customer can afford to buy the more efficient appliance to reduce their subsequent bills.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

3. Provide support as to why Delta should continue its Conservation/Energy Efficiency Program given that the current net resource savings is negative.

Response:

The calculation of net resource savings is most similar to the Total Resource Cost Test performed as part of the California Standard Tests. However, neither of these calculations take into account the overall impact the CEP has on the customer rates. Delta believes the Rate Payer Impact test is a better gauge to determine the impact the CEP program has on its customers. Although the net resources savings is negative, Delta believes the CEP should continue because the Rate Payer Impact test yields a cost benefit ratio greater than one.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

4. Explain why Delta believes it should continue its Conservation/Energy Efficiency Program, given the declining offerings of Demand Side Management programs by electric utilities in Delta's service territory.

Response:

As stated in the response to Item 1, Delta considers promotion of energy efficiency and conservation to be an important part of its corporate strategic plan, and a key component of achieving this strategic objective is our CEP. Although there have been declining offerings of Demand Side Management programs by electric utilities in Delta's service territory, the Ratepayer Impact Measure yields a benefit cost ratio greater than one. As such, the program does not disadvantage any class of customers. Delta believes the CEP program should be allowed to continue as designed. However, if the Commission orders that the CEP rate be reduced or eliminated prospectively, the Company requests the option, at its discretion, to continue a similar rebate program on its own.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

5. Provide the number of participants and actual program costs to date for 2018 individually for the Furnace Rebate Program, the Water Heater Program, and the Energy Audit Program, and for Delta's Demand Side Management program as a whole.

Response:

Exhibit D provides the number of participants and program costs from November 1, 2017 through May 25, 2018 for the Furnace Rebate Program, the Water Heater Program, and CEP as a whole. There have been no energy audits performed in 2018 (November 1, 2017 to date), and due to lack of participation, the Company does not wish to continue the Energy Audit Program. Delta has always considered and operated this suite of programs singularly as one program.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
CASE NO. 2018-00029

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
DATED MAY 25, 2018

6. Provide the number of participants and estimated program costs for the Furnace Rebate Program, the Water Heater Program, and the Energy Audit Program, and for Delta's Demand Side Management program as a whole, for those customers that have applied for but have not received a rebate, audit, or replacement furnace.

Response:

Exhibit E provides the number of participants and program costs from November 1, 2017 through May 25, 2018 for the Furnace Rebate Program, the Water Heater Program, and CEP as a whole for those customers who have applied for but have not received a rebate. There have been no energy audits performed in 2018 (November 1, 2017 to date), and Delta does not have a program which provides replacement furnaces. Delta has always considered and operated this suite of programs singularly as one program.

Sponsoring Witness:

Jennifer Lowery Croft

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

$$NPV_P = B_P - C_P$$

B_P =	$	3,925,709
C_P =		2,632,911
NPV_P =	**$**	**1,292,798**

Benefit-Cost Ratio **1.49**

Conclusion:

As the net present value is greater than zero, the program will benefit the participants.

Where:

NPV_P = Net present value to all participants
B_P = NPV of benefit to all participants
C_P = NPV of cost to all participants

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

BR_t = Bill reductions in year t
BI_t = Bill increases in year t
INC_t = Incentives paid to the participant by the Utility
PC_t = Participant costs in year t, which include incremental captial costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

t	BR_t	INC_t	B_P
1	29,817	125,800	155,617
2	60,349	125,800	186,149
3	91,609	125,800	217,409
4	123,612	125,800	249,412
5	156,369	125,800	282,169
6	189,894	125,800	315,694
7	224,202	125,800	350,002
8	259,305	125,800	385,105
9	295,219	125,800	421,019
10	331,958	125,800	457,758
11	369,535	125,800	495,335
12	407,967	125,800	533,767
13	447,268	125,800	573,068
14	487,453	125,800	613,253
15	528,538	125,800	654,338
16	570,539	125,800	696,339
17	613,472	125,800	739,272
18	657,354	125,800	783,154
19	702,200	125,800	828,000
20	748,028	125,800	873,828
	7,294,688	2,516,000	9,810,688

7.970% Discount Rate

$3,925,709 NPV

BR_t = Bill reductions in year t
INC_t = Incentives paid to the participant by the Utility

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

BR_t = Bill reductions in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost*	(3) Distribution Charge	(4) (2) + (3) Combined Rate	(1) x (4) BR_t
1	32,699	$ 0.480	$ 0.432	$ 0.91	$ 29,817
2	65,398	$ 0.486	$ 0.437	$ 0.92	$ 60,349
3	98,097	$ 0.492	$ 0.442	$ 0.93	$ 91,609
4	130,796	$ 0.497	$ 0.448	$ 0.95	$ 123,612
5	163,495	$ 0.503	$ 0.453	$ 0.96	$ 156,369
6	196,194	$ 0.509	$ 0.458	$ 0.97	$ 189,894
7	228,893	$ 0.516	$ 0.464	$ 0.98	$ 224,202
8	261,592	$ 0.522	$ 0.469	$ 0.99	$ 259,305
9	294,291	$ 0.528	$ 0.475	$ 1.00	$ 295,219
10	326,990	$ 0.534	$ 0.481	$ 1.02	$ 331,958
11	359,689	$ 0.541	$ 0.487	$ 1.03	$ 369,535
12	392,388	$ 0.547	$ 0.492	$ 1.04	$ 407,967
13	425,087	$ 0.554	$ 0.498	$ 1.05	$ 447,268
14	457,786	$ 0.561	$ 0.504	$ 1.06	$ 487,453
15	490,485	$ 0.567	$ 0.510	$ 1.08	$ 528,538
16	523,184	$ 0.574	$ 0.516	$ 1.09	$ 570,539
17	555,883	$ 0.581	$ 0.523	$ 1.10	$ 613,472
18	588,582	$ 0.588	$ 0.529	$ 1.12	$ 657,354
19	621,281	$ 0.595	$ 0.535	$ 1.13	$ 702,200
20	653,980	$ 0.602	$ 0.542	$ 1.14	$ 748,028
					$ 7,294,688

(1) Total Ccf savings, based on participation levels in program year 2017. Ccf conserved are cummulative.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook".

(3) Distribution charge for residential customers is base rate per Ccf. Scheduled per RIM test.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

INC_t = Incentives paid to the participant by the Utility, for t = 1

t	(1) INC_t
1	125,800
2	125,800
3	125,800
4	125,800
5	125,800
6	125,800
7	125,800
8	125,800
9	125,800
10	125,800
11	125,800
12	125,800
13	125,800
14	125,800
15	125,800
16	125,800
17	125,800
18	125,800
19	125,800
20	125,800
	2,516,000

(1) Obtained from CEP filing, Schedule A, for year 2017 based on actual participation levels at rebate amounts, per unit

Note: Rebates are given to participant in the year they elect to participate.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

t	(1) BI_t	(2) PC_t	(1) + (2) C_P
1	2,754	388,180	390,934
2	2,992	388,180	391,172
3	3,230	388,180	391,410
4	3,467	388,180	391,647
5	3,705	388,180	391,885
6	3,943	388,180	392,123
7	4,181	388,180	392,361
8	4,418	388,180	392,598
9	4,656	388,180	392,836
10	4,894	388,180	393,074
11	5,132	388,180	393,312
12	5,369	388,180	393,549
13	5,607	388,180	393,787
14	5,845	388,180	394,025
15	6,083	388,180	394,263
16	6,320	388,180	394,500
17	6,558	388,180	394,738
18	6,796	388,180	394,976
19	7,034	388,180	395,214
20	7,271	388,180	395,451
	100,255	7,763,600	7,863,855

7.970% Discount Rate

$2,632,911 NPV

BI_t = Bill increases in year t

PC_t = Participant costs in year t, which include incremental capital costs

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

BI_t = PF x CEPRC

t	(1) CEPCR	(2) CEPLS	(3) CEPI	(4) (1) + (2) + (3) CEPRC	(5) PF	(4) x (5) BI_t
1	149,448	14,121	-	163,569	0.0168	2,754
2	163,569	14,121	-	177,690	0.0168	2,992
3	177,690	14,121	-	191,811	0.0168	3,230
4	191,811	14,121	-	205,932	0.0168	3,467
5	205,932	14,121	-	220,053	0.0168	3,705
6	220,053	14,121	-	234,174	0.0168	3,943
7	234,174	14,121	-	248,295	0.0168	4,181
8	248,295	14,121	-	262,416	0.0168	4,418
9	262,416	14,121	-	276,537	0.0168	4,656
10	276,537	14,121	-	290,658	0.0168	4,894
11	290,658	14,121	-	304,779	0.0168	5,132
12	304,779	14,121	-	318,900	0.0168	5,369
13	318,900	14,121	-	333,021	0.0168	5,607
14	333,021	14,121	-	347,142	0.0168	5,845
15	347,142	14,121	-	361,263	0.0168	6,083
16	361,263	14,121	-	375,384	0.0168	6,320
17	375,384	14,121	-	389,505	0.0168	6,558
18	389,505	14,121	-	403,626	0.0168	6,796
19	403,626	14,121	-	417,747	0.0168	7,034
20	417,747	14,121	-	431,868	0.0168	7,271
	5,671,953	282,420	-	5,954,373		100,255

(1) - (3) Represents the individual components which comprise the CEP cost recovery. Amounts for year one are based on the 2017 program and actual participation.

For further explanation on the calculations behind (1) - (3) see the proposed tariff included with the filing requirements for Case 2018-00029.

(1) CEPCR represents the program cost recovery of expenses for 2017. As noted this analysis is for a single year of participation, therefore the CEPCR is recovered where t=1.

(2) CEPLS represents the lost sales attributable to participation in the CEP. Lost sales for a given year are recovered annually through the CEP mechanism until the next general rate case when rates can be reset.

(3) CEPI represents the incentive earned by the company based on the conservation in 2017. As noted this analysis is for a single year of participation, therefore the CEPI is recovered where t=1.

(5) BI_t represents the impact of increased rates on the program participants. Since the CEPRC is recovered from all residential customers, a factor was applied to determine the amount of impact to the CEP participants. This is a ratio of participants to the number of residential customers as of 10/31 of 2017 program year.

t	A	B	A/B
1	479	28,449	0.01684

A Program participants
B Total residential customers
A/B Participant Factor (PF)

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Participant Test

PC_t = Participant costs for t = 1

(1) (2)

t	PC_t
1	388,180
2	388,180
3	388,180
4	388,180
5	388,180
6	388,180
7	388,180
8	388,180
9	388,180
10	388,180
11	388,180
12	388,180
13	388,180
14	388,180
15	388,180
16	388,180
17	388,180
18	388,180
19	388,180
20	388,180
	7,763,600

(1) Based on actual participation levels in 2017 of the CEP

(2)

A. High Efficiency Heating Savings	**Incremental Cost**
1. High Efficiency Forced Air Furnaces	$ 1,314
2. High Efficiency Dual Fuel Units	1,314
3. High Efficiency Gas Space Heating	143
4. High Efficiency Gas Logs/Fireplaces	143

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Program Administrator Cost Test

$NPV_{pa} = B_{pa} - C_{pa}$

B_{pa}	=	$	1,414,888
C_{pa}	=		1,331,608
NPV_{pa}	**=**	**$**	**83,280**

Benefit-Cost Ratio **1.06**

Conclusion:

As the net present value is greater than zero, the program would decrease costs to the utility.

Where:

NPV_{pa} = Net present value of total cost of the resource
B_{pa} = NPV of benefits of the program
C_{pa} = NPV of costs of the programs

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Program Administrator Cost Test

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	UAC_t	B_{pa}
1	$ 15,696	$ 15,696
2	$ 31,768	$ 31,768
3	$ 48,223	$ 48,223
4	$ 65,069	$ 65,069
5	$ 82,313	$ 82,313
6	$ 99,961	$ 99,961
7	$ 118,020	$ 118,020
8	$ 136,499	$ 136,499
9	$ 155,404	$ 155,404
10	$ 174,743	$ 174,743
11	$ 194,524	$ 194,524
12	$ 214,755	$ 214,755
13	$ 235,443	$ 235,443
14	$ 256,596	$ 256,596
15	$ 278,224	$ 278,224
16	$ 300,333	$ 300,333
17	$ 322,933	$ 322,933
18	$ 346,033	$ 346,033
19	$ 369,640	$ 369,640
20	$ 393,763	$ 393,763
		$ 3,839,940

7.970% Discount Rate

$1,414,888 NPV

UAC_t = Utility avoided supply costs in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Program Administrator Cost Test

UAC_t = Utility avoided supply costs in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost	(1) x (2) UAC_t
1	32,699	$ 0.480	$ 15,696
2	65,398	$ 0.486	$ 31,768
3	98,097	$ 0.492	$ 48,223
4	130,796	$ 0.497	$ 65,069
5	163,495	$ 0.503	$ 82,313
6	196,194	$ 0.509	$ 99,961
7	228,893	$ 0.516	$ 118,020
8	261,592	$ 0.522	$ 136,499
9	294,291	$ 0.528	$ 155,404
10	326,990	$ 0.534	$ 174,743
11	359,689	$ 0.541	$ 194,524
12	392,388	$ 0.547	$ 214,755
13	425,087	$ 0.554	$ 235,443
14	457,786	$ 0.561	$ 256,596
15	490,485	$ 0.567	$ 278,224
16	523,184	$ 0.574	$ 300,333
17	555,883	$ 0.581	$ 322,933
18	588,582	$ 0.588	$ 346,033
19	621,281	$ 0.595	$ 369,640
20	653,980	$ 0.602	$ 393,763
			$ 3,839,940

(1) Total projected Ccf savings, based on participation levels in program year 2017.
Ccf conserved continue to be saved year after year.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook"

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Program Administrator Cost Test

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) INC_t	(3) UIC_t	C_{pa}
1	9,527	125,800	-	135,327
2	9,527	125,800	-	135,327
3	9,527	125,800	-	135,327
4	9,527	125,800	-	135,327
5	9,527	125,800	-	135,327
6	9,527	125,800	-	135,327
7	9,527	125,800	-	135,327
8	9,527	125,800	-	135,327
9	9,527	125,800	-	135,327
10	9,527	125,800	-	135,327
11	9,527	125,800	-	135,327
12	9,527	125,800	-	135,327
13	9,527	125,800	-	135,327
14	9,527	125,800	-	135,327
15	9,527	125,800	-	135,327
16	9,527	125,800	-	135,327
17	9,527	125,800	-	135,327
18	9,527	125,800	-	135,327
19	9,527	125,800	-	135,327
20	9,527	125,800	-	135,327
	190,543	2,516,000	-	2,706,543

7.970% Discount Rate

$1,331,608 NPV

PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

(1) Program costs scheduled from PRC_t which was calculated for the RIM Test

(2) Incentives scheduled from INC_t which was calculated for the Participant test

(3) No known increased supply costs as a result of operating the CEP

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Ratepayer Impact Measure (RIM) Test

$$NPV_{RIM} = B_{RIM} - C_{RIM}$$

B_{RIM} =	$	8,857,468
C_{RIM} =		2,449,474
NPV_{RIM} =	**$**	**6,407,994**

Benefit-Cost Ratio **3.62**

Conclusion:

As the net present value is greater than zero, the program will benefit rates and bills.

Where:

NPV_{RIM} = Net present value levels
B_{RIM} = Benefits to rate levels or customer bills
C_{RIM} = Costs to rate levels or customer bills

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

$$C_{RIM} = \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
RG_t = Revenue gain from increased sales in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Ratepayer Impact Measure (RIM) Test

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

t	RG_t	B_{RIM}
1	105,575	105,575
2	212,242	212,242
3	320,021	320,021
4	428,932	428,932
5	538,995	538,995
6	650,231	650,231
7	762,660	762,660
8	876,304	876,304
9	991,185	991,185
10	1,107,325	1,107,325
11	1,224,745	1,224,745
12	1,343,469	1,343,469
13	1,463,520	1,463,520
14	1,584,920	1,584,920
15	1,707,694	1,707,694
16	1,831,866	1,831,866
17	1,957,461	1,957,461
18	2,084,502	2,084,502
19	2,213,017	2,213,017
20	2,343,029	2,343,029
	23,747,695	23,747,695

7.970% Discount Rate

$8,857,468 NPV

UAC_t = Utility avoided supply costs in year t
RG_t = Revenue gain from increased sales in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Ratepayer Impact Measure (RIM) Test

RG_t = Revenue gain from increased sales in year t

NOTE: In determining revenue gain, Delta assumed 50% of customers would switch to an alternative fuel if not participating in this program.

	(1)	(2)	(3)	(4)	(((1)x(2)x12 months) + ((1)x(3) x(4))) x 50%
t	**Cumulative Participants**	**Monthly Customer Charge**	**Average Usage**	**Volumetric Rate**	**RG_t**
1	479	20.90	440	0.432	105,575
2	958	20.90	440	0.437	212,242
3	1,437	20.90	440	0.442	320,021
4	1,916	20.90	440	0.448	428,932
5	2,395	20.90	440	0.453	538,995
6	2,874	20.90	440	0.458	650,231
7	3,353	20.90	440	0.464	762,660
8	3,832	20.90	440	0.469	876,304
9	4,311	20.90	440	0.475	991,185
10	4,790	20.90	440	0.481	1,107,325
11	5,269	20.90	440	0.487	1,224,745
12	5,748	20.90	440	0.492	1,343,469
13	6,227	20.90	440	0.498	1,463,520
14	6,706	20.90	440	0.504	1,584,920
15	7,185	20.90	440	0.510	1,707,694
16	7,664	20.90	440	0.516	1,831,866
17	8,143	20.90	440	0.523	1,957,461
18	8,622	20.90	440	0.529	2,084,502
19	9,101	20.90	440	0.535	2,213,017
20	9,580	20.90	440	0.542	2,343,029
					23,747,695

(1) Based on program participation in program year 2017. Future years include cumulative prior years participation.

(2) Monthly customer charge per current approved tariffs

(3) Average residental customer usage in 2017 in Ccf

(4) Base rate per Ccf per current approved tariffs adjusted for 1.2% to account for future rate cases.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Ratepayer Impact Measure (RIM) Test

$$C_{RIM} \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

t	(1) UIC_t	(2) RL_t	(3) PRC_t	(4) INC_t	(1) + (2) C_{RIM}
1	-	14,121	9,527	125,800	149,448
2	-	28,242	9,527	125,800	163,569
3	-	42,363	9,527	125,800	177,690
4	-	56,484	9,527	125,800	191,811
5	-	70,605	9,527	125,800	205,932
6	-	84,726	9,527	125,800	220,053
7	-	98,847	9,527	125,800	234,174
8	-	112,968	9,527	125,800	248,295
9	-	127,089	9,527	125,800	262,416
10	-	141,210	9,527	125,800	276,537
11	-	155,331	9,527	125,800	290,658
12	-	169,452	9,527	125,800	304,779
13	-	183,573	9,527	125,800	318,900
14	-	197,694	9,527	125,800	333,021
15	-	211,815	9,527	125,800	347,142
16	-	225,936	9,527	125,800	361,263
17	-	240,057	9,527	125,800	375,384
18	-	254,178	9,527	125,800	389,505
19	-	268,299	9,527	125,800	403,626
20	-	282,420	9,527	125,800	417,747
	-	2,965,410	190,543	2,516,000	5,671,953

7.970% Discount Rate

$2,449,474 NPV

UIC_t = Utility increased supply costs in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

(1) No known increased supply costs

(2) Lost sales based on 2017 CEP filing

(3) Program administrator costs for year t represent program cost recovery expenses, based on 2017 CEP filing less incentives paid to participants (column (4) herein).

(4) Scheduled per calculation performed for Participant Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Total Resource Cost (TRC) Test

$$NPV_{TRC} = B_{TRC} - C_{TRC}$$

B_{TRC} =	$	1,414,888
C_{TRC} =		3,913,407
NPV_{TRC} =	**$**	**(2,498,519)**

Benefit-Cost Ratio **0.36**

Conclusion:

As the net present value is less than zero, the program is a more expensive resource than the supply option upon which the marginal costs are based.

Where:

NPV_{TRC} = Net present value of total cost of the resource
B_{TRC} = NPV of benefits of the program
C_{TRC} = NPV of costs of the programs

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Total Resource Cost (TRC) Test

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	(1) UAC_t	B_{TRC}
1	15,696	15,696
2	31,768	31,768
3	48,223	48,223
4	65,069	65,069
5	82,313	82,313
6	99,961	99,961
7	118,020	118,020
8	136,499	136,499
9	155,404	155,404
10	174,743	174,743
11	194,524	194,524
12	214,755	214,755
13	235,443	235,443
14	256,596	256,596
15	278,224	278,224
16	300,333	300,333
17	322,933	322,933
18	346,033	346,033
19	369,640	369,640
20	393,763	393,763
	3,839,940	3,839,940

7.970% Discount Rate

$1,414,888 NPV

UAC_t = Utility avoided supply costs in year t

(1) Scheduled per calculation performed for Program Administrator Cost Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Furnace Rebate Program
Total Resource Cost (TRC) Test

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) PC_t	(3) UIC_t	C_{TRC}
1	9,527	388,180	-	397,707
2	9,527	388,180	-	397,707
3	9,527	388,180	-	397,707
4	9,527	388,180	-	397,707
5	9,527	388,180	-	397,707
6	9,527	388,180	-	397,707
7	9,527	388,180	-	397,707
8	9,527	388,180	-	397,707
9	9,527	388,180	-	397,707
10	9,527	388,180	-	397,707
11	9,527	388,180	-	397,707
12	9,527	388,180	-	397,707
13	9,527	388,180	-	397,707
14	9,527	388,180	-	397,707
15	9,527	388,180	-	397,707
16	9,527	388,180	-	397,707
17	9,527	388,180	-	397,707
18	9,527	388,180	-	397,707
19	9,527	388,180	-	397,707
20	9,527	388,180	-	397,707
	190,543	7,763,600	-	7,954,143

7.970% Discount Rate

$3,913,407 NPV

PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs
UIC_t = Utility increased supply costs in year t

(1) Scheduled per calculation performed for RIM Test

(2) Represents net participant costs which is the incremental cost to the participant of purchasing a high-efficiency appliance versus one with standard efficiency. Amount scheduled from PC_t from the Participant Test.

(3) No known increased supply costs as a result of operating the CEP

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

$$NPV_P = B_P - C_P$$

B_P =	$	1,228,316
C_P =		2,145,934
NPV_P =	**$**	**(917,618)**

Benefit-Cost Ratio **0.57**

Conclusion:

As the net present value is less than zero, the program will not benefit the participants.

Where:

NPV_P = Net present value to all participants
B_P = NPV of benefit to all participants
C_P = NPV of cost to all participants

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

BR_t = Bill reductions in year t
BI_t = Bill increases in year t
INC_t = Incentives paid to the participant by the Utility
PC_t = Participant costs in year t, which include incremental captial costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

t	BR_t	INC_t	B_P
1	9,811	34,950	44,761
2	19,857	34,950	54,807
3	30,143	34,950	65,093
4	40,673	34,950	75,623
5	51,452	34,950	86,402
6	62,483	34,950	97,433
7	73,771	34,950	108,721
8	85,322	34,950	120,272
9	97,139	34,950	132,089
10	109,228	34,950	144,178
11	121,592	34,950	156,542
12	134,238	34,950	169,188
13	147,169	34,950	182,119
14	160,392	34,950	195,342
15	173,911	34,950	208,861
16	187,731	34,950	222,681
17	201,857	34,950	236,807
18	216,296	34,950	251,246
19	231,052	34,950	266,002
20	246,131	34,950	281,081
	2,400,248	699,000	3,099,248

7.970% Discount Rate

$1,228,316 NPV

BR_t = Bill reductions in year t
INC_t = Incentives paid to the participant by the Utility

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

BR_t = Bill reductions in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost*	(3) Distribution Charge	(4) (2) + (3) Combined Rate	(1) x (4) BR_t
1	10,759	$ 0.480	$ 0.432	$ 0.91	$ 9,811
2	21,519	$ 0.486	$ 0.437	$ 0.92	$ 19,857
3	32,278	$ 0.492	$ 0.442	$ 0.93	$ 30,143
4	43,037	$ 0.497	$ 0.448	$ 0.95	$ 40,673
5	53,797	$ 0.503	$ 0.453	$ 0.96	$ 51,452
6	64,556	$ 0.509	$ 0.458	$ 0.97	$ 62,483
7	75,315	$ 0.516	$ 0.464	$ 0.98	$ 73,771
8	86,074	$ 0.522	$ 0.469	$ 0.99	$ 85,322
9	96,834	$ 0.528	$ 0.475	$ 1.00	$ 97,139
10	107,593	$ 0.534	$ 0.481	$ 1.02	$ 109,228
11	118,352	$ 0.541	$ 0.487	$ 1.03	$ 121,592
12	129,112	$ 0.547	$ 0.492	$ 1.04	$ 134,238
13	139,871	$ 0.554	$ 0.498	$ 1.05	$ 147,169
14	150,630	$ 0.561	$ 0.504	$ 1.06	$ 160,392
15	161,390	$ 0.567	$ 0.510	$ 1.08	$ 173,911
16	172,149	$ 0.574	$ 0.516	$ 1.09	$ 187,731
17	182,908	$ 0.581	$ 0.523	$ 1.10	$ 201,857
18	193,667	$ 0.588	$ 0.529	$ 1.12	$ 216,296
19	204,427	$ 0.595	$ 0.535	$ 1.13	$ 231,052
20	215,186	$ 0.602	$ 0.542	$ 1.14	$ 246,131
					$ 2,400,248

(1) Total Ccf savings, based on participation levels in program year 2017. Ccf conserved are cummulative.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook".

(3) Distribution charge for residential customers is base rate per Ccf. Scheduled per RIM test.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

INC_t = Incentives paid to the participant by the Utility, for t = 1

t	(1) INC_t
1	34,950
2	34,950
3	34,950
4	34,950
5	34,950
6	34,950
7	34,950
8	34,950
9	34,950
10	34,950
11	34,950
12	34,950
13	34,950
14	34,950
15	34,950
16	34,950
17	34,950
18	34,950
19	34,950
20	34,950
	699,000

(1) Obtained from CEP filing, Schedule A, for year 2017 based on actual participation levels at rebate amounts, per unit

Note: Rebates are given to participant in the year they elect to participate.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

t	(1) BI_t	(2) PC_t	(1) + (2) C_P
1	226	319,066	319,292
2	248	319,066	319,314
3	271	319,066	319,337
4	293	319,066	319,359
5	315	319,066	319,381
6	338	319,066	319,404
7	360	319,066	319,426
8	382	319,066	319,448
9	405	319,066	319,471
10	427	319,066	319,493
11	450	319,066	319,516
12	472	319,066	319,538
13	494	319,066	319,560
14	517	319,066	319,583
15	539	319,066	319,605
16	561	319,066	319,627
17	584	319,066	319,650
18	606	319,066	319,672
19	629	319,066	319,695
20	651	319,066	319,717
	8,768	6,381,320	6,390,088

7.970% Discount Rate

$2,145,934 NPV

BI_t = Bill increases in year t

PC_t = Participant costs in year t, which include incremental capital costs

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

BI_t = **PF x CEPRC**

t	(1) CEPCR	(2) CEPLS	(3) CEPI	(4) (1) + (2) + (3) CEPRC	(5) PF	(4) x (5) BI_t
1	42,244	4,647	-	46,891	0.0048	226
2	46,891	4,647	-	51,538	0.0048	248
3	51,538	4,647	-	56,185	0.0048	271
4	56,185	4,647	-	60,832	0.0048	293
5	60,832	4,647	-	65,479	0.0048	315
6	65,479	4,647	-	70,126	0.0048	338
7	70,126	4,647	-	74,773	0.0048	360
8	74,773	4,647	-	79,420	0.0048	382
9	79,420	4,647	-	84,067	0.0048	405
10	84,067	4,647	-	88,714	0.0048	427
11	88,714	4,647	-	93,361	0.0048	450
12	93,361	4,647	-	98,008	0.0048	472
13	98,008	4,647	-	102,655	0.0048	494
14	102,655	4,647	-	107,302	0.0048	517
15	107,302	4,647	-	111,949	0.0048	539
16	111,949	4,647	-	116,596	0.0048	561
17	116,596	4,647	-	121,243	0.0048	584
18	121,243	4,647	-	125,890	0.0048	606
19	125,890	4,647	-	130,537	0.0048	629
20	130,537	4,647	-	135,184	0.0048	651
	1,727,807	92,940	-	1,820,747		8,768

(1) - (3) Represents the individual components which comprise the CEP cost recovery. Amounts for year one are based on the 2017 program and actual participation.

For further explanation on the calculations behind (1) - (3) see the proposed tariff included with the filing requirements for Case 2018-00029.

(1) CEPCR represents the program cost recovery of expenses for 2017. As noted this analysis is for a single year of participation, therefore the CEPCR is recovered where t=1.

(2) CEPLS represents the lost sales attributable to participation in the CEP. Lost sales for a given year are recovered annually through the CEP mechanism until the next general rate case when rates can be reset.

(3) CEPI represents the incentive earned by the company based on the conservation in 2017. As noted this analysis is for a single year of participation, therefore the CEPI is recovered where t=1.

(5) BI_t represents the impact of increased rates on the program participants. Since the CEPRC is recovered from all residential customers, a factor was applied to determine the amount of impact to the CEP participants. This is a ratio of participants to the number of residential customers as of 10/31 of 2017 program year.

t	A	B	A/B
1	137	28,449	0.00482

A Program participants
B Total residential customers
A/B Participant Factor (PF)

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Participant Test

PC_t = Participant costs for t = 1

	(1) (2)
t	**PC_t**
1	319,066
2	319,066
3	319,066
4	319,066
5	319,066
6	319,066
7	319,066
8	319,066
9	319,066
10	319,066
11	319,066
12	319,066
13	319,066
14	319,066
15	319,066
16	319,066
17	319,066
18	319,066
19	319,066
20	319,066
	6,381,320

(1) Based on actual participation levels in 2017 of the CEP

(2) **B. High Efficiency Water Heating Savings**	**Incremental Cost**
1. High Efficiency Holding Tank Models	$ 1,710
2. High Efficiency Power Vent Models	1,710
3. High Efficiency On-Demand Models	2,957

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Program Administrator Cost Test

$NPV_{pa} = B_{pa} - C_{pa}$

B_{pa}	=	$	465,556
C_{pa}	=		369,950
NPV_{pa}	**=**	**$**	**95,606**

Benefit-Cost Ratio **1.26**

Conclusion:

As the net present value is greater than zero, the program would decrease costs to the utility.

Where:

NPV_{pa} = Net present value of total cost of the resource
B_{pa} = NPV of benefits of the program
C_{pa} = NPV of costs of the programs

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Program Administrator Cost Test

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	UAC_t	B_{pa}
1	$ 5,164	$ 5,164
2	$ 10,453	$ 10,453
3	$ 15,867	$ 15,867
4	$ 21,410	$ 21,410
5	$ 27,084	$ 27,084
6	$ 32,891	$ 32,891
7	$ 38,833	$ 38,833
8	$ 44,914	$ 44,914
9	$ 51,134	$ 51,134
10	$ 57,498	$ 57,498
11	$ 64,006	$ 64,006
12	$ 70,663	$ 70,663
13	$ 77,470	$ 77,470
14	$ 84,431	$ 84,431
15	$ 91,547	$ 91,547
16	$ 98,822	$ 98,822
17	$ 106,258	$ 106,258
18	$ 113,859	$ 113,859
19	$ 121,626	$ 121,626
20	$ 129,564	$ 129,564
		$ 1,263,496

7.970% Discount Rate

$465,556 NPV

UAC_t = Utility avoided supply costs in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Program Administrator Cost Test

UAC_t = Utility avoided supply costs in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost	(1) x (2) UAC_t
1	10,759	$ 0.480	$ 5,164
2	21,519	$ 0.486	$ 10,453
3	32,278	$ 0.492	$ 15,867
4	43,037	$ 0.497	$ 21,410
5	53,797	$ 0.503	$ 27,084
6	64,556	$ 0.509	$ 32,891
7	75,315	$ 0.516	$ 38,833
8	86,074	$ 0.522	$ 44,914
9	96,834	$ 0.528	$ 51,134
10	107,593	$ 0.534	$ 57,498
11	118,352	$ 0.541	$ 64,006
12	129,112	$ 0.547	$ 70,663
13	139,871	$ 0.554	$ 77,470
14	150,630	$ 0.561	$ 84,431
15	161,390	$ 0.567	$ 91,547
16	172,149	$ 0.574	$ 98,822
17	182,908	$ 0.581	$ 106,258
18	193,667	$ 0.588	$ 113,859
19	204,427	$ 0.595	$ 121,626
20	215,186	$ 0.602	$ 129,564
			$ 1,263,496

(1) Total projected Ccf savings, based on participation levels in program year 2017.
Ccf conserved continue to be saved year after year.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook"

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Program Administrator Cost Test

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) INC_t	(3) UIC_t	C_{pa}
1	2,647	34,950	-	37,597
2	2,647	34,950	-	37,597
3	2,647	34,950	-	37,597
4	2,647	34,950	-	37,597
5	2,647	34,950	-	37,597
6	2,647	34,950	-	37,597
7	2,647	34,950	-	37,597
8	2,647	34,950	-	37,597
9	2,647	34,950	-	37,597
10	2,647	34,950	-	37,597
11	2,647	34,950	-	37,597
12	2,647	34,950	-	37,597
13	2,647	34,950	-	37,597
14	2,647	34,950	-	37,597
15	2,647	34,950	-	37,597
16	2,647	34,950	-	37,597
17	2,647	34,950	-	37,597
18	2,647	34,950	-	37,597
19	2,647	34,950	-	37,597
20	2,647	34,950	-	37,597
	52,937	699,000	-	751,937

7.970% Discount Rate

$369,950 NPV

PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

(1) Program costs scheduled from PRC_t which was calculated for the RIM Test

(2) Incentives scheduled from INC_t which was calculated for the Participant test

(3) No known increased supply costs as a result of operating the CEP

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Ratepayer Impact Measure (RIM) Test

$$NPV_{RIM} = B_{RIM} - C_{RIM}$$

B_{RIM} =	$	2,533,347
C_{RIM} =		737,822
NPV_{RIM} =	**$**	**1,795,525**

Benefit-Cost Ratio **3.43**

Conclusion:

As the net present value is greater than zero, the program will benefit rates and bills.

Where:

NPV_{RIM} = Net present value levels
B_{RIM} = Benefits to rate levels or customer bills
C_{RIM} = Costs to rate levels or customer bills

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

$$C_{RIM} = \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
RG_t = Revenue gain from increased sales in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Ratepayer Impact Measure (RIM) Test

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

t	RG_t	B_{RIM}
1	30,196	30,196
2	60,704	60,704
3	91,530	91,530
4	122,680	122,680
5	154,159	154,159
6	185,974	185,974
7	218,130	218,130
8	250,634	250,634
9	283,491	283,491
10	316,709	316,709
11	350,293	350,293
12	384,249	384,249
13	418,585	418,585
14	453,307	453,307
15	488,422	488,422
16	523,937	523,937
17	559,858	559,858
18	596,194	596,194
19	632,950	632,950
20	670,136	670,136
	6,792,138	6,792,138

7.970% Discount Rate

$2,533,347 NPV

UAC_t = Utility avoided supply costs in year t
RG_t = Revenue gain from increased sales in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Ratepayer Impact Measure (RIM) Test

RG_t = Revenue gain from increased sales in year t

NOTE: In determining revenue gain, Delta assumed 50% of customers would switch to an alternative fuel if not participating in this program.

	(1)	(2)	(3)	(4)	(((1)x(2)x12 months) + ((1)x(3)x(4))) x 50%
t	**Cumulative Participants**	**Monthly Customer Charge**	**Average Usage**	**Volumetric Rate**	**RG_t**
1	137	20.90	440	0.432	30,196
2	274	20.90	440	0.437	60,704
3	411	20.90	440	0.442	91,530
4	548	20.90	440	0.448	122,680
5	685	20.90	440	0.453	154,159
6	822	20.90	440	0.458	185,974
7	959	20.90	440	0.464	218,130
8	1,096	20.90	440	0.469	250,634
9	1,233	20.90	440	0.475	283,491
10	1,370	20.90	440	0.481	316,709
11	1,507	20.90	440	0.487	350,293
12	1,644	20.90	440	0.492	384,249
13	1,781	20.90	440	0.498	418,585
14	1,918	20.90	440	0.504	453,307
15	2,055	20.90	440	0.510	488,422
16	2,192	20.90	440	0.516	523,937
17	2,329	20.90	440	0.523	559,858
18	2,466	20.90	440	0.529	596,194
19	2,603	20.90	440	0.535	632,950
20	2,740	20.90	440	0.542	670,136
					6,792,138

(1) Based on program participation in program year 2017. Future years include cumulative prior years participation.

(2) Monthly customer charge per current approved tariffs

(3) Average residental customer usage in 2017 in Ccf

(4) Base rate per Ccf per current approved tariffs adjusted for 1.2% to account for future rate cases

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Ratepayer Impact Measure (RIM) Test

$$C_{RIM} \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

t	(1) UIC_t	(2) RL_t	(3) PRC_t	(4) INC_t	(1) + (2) C_{RIM}
1	-	4,647	2,647	34,950	42,244
2	-	9,294	2,647	34,950	46,891
3	-	13,941	2,647	34,950	51,538
4	-	18,588	2,647	34,950	56,185
5	-	23,235	2,647	34,950	60,832
6	-	27,882	2,647	34,950	65,479
7	-	32,529	2,647	34,950	70,126
8	-	37,176	2,647	34,950	74,773
9	-	41,823	2,647	34,950	79,420
10	-	46,470	2,647	34,950	84,067
11	-	51,117	2,647	34,950	88,714
12	-	55,764	2,647	34,950	93,361
13	-	60,411	2,647	34,950	98,008
14	-	65,058	2,647	34,950	102,655
15	-	69,705	2,647	34,950	107,302
16	-	74,352	2,647	34,950	111,949
17	-	78,999	2,647	34,950	116,596
18	-	83,646	2,647	34,950	121,243
19	-	88,293	2,647	34,950	125,890
20	-	92,940	2,647	34,950	130,537
	-	975,870	52,937	699,000	1,727,807

7.970% Discount Rate

$737,822 NPV

UIC_t = Utility increased supply costs in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

(1) No known increased supply costs

(2) Lost sales based on 2017 CEP filing

(3) Program administrator costs for year t represent program cost recovery expenses, based on 2017 CEP filing less incentives paid to participants (column (4) herein).

(4) Scheduled per calculation performed for Participant Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Total Resource Cost (TRC) Test

$$NPV_{TRC} = B_{TRC} - C_{TRC}$$

B_{TRC} =	$	465,556
C_{TRC} =		7,079,037
NPV_{TRC} =	**$**	**(6,613,481)**

Benefit-Cost Ratio **0.07**

Conclusion:

As the net present value is less than zero, the program is a more expensive resource than the supply option upon which the marginal costs are based.

Where:

NPV_{TRC} = Net present value of total cost of the resource
B_{TRC} = NPV of benefits of the program
C_{TRC} = NPV of costs of the programs

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Total Resource Cost (TRC) Test

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	(1) UAC_t	B_{TRC}
1	5,164	5,164
2	10,453	10,453
3	15,867	15,867
4	21,410	21,410
5	27,084	27,084
6	32,891	32,891
7	38,833	38,833
8	44,914	44,914
9	51,134	51,134
10	57,498	57,498
11	64,006	64,006
12	70,663	70,663
13	77,470	77,470
14	84,431	84,431
15	91,547	91,547
16	98,822	98,822
17	106,258	106,258
18	113,859	113,859
19	121,626	121,626
20	129,564	129,564
	1,263,496	1,263,496

7.970% Discount Rate

$465,556 NPV

UAC_t = Utility avoided supply costs in year t

(1) Scheduled per calculation performed for Program Administrator Cost Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Water Heater Program
Total Resource Cost (TRC) Test

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) PC_t	(3) UIC_t	C_{TRC}
1	12,174	707,246	-	719,420
2	12,174	707,246	-	719,420
3	12,174	707,246	-	719,420
4	12,174	707,246	-	719,420
5	12,174	707,246	-	719,420
6	12,174	707,246	-	719,420
7	12,174	707,246	-	719,420
8	12,174	707,246	-	719,420
9	12,174	707,246	-	719,420
10	12,174	707,246	-	719,420
11	12,174	707,246	-	719,420
12	12,174	707,246	-	719,420
13	12,174	707,246	-	719,420
14	12,174	707,246	-	719,420
15	12,174	707,246	-	719,420
16	12,174	707,246	-	719,420
17	12,174	707,246	-	719,420
18	12,174	707,246	-	719,420
19	12,174	707,246	-	719,420
20	12,174	707,246	-	719,420
	121,740	7,072,460	-	7,194,200

7.970% Discount Rate

$7,079,037 NPV

PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs
UIC_t = Utility increased supply costs in year t

(1) Scheduled per calculation performed for RIM Test

(2) Represents net participant costs which is the incremental cost to the participant of purchasing a high-efficiency appliance versus one with standard efficiency. Amount scheduled from PC_t from the Participant Test.

(3) No known increased supply costs as a result of operating the CEP

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

$$NPV_P = B_P - C_P$$

B_P	=	$	5,156,490
C_P	=		4,793,327
NPV_P	**=**	**$**	**363,163**

Benefit-Cost Ratio **1.08**

Conclusion:

As the net present value is greater than zero, the program will benefit the participants.

Where:

NPV_P = Net present value to all participants
B_P = NPV of benefit to all participants
C_P = NPV of cost to all participants

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

BR_t = Bill reductions in year t
BI_t = Bill increases in year t
INC_t = Incentives paid to the participant by the Utility
PC_t = Participant costs in year t, which include incremental captial costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

$$B_P = \sum_{t=1}^{N} \frac{BR_t + INC_t}{(1+d)^{t-1}}$$

t	BR_t	INC_t	B_P
1	39,655	160,750	200,405
2	80,261	160,750	241,011
3	121,837	160,750	282,587
4	164,398	160,750	325,148
5	207,964	160,750	368,714
6	252,551	160,750	413,301
7	298,179	160,750	458,929
8	344,865	160,750	505,615
9	392,629	160,750	553,379
10	441,490	160,750	602,240
11	491,466	160,750	652,216
12	542,579	160,750	703,329
13	594,847	160,750	755,597
14	648,292	160,750	809,042
15	702,934	160,750	863,684
16	758,793	160,750	919,543
17	815,893	160,750	976,643
18	874,253	160,750	1,035,003
19	933,896	160,750	1,094,646
20	994,845	160,750	1,155,595
	9,701,627	3,215,000	12,916,627

7.970% Discount Rate

$5,156,490 NPV

BR_t = Bill reductions in year t
INC_t = Incentives paid to the participant by the Utility

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

BR_t = Bill reductions in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost*	(3) Distribution Charge	(4) (2) + (3) Combined Rate	(1) x (4) BR_t
1	43,488	$ 0.480	$ 0.432	$ 0.91	$ 39,655
2	86,977	$ 0.486	$ 0.437	$ 0.92	$ 80,261
3	130,465	$ 0.492	$ 0.442	$ 0.93	$ 121,837
4	173,953	$ 0.497	$ 0.448	$ 0.95	$ 164,398
5	217,442	$ 0.503	$ 0.453	$ 0.96	$ 207,964
6	260,930	$ 0.509	$ 0.458	$ 0.97	$ 252,551
7	304,418	$ 0.516	$ 0.464	$ 0.98	$ 298,179
8	347,906	$ 0.522	$ 0.469	$ 0.99	$ 344,865
9	391,395	$ 0.528	$ 0.475	$ 1.00	$ 392,629
10	434,883	$ 0.534	$ 0.481	$ 1.02	$ 441,490
11	478,371	$ 0.541	$ 0.487	$ 1.03	$ 491,466
12	521,860	$ 0.547	$ 0.492	$ 1.04	$ 542,579
13	565,348	$ 0.554	$ 0.498	$ 1.05	$ 594,847
14	608,836	$ 0.561	$ 0.504	$ 1.06	$ 648,292
15	652,325	$ 0.567	$ 0.510	$ 1.08	$ 702,934
16	695,813	$ 0.574	$ 0.516	$ 1.09	$ 758,793
17	739,301	$ 0.581	$ 0.523	$ 1.10	$ 815,893
18	782,789	$ 0.588	$ 0.529	$ 1.12	$ 874,253
19	826,278	$ 0.595	$ 0.535	$ 1.13	$ 933,896
20	869,766	$ 0.602	$ 0.542	$ 1.14	$ 994,845
					$ 9,701,627

(1) Total Ccf savings, based on participation levels in program year 2017. Ccf conserved are cummulative.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook".

(3) Distribution charge for residential customers is base rate per Ccf. Scheduled per RIM test.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

INC_t = Incentives paid to the participant by the Utility, for t = 1

t	(1) INC_t
1	160,750
2	160,750
3	160,750
4	160,750
5	160,750
6	160,750
7	160,750
8	160,750
9	160,750
10	160,750
11	160,750
12	160,750
13	160,750
14	160,750
15	160,750
16	160,750
17	160,750
18	160,750
19	160,750
20	160,750
	3,215,000

(1) Obtained from CEP filing, Schedule A, for year 2017 based on actual participation levels at rebate amounts, per unit

Note: Rebates are given to participant in the year they elect to participate.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

$$C_P = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

t	(1) BI_t	(2) PC_t	(1) + (2) C_P
1	4,565	707,246	711,811
2	4,972	707,246	712,218
3	5,380	707,246	712,626
4	5,787	707,246	713,033
5	6,194	707,246	713,440
6	6,602	707,246	713,848
7	7,009	707,246	714,255
8	7,416	707,246	714,662
9	7,824	707,246	715,070
10	8,231	707,246	715,477
11	8,231	707,246	715,477
12	8,231	707,246	715,477
13	8,231	707,246	715,477
14	8,231	707,246	715,477
15	8,231	707,246	715,477
16	8,231	707,246	715,477
17	8,231	707,246	715,477
18	8,231	707,246	715,477
19	8,231	707,246	715,477
20	8,231	707,246	715,477
	146,288	14,144,920	14,291,208

7.970% Discount Rate

$4,793,327 NPV

BI_t = Bill increases in year t

PC_t = Participant costs in year t, which include incremental capital costs

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

BI_t = **PF x CEPRC**

t	(1) CEPCR	(2) CEPLS	(3) CEPI	(4) (1) + (2) + (3) CEPRC	(5) PF	(4) x (5) BI_t
1	191,705	18,781	-	210,486	0.0217	4,565
2	210,486	18,781	-	229,267	0.0217	4,972
3	229,267	18,781	-	248,048	0.0217	5,380
4	248,048	18,781	-	266,829	0.0217	5,787
5	266,829	18,781	-	285,610	0.0217	6,194
6	285,610	18,781	-	304,391	0.0217	6,602
7	304,391	18,781	-	323,172	0.0217	7,009
8	323,172	18,781	-	341,953	0.0217	7,416
9	341,953	18,781	-	360,734	0.0217	7,824
10	360,734	18,781	-	379,515	0.0217	8,231
11	360,734	18,781	-	379,515	0.0217	8,231
12	360,734	18,781	-	379,515	0.0217	8,231
13	360,734	18,781	-	379,515	0.0217	8,231
14	360,734	18,781	-	379,515	0.0217	8,231
15	360,734	18,781	-	379,515	0.0217	8,231
16	360,734	18,781	-	379,515	0.0217	8,231
17	360,734	18,781	-	379,515	0.0217	8,231
18	360,734	18,781	-	379,515	0.0217	8,231
19	360,734	18,781	-	379,515	0.0217	8,231
20	360,734	18,781	-	379,515	0.0217	8,231
	6,369,535	375,620	-	6,745,155		146,288

(1) - (3) Represents the individual components which comprise the CEP cost recovery. Amounts for year one are based on the 2017 program and actual participation.

For further explanation on the calculations behind (1) - (3) see the proposed tariff included with the filing requirements for Case 2018-00029.

(1) CEPCR represents the program cost recovery of expenses for 2017. As noted this analysis is for a single year of participation, therefore the CEPCR is recovered where t=1.

(2) CEPLS represents the lost sales attributable to participation in the CEP. Lost sales for a given year are recovered annually through the CEP mechanism until the next general rate case when rates can be reset.

(3) CEPI represents the incentive earned by the company based on the conservation in 2017. As noted this analysis is for a single year of participation, therefore the CEPI is recovered where t=1.

(5) BI_t represents the impact of increased rates on the program participants. Since the CEPRC is recovered from all residential customers, a factor was applied to determine the amount of impact to the CEP participants. This is a ratio of participants to the number of residential customers as of 10/31 of 2017 program year.

t	A	B	A/B
1	617	28,449	0.02169

A Program participants
B Total residential customers
A/B Participant Factor (PF)

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Participant Test

PC_t = Participant costs for t = 1

(1) (2)

t	PC_t
1	707,246
2	707,246
3	707,246
4	707,246
5	707,246
6	707,246
7	707,246
8	707,246
9	707,246
10	707,246
11	707,246
12	707,246
13	707,246
14	707,246
15	707,246
16	707,246
17	707,246
18	707,246
19	707,246
20	707,246
	14,144,920

(1) Based on actual participation levels in 2017 of the CEP

(2)

	Incremental Cost
A. High Efficiency Heating Savings	
1. High Efficiency Forced Air Furnaces	$ 1,314
2. High Efficiency Dual Fuel Units	1,314
3. High Efficiency Gas Space Heating	143
4. High Efficiency Gas Logs/Fireplaces	143
B. High Efficiency Water Heating Savings	
1. High Efficiency Holding Tank Models	1,710
2. High Efficiency Power Vent Models	1,710
3. High Efficiency On-Demand Models	2,957
C. Energy Audits	
1. Residential Energy Audits	0

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Program Administrator Cost Test

$NPV_{pa} = B_{pa} - C_{pa}$

B_{pa}	=	$	1,881,742
C_{pa}	=		1,701,559
NPV_{pa}	**=**	**$**	**180,183**

Benefit-Cost Ratio **1.11**

Conclusion:

As the net present value is greater than zero, the program would decrease costs to the utility.

Where:

NPV_{pa} = Net present value of total cost of the resource
B_{pa} = NPV of benefits of the program
C_{pa} = NPV of costs of the programs

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Program Administrator Cost Test

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	UAC_t	B_{pa}
1	$ 20,874	$ 20,874
2	$ 42,250	$ 42,250
3	$ 64,135	$ 64,135
4	$ 86,540	$ 86,540
5	$ 109,473	$ 109,473
6	$ 132,944	$ 132,944
7	$ 156,962	$ 156,962
8	$ 181,538	$ 181,538
9	$ 206,681	$ 206,681
10	$ 232,401	$ 232,401
11	$ 258,709	$ 258,709
12	$ 285,615	$ 285,615
13	$ 313,129	$ 313,129
14	$ 341,262	$ 341,262
15	$ 370,026	$ 370,026
16	$ 399,431	$ 399,431
17	$ 429,488	$ 429,488
18	$ 460,209	$ 460,209
19	$ 491,605	$ 491,605
20	$ 523,689	$ 523,689
		$ 5,106,959

7.970% Discount Rate

$1,881,742 NPV

UAC_t = Utility avoided supply costs in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Program Administrator Cost Test

UAC_t = Utility avoided supply costs in year t

t	(1) Ccf Conserved	(2) Projected Gas Cost	(1) x (2) UAC_t
1	43,488	$ 0.480	$ 20,874
2	86,977	$ 0.486	$ 42,250
3	130,465	$ 0.492	$ 64,135
4	173,953	$ 0.497	$ 86,540
5	217,442	$ 0.503	$ 109,473
6	260,930	$ 0.509	$ 132,944
7	304,418	$ 0.516	$ 156,962
8	347,906	$ 0.522	$ 181,538
9	391,395	$ 0.528	$ 206,681
10	434,883	$ 0.534	$ 232,401
11	478,371	$ 0.541	$ 258,709
12	521,860	$ 0.547	$ 285,615
13	565,348	$ 0.554	$ 313,129
14	608,836	$ 0.561	$ 341,262
15	652,325	$ 0.567	$ 370,026
16	695,813	$ 0.574	$ 399,431
17	739,301	$ 0.581	$ 429,488
18	782,789	$ 0.588	$ 460,209
19	826,278	$ 0.595	$ 491,605
20	869,766	$ 0.602	$ 523,689
			$ 5,106,959

(1) Total projected Ccf savings, based on participation levels in program year 2017. Ccf conserved continue to be saved year after year.

(2) Projected gas cost, based on weighted average cost of gas (WACOG) per Ccf for 2017, adjusted 1.2% each year based on the Department of Energy "Annual Energy Outlook"

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Program Administrator Cost Test

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) INC_t	(3) UIC_t	C_{pa}
1	12,174	160,750	-	172,924
2	12,174	160,750	-	172,924
3	12,174	160,750	-	172,924
4	12,174	160,750	-	172,924
5	12,174	160,750	-	172,924
6	12,174	160,750	-	172,924
7	12,174	160,750	-	172,924
8	12,174	160,750	-	172,924
9	12,174	160,750	-	172,924
10	12,174	160,750	-	172,924
11	12,174	160,750	-	172,924
12	12,174	160,750	-	172,924
13	12,174	160,750	-	172,924
14	12,174	160,750	-	172,924
15	12,174	160,750	-	172,924
16	12,174	160,750	-	172,924
17	12,174	160,750	-	172,924
18	12,174	160,750	-	172,924
19	12,174	160,750	-	172,924
20	12,174	160,750	-	172,924
	243,480	3,215,000	-	3,458,480

7.970% Discount Rate

$1,701,559 NPV

PRC_t = Program Administrator Costs in year t
INC_t = Incentives paid to the participant by the Utility
UIC_t = Utility increased supply costs in year t

(1) Program costs scheduled from PRC_t which was calculated for the RIM Test

(2) Incentives scheduled from INC_t which was calculated for the Participant test

(3) No known increased supply costs as a result of operating the CEP

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Ratepayer Impact Measure (RIM) Test

$$NPV_{RIM} = B_{RIM} - C_{RIM}$$

B_{RIM} =	$	11,409,307
C_{RIM} =		3,188,325
NPV_{RIM} =	**$**	**8,220,982**

Benefit-Cost Ratio **3.58**

Conclusion:

As the net present value is greater than zero, the program will benefit rates and bills.

Where:

NPV_{RIM} = Net present value levels
B_{RIM} = Benefits to rate levels or customer bills
C_{RIM} = Costs to rate levels or customer bills

$$B_{RIM} \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

$$C_{RIM} \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
RG_t = Revenue gain from increased sales in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Ratepayer Impact Measure (RIM) Test

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}}$$

t	RG_t	B_{RIM}
1	135,991	135,991
2	273,389	273,389
3	412,219	412,219
4	552,507	552,507
5	694,279	694,279
6	837,562	837,562
7	982,383	982,383
8	1,128,768	1,128,768
9	1,276,746	1,276,746
10	1,426,346	1,426,346
11	1,577,595	1,577,595
12	1,730,523	1,730,523
13	1,885,160	1,885,160
14	2,041,536	2,041,536
15	2,199,681	2,199,681
16	2,359,627	2,359,627
17	2,521,406	2,521,406
18	2,685,048	2,685,048
19	2,850,587	2,850,587
20	3,018,056	3,018,056
	30,589,410	30,589,410

7.970% Discount Rate

$11,409,307 NPV

UAC_t = Utility avoided supply costs in year t
RG_t = Revenue gain from increased sales in year t

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Ratepayer Impact Measure (RIM) Test

RG_t = Revenue gain from increased sales in year t

NOTE: In determining revenue gain, Delta assumed 50% of customers would switch to an alternative fuel if not participating in this program.

	(1)	(2)	(3)	(4)	(((1)x(2)x12 months) + ((1)x(3)x(4))) x 50%
t	**Cumulative Participants**	**Monthly Customer Charge**	**Average Usage**	**Volumetric Rate**	**RG_t**
1	617	20.90	440	0.43	135,991
2	1,234	20.90	440	0.44	273,389
3	1,851	20.90	440	0.44	412,219
4	2,468	20.90	440	0.45	552,507
5	3,085	20.90	440	0.45	694,279
6	3,702	20.90	440	0.46	837,562
7	4,319	20.90	440	0.46	982,383
8	4,936	20.90	440	0.47	1,128,768
9	5,553	20.90	440	0.48	1,276,746
10	6,170	20.90	440	0.48	1,426,346
11	6,787	20.90	440	0.49	1,577,595
12	7,404	20.90	440	0.49	1,730,523
13	8,021	20.90	440	0.50	1,885,160
14	8,638	20.90	440	0.50	2,041,536
15	9,255	20.90	440	0.51	2,199,681
16	9,872	20.90	440	0.52	2,359,627
17	10,489	20.90	440	0.52	2,521,406
18	11,106	20.90	440	0.53	2,685,048
19	11,723	20.90	440	0.54	2,850,587
20	12,340	20.90	440	0.54	3,018,056
					30,589,410

(1) Based on program participation in program year 2017. Future years include cumulative prior years participation.

(2) Monthly customer charge per current approved tariffs

(3) Average residental customer usage in 2017 in Ccf

(4) Base rate per Ccf per current approved tariffs adjusted for 1.2% to account for future rate cases.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Ratepayer Impact Measure (RIM) Test

$$C_{RIM} \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}}$$

t	(1) UIC_t	(2) RL_t	(3) PRC_t	(4) INC_t	(1) + (2) C_{RIM}
1	-	18,781	12,174	160,750	191,705
2	-	37,562	12,174	160,750	210,486
3	-	56,343	12,174	160,750	229,267
4	-	75,124	12,174	160,750	248,048
5	-	93,905	12,174	160,750	266,829
6	-	112,686	12,174	160,750	285,610
7	-	131,467	12,174	160,750	304,391
8	-	150,248	12,174	160,750	323,172
9	-	169,029	12,174	160,750	341,953
10	-	187,810	12,174	160,750	360,734
11	-	206,591	12,174	160,750	379,515
12	-	225,372	12,174	160,750	398,296
13	-	244,153	12,174	160,750	417,077
14	-	262,934	12,174	160,750	435,858
15	-	281,715	12,174	160,750	454,639
16	-	300,496	12,174	160,750	473,420
17	-	319,277	12,174	160,750	492,201
18	-	338,058	12,174	160,750	510,982
19	-	356,839	12,174	160,750	529,763
20	-	375,620	12,174	160,750	548,544
	-	3,944,010	243,480	3,215,000	7,402,490

7.970% Discount Rate

$3,188,325 NPV

UIC_t = Utility increased supply costs in year t
RL_t = Revenue loss from reduced sales in year t
PRC_t = Program administrator costs in year t
INC_t = Incentives paid to the participant by the sponsoring utility in year t

(1) No known increased supply costs

(2) Lost sales based on 2017 CEP filing

(3) Program administrator costs for year t represent program cost recovery expenses, based on 2017 CEP filing less incentives paid to participants (column (4) herein).

(4) Scheduled per calculation performed for Participant Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Total Resource Cost (TRC) Test

$$NPV_{TRC} = B_{TRC} - C_{TRC}$$

B_{TRC} =	$	1,881,742
C_{TRC} =		7,079,037
NPV_{TRC} =	**$**	**(5,197,295)**

Benefit-Cost Ratio **0.27**

Conclusion:

As the net present value is less than zero, the program is a more expensive resource than the supply option upon which the marginal costs are based.

Where:

NPV_{TRC} = Net present value of total cost of the resource
B_{TRC} = NPV of benefits of the program
C_{TRC} = NPV of costs of the programs

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

UAC_t = Utility avoided supply costs in year t
UIC_t = Utility increased supply costs in year t
PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs

Note: Where t = 1 = 2017

The following calculations are based on actual participation levels in 2017.

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Total Resource Cost (TRC) Test

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

t	(1) UAC_t	B_{TRC}
1	20,874	20,874
2	42,250	42,250
3	64,135	64,135
4	86,540	86,540
5	109,473	109,473
6	132,944	132,944
7	156,962	156,962
8	181,538	181,538
9	206,681	206,681
10	232,401	232,401
11	258,709	258,709
12	285,615	285,615
13	313,129	313,129
14	341,262	341,262
15	370,026	370,026
16	399,431	399,431
17	429,488	429,488
18	460,209	460,209
19	491,605	491,605
20	523,689	523,689
	5,106,959	5,106,959

7.970% Discount Rate

$1,881,742 NPV

UAC_t = Utility avoided supply costs in year t

(1) Scheduled per calculation performed for Program Administrator Cost Test

Delta Natural Gas Company, Inc.
Conservation/Efficiency Program
Total Resource Cost (TRC) Test

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PC_t + UIC_t}{(1+d)^{t-1}}$$

t	(1) PRC_t	(2) PC_t	(3) UIC_t	C_{TRC}
1	12,174	707,246	-	719,420
2	12,174	707,246	-	719,420
3	12,174	707,246	-	719,420
4	12,174	707,246	-	719,420
5	12,174	707,246	-	719,420
6	12,174	707,246	-	719,420
7	12,174	707,246	-	719,420
8	12,174	707,246	-	719,420
9	12,174	707,246	-	719,420
10	12,174	707,246	-	719,420
11	12,174	707,246	-	719,420
12	12,174	707,246	-	719,420
13	12,174	707,246	-	719,420
14	12,174	707,246	-	719,420
15	12,174	707,246	-	719,420
16	12,174	707,246	-	719,420
17	12,174	707,246	-	719,420
18	12,174	707,246	-	719,420
19	12,174	707,246	-	719,420
20	12,174	707,246	-	719,420
	243,480	14,144,920	-	14,388,400

7.970% Discount Rate

$7,079,037 NPV

PRC_t = Program administrator costs in year t
PC_t = Participant costs in year t, which include incremental capital costs
UIC_t = Utility increased supply costs in year t

(1) Scheduled per calculation performed for RIM Test

(2) Represents net participant costs which is the incremental cost to the participant of purchasing a high-efficiency appliance versus one with standard efficiency. Amount scheduled from PC_t from the Participant Test.

(3) No known increased supply costs as a result of operating the CEP

Current Year Program Participation

Program participants 11-1-17 through 5-25-2018

A. High Efficiency Heating Savings	**Number of Participants**		**Actual Program Costs**
1. High Efficiency Forced Air Furnaces	149	$	59,600
2. High Efficiency Dual Fuel Units	19	$	5,700
3. High Efficiency Gas Space Heating	70	$	7,000
4. High Efficiency Gas Logs/Fireplaces	100	$	10,000
			82,300
B. High Efficiency Water Heating Savings			
1. High Efficiency Holding Tank Models	30	$	6,000
2. High Efficiency Power Vent Models	4	$	1,000
3. High Efficiency On-Demand Models	27	$	8,100
		$	15,100
Total - A. B.	**399**	**$**	**97,400**

Current Year Program Participation

Program participants 11-1-17 through 5-25-2018 who have applied for a rebate but have not yet been paid

A. High Efficiency Heating Savings	**Number of Participants**		**Actual Program Costs**
1. High Efficiency Forced Air Furnaces	6	$	2,400
2. High Efficiency Dual Fuel Units	1	$	300
3. High Efficiency Gas Space Heating	-	$	-
4. High Efficiency Gas Logs/Fireplaces	2	$	200
Furnace Rebate Program Total			**2,900**
B. High Efficiency Water Heating Savings			
1. High Efficiency Holding Tank Models	2	$	400
2. High Efficiency Power Vent Models	-	$	-
3. High Efficiency On-Demand Models	9	$	2,700
Water Heater Program Total		**$**	**3,100**
Total - A. B.	**20**	**$**	**6,000**

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF CLARK)

The undersigned, Jennifer L. Croft, being duly sworn, deposes and says that she is Manager – Employee and Regulatory Services of Delta Natural Gas Company, Inc. and that she has personal knowledge of the matters set forth in the foregoing testimony, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Jennifer L. Croft
Jennifer L. Croft

Subscribed and sworn to before me, a Notary Public, in said County and State this 31ST day of May 2018.

Donna K. Fuller
Notary Public, ID No. 558932
State at Large, Kentucky
My Commission Expires on July 11, 2020

Donna K. Fuller (SEAL)
Notary Public

My Commission Expires:

July 11, 2020