



IDEA2021

Powering the Future: District Energy/CHP/Microgrids
Sept. 27-29 | Austin Convention Center | Austin, Texas



District Energy – LEED - Sustainability

J. Tim Griffin, P.E. RMF Engineering, Inc.





Why Energy Matters for LEED?

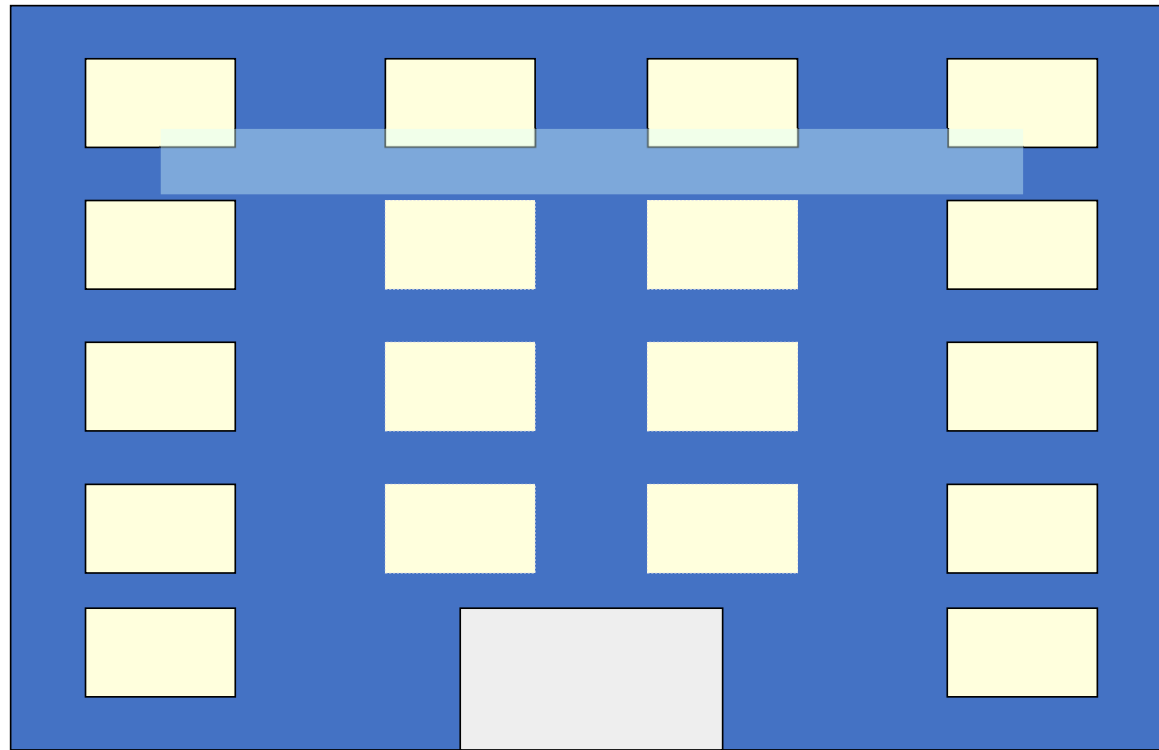
- 18 out of 110 points



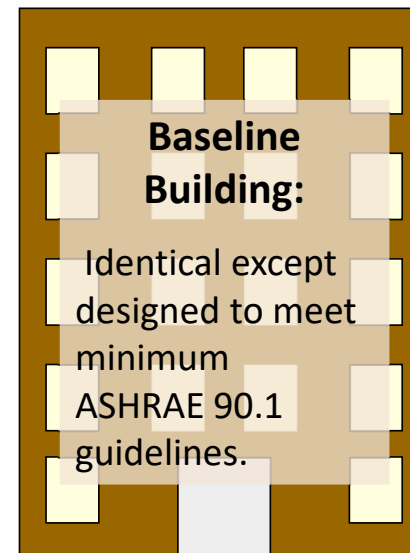
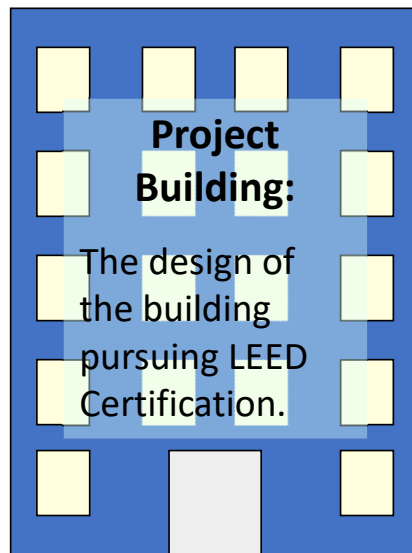
Goals & Application – Energy

- **Goal:** Demonstrate energy performance greater than required by the pre-requisite.
- Earn points for greater energy savings.

ASHRAE 90.1



Appendix G

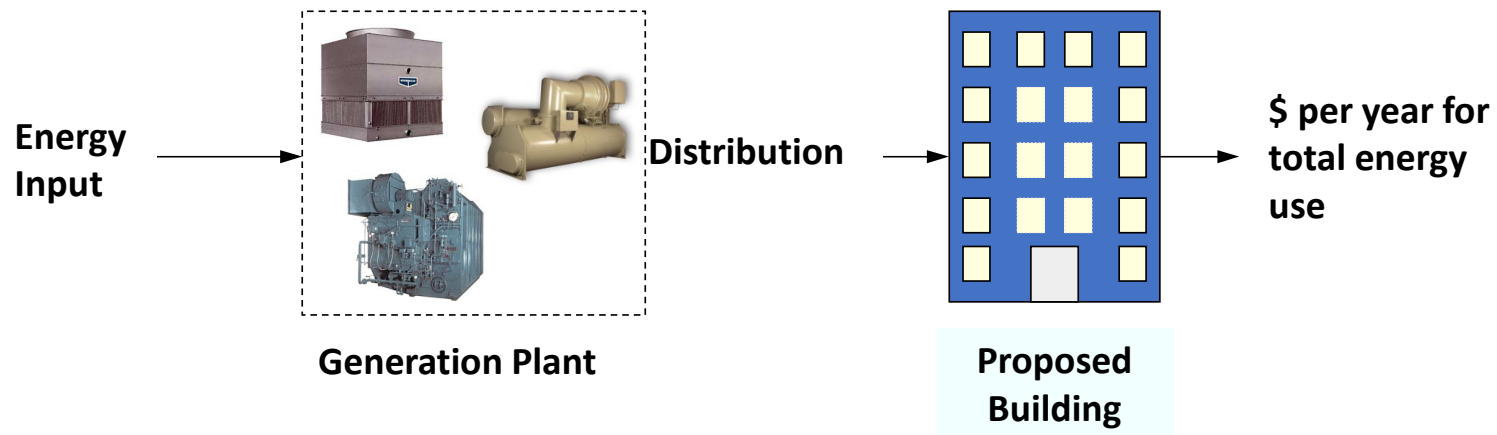


ENERGY USE IN DOLLARS

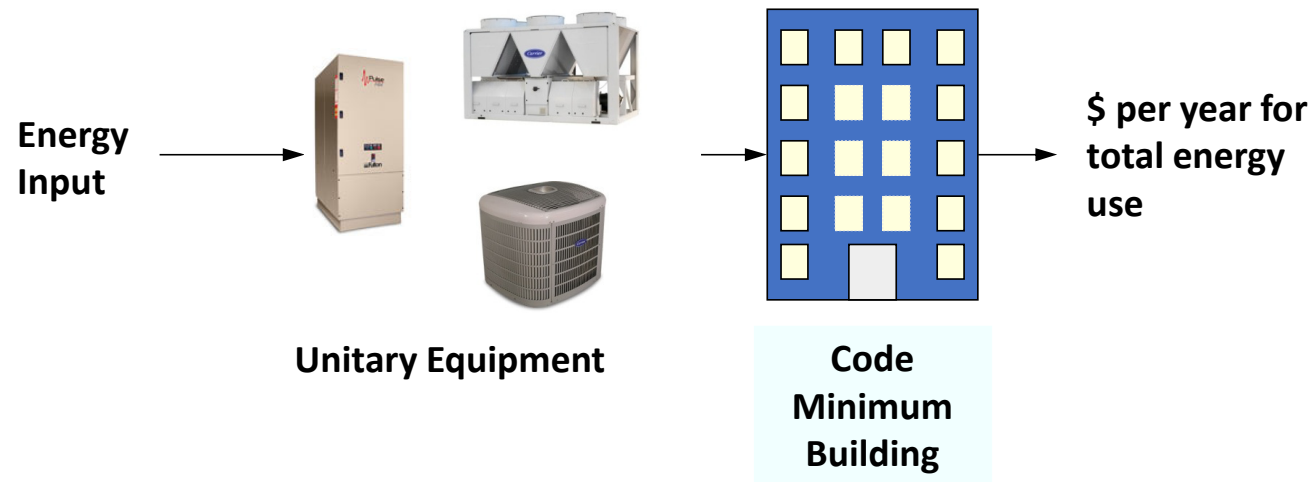
Modeling Software Options



District Energy Analysis

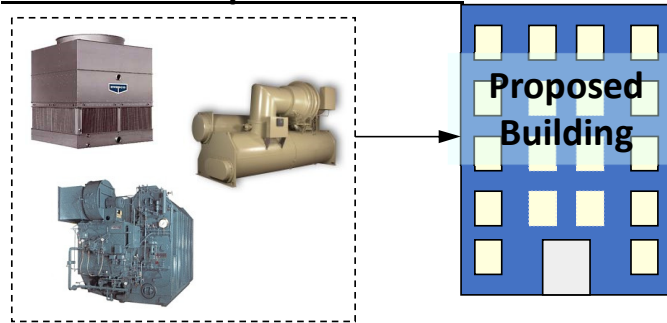


Code Minimum Comparison



Option 1 Path 2 Model

Virtual DES-equivalent Plant

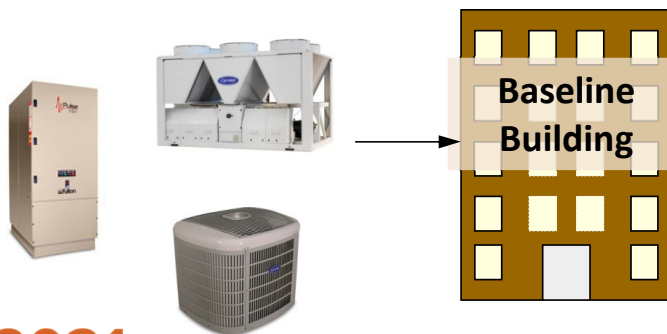


\$ per year
for total
energy use

$$100 * \left(1 - \frac{\text{Proposed Building \$}}{\text{Baseline Building \$}} \right) = \text{Percentage Improvement}$$

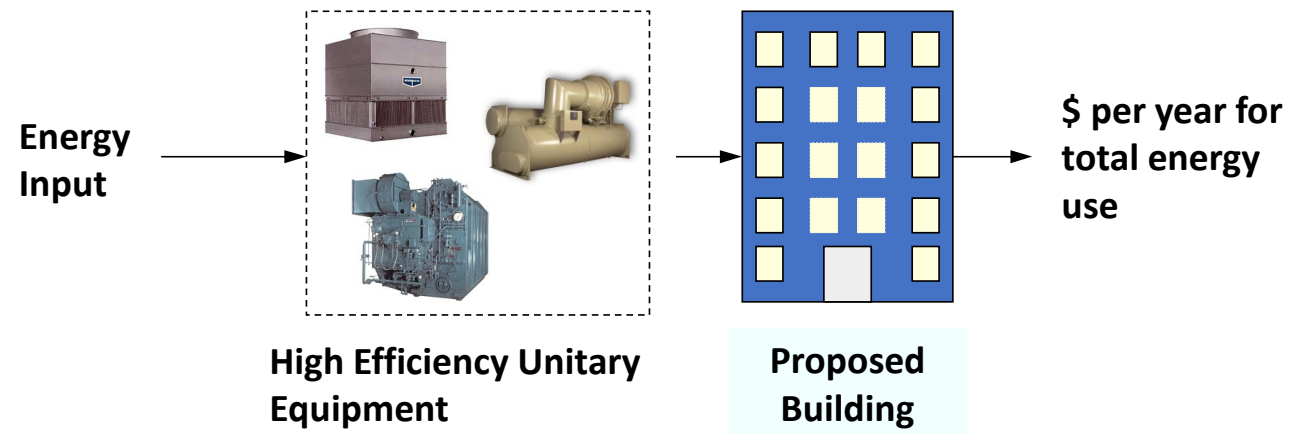
LEED Version 4	
% Improvement	Points Earned
6%	1
12%	4
18%	7
24%	10
29%	12
35%	14
38%	15
42%	16
46%	17
50%	18

On-Site Equipment per ASHRAE 90.1 - 2004

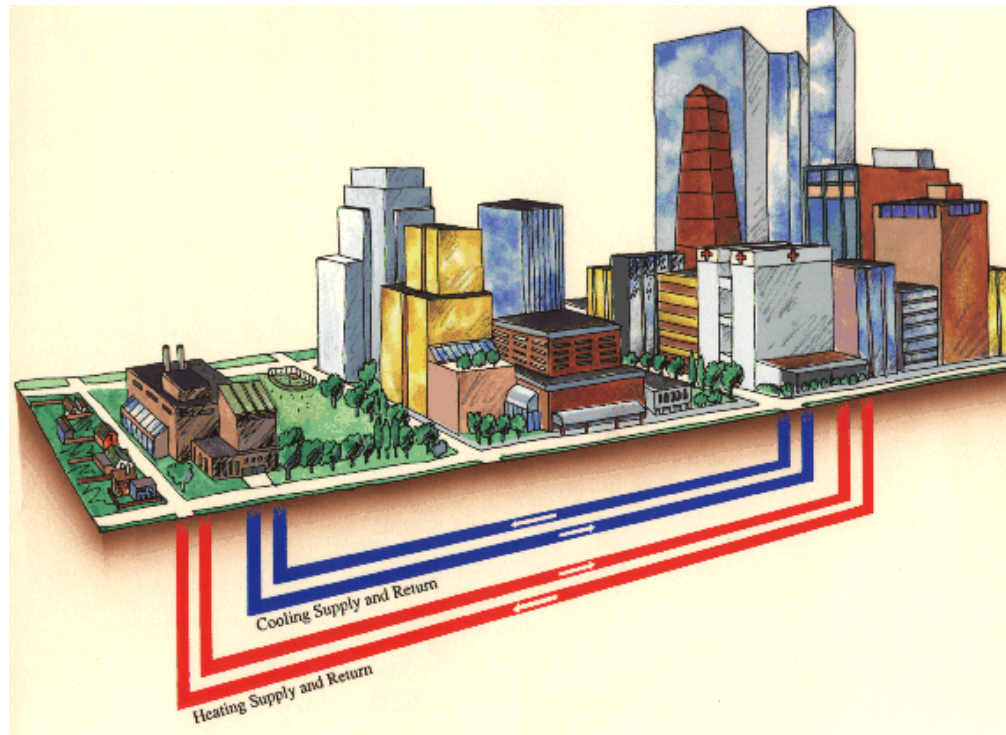


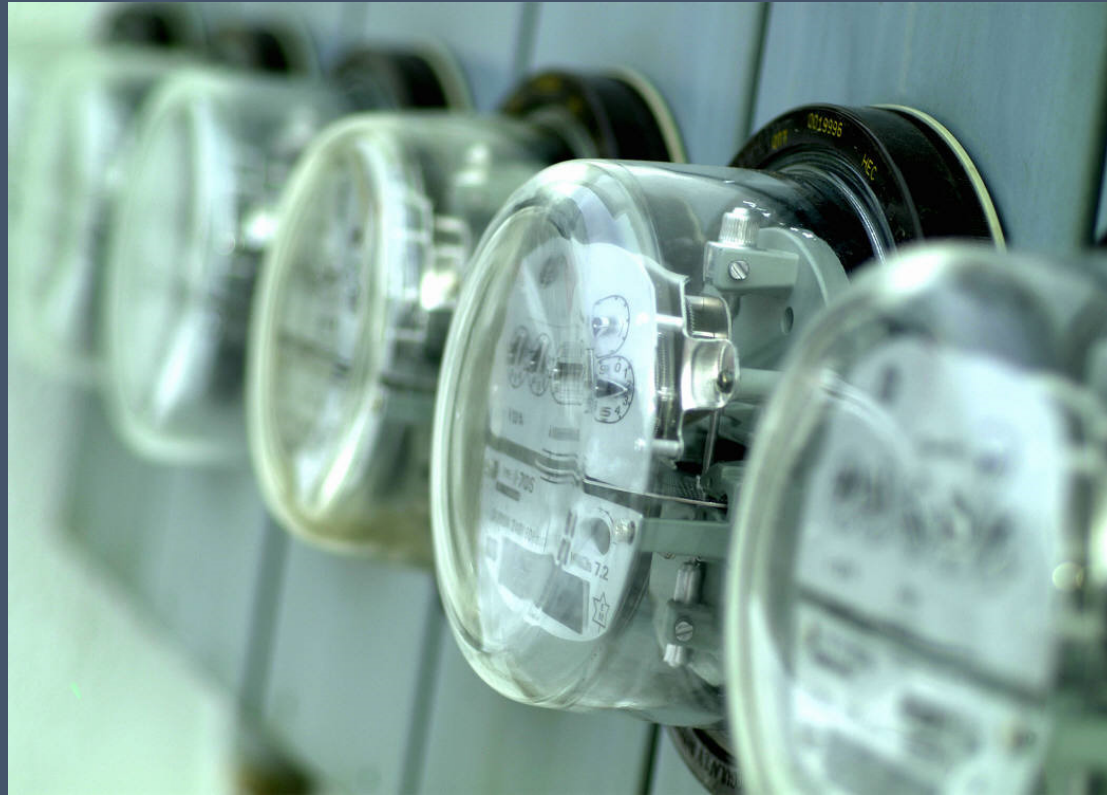
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Real Comparison

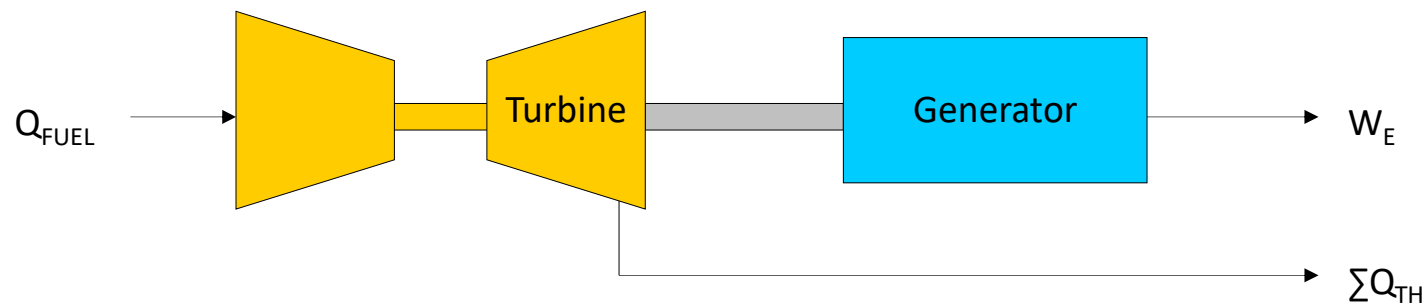


District Energy - Challenges





Option 2 for CHP



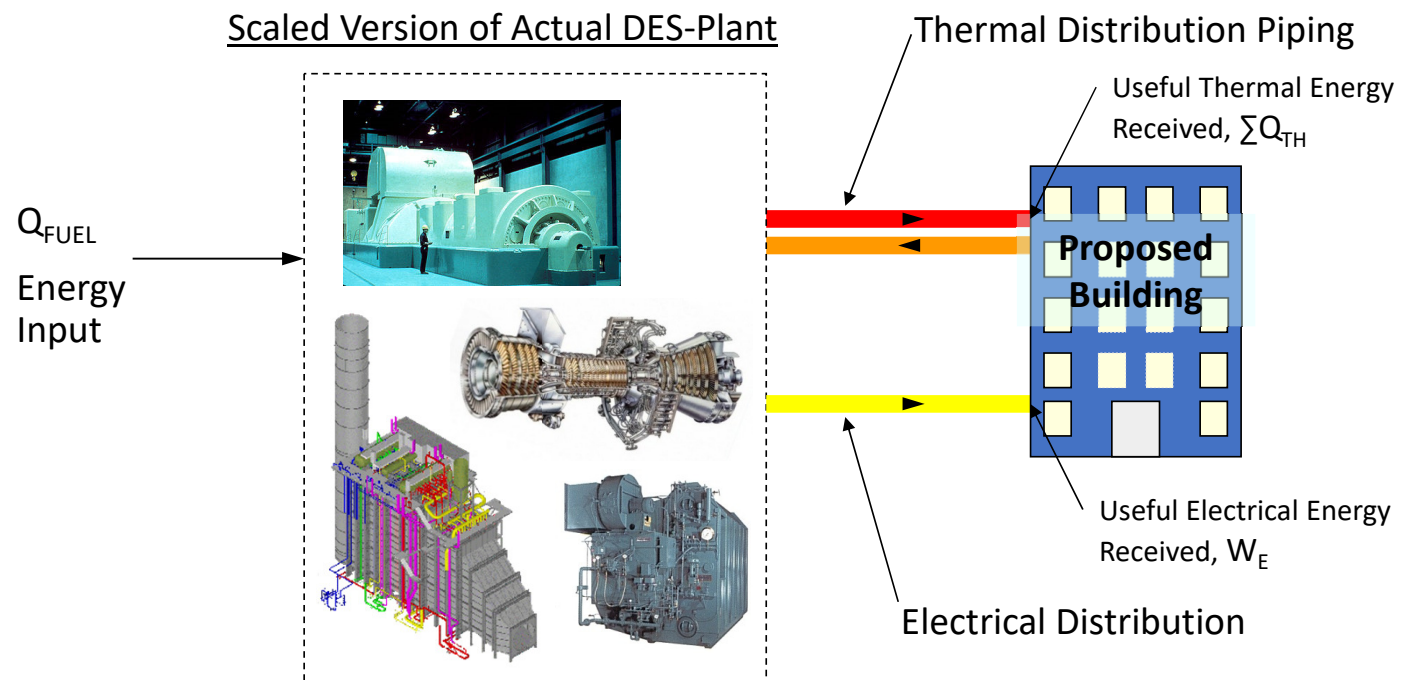
Q_{FUEL} – Sum of all fuel used by the CHP.

W_E – Net useful Electrical Power, produced by the CHP.

ΣQ_{TH} – Net useful Thermal Output, produced by the CHP.

Reference: <http://www.epa.gov/chp/basic/methods.html>

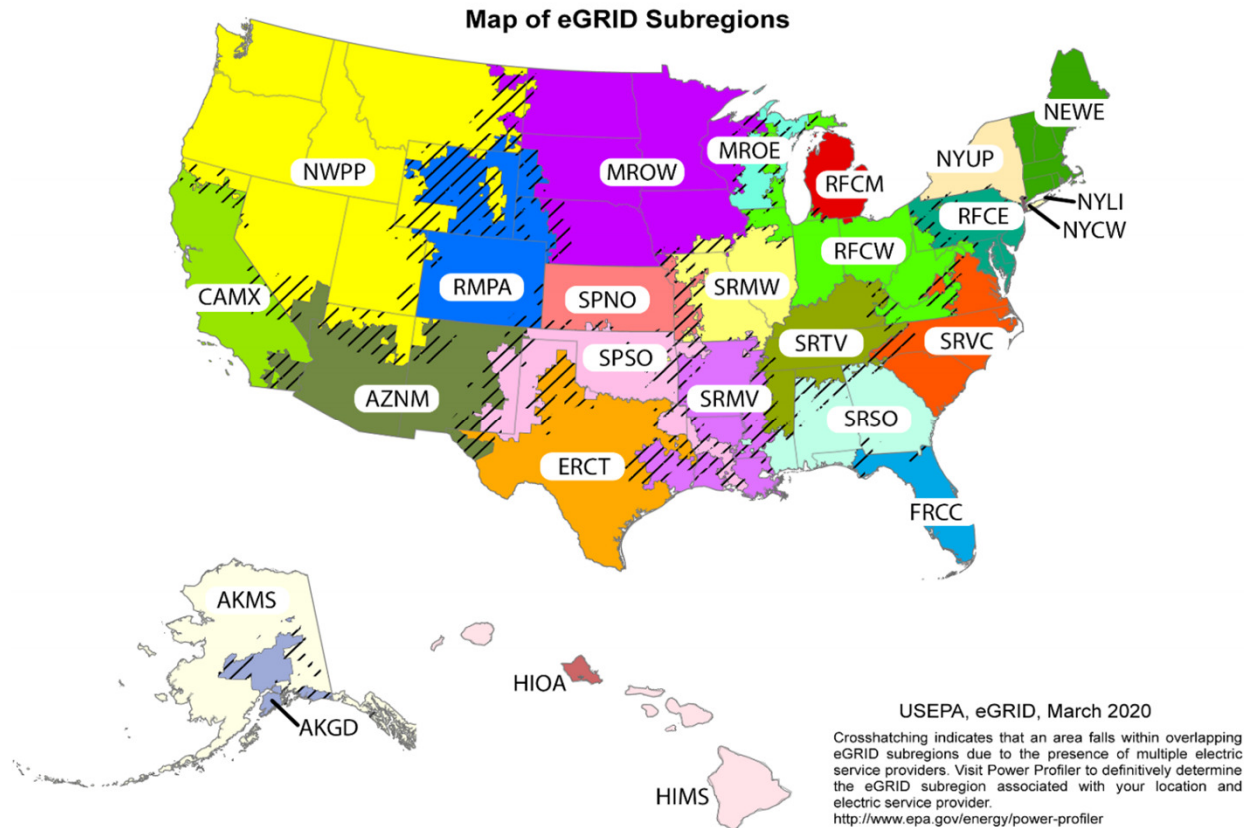
Free Electricity



The Economists – October 15th, 2013

- Traditional power plants that use coal, gas or nuclear energy typically only convert a third of the energy they produce into electricity. The rest is wasted as heat. A combined district utility can convert 40% of that energy into electricity and 40% to heat buildings, wasting just one-fifth at the generation stage, though another 7% is on average is wasted in distributing the heat around a city.

Version 4.1 – Greenhouse Gas Accounting



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eGRID subregion acronym	eGRID subregion name	Total output emission rates							Non-baseload output emission rates							Grid Gross Loss (%)
		lb/MWh							lb/MWh							
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AKGD	ASCC Alaska Grid	1,039.6	0.082	0.011	1,045.0	5.5	5.4	1.1	1,262.5	0.110	0.015	1,269.6	6.5	6.4	1.1	5.12%
AKMS	ASCC Miscellaneous	525.1	0.024	0.004	527.0	7.7	7.8	0.7	1,528.3	0.068	0.012	1,533.6	22.8	23.0	2.0	5.12%
AZNM	WECC Southwest	1,022.4	0.077	0.011	1,027.5	0.7	0.7	0.3	1,435.3	0.097	0.014	1,441.8	1.0	0.9	0.3	4.80%
CAMX	WECC California	496.5	0.034	0.004	498.7	0.5	0.4	0.0	929.5	0.047	0.006	932.5	0.8	0.7	0.0	4.80%
ERCT	ERCOT All	931.7	0.066	0.009	936.1	0.5	0.6	0.8	1,261.0	0.083	0.012	1,266.5	0.8	0.8	1.1	4.87%
FRCC	FRCC All	931.8	0.066	0.009	936.1	0.4	0.4	0.3	1,123.9	0.068	0.009	1,128.3	0.4	0.4	0.4	4.88%
HIMS	HICC Miscellaneous	1,110.7	0.118	0.018	1,119.1	7.6	7.6	4.0	1,535.7	0.139	0.022	1,545.8	11.8	11.5	5.0	5.14%
HIOA	HICC Oahu	1,669.9	0.180	0.027	1,682.6	3.5	3.8	8.0	1,682.1	0.159	0.025	1,693.6	4.2	4.2	8.4	5.14%
MROE	MRO East	1,678.0	0.169	0.025	1,689.7	0.9	0.9	0.9	1,634.3	0.149	0.022	1,644.5	0.9	1.0	1.0	4.88%
MROW	MRO West	1,239.8	0.138	0.020	1,249.2	1.0	1.0	1.4	1,764.3	0.192	0.027	1,777.0	1.5	1.4	1.8	4.88%
NEWE	NPCC New England	522.3	0.082	0.011	527.6	0.4	0.4	0.1	931.0	0.086	0.011	936.5	0.5	0.4	0.3	4.88%
NWPP	WECC Northwest	639.0	0.064	0.009	643.4	0.6	0.6	0.4	1,575.1	0.148	0.021	1,585.2	1.4	1.4	0.8	4.80%
NYCW	NPCC NYC/Westchester	596.4	0.022	0.003	597.8	0.3	0.2	0.0	1,067.6	0.022	0.002	1,068.9	0.5	0.5	0.1	4.88%
NYLI	NPCC Long Island	1,184.2	0.139	0.018	1,193.1	0.9	0.8	0.2	1,320.3	0.040	0.005	1,322.8	1.0	0.9	0.4	4.88%
NYUP	NPCC Upstate NY	253.1	0.018	0.002	253.9	0.1	0.1	0.1	931.5	0.043	0.005	934.0	0.5	0.5	0.5	4.88%
RFCE	RFC East	716.0	0.061	0.008	720.0	0.3	0.3	0.5	1,242.6	0.091	0.013	1,248.6	0.7	0.6	0.8	4.88%
RFCM	RFC Michigan	1,312.6	0.129	0.018	1,321.2	0.8	0.8	1.3	1,748.9	0.171	0.024	1,760.3	1.2	1.2	2.1	4.88%
RFCW	RFC West	1,166.1	0.117	0.017	1,174.0	0.8	0.7	0.9	1,828.3	0.179	0.026	1,840.5	1.4	1.1	1.4	4.88%
RMPA	WECC Rockies	1,273.6	0.123	0.018	1,281.9	0.7	0.7	0.4	1,542.6	0.120	0.017	1,550.7	0.8	0.8	0.4	4.80%
SPNO	SPP North	1,163.2	0.124	0.018	1,171.6	0.6	0.7	0.3	1,945.5	0.201	0.029	1,959.2	1.2	1.3	0.7	4.88%
SPSO	SPP South	1,166.6	0.091	0.013	1,172.8	0.8	0.9	1.2	1,603.5	0.118	0.017	1,611.5	1.3	1.3	1.9	4.88%
SRMV	SERC Mississippi Valley	854.6	0.055	0.008	858.4	0.6	0.7	1.0	1,137.6	0.069	0.010	1,142.2	0.9	0.9	1.4	4.88%
SRMW	SERC Midwest	1,664.2	0.185	0.027	1,676.8	1.1	0.8	2.5	1,907.0	0.204	0.030	1,920.9	1.1	0.9	2.7	4.88%
SRSO	SERC South	1,027.9	0.081	0.012	1,033.5	0.5	0.4	0.3	1,413.7	0.107	0.015	1,420.9	0.8	0.7	0.5	4.88%
SRTV	SERC Tennessee Valley	1,031.5	0.097	0.014	1,038.1	0.6	0.5	0.6	1,644.3	0.149	0.021	1,654.4	0.8	0.8	0.9	4.88%
SRVC	SERC Virginia/Carolina	743.3	0.067	0.009	747.5	0.4	0.4	0.3	1,422.6	0.128	0.018	1,430.9	0.9	0.8	0.5	4.88%
U.S.		947.2	0.085	0.012	952.9	0.6	0.6	0.7	1,432.3	0.117	0.017	1,440.1	1.0	0.9	1.0	4.87%

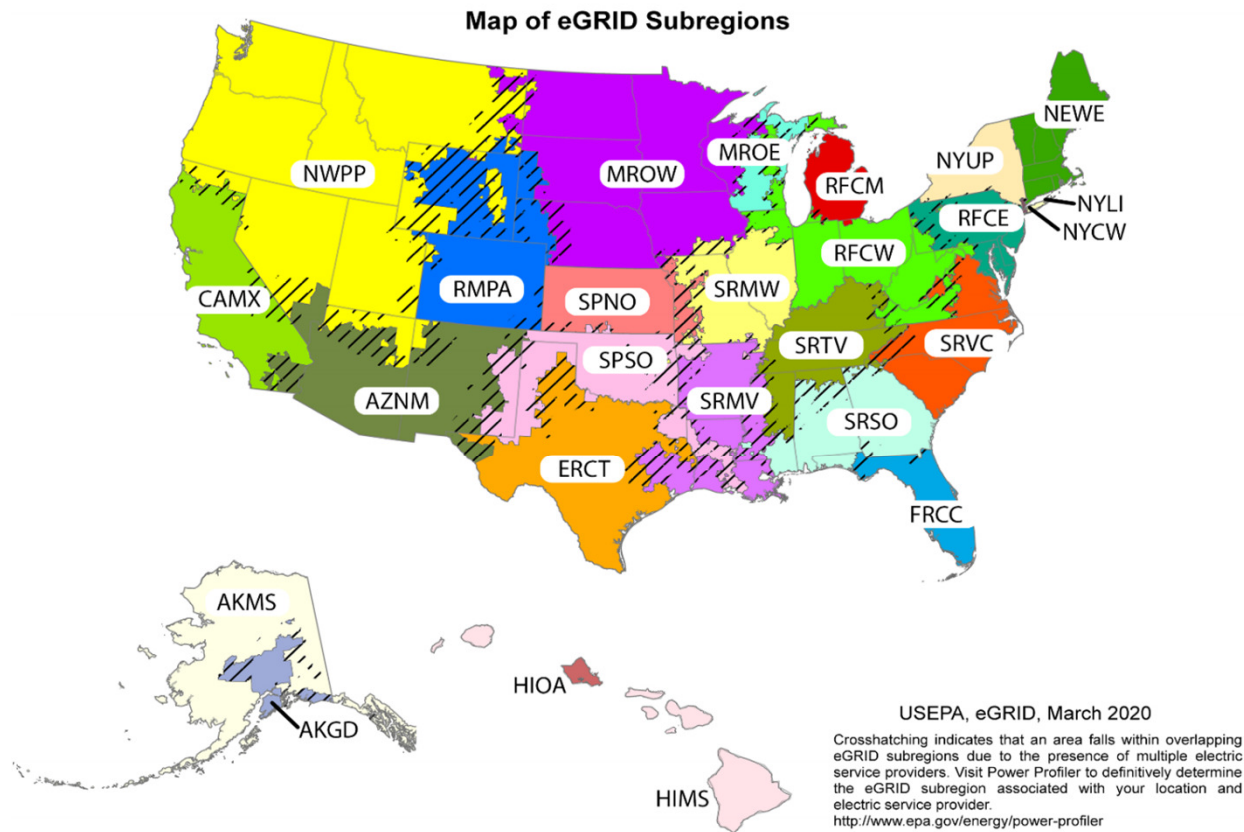
Created: 3/9/2020

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SRMV	SERC Mississippi Valley	854.6	0.055	0.008	858.4	0.6	0.7	1.0	1,137.6	0.069	0.010	1,142.2	0.9	0.9	1.4	4.88%
SRMW	SERC Midwest	1,664.2	0.185	0.027	1,676.8	1.1	0.8	2.5	1,907.0	0.204	0.030	1,920.9	1.1	0.9	2.7	4.88%
SRSO	SERC South	1,027.9	0.081	0.012	1,033.5	0.5	0.4	0.3	1,413.7	0.107	0.015	1,420.9	0.8	0.7	0.5	4.88%
SRTV	SERC Tennessee Valley	1,031.5	0.097	0.014	1,038.1	0.6	0.5	0.6	1,644.3	0.149	0.021	1,654.4	0.8	0.8	0.9	4.88%
SRVC	SERC Virginia/Carolina	743.3	0.067	0.009	747.5	0.4	0.4	0.3	1,422.6	0.128	0.018	1,430.9	0.9	0.8	0.5	4.88%
U.S.		947.2	0.085	0.012	952.9	0.6	0.6	0.7	1,432.3	0.117	0.017	1,440.1	1.0	0.9	1.0	4.87%

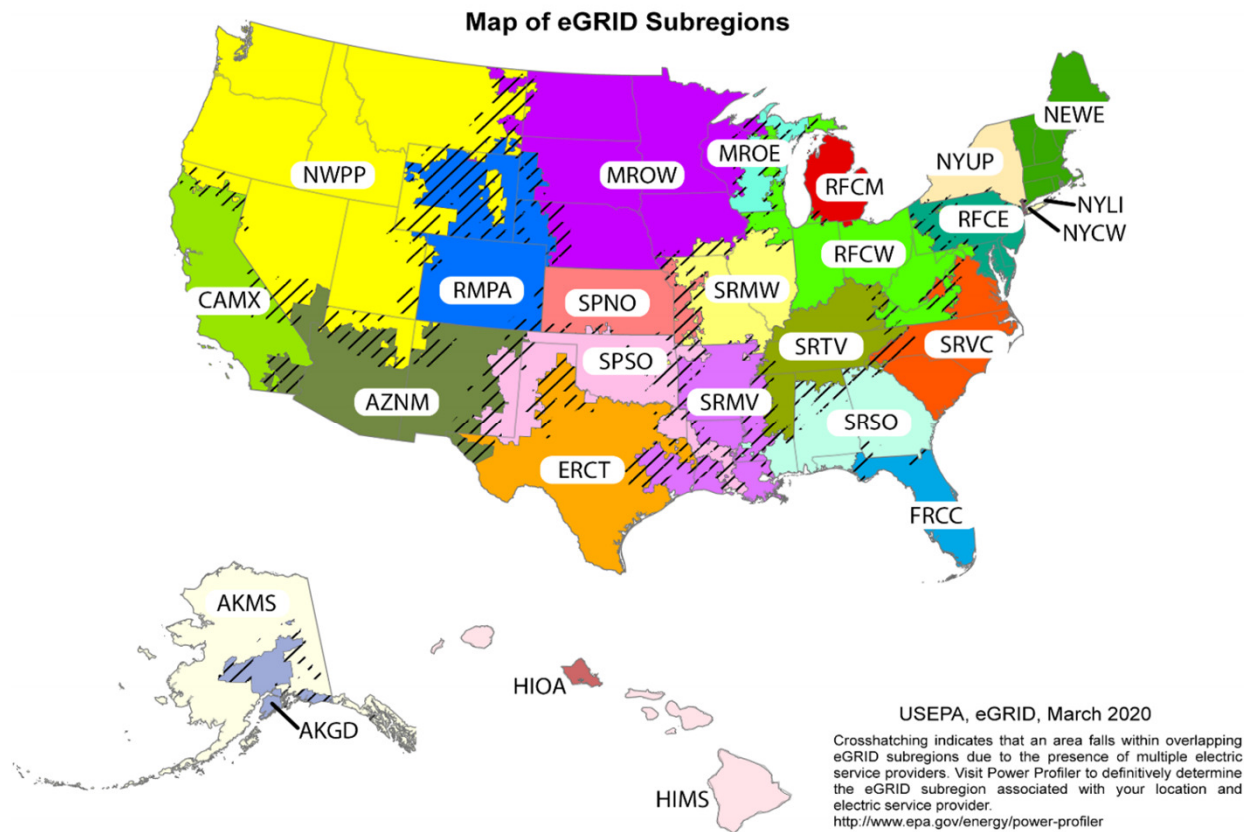
Created: 3/9/2020

Version 4.1 – Greenhouse Gas Accounting

2. Subregion Resource Mix (eGRID2018)														
eGRID subregion acronym	eGRID subregion name	Nameplate Capacity (MW)	Net Generation (MWh)	Generation Resource Mix (percent)*										
				Coal	Oil	Gas	Other Fossil	Nuclear	Hydro	Biomass	Wind	Solar	Geo-thermal	Other unknown/purchased fuel
AKGD	ASCC Alaska Grid	2,417	4,641,060	13.5%	8.3%	61.0%	0.0%	0.0%	13.6%	0.9%	2.6%	0.0%	0.0%	0.0%
AKMS	ASCC Miscellaneous	1,054	1,603,241	0.0%	26.3%	7.2%	0.0%	0.0%	64.4%	0.2%	2.1%	0.0%	0.0%	0.0%
AZNM	WECC Southwest	64,435	165,353,383	26.7%	0.0%	41.1%	0.0%	18.8%	3.4%	0.4%	1.8%	4.4%	3.4%	0.0%
CAMX	WECC California	111,738	200,103,502	4.4%	0.0%	45.2%	0.7%	9.1%	11.0%	2.8%	7.3%	14.9%	4.2%	0.3%
ERCT	ERCOT All	168,673	411,784,692	22.6%	0.0%	48.5%	0.4%	10.0%	0.2%	0.2%	17.0%	0.8%	0.0%	0.1%
FRCC	FRCC All	102,499	233,469,406	11.6%	0.9%	70.6%	0.0%	12.6%	0.1%	2.6%	0.0%	0.9%	0.0%	0.6%
HIMS	HICC Miscellaneous	1,265	2,743,591	0.0%	66.2%	0.0%	0.0%	0.0%	3.5%	1.9%	14.6%	2.9%	4.0%	6.9%
HIOA	HICC Oahu	2,354	7,053,182	18.6%	69.9%	0.0%	0.8%	0.0%	0.0%	6.4%	2.8%	1.5%	0.0%	0.0%
MROE	MRO East	11,489	24,091,646	64.1%	0.5%	22.6%	0.1%	0.0%	5.3%	4.3%	3.1%	0.0%	0.0%	0.1%
MROW	MRO West	81,925	236,704,124	51.8%	0.1%	8.0%	0.0%	10.6%	6.0%	1.1%	21.7%	0.5%	0.0%	0.2%
NEWE	NPCC New England	45,440	105,482,006	1.0%	1.2%	48.9%	0.2%	29.8%	6.7%	7.7%	3.4%	1.1%	0.0%	0.1%
NWPP	WECC Northwest	92,607	294,782,039	21.3%	0.2%	15.7%	0.3%	3.3%	47.7%	1.2%	8.3%	1.3%	0.6%	0.1%
NYCW	NPCC NYC/Westchester	17,331	43,455,637	0.0%	1.4%	60.1%	0.0%	37.6%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%
NYLI	NPCC Long Island	6,322	10,573,426	0.0%	5.5%	84.3%	0.0%	0.0%	0.0%	9.0%	0.0%	1.3%	0.0%	0.0%
NYUP	NPCC Upstate NY	30,838	84,997,204	0.8%	0.6%	25.9%	0.0%	31.3%	34.6%	2.0%	4.7%	0.2%	0.0%	0.0%
RFCE	RFC East	98,984	297,325,701	15.5%	0.5%	39.6%	0.2%	38.9%	2.0%	1.7%	1.0%	0.5%	0.0%	0.0%
RFCM	RFC Michigan	34,643	94,438,353	43.1%	1.3%	32.5%	1.8%	13.6%	0.0%	2.0%	5.7%	0.1%	0.0%	0.0%
RFCW	RFC West	192,653	532,056,236	44.4%	0.3%	21.0%	0.7%	28.3%	0.9%	0.6%	3.6%	0.1%	0.0%	0.0%
RMPA	WECC Rockies	23,700	65,413,620	44.8%	0.0%	25.5%	0.0%	0.0%	12.5%	0.3%	15.3%	1.6%	0.0%	0.1%
SPNO	SPP North	30,309	70,807,115	46.9%	0.2%	11.7%	0.0%	12.9%	0.2%	0.1%	27.9%	0.1%	0.0%	0.0%
SPSO	SPP South	62,596	160,677,686	30.9%	1.7%	40.0%	0.3%	0.0%	2.8%	1.4%	22.4%	0.4%	0.0%	0.1%
SRMV	SERC Mississippi Valley	58,996	177,877,883	16.8%	1.0%	56.5%	1.7%	20.7%	1.3%	1.6%	0.0%	0.1%	0.0%	0.3%
SRMW	SERC Midwest	40,774	128,388,555	70.2%	0.1%	9.4%	0.0%	14.8%	1.0%	0.1%	4.2%	0.0%	0.0%	0.2%
SRSO	SERC South	88,734	262,135,271	26.3%	0.2%	47.3%	0.0%	18.5%	3.0%	3.6%	0.0%	1.0%	0.0%	0.0%
SRTV	SERC Tennessee Valley	72,620	224,259,819	35.5%	0.1%	26.5%	0.0%	27.5%	9.5%	0.8%	0.0%	0.2%	0.0%	0.0%
SRVC	SERC Virginia/Carolina	117,248	328,151,742	19.1%	0.6%	34.6%	0.1%	37.8%	2.3%	2.8%	0.4%	2.2%	0.0%	0.1%
U.S.		1,561,643	4,168,370,118	27.5%	0.6%	35.1%	0.3%	19.4%	6.9%	1.6%	6.5%	1.5%	0.4%	0.1%

*percentages may not sum to 100 due to rounding

Version 4.1 – Greenhouse Gas Accounting



Version 4.1 – Greenhouse Gas Accounting

1. Subregion Output Emission Rates (eGRID2018)																
eGRID subregion acronym	eGRID subregion name	Total output emission rates							Non-baseload output emission rates							Grid Gross Loss (%)
		lb/MWh							lb/MWh							
		CO ₂	CH ₄	N ₂ O	CO ₂ e	Annual NO _x	Ozone Season NO _x	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e	Annual NO _x	Ozone Season NO _x	SO ₂	
AKGD	ASCC Alaska Grid	1,039.6	0.082	0.011	1,045.0	5.5	5.4	1.1	1,262.5	0.110	0.015	1,269.6	6.5	6.4	1.1	5.12%
AKMS	ASCC Miscellaneous	525.1	0.024	0.004	527.0	7.7	7.8	0.7	1,528.3	0.068	0.012	1,533.6	22.8	23.0	2.0	5.12%
AZNM	WECC Southwest	1,022.4	0.077	0.011	1,027.5	0.7	0.7	0.3	1,435.3	0.097	0.014	1,441.8	1.0	0.9	0.3	4.80%
CAMX	WECC California	496.5	0.034	0.004	498.7	0.5	0.4	0.0	929.5	0.047	0.006	932.5	0.8	0.7	0.0	4.80%
ERCT	ERCOT All	931.7	0.066	0.009	936.1	0.5	0.6	0.8	1,261.0	0.083	0.012	1,266.5	0.8	0.8	1.1	4.87%
FRCC	FRCC All	931.8	0.066	0.009	936.1	0.4	0.4	0.3	1,123.9	0.068	0.009	1,128.3	0.4	0.4	0.4	4.88%
HIMS	HICC Miscellaneous	1,110.7	0.118	0.018	1,119.1	7.6	7.6	4.0	1,535.7	0.139	0.022	1,545.8	11.8	11.5	5.0	5.14%
HIOA	HICC Oahu	1,669.9	0.180	0.027	1,682.6	3.5	3.8	8.0	1,682.1	0.159	0.025	1,693.6	4.2	4.2	8.4	5.14%
MROE	MRO East	1,678.0	0.169	0.025	1,689.7	0.9	0.9	0.9	1,634.3	0.149	0.022	1,644.5	0.9	1.0	1.0	4.88%
MROW	MRO West	1,239.8	0.138	0.020	1,249.2	1.0	1.0	1.4	1,764.3	0.192	0.027	1,777.0	1.5	1.4	1.8	4.88%
NEWE	NPCC New England	522.3	0.082	0.011	527.6	0.4	0.4	0.1	931.0	0.086	0.011	936.5	0.5	0.4	0.3	4.88%
NWPP	WECC Northwest	639.0	0.064	0.009	643.4	0.6	0.6	0.4	1,575.1	0.148	0.021	1,585.2	1.4	1.4	0.8	4.80%
NYCW	NPCC NYC/Westchester	596.4	0.022	0.003	597.8	0.3	0.2	0.0	1,067.6	0.022	0.002	1,068.9	0.5	0.5	0.1	4.88%
NYLI	NPCC Long Island	1,184.2	0.139	0.018	1,193.1	0.9	0.8	0.2	1,320.3	0.040	0.005	1,322.8	1.0	0.9	0.4	4.88%
NYUP	NPCC Upstate NY	253.1	0.018	0.002	253.9	0.1	0.1	0.1	931.5	0.043	0.005	934.0	0.5	0.5	0.5	4.88%
RFCE	RFC East	716.0	0.061	0.008	720.0	0.3	0.3	0.5	1,242.6	0.091	0.013	1,248.6	0.7	0.6	0.8	4.88%
RFCM	RFC Michigan	1,312.6	0.129	0.018	1,321.2	0.8	0.8	1.3	1,748.9	0.171	0.024	1,760.3	1.2	1.2	2.1	4.88%
RFCW	RFC West	1,166.1	0.117	0.017	1,174.0	0.8	0.7	0.9	1,828.3	0.179	0.026	1,840.5	1.4	1.1	1.4	4.88%
RMPA	WECC Rockies	1,273.6	0.123	0.018	1,281.9	0.7	0.7	0.4	1,542.6	0.120	0.017	1,550.7	0.8	0.8	0.4	4.80%
SPNO	SPP North	1,163.2	0.124	0.018	1,171.6	0.6	0.7	0.3	1,945.5	0.201	0.029	1,959.2	1.2	1.3	0.7	4.88%
SPSO	SPP South	1,166.6	0.091	0.013	1,172.8	0.8	0.9	1.2	1,603.5	0.118	0.017	1,611.5	1.3	1.3	1.9	4.88%
SRMV	SERC Mississippi Valley	854.6	0.055	0.008	858.4	0.6	0.7	1.0	1,137.6	0.069	0.010	1,142.2	0.9	0.9	1.4	4.88%
SRMW	SERC Midwest	1,664.2	0.185	0.027	1,676.8	1.1	0.8	2.5	1,907.0	0.204	0.030	1,920.9	1.1	0.9	2.7	4.88%
SRSO	SERC South	1,027.9	0.081	0.012	1,033.5	0.5	0.4	0.3	1,413.7	0.107	0.015	1,420.9	0.8	0.7	0.5	4.88%
SRTV	SERC Tennessee Valley	1,031.5	0.097	0.014	1,038.1	0.6	0.5	0.6	1,644.3	0.149	0.021	1,654.4	0.8	0.8	0.9	4.88%
SRVC	SERC Virginia/Carolina	743.3	0.067	0.009	747.5	0.4	0.4	0.3	1,422.6	0.128	0.018	1,430.9	0.9	0.8	0.5	4.88%
U.S.		947.2	0.085	0.012	952.9	0.6	0.6	0.7	1,432.3	0.117	0.017	1,440.1	1.0	0.9	1.0	4.87%

Created: 3/9/2020

Version 4.1 – Greenhouse Gas Accounting

2. Subregion Resource Mix (eGRID2018)														
eGRID subregion acronym	eGRID subregion name	Nameplate Capacity (MW)	Net Generation (MWh)	Generation Resource Mix (percent)*										
				Coal	Oil	Gas	Other Fossil	Nuclear	Hydro	Biomass	Wind	Solar	Geo-thermal	Other unknown/purchased fuel
AKGD	ASCC Alaska Grid	2,417	4,641,060	13.5%	8.3%	61.0%	0.0%	0.0%	13.6%	0.9%	2.6%	0.0%	0.0%	0.0%
AKMS	ASCC Miscellaneous	1,054	1,603,241	0.0%	26.3%	7.2%	0.0%	0.0%	64.4%	0.2%	2.1%	0.0%	0.0%	0.0%
AZNM	WECC Southwest	64,435	165,353,383	26.7%	0.0%	41.1%	0.0%	18.8%	3.4%	0.4%	1.8%	4.4%	3.4%	0.0%
CAMX	WECC California	111,738	200,103,502	4.4%	0.0%	45.2%	0.7%	9.1%	11.0%	2.8%	7.3%	14.9%	4.2%	0.3%
ERCT	ERCOT All	168,673	411,784,692	22.6%	0.0%	48.5%	0.4%	10.0%	0.2%	0.2%	17.0%	0.8%	0.0%	0.1%
FRCC	FRCC All	102,499	233,469,406	11.6%	0.9%	70.6%	0.0%	12.6%	0.1%	2.6%	0.0%	0.9%	0.0%	0.6%
HIMS	HICC Miscellaneous	1,265	2,743,591	0.0%	66.2%	0.0%	0.0%	0.0%	3.5%	1.9%	14.6%	2.9%	4.0%	6.9%
HIOA	HICC Oahu	2,354	7,053,182	18.6%	69.9%	0.0%	0.8%	0.0%	0.0%	6.4%	2.8%	1.5%	0.0%	0.0%
MROE	MRO East	11,489	24,091,646	64.1%	0.5%	22.6%	0.1%	0.0%	5.3%	4.3%	3.1%	0.0%	0.0%	0.1%
MROW	MRO West	81,925	236,704,124	51.8%	0.1%	8.0%	0.0%	10.6%	6.0%	1.1%	21.7%	0.5%	0.0%	0.2%
NEWE	NPCC New England	45,440	105,482,006	1.0%	1.2%	48.9%	0.2%	29.8%	6.7%	7.7%	3.4%	1.1%	0.0%	0.1%
NWPP	WECC Northwest	92,607	294,782,039	21.3%	0.2%	15.7%	0.3%	3.3%	47.7%	1.2%	8.3%	1.3%	0.6%	0.1%
NYCW	NPCC NYC/Westchester	17,331	43,455,637	0.0%	1.4%	60.1%	0.0%	37.6%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%
NYLI	NPCC Long Island	6,322	10,573,426	0.0%	5.5%	84.3%	0.0%	0.0%	0.0%	9.0%	0.0%	1.3%	0.0%	0.0%
NYUP	NPCC Upstate NY	30,838	84,997,204	0.8%	0.6%	25.9%	0.0%	31.3%	34.6%	2.0%	4.7%	0.2%	0.0%	0.0%
RFCE	RFC East	98,984	297,325,701	15.5%	0.5%	39.6%	0.2%	38.9%	2.0%	1.7%	1.0%	0.5%	0.0%	0.0%
RFCH	RFC Michigan	34,643	94,438,353	43.1%	1.3%	32.5%	1.8%	13.6%	0.0%	2.0%	5.7%	0.1%	0.0%	0.0%
RFCH	RFC West	192,653	532,056,236	44.4%	0.3%	21.0%	0.7%	28.3%	0.9%	0.6%	3.6%	0.1%	0.0%	0.0%
RMPA	WECC Rockies	23,700	65,413,620	44.8%	0.0%	25.5%	0.0%	0.0%	12.5%	0.3%	15.3%	1.6%	0.0%	0.1%
SPNO	SPP North	30,309	70,807,115	46.9%	0.2%	11.7%	0.0%	12.9%	0.2%	0.1%	27.9%	0.1%	0.0%	0.0%
SPSO	SPP South	62,596	160,677,686	30.9%	1.7%	40.0%	0.3%	0.0%	2.8%	1.4%	22.4%	0.4%	0.0%	0.1%
SRMV	SERC Mississippi Valley	58,996	177,877,883	16.8%	1.0%	56.5%	1.7%	20.7%	1.3%	1.6%	0.0%	0.1%	0.0%	0.3%
SRMW	SERC Midwest	40,774	128,388,555	70.2%	0.1%	9.4%	0.0%	14.8%	1.0%	0.1%	4.2%	0.0%	0.0%	0.2%
SRSO	SERC South	88,734	262,135,271	26.3%	0.2%	47.3%	0.0%	18.5%	3.0%	3.6%	0.0%	1.0%	0.0%	0.0%
SRTV	SERC Tennessee Valley	72,620	224,259,819	35.5%	0.1%	26.5%	0.0%	27.5%	9.5%	0.8%	0.0%	0.2%	0.0%	0.0%
SRVC	SERC Virginia/Carolina	117,248	328,151,742	19.1%	0.6%	34.6%	0.1%	37.8%	2.3%	2.8%	0.4%	2.2%	0.0%	0.1%
U.S.		1,561,643	4,168,370,118	27.5%	0.6%	35.1%	0.3%	19.4%	6.9%	1.6%	6.5%	1.5%	0.4%	0.1%

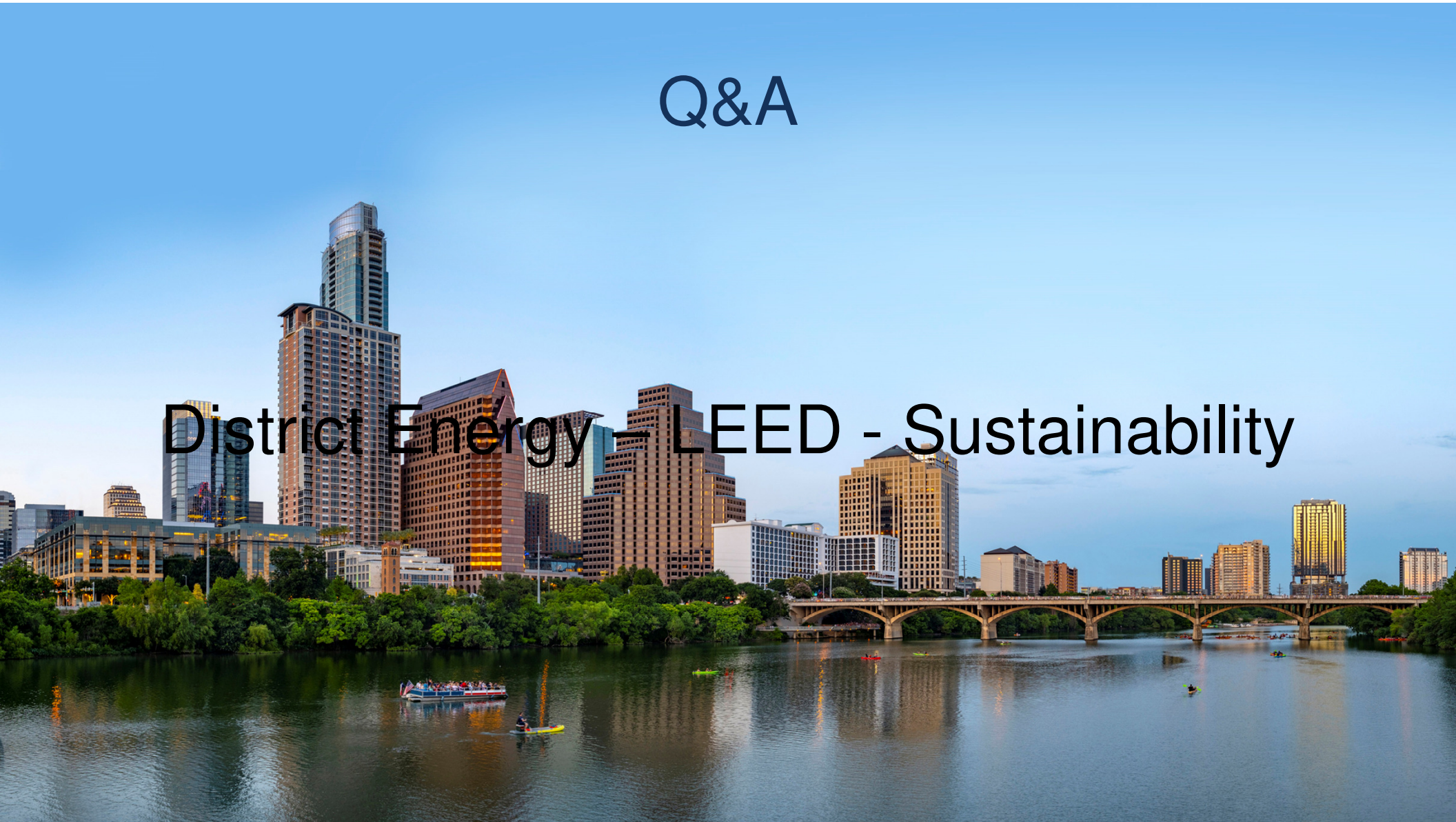
*percentages may not sum to 100 due to rounding

Version 4.1 – Greenhouse Gas Accounting

- No difference for standard systems.
- Can halve points achieved from CHP.
- Interesting opportunity for TES.

Q&A

District Energy – LEED - Sustainability



Thank You!

J. Tim Griffin, P.E.
RMF Engineering, Inc.
tim.griffin@rmf.com

