

# Program Planning Template

## 2014 – 2017 Programs

### GY 4 – 6; EY 7 - 9

Program Applicable for: Ameren \_\_\_\_\_ ComEd \_\_\_\_\_ DCEO X \_\_\_\_\_  
Nicor \_\_\_\_\_ People's Gas/North Shore Gas \_\_\_\_\_

<b>Program Name</b>	<b>Combined Heat and Power (2014 through 2017)</b>
<b>Objective</b>	To achieve electric and natural gas savings through the use of combined heat and power in the public sector
<b>Target Market</b>	Public sector buildings/facilities such as water and waste water treatment facilities; schools, colleges and universities; health care; office buildings, and campus complexes.
<b>Program Duration</b>	June, 2014 through May 2017
<b>Program Description</b>	<p>This program will be offered for the first time in 2014 and depending on the project will have the potential to accrue electric savings or both electric and natural gas savings. The program is established to encourage investment in Conventional or Topping Cycle CHP systems as well as Waste Heat-to-Power or Bottoming cycle CHP systems in the public sector.</p> <p>The intent is to issue a competitive solicitation that will seek qualified applications that will reduce the total Btus of electricity and natural gas required to meet the end use needs of the facility. Depending on the application, the saved Btus can be converted totally into kWh saved or a combination of kWh and therms saved. In all cases the saved energy will account for any additional natural gas utilized at the site. Depending on the results of the initial competitive solicitation, DCEO will consider either additional competitive solicitations or structure the program to allow applications to be submitted throughout the program year.</p> <p>The incentive levels are set to provide (on average) the equivalent of \$750/kW of capacity installed. This represents between 25% and 50% of the installed cost of most CHP systems. However the total incentive for any one project will be capped at \$2M or 50% of the total cost of the project (whichever is less). The incentive will be structured to provide assistance during the design/engineering phase, the construction phase as well as the energy production phase. This approach ensures that approximately 2/3 of the total incentive (production phase) is based on the actual performance of the system over the first 12 months of operation.</p> <p>Applications will be reviewed by DCEO and/or its designated agent (Energy Resources Center) to ensure that they meet all the requirements of the RFP, including but not limited to the sustained ability to utilize both the electricity and thermal energy produced by the system and attain minimum system efficiencies of 60% (LHV) with at least 20% of the system's total useful energy output<sup>1</sup> in the form of useful thermal energy<sup>2</sup> on an annual basis. All applications must pass the TRC test. Part of the application approval process will have the DCEO EM&amp;V evaluator company review the application and provide their feedback on the potential project meeting the requirements of the EM&amp;V protocols.</p> <p>Unlike many other energy efficiency projects, most CHP projects take in excess of 12 months to develop and implement. The ability to roll-over program funds during the three year program cycle for both gas and electric program funds allows this program to adapt to the development and implementation time frames associated with most CHP projects.</p>

<sup>1</sup> Useful energy output is defined as net power generated (total power generated less CHP system parasitic electric).

<sup>2</sup> Useful thermal energy is defined as the thermal energy from the CHP system that is actually recovered and utilized in the facility/process

<b>Program Name</b>	<b>Combined Heat and Power (2014 through 2017)</b>
<b>Eligible Customers</b>	Public sector entities throughout the state and located in the service territories of ComEd, Ameren, Nicor, Peoples and/or North Shore Gas. The type of facilities can include (but are not to be limited to) K-12 schools, community colleges, public universities, municipally owned water and waste water treatment facilities, city/county government/state/federal facilities and campuses, and publicly owned health care. The eligible facilities must have sufficient and sustainable thermal and electric loads so that the application can demonstrate the ability of the CHP system to operate with an annual fuel use efficiency of at least 60% (LHV) with at least 20% of the system's total useful energy output in the form of useful thermal energy on an annual basis.
<b>Eligible Measures</b>	<ol style="list-style-type: none"> <li>1. Conventional or Topping Cycle CHP is defined as an integrated system that is located at or near the building or facility (on-site, on the customer side of the meter) that utilizes a prime mover (reciprocating engine, gas turbine, micro-turbine, fuel cell, boiler/steam turbine combination) for the purpose of generating electricity and useful thermal energy (such as steam, hot water, or chilled water) where the primary function of the facility where the CHP is located is not to generate electricity for use on the grid. An eligible system must demonstrate a minimum fuel use annual energy efficiency of 60% (LHV) with at least 20% of the system's total useful energy output in the form of useful thermal energy on an annual basis.</li> <li>2. Waste Heat-to-Power or Bottoming Cycle CHP is defined as an integrated system that is located at or near the building or facility (on-site, on the customer side of the meter) that: <ul style="list-style-type: none"> <li>➤ Utilizes exhaust heat from an industrial/commercial process and converts that heat to generate electricity (except for exhaust heat from a facility whose primary purpose is the generation of electricity for use on the grid).</li> <li>➤ Utilizes the pressure drop in an industrial/commercial facility to generate electricity through a backpressure steam turbine where the facility normally uses a pressure reducing valve (PRV) to reduce the pressure in their facility.</li> <li>➤ Utilizes the pressure reduction in natural gas pipelines (located at natural gas compressor stations) before the gas is distributed through the pipeline to generate electricity, provided that the conversion of energy to electricity is achieved without using additional fossil fuels.</li> </ul> <p>Since these Waste Heat-to-Power or Bottoming Cycle CHP systems utilize waste heat, they do not have to meet any specified system efficiency level to qualify (assuming they use no additional fossil fuel).</p> </li> </ol>
<b>Implementation Strategy</b>	<p>The CHP program will be implemented through a competitive procurement process (RFP) issued in late winter or early spring of 2014. Applications will be accepted and reviewed by DCEO and/or its designated agent (Energy Resources Center). The ERC will provide technical assistance in the implementation of the program. All applications must pass the Illinois TRC test. Part of the application approval process will have the DCEO EM&amp;V evaluator review the application and provide their feedback on the potential project meeting the requirements of the EM&amp;V protocols.</p> <p>Approved applications will be implemented until program dollars are expended or additional funds are allocated. Depending on the results of the initial competitive solicitation, DCEO will consider either additional competitive solicitations or structure the program to allow applications to be submitted throughout the program year..</p>
<b>Marketing Strategy</b>	The initial program offering will be advertised through the DCEO Trade Ally Program and program events. The ERC will directly market the program with potential applicants such as University campuses, waste water treatment facilities, etc., as well as market through trade associations dealing with the public sector. The ERC will also market the program through its Midwest Clean Energy Application Center website and events as well as through the Midwest Cogeneration Association.

<b>Program Name</b>	<b>Combined Heat and Power (2014 through 2017)</b>
<b>Incentive Levels</b>	<p>Incentive levels were designed to provide (on average) the equivalent of \$750/kW of installed capacity, which is meant to represent between 25% and 50% of the total cost of most CHP systems.</p> <p>Incentives will be capped at \$2 million per CHP project or 50% of the total cost of the project (whichever is less).</p> <ul style="list-style-type: none"> <li>• Design Incentive = \$75/kW issued at the completion of the detailed design phase</li> <li>• Construction Incentive = \$175/kW issued at the commissioning of the system <ul style="list-style-type: none"> <li>• Production Incentive = \$0.08/kWh produced for topping cycle CHP systems when the system efficiency is measured on an annual basis at 75% (LHV) or higher</li> <li>• \$0.06/kWh produced for topping cycle CHP systems when the system efficiency is measured on an annual basis between 60% (LHV) and 74.9% (LHV).</li> <li>• \$0.08/kWh produced for bottoming cycle CHP systems</li> <li>• Production incentives are issued at the end of 12 months of operation and based on meeting the measured operating requirements of the system.</li> </ul> </li> </ul> <p>The Design &amp; Construction incentive is capped at \$650,000</p> <p>For Conventional or Topping Cycle CHP projects that replace the use of grid generated electricity and replace thermal energy provided from a natural gas boiler or other natural gas fueled equipment, DCEO will provide approximately 80% of the incentive funds from the appropriate electric program and approximately 20% of the incentive funds from the appropriate natural gas program, depending on fund availability. The total MMBtus savings will be split in the same ratio as the funds and converted to kWh and therms.</p> <p>For all other CHP projects (Topping or Bottoming Cycle), the incentive funds will come entirely from the electric program and the total MMBtus savings will be converted to kWh and applied to the electric program only.</p>

Program Name	Combined Heat and Power (2014 through 2017)
Calculating Energy Savings	<p>For Topping Cycle CHP systems, the energy savings calculations will be done in the following two step process:</p> <p>Step 1: Calculate the fuel savings associated with the use of the CHP system to generate the electricity and useable thermal energy versus the use of electricity generated from the local grid and the thermal energy provided by an on-site boiler.</p> $S \text{ fuel CHP} = F \text{ grid} + F \text{ thermal CHP} - F \text{ total CHP}$ <ul style="list-style-type: none"> <li>S fuel CHP defined as the fuel savings in Btus associated with the use of the CHP system versus the use of electricity from the grid and the thermal from an on-site boiler or heater.</li> <li>F grid is the fuel in Btus that would have been used by the grid to generate the net electricity output of the CHP system<sup>3</sup>. <math>F \text{ grid} = E_{\text{net CHP}} \times H \text{ grid}</math> (H is the heat rate of the grid). H grid should be based on the average fossil heat rate for the state or for the EPA eGRid subregion and include a factor that takes into account T&amp;D losses<sup>4</sup></li> <li>F thermal CHP is the fuel in Btus that would have been used on-site by a boiler or heater to provide the actual useful thermal output<sup>5</sup> provided by the CHP system. To calculate F thermal CHP, you take the useful thermal output of the CHP system and divide that number by the efficiency of the onsite boiler or heater that is displaced by the CHP system. . If the efficiency of the replaced boiler/heater is unknown, assume 80%.</li> </ul> <p>F total CHP is the total fuel in Btus consumed by the CHP system Depending on the application, the energy savings in Btus can be allocated or split between the electric and gas program:</p> <ul style="list-style-type: none"> <li>For Topping cycle CHP systems where the waste heat is utilized to replace heat generated by a natural gas boiler, DCEO will split the savings based on the incentives provided (expected to average 80% electric and 20% natural gas). For those systems where no savings are to be allocated to the natural gas program, all the savings will be allocated to the electric program.</li> </ul> <p>Step 2: Converting the fuel savings (Btus) to allowable electricity and/or gas savings:</p> <ul style="list-style-type: none"> <li>To convert the Btus saved to electricity saved (kWh), we first calculate the effective heat rate of the CHP system: <math>H_{\text{eff CHP}} = (F \text{ total CHP} - F \text{ thermal CHP}) \div E_{\text{net CHP}}</math>. Once we have determined the effective heat rate of the CHP system, we can convert the Btus to saved kWh; <math>S \text{ CHP Elec} = S \text{ fuel CHP} \div H_{\text{eff CHP}}</math>.</li> <li>To convert the Btus saved to natural gas saved (therms), we divide the Btus by 100,000 Btu / therm; <math>S \text{ CHP gas} = S \text{ fuel CHP} \div 100,000 \text{ Btu/therm}</math></li> </ul> <p>For all Bottoming cycle CHP systems, the energy savings are all applied to the electric program and are equal to the total electricity (kWh) produced by the CHP system (assuming no additional fossil fuels are used in the waste heat-to-power system).</p>
Milestones	<ul style="list-style-type: none"> <li>Program Guideline for FY 2014 prepared and issued by February 1<sup>st</sup> 2014</li> <li>Competitive solicitation (RFP) issued by March 15<sup>th</sup>, 2014</li> <li>Applications approved starting June 1<sup>st</sup>, 2014</li> </ul>

<sup>3</sup> Net electricity output is defined as total power generated less CHP system parasitic electric requirements

<sup>4</sup> Fuel and Carbon Dioxide Emissions Savings Calculation Methodology for Combined Heat and Power Systems, US EPA CHP Partnership, August 2102, [http://www.epa.gov/chp/documents/fuel\\_and\\_co2\\_savings.pdf](http://www.epa.gov/chp/documents/fuel_and_co2_savings.pdf)

<sup>5</sup> Useful thermal output is defined as the thermal output of the CHP system that is actually recovered and used by the facility.

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<b>Program Name</b>	<b>Combined Heat and Power (2014 through 2017)</b>		
<b>Estimated Participation</b>			
	<b>Year 1 Participation</b>	<b>Year 2 Participation</b>	<b>Year 3 Participation</b>
Total	7	7	8

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**Program Name**

**Combined Heat and Power (2014 through 2017)**

**Estimated Budget**

<b>Budget Information Total Program (Gas + Electric)</b>				
<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
Program Implementation	\$180,000	\$360,000	\$540,000	\$1,080,000
Portfolio Admin	\$222,222	\$444,444	\$666,667	\$1,333,333
Incentives	\$1,820,000	\$3,640,000	\$5,460,000	\$10,920,000
<b>Total</b>	<b>\$2,222,222</b>	<b>\$4,444,444</b>	<b>\$6,666,667</b>	<b>\$13,333,333</b>

<b>Electric Budget Information Total Program</b>				
<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
Program Implementation	\$144,000	\$288,000	\$432,000	\$864,000
Portfolio Admin	\$177,778	\$355,556	\$533,333	\$1,066,667
Incentives	\$1,456,000	\$2,912,000	\$4,368,000	\$8,736,000
<b>Total</b>	<b>\$1,777,778</b>	<b>\$3,555,556</b>	<b>\$5,333,333</b>	<b>\$10,666,667</b>

<b>ComEd (72.2%)</b>				
<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
Program Implementation	\$104,014	\$208,028	\$312,041	\$624,083
Portfolio Admin	\$128,412	\$256,824	\$385,236	\$770,473
Incentives	\$1,051,695	\$2,103,390	\$3,155,085	\$6,310,170
<b>Total</b>	<b>\$1,284,121</b>	<b>\$2,568,242</b>	<b>\$3,852,363</b>	<b>\$7,704,725</b>

<b>Ameren (27.8%)</b>				
<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
Program Implementation	\$39,986	\$79,972	\$119,959	\$239,917
Portfolio Admin	\$49,366	\$98,731	\$148,097	\$296,194
Incentives	\$404,305	\$808,610	\$1,212,915	\$2,425,830
<b>Total</b>	<b>\$493,657</b>	<b>\$987,314</b>	<b>\$1,480,971</b>	<b>\$2,961,942</b>

Program Name	Combined Heat and Power (2014 through 2017)				
Estimated Budget	<b>Gas Budget Information Total Program</b>				
	<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
	Program Implementation	\$36,000	\$72,000	\$108,000	\$216,000
	Portfolio Admin	\$44,444	\$88,889	\$133,333	\$266,667
	Incentives	\$364,000	\$728,000	\$1,092,000	\$2,184,000
	<b>Total</b>	<b>\$444,444</b>	<b>\$888,889</b>	<b>\$1,333,333</b>	<b>\$2,666,667</b>
	<b>Ameren (15.9%)</b>				
	<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
	Program Implementation	\$9,997	\$19,993	\$29,990	\$59,979
	Portfolio Admin	\$12,341	\$24,683	\$37,024	\$74,049
	Incentives	\$101,076	\$202,153	\$303,229	\$606,458
	<b>Total</b>	<b>\$123,414</b>	<b>\$246,828</b>	<b>\$370,243</b>	<b>\$740,485</b>
	<b>NICOR (53.2%)</b>				
	<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
	Program Implementation	\$16,442	\$32,884	\$49,326	\$98,652
	Portfolio Admin	\$20,299	\$40,598	\$60,896	\$121,793
	Incentives	\$166,247	\$332,495	\$498,742	\$997,484
	<b>Total</b>	<b>\$202,988</b>	<b>\$405,977</b>	<b>\$608,965</b>	<b>\$1,217,930</b>
	<b>People's Gas (25.0%)</b>				
	<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
	Program Implementation	\$7,743	\$15,486	\$23,229	\$46,458
	Portfolio Admin	\$9,559	\$19,119	\$28,678	\$57,356
	Incentives	\$78,291	\$156,582	\$234,873	\$469,745
	<b>Total</b>	<b>\$95,593</b>	<b>\$191,186</b>	<b>\$286,780</b>	<b>\$573,559</b>
	<b>North Shore (5.9%)</b>				
	<b>Budget Category</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>
	Program Implementation	\$1,818	\$3,637	\$5,455	\$10,910
Portfolio Admin	\$2,245	\$4,490	\$6,735	\$13,469	
Incentives	\$18,385	\$36,771	\$55,156	\$110,313	
<b>Total</b>	<b>\$22,449</b>	<b>\$44,897</b>	<b>\$67,346</b>	<b>\$134,692</b>	

Program Name	Combined Heat and Power (2014 through 2017)									
<b>Savings Targets</b>	Note: Savings are accrued with a one-year delay, since projects will be evaluated after 12 months of operation to determine the full incentive and count the realized savings.									
		Year 1		Year 2		Year 3		Total		
		MWh	MW	MWh	MW	MWh	MW	MWh	MW	
	Ameren (27.4%)	0	0.00	2,023	0.57	5,007	1.33	7,030	1.90	
	ComEd (72.2%)	0	0.00	6,018	1.62	14,237	3.61	20,255	5.23	
	<b>Total Gross Electric Savings</b>	<b>0</b>	<b>0.00</b>	<b>9,787</b>	<b>2.67</b>	<b>23,420</b>	<b>6.01</b>	<b>33,207</b>	<b>8.68</b>	
	<b>Total Net Electric Savings (82% NTG)</b>	See Note Above		<b>8,042</b>	<b>2.19</b>	<b>19,243</b>	<b>4.94</b>	<b>27,285</b>	<b>7.13</b>	
<b>Other Program Metrics</b>		Year 1	Year 2	Year 3	Total					
		Therms	Therms	Therms	Therms					
		Ameren (27.8%)	0	30,605	73,630	104,235				
		Nicor (45.7%)	0	56,232	125,343	181,576				
		Peoples (21.5%)	0	26,482	59,028	85,509				
		North Shore (5.1%)	0	6,219	13,862	20,081				
		<b>Total Gross Gas Savings</b>	<b>0</b>	<b>137,400</b>	<b>312,486</b>	<b>449,886</b>				
		<b>Total Net Gas Savings (87% NTG)</b>	<b>0</b>	<b>119,538</b>	<b>271,863</b>	<b>391,401</b>				
		Statewide								
	TRC			1.20						
	TRC w/NEBs			1.32						