ES-3 and ES-9 Removing Barriers and Providing Incentives to Combined Heat and Power (CHP) and Clean DG

Mitigation Option Description

Combined Heating Cooling and Power (CHP), also know as cogeneration, is a method of utilizing the thermal energy (heat) produced when generating electricity (power) in a single, coordinated process. CHP is more energy efficient than separate generation of electricity at a separate central electric plant and production of localized thermal energy for the end user. This distributed generation resource allows for recycling the heat, which is normally wasted to cooling towers or lakes at centralized electric generating stations, to meet onsite thermally driven demand such as process and space heating, cooling and dehumidification.

Mitigation Option Design

The proposed policy would encourage the adoption of CHP through a combination of regulatory improvements and expanded incentives designed to improve interconnection and net metering standards, adopt output based emission standards, and allow GHG friendly business arrangements, such as third party ownership of CHP based generation.

Goals: 50 percent of North Carolina's 4,000 MW of planned new electric generation will be CHP.

Timing: Goal should be achieved by 2018, within the time frame for new generation additions.

Coverage of parties: NC Utilities Commission, Utilities, NC Sustainable Energy Assoc.

Other: Not applicable.

Implementation Mechanisms

This is a command and control policy that would be implemented with the following steps: 1) Encourage CHP systems of 20 MW or smaller (or of equivalent mechanical power) by a speedy adoption and customer friendly implementation of FERC Order 2006 Standardization of Small Generator Interconnection Agreements and Procedures, 2) Qualify recycled energy from CHP generation for existing renewable and energy efficiency incentive and loan programs, 3) Allow energy service companies to sell CHP and CDG output to third party customers, and 4) Facilitate governmental and non profit organizations to easily sell renewable energy credits and tax credits to the market place.

Related Policies/Programs in Place

The policy design statements point to key related policy and programs which already exist in NC, at the national level and other states such as Connecticut, New York, Texas and California for successfully implementing CHP and CDG

Types(s) of GHG Reductions

Substantial carbon dioxide reductions would be achieved from displaced coal generation.

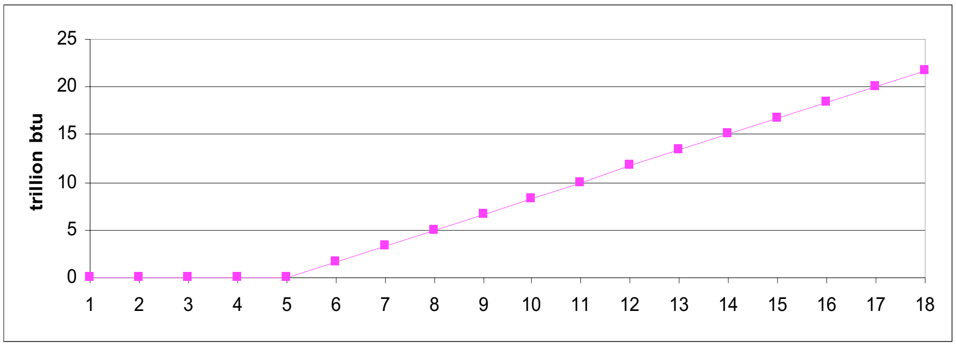
Estimated GHG Savings and Costs per $MtCO_2e$

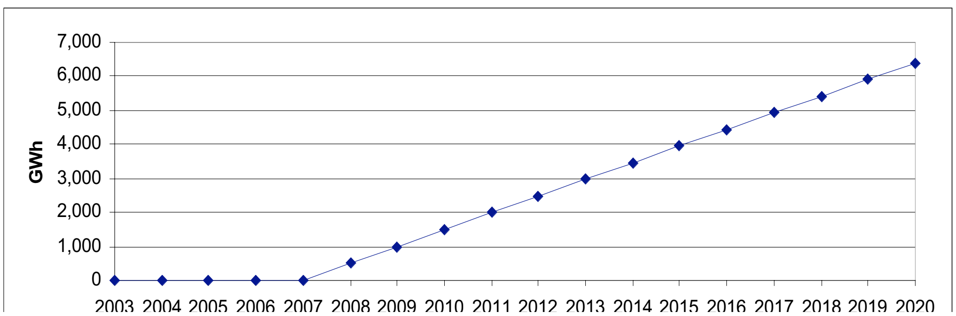
The table below summarizes the annual GHG reductions in 2010 and 2020, the cumulative GHG reductions through 2020, the incremental cost of the option (expressed in net present value terms), and the cost-effectiveness of the option (expressed in terms of $ per ton of CO2-equivalent avoided).

		GHG Reductions (E6 tonnes CO2-equiv)				
Option No.	Option Name	2010	2020	Total (2007-2020)	NPV of Costs (E6 2005$)	Cost of Saved Carbon (2005$/tCO2 avoided)
ES-3 & ES-9	CHP incentives and barrier removal	0.72	2.84	20.64	$83	$4.0

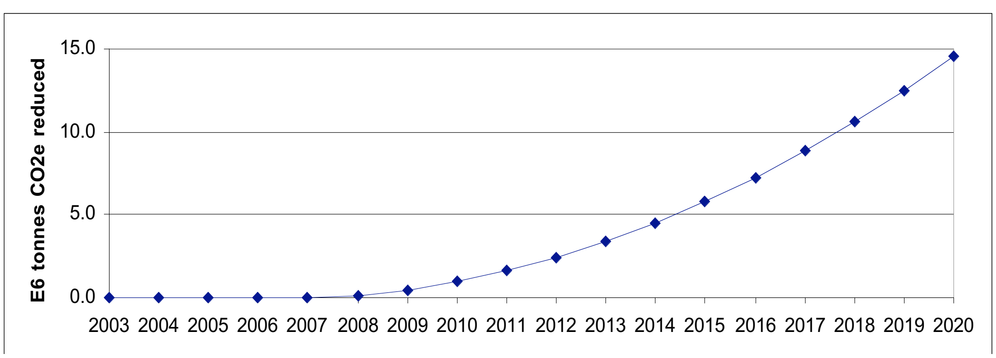
- ***Data Sources:*** EIA's Annual Energy Outlook (AEO) for 2006; *Combined Heat and Power White Paper*, dated January, 2006, prepared for the Clean and Diversified Energy Initiative of the Western Governors Association based on a study in 2003 for NREL by Energy and Environmental Analysis
- ***Quantification Methods:*** The proposed analysis will use a simple spreadsheet tool to evaluate the costs and benefits associated with introducing 2,000 MW over the study period. It will involve the following steps
    - The starting point for the analysis is to develop a better understanding of the CHP in NC, based on a review of available studies. This will help to confirm a key assumption of the analysis that there exists at least 2,000 MW of CHP potential by 2020, as well as identify a working split between commercial and industrial CHP.
    - Integrate assumptions regarding the penetration of and fuel shares for new CHP systems, estimates of future capacity of CHP developed under the policy, and CHP cost and performance for different kinds of systems into a spreadsheet model to estimate the overall net GHG emissions reduction and net cost of the policy. The avoided GHG emissions will be estimated in a manner consistent with the analysis of demand reduction options in RCI.
- ***Key Assumptions:*** A key assumptions is that CHP potential is at least 2,000 MW, and can be phased in at an acceptable rate. Systems are assumed to operate an average of 5000 hours per year (at full capacity), and 90 percent of co-generated heat is assumed to be usable (and displaces heat from purchased fuels). Gas-fired, biomass-fired, and coal-fired capacity are assumed, with a mix that includes a heavy reliance on natural gas.
- ***Analytical issues:*** There were several assumptions that were made in quantifying the GHG reduction benefits and cost effectiveness of this option, as follows:
    - *CHP targets:* The CAPAG indicated that a sensitivity analysis should be conducted regarding the level of penetration of CHP systems. Hence, the analysis was set up to consider the following sensitivities.
        1. 50% of the target is met: This corresponds to 1,000 MW of new CHP capacity. *Note that this is the default assumption and the results reflect this assumption.*
        2. 90% of the target is met: This corresponds to 1,800 MW of new CHP capacity.

- *Fuel mix:* It was assumed that the fraction of new CHP capacity fueled with NG was 90%, with the remaining 10% split evenly between biomass and coal.
- *Energy and system electricity displaced by CHP:* CHP electric production characteristics as well and system transmission and distribution (T&D) losses were accounted for to estimate annual fuel and system electric generation displaced, as shown on the graph below:





- *Marginal impact of CHP:* See the discussion under ES-1. The same default assumptions were used.
- *CO2-equivalent emission factor and cumulative emission reductions:* See the discussion under ES-1 for electric supply. The same default assumptions were used. For fuel, standard IPCC emission factors were used for natural gas, coal, biomass, and oil. The graph below shows cumulative CO2-equivalent emission reductions associated with CHP systems.



Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD