

Attached is Texas Gas Service consultant Paul Raab's savings analysis requested during the May RMC meeting. His explanation of the analysis, by page, is listed below.

1. Savings analysis – this summarizes the 2016 results of the programs, showing participants, expenditures, the site natural gas savings achieved over the life of each measure installed, the site kWh savings achieved over the life of each measure installed and the total source energy savings achieved over the life of each measure installed. The last 3 columns develop the cumulative savings for each of these three measures. On lines 42-48, I show the 2016 WN Volumes of the eligible customers, the target savings and the percentage of the 5% target achieved (89.42%). This lead me to conclude that, with some modest growth in the program, we should be able to at least get close to the goal. Line 48 shows that TGS will achieve the equivalent of a 4.47% cumulative savings (.89% annually), assuming the status quo continues.
2. Site savings analysis – this summarizes the same information as above, but assumes that we do not include the savings information from the fuel switching programs. This analysis shows that the reming TGS programs will achieve only 76.10% of the 5% target, or a cumulative target of 3.81% (.76% annually).
3. EERS by State – to provide the Commission with some context, I have also included a summary of the electric and natural gas energy efficiency resource standards (EERS) by state, which could support a lower target overall and certainly supports a lower target relative to whatever target is applied to the AE programs.
4. GHG Reductions – finally, I have included a comparison of GHG emissions reductions if the fuel-switching programs are eliminated. This analysis shows that, without those programs, total energy savings will be reduced by about 10% and CO2e emissions will increase by 5,938,000 pounds, or about 9%.



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Cumulative for 5 Years									
Program	Participants	Program Expenditures (\$)	Site Natural Gas Savings (therms)	Site Alternate Energy Savings	Total Source Energy Savings (MMBtu)	Site Natural Gas Savings (therms)	Site Alternate Energy Savings	Total Source Energy Savings (MMBtu)	
Commercial Water Heater	6	\$ 20,333	4,100.29	-	430.53	61,504.31	-	6,457.95	
Commercial Tankless Water Heater	24	\$ 14,400	14,178.77	-	1,488.77	212,681.58	-	22,331.57	
Dryer Program	15	\$ 3,375	(577.32)	8,562.00	31.11	(8,659.80)	128,430.00	466.68	
Commercial Food Service Program	2	\$ 763	7,414.00	-	778.47	111,210.00	-	11,677.05	
Faucet Aerator Direct Install	2,907	\$ 37,805	29,978.55	-	3,147.75	449,678.25	-	47,216.22	
Pre-Rinse Spray Valve Direct Install	16	\$ 2,240	3,179.34	-	333.83	47,690.10	-	5,007.46	
Showerhead Direct Install - Handheld	79	\$ 1,659	432.63	-	45.43	6,489.45	-	681.39	
Showerhead Direct Install - Fixed	1,389	\$ 18,057	9,517.22	-	999.31	142,758.30	-	14,989.62	
Weather Stripping Direct Install	4,037	\$ 32,296	8,181.29	-	859.04	122,719.31	-	12,885.53	
Natural Gas Vehicle Commercial Rebate	1	\$ 3,000	(497.71)	509.43	12.30	(7,465.71)	7,641.43	184.50	
Small Commercial Educational Program		\$ 5,314							
Subtotal Small Commercial	8,476	139,242	75,907	9,071	8,127	1,138,606	136,071	121,898	
High Efficiency Water Heater Residential Rebate (>.62)	10	\$ 400	40.22	-	4.22	603.23	-	63.34	
High Efficiency Water Heater Residential Rebate (>.67)	7	\$ 700	91.17	-	9.57	1,367.62	-	143.60	
Tankless Water Heater Residential Rebate	336	\$ 252,000	11,238.35	-	1,180.03	168,575.22	-	17,700.40	
Furnace Tune-up Residential Rebate	372	\$ 14,880	3,266.50	-	342.98	48,997.51	-	5,144.74	
High Efficiency Furnace Residential Rebate (>92%)	41	\$ 27,675	915.70	-	96.15	13,735.45	-	1,442.22	
Natural Gas Vehicle Program	4	\$ 8,000	(1,990.95)	2,037.62	49.00	(29,864.29)	30,564.29	735.00	
Natural Gas Dryer Program	1,053	\$ 266,925	(40,527.86)	601,052.40	2,184.06	(607,917.96)	9,015,786.00	32,760.86	
Attic Insulation Residential Rebate	536	\$ 97,860	66,390.56	-	6,971.01	995,858.42	-	104,565.13	
Duct Efficiency Improvement Residential Rebate	1,121	\$ 217,298	38,389.29	-	4,030.88	575,839.30	-	60,463.13	
Residential Wireless Thermostat	3	\$ 75	43.15	-	4.53	647.24	-	67.96	
Water Heater	118	\$ 235,186	474.54	-	49.83	7,118.13	-	747.40	
Stove	102	\$ 108,618	(9,822.98)	115,158.00	202.35	(147,344.66)	1,727,370.00	3,035.30	
Furnace	94	\$ 349,141	1,035.38	-	108.71	15,530.67	-	1,630.72	
Dryer	12	\$ 16,500	(461.86)	6,849.60	24.89	(6,927.84)	102,744.00	373.34	
High Efficiency Furnace Home Builders Rebate (>92%)	37	\$ 24,975	826.36	-	86.77	12,395.41	-	1,301.52	
Natural Gas Dryer Home Builders Rebate	226	\$ 192,450	(8,698.29)	129,000.80	468.75	(130,474.32)	1,935,012.00	7,031.30	
Hydronic Heating Home Builders Rebate	100	\$ 12,500	604.33	-	63.46	9,065.00	-	951.83	
Tankless Water Heater Home Builders Rebate	1,123	\$ 673,800	37,561.50	-	3,943.96	563,422.55	-	59,159.37	
Home Builders Program - Incentive		\$ 2,600							
Residential Educational Program		\$ 450,358							
Subtotal Residential	5,295	\$ 2,951,940	99,375	854,098	19,821	1,490,627	12,811,476	297,317	
Overhead Expenses		\$ 327,070							
Totals	13,771	\$ 3,418,252	175,282	863,170	27,948	2,629,232	12,947,548	419,215	
2016 WN Volumes (therms)								93,767,920.23	
Target Savings (MMBtus)								468,840	
Percent of Target								89.42%	
Implied Savings Target Achieved								4.47%	0.89%

Program	Participants	Program Expenditures (\$)		Site Natural Gas Savings (therms)	Site Alternate Energy Savings	Total Source Energy Savings (MMBtu)	Cumulative for 5 Years		Total Source Energy Savings (MMBtu)
							Site Natural Gas Savings (therms)	Site Alternate Energy Savings	
Commercial Water Heater	6	\$	20,333	4,100.29	-	430.53	61,504.31	-	6,457.95
Commercial Tankless Water Heater	24	\$	14,400	14,178.77	-	1,488.77	212,681.58	-	22,331.57
Dryer Program							-	-	-
Commercial Food Service Program	2	\$	763	7,414.00	-	778.47	111,210.00	-	11,677.05
Faucet Aerator Direct Install	2,907	\$	37,805	29,978.55	-	3,147.75	449,678.25	-	47,216.22
Pre-Rinse Spray Valve Direct Install	16	\$	2,240	3,179.34	-	333.83	47,690.10	-	5,007.46
Showerhead Direct Install - Handheld	79	\$	1,659	432.63	-	45.43	6,489.45	-	681.39
Showerhead Direct Install - Fixed	1,389	\$	18,057	9,517.22	-	999.31	142,758.30	-	14,989.62
Weather Stripping Direct Install	4,037	\$	32,296	8,181.29	-	859.04	122,719.31	-	12,885.53
Natural Gas Vehicle Commercial Rebate							-	-	-
Small Commercial Educational Program		\$	5,314						
Subtotal Small Commercial	8,460		132,867	76,982	-	8,083	1,154,731	-	121,247
High Efficiency Water Heater Residential Rebate (>.62)	10	\$	400	40.22	-	4.22	603.23	-	63.34
High Efficiency Water Heater Residential Rebate (>.67)	7	\$	700	91.17	-	9.57	1,367.62	-	143.60
Tankless Water Heater Residential Rebate	336	\$	252,000	11,238.35	-	1,180.03	168,575.22	-	17,700.40
Furnace Tune-up Residential Rebate	372	\$	14,880	3,266.50	-	342.98	48,997.51	-	5,144.74
High Efficiency Furnace Residential Rebate (>92%)	41	\$	27,675	915.70	-	96.15	13,735.45	-	1,442.22
Natural Gas Vehicle Program							-	-	-
Natural Gas Dryer Program							-	-	-
Attic Insulation Residential Rebate	536	\$	97,860	66,390.56	-	6,971.01	995,858.42	-	104,565.13
Duct Efficiency Improvement Residential Rebate	1,121	\$	217,298	38,389.29	-	4,030.88	575,839.30	-	60,463.13
Residential Wireless Thermostat	3	\$	75	43.15	-	4.53	647.24	-	67.96
Water Heater	118	\$	235,186	474.54	-	49.83	7,118.13	-	747.40
Stove							-	-	-
Furnace	94	\$	349,141	1,035.38	-	108.71	15,530.67	-	1,630.72
Dryer							-	-	-
High Efficiency Furnace Home Builders Rebate (>92%)	37	\$	24,975	826.36	-	86.77	12,395.41	-	1,301.52
Natural Gas Dryer Home Builders Rebate							-	-	-
Hydronic Heating Home Builders Rebate	100	\$	12,500	604.33	-	63.46	9,065.00	-	951.83
Tankless Water Heater Home Builders Rebate	1,123	\$	673,800	37,561.50	-	3,943.96	563,422.55	-	59,159.37
Home Builders Program - Incentive		\$	2,600						
Residential Educational Program		\$	450,358						
Subtotal Residential	3,898	\$	2,359,447	160,877	-	16,892	2,413,156	-	253,381
Overhead Expenses		\$	327,070						
Totals	12,358	\$	2,819,384	237,859	-	24,975	3,567,887	-	374,628

2016 WN Volumes (therms)	93,767,920.23
Target Savings (therms)	4,688,396
Percent of Target	76.10%
Implied Savings Target Achieved	3.81%
	0.76%

### Summary/Comparison of Energy Efficiency Resource Standards (EERS)

State	Electric		Natural Gas	
	Metric	Goal	Metric	Goal
Arizona	Cumulative retail sales, 2011-2020	20.00%	Annual sales to 2030	0.60%
Arkansas	Annual sales, 2011-2019	0.25 - 1.00%	Annual sales, 2017-2019	0.50%
California	Annual sales	1.15%	Annual sales	0.42%
Colorado 1/	Annual sales	400 GWh	Prior year revenues	0.50%
Connecticut	Annual sales, 2016-2018	1.51%	Annual sales, 2016-2018	0.61%
Hawaii	Annual sales to 2030	1.40%	None	-
Illinois 2/	Annual sales, 2018-2030	1.77 - 2.08%	Annual sales, 2012-2019	0.20% - 1.50%
Iowa	Annual sales to 2018	1.10 - 1.20%	Annual sales to 2018	0.66 - 1.20%
Maine	Cumulative retail sales, 2014-2020	20.00%	Annual sales, 2017-2019	0.20%
Maryland	Annual sales	0.20%	None	-
Massachusetts	Annual sales, 2016-2018	2.93%	Annual sales, 2016-2018	1.24%
Michigan	Annual sales to 2021	1.00%	Annual sales to 2021	0.75%
Minnesota	Annual sales	1.50%	Annual sales	1.00%
Nevada	Retail sales to 2025	5.00%	None	-
New Hampshire	Annual sales, 2018-2020	0.80 - 1.30%	Annual sales, 2018-2020	0.70 - 0.80%
New Mexico	Retail sales in 2005	8.00%	None	-
New York	Annual sales, 2016-2018	0.40 - 0.90%	Annual sales, 2016-2018	0.28%
North Carolina	Annual sales, 2015-2021	1.50 - 5.00%	None	-
Ohio	Annual sales, 2009-2021	0.30 - 2.00%	None	-
Oregon	Annual sales, 2015-2019	1.30%	Annual sales, 2015-2019	0.30%
Pennsylvania	Annual sales, 2016-2020	0.80%	None	-
Rhode Island	Annual sales, 2015-2017	2.50 - 2.60%	Annual sales, 2015-2017	1.00 - 1.10%
Texas 3/	Incremental load growth	30.00%	None	-
Vermont	Annual sales, 2015-2017	2.10%	None	-
Washington	Annual sales to 2030	1.50%	None	-
Wisconsin	Annual sales, 2015-2018	0.81%	Annual sales, 2015-2018	0.60%

#### Notes:

1/ About 1.35% of 2015 sales

2/ Subject to spending limits

3/ Subject to cost cap

Source: ACEEE Policy Brief, State Energy Efficiency Resource Standards (EERS), January 2017.

Program/Measure	Measure Life	Site Natural Gas Savings (therms)	Site Alternate Energy Savings	Total Source Energy Savings (MMBtu)	CO2e Emissions Reductions (1,000 lbs)
Commercial Water Heater	13	53,303.74	-	5,596.89	785.07
Commercial Tankless Water Heater	13	184,324.03	-	19,354.02	2,715.18
Commercial Dryer					
Commercial Food Service	12	88,968.00	-	9,341.64	1,310.52
Faucet Aerator Direct Install	10	299,785.50	-	31,477.48	4,415.90
Pre-Rinse Spray Valve Direct Install	5	15,896.70	-	1,669.15	234.15
Showerhead Direct Install - Handheld	10	4,326.30	-	454.26	63.80
Showerhead Direct Install - Fixed	10	95,172.20	-	9,993.08	1,401.90
Weather Stripping Direct Install	11	89,994.16	-	9,449.39	1,325.61
Natural Gas Vehicle Commercial Rebate					
Small Commercial Educational Program					
Subtotal Small Commercial		831,770.63	-	87,335.92	12,252.13
High Efficiency Water Heater Residential Rebate (>.62)	13	522.80	-	54.89	7.67
High Efficiency Water Heater Residential Rebate (>.67)	13	1,185.27	-	124.45	17.42
Tankless Water Heater Residential Rebate	13	146,098.53	-	15,340.35	2,152.02
Furnace Tune-up Residential Rebate	3	9,799.50	-	1,028.95	144.36
High Efficiency Furnace Residential Rebate (>92%)	18	16,482.54	-	1,730.67	242.82
Natural Gas Vehicle Residential Rebate					
Natural Gas Dryer Residential Rebate					
Attic Insulation Residential Rebate	25	1,659,764.04	-	174,275.22	24,448.50
Duct Efficiency Improvement Residential Rebate	18	691,007.16	-	72,555.75	10,178.46
Residential Wireless Thermostat	11	474.64	-	49.84	6.93
Free Equipment Water Heater Residential Rebate	13	6,169.05	-	647.75	91.00
Free Equipment Stove Residential Rebate					
Free Equipment Furnace Residential Rebate	18	18,636.80	-	1,956.86	274.50
Free Equipment Dryer Residential Rebate					
High Efficiency Furnace Home Builders Rebate (>92%)	18	14,874.49	-	1,561.82	219.06
Natural Gas Dryer Home Builders Rebate					
Hydronic Heating Home Builders Rebate	18	10,878.01	-	1,142.19	160.20
Tankless Water Heater Home Builders Rebate	13	488,299.54	-	51,271.45	7,192.77
Whole Home Program - Incentive					
Residential Educational Program					

Subtotal Residential	3,064,192.38	-	321,740.20	45,135.71
Site Energy Only Totals	3,895,963	-	409,076	57,388
As Implemented Totals	2,966,268	12,938,378	453,442	63,326
Site Energy Only Totals	(929,695)	12,938,378	44,366	5,938
			10%	9%