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Combined Heat and Power: A Technology Whose Time Has Come

*Steven Ferraina**

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I.

INTRODUCTION

On October 29, 2012, Hurricane Sandy blew through the largely populated areas of New Jersey, New York, and Connecticut.¹ It was, at the time, the largest storm in the region's history.² While many areas lost electricity from the electrical grid, the few buildings equipped with Combined Heat and Power ("CHP") remained lit and heated.³ For example, many residential and commercial facilities lost power for days after the storm, but natural gas powered CHP systems at the Co-Op City apartment complex and New York University, Fairfield University, and Princeton University kept their buildings functioning.⁴ According to Ross Tomlin, an employee of Gulf Coast Clean Energy Application Center of the Department of Energy, "because CHP relies on natural gas delivered through underground pipelines, [the systems] can weather just about any

1. *CHP Kept Schools, Hospitals Running Amid Hurricane Sandy*, ALLIANCE TO SAVE ENERGY (Dec. 11, 2012), <http://ase.org/efficiencynews/chp-kept-schools-hospitals-running-amid-hurricane-sandy>.

2. Todd Gutner, *Hurricane Sandy Grows To Largest Atlantic Tropical Storm Ever*, CBS BOSTON WBZ-TV (Oct. 28, 2012), <http://boston.cbslocal.com/2012/10/28/hurricane-sandy-grows-to-largest-atlantic-tropical-storm-ever/>.

3. ALLIANCE TO SAVE ENERGY, *supra* note 1; *see, e.g.*, Christina Nyquist, *How Students Stayed Warm During Hurricane Sandy: Meet Princeton's Natural Gas-fired Cogeneration Plant*, TRUE BLUE NAT. GAS (Nov. 28, 2012), <http://www.truebluenaturalgas.org/students-stayed-warm-hurricane-sandy-meet-princetons-natural-gas-fired-cogeneration-plant/>.

4. *Newsletter November 2012*, HARC (Nov. 2012), <http://news.harc.edu/November2012/HARCpromotesCHP/tabid/2644/Default.aspx>.

storm.”⁵ But minimizing the effects of natural disasters is only one of CHP’s many benefits.

CHP is the process of capturing heat from existing heat sources, such as boilers, and using the heat to power energy sources, such as steam-powered turbines, to create electricity, hot water, and heat.⁶ The technology not only reduces energy costs through efficiency—at least twenty to thirty percent more efficient than separate heat and power systems⁷—but it also protects the environment by burning less fuel, and thus reducing greenhouse gas emissions and air pollution.⁸ While this technology has seen continued barriers over the years, one company, Recycled Energy Development (“RED”), recognized that “the US lags far behind the world leaders when it comes to producing energy through [CHP]” and has taken steps to utilize the technology.⁹

The average increase in energy costs for households between 2001 and 2012 was forty-three percent.¹⁰ This increase in energy costs affects consumers and businesses alike, with electricity costs topping many businesses’ lists of expenses.¹¹ America undeniably faces a severe energy crisis both in the private sector, due to rising energy costs, and in the public sector, due to gridlock in government.¹² Among the many green energy

5. *Id.*

6. *See id.* at 2.

7. *See id.*

8. *Combined Heat and Power Partnership, Basic Information*, ENVTL. PROT. AGENCY, <http://www.epa.gov/chp/basic/index.html> (last visited Nov. 5, 2013).

9. *Resources*, RECYCLED ENERGY DEV., http://www.recycled-energy.com/resources/chp_share_of_power_production/ (last visited Mar. 22, 2013). RED implements energy projects through the development, ownership, and operating phases to use wasted energy and reduce other companies’ greenhouse gas emissions and energy costs. *Who RED Is*, RECYCLED ENERGY DEV., http://www.recycled-energy.com/main/who_it_is.html (last visited Jan. 20, 2013). For more information about how RED achieves this goal, visit their website at <http://www.recycled-energy.com>.

10. *See Energy Cost Impacts on American Families, 2001-2012*, AM. COALITION FOR CLEAN COAL ELEC., 3 (Feb. 2012), available at http://www.americaspower.org/sites/default/files/Energy_Cost_Impacts_2012_FINAL.pdf.

11. *See id.* at 1.

12. *See How to Solve America’s Energy Crisis and Global Warming*, UNION

technologies currently available, CHP is “the least sexy”¹³ and considered “a ‘homeless’ suite of technologies” when compared to solar, wind, and hydropower energy systems.¹⁴ Recently, however, the federal government gave CHP a second look as it attempted to educate state governments and companies about the benefits of the CHP technology.¹⁵ The severe lack of effective and efficient state government incentive programs is hindering the CHP technology from reaching its full potential of providing cheap, sustainable power to businesses.¹⁶

This Comment will argue that, given the policy benefits of the CHP technology, the federal government should create an organization to establish and monitor a CHP legislative blueprint with three financial incentive program options; states should establish two of those three financial incentive programs; and states should include CHP in their Renewable Portfolio Standards. This Comment will analyze the financial barriers hindering effective widespread use of CHP among private sector companies, examine current effective and ineffective state financial incentive programs, and determine which financial incentive regulations the federal government should include in the legislative blueprint.¹⁷ Because this is mainly a state law

OF CONCERNED SCIENTISTS, 1 (2008), available at http://www.ucsusa.org/assets/documents/global_warming/Principles-for-Solving-Global-Warming.pdf; *Senate Gridlock Continues to Threaten U.S. Wind and Solar Energy Development*, FORCECHANGE.COM, <http://forcechange.com/523/senate-gridlock-continues-to-threaten-us-wind-and-solar-energy-development/> (last visited Jan. 20, 2013) (discussing the effects of governmental gridlock on wind and solar energy development).

13. Katherine Tweed, *Long Live CHP: Obama Targets Industrial Energy Efficiency*, GREENTECH EFFICIENCY (Aug. 31, 2012), www.greentechmedia.com/articles/read/Long-Live-CHP-Obama-Targets-Industrial-Energy-Efficiency/.

14. Anna Chittum & Nate Kaufman, *Challenges Facing Combined Heat and Power Today: A State-by-State Assessment*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., iii-iv (2011), available at www.iowaeconomicdevelopment.com/userdocs/documents/ieda/ACEEE2011statebystate.pdf.

15. *Combined Heat and Power, A Clean Energy Solution*, U.S. DEP'T OF ENERGY, 3 (Aug. 2012), available at www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf.

16. See *id.* at 12.

17. Any other CHP barriers, such as permitting or siting issues and other state regulatory barriers, are outside the scope of this Comment. CHP installations may still be required to follow state “zoning, environmental,

issue, no “one size fits all” approach will suffice; however, a legislative blueprint can educate state legislatures about the financial incentives that can be put in place to allow for effective and widespread use of the CHP technology. Such a legislative blueprint must include: 1) a rebate for installed costs of the technology, 2) a feed-in tariff¹⁸ to entice companies to re-funnel excess power through the grid system,¹⁹ and 3) a provision of grants to companies who successfully complete CHP installations.

Section II includes a background discussion of the CHP technology that will help facilitate an understanding of how the technology works and what financial incentives previously existed. Section III includes an analysis of financial incentives, illustrated by state examples that will help analyze how the incentives operate. Section IV includes an analysis of states with little financial incentive programs and demonstrates why it hinders the CHP technology. Section V discusses the proposed solution to this problem, as introduced above.

II.

BACKGROUND: CHP'S LONG, BUT NEGLECTED LIFE

Background information about CHP will help foster an understanding about the positive attributes of the technology.

health, and safety requirements,” which make it difficult for companies to get state permits to install CHP systems because such local government departments “may have no previous experience with a CHP project.” *See id.* at 18.

18. A feed-in tariff aims to make alternative energies more competitive in the market by “identif[y]ing the cost differential between desired alternative generation technologies and the current market rate for sources of electric power generation and establishes a preferential rate (or tariff) that is sufficiently high to bridge the gap between conventional and favored technology [paid to the alternative generation source producer] to attract investment in alternative generation sources.” David Grinlinton & LeRoy Paddock, *Climate Change and the Future of Energy: The Role of Feed-In Tariffs in Supporting the Expansion of Solar Energy Production*, 41 U. TOL. L. REV. 943, 946 (2010).

19. A feed-in tariff should be used instead of net-metering because a feed-in tariff reimburses companies that produce excess electricity and sell it back to electrical providers instead of receiving credits simply for produced energy in general, regardless if it is in excess of what their electricity needs are. *See infra* Section III(C).

This section provides the necessary foundation for understanding how CHP systems achieve lower energy costs, limit greenhouse gas emissions, and benefit businesses and regions surrounding them. Additionally, a brief overview of past and present federal CHP-related financial incentive programs will demonstrate how federal investment schemes in the CHP technology have changed over time.

A. *What is CHP?*

The amount of energy lost in wasted heat from machinery in America is greater than Japan's entire energy needs.²⁰ This is a massive waste of potential energy. A business without a CHP system normally uses boilers or furnaces to produce thermal energy, such as steam, for hot water and heating systems. The business then *separately* purchases electricity from a power plant through the electrical grid system.²¹ Alternatively, a CHP system collects the wasted heat produced by machinery, such as boilers and steam turbines, and uses the wasted heat to produce additional electricity within a single system.²² The CHP technology allows the system to create its *own* electrical power and thermal energy within a single energy efficient source, while cutting out the need to purchase separate electricity from a power plant.²³ A standard CHP system operates at roughly sixty-five to seventy-five percent system operation efficiency, as opposed to forty-five percent system operation efficiency of separate heat and power systems used by many businesses.²⁴ CHP systems must be powered by a fuel source, which is usually natural gas. Increasingly lower natural gas costs make the CHP technology more affordable to run on a daily basis.²⁵

Businesses can choose from two different types of CHP systems—a topping cycle or a bottoming cycle—that are either retrofitted on top of existing heat units, such as boilers or

20. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 3.

21. *Id.* at 3, 7.

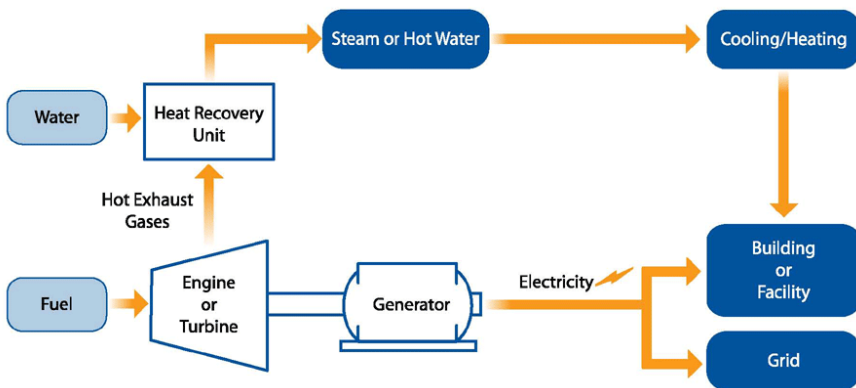
22. *Id.* at 7.

23. *Id.* at 3, 7.

24. *Id.* at 7.

25. *Id.* at 3.

furnaces, or installed as a new system.²⁶ A topping cycle consists of fuel powering a “prime mover such as a gas turbine or reciprocating engine,” which produces electricity, and then the excess heat is collected to provide heating or hot water for the building.²⁷ A bottoming cycle consists of fuel powering a boiler or furnace, which operates a steam turbine that generates electricity, and then excess heat from the machinery is collected to produce heat or hot water.²⁸ In the first system, the fuel powers the generator, and in the second system, the fuel powers the boiler, which powers the generator. In both types of CHP systems, the electricity produced by the turbine can be used to power the building or be recycled back through the grid system.²⁹



Source: EPA Combined Heat and Power Partnership. An example of a topping cycle CHP system.³⁰

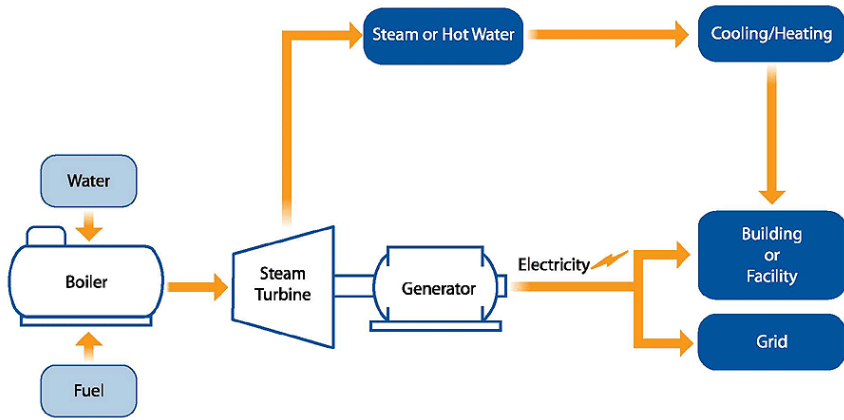
26. *Id.* at 7.

27. *Id.*

28. *Id.*

29. See *Combined Heat and Power Partnership*, *supra* note 8.

30. *Id.*



Source: EPA Combined Heat and Power Partnership. An example of a bottoming cycle CHP system.³¹

CHP systems have many practical benefits. Because CHP systems combine heat and power into one efficient system, the system reuses the fuel's energy multiple times. Thus there are fewer greenhouse gas emissions, such as carbon dioxide, nitrogen oxide, and sulfur dioxide.³² CHP systems are also an extremely reliable source of energy, as witnessed during Hurricane Sandy, because "they are independently fueled and operated."³³ There are also financial benefits when installing CHP systems, such as "avoid[ing] needless and economically inefficient investment in new transmission capacity."³⁴ These benefits occur because the system is located "at the site of demand" and saving fuel and energy costs by creating its own electricity.³⁵ One of the biggest reasons companies hesitate about whether to install a CHP system is that CHP systems have expensive upfront costs in the amount of \$700-\$3,000 per kW, which is at least \$1.4 million for

31. *Id.*

32. *Benefits*, U.S. CLEAN HEAT & POWER ASS'N, <http://chpassociation.org/benefits/> (last visited Oct. 28, 2013).

33. *Id.*

34. *Id.*

35. *Id.*

an average 2MW CHP system.³⁶ A study completed by the American Council for an Energy-Efficient Economy (“ACEEE”) in 2011 found that economic challenges were the first or second largest barrier to CHP system implementations in every state.³⁷ These environmental and financial issues will be discussed below in further detail.

B. *Energy and Environmental Benefits of CHP Systems*

The benefits of CHP systems include both environmental benefits for the surrounding region and financial benefits for businesses.³⁸ A company’s energy use is more efficient, environmentally friendly, and cheaper when using a CHP system. This is because the company is buying less from the electrical grid, the burden on the electric grid is reduced, and regional greenhouse gas emissions are reduced.³⁹ As this Comment explains in the following section, installing CHP systems in manufacturing plants, hospitals, and schools, among other facilities, will not only please America’s business and financial sectors, but also America’s environmentalists. It is rare that such a technology is proven to be feasible in any geographical location and to satisfy communities’ needs for low-cost, effective, efficient, and environmentally friendly heat and power generators.

1. Environmental Benefits

While some may argue “CHP is . . . not well-suited for renewable energy programs because it often is powered by non-renewable fuels,”⁴⁰ CHP has overwhelming beneficial environmental impacts. The CHP technology currently constitutes about nine percent of America’s electrical generation, but has the potential to reach twenty percent.⁴¹ This increase of

36. Chittum & Kaufman, *supra* note 14, at 6.

37. *Id.*

38. *See Combined Heat and Power, A Clean Energy Solution, supra* note 15, at 3.

39. *Id.* at 5.

40. Chittum & Kaufman, *supra* note 14, at iii.

41. *Id.*

11% in electrical generation “could save the country 5.3 Quads of fuel—almost half the total energy consumed by all U.S. households today.”⁴² Currently, CHP’s national capacity is eighty-two gigawatts (“GW”).⁴³ A recent Executive Order signed by President Obama established a national goal of 40 GW of additional CHP power by 2020, which would save roughly “one Quadrillion Btus . . . of energy annually and eliminate over 150 million metric tons of CO₂ emissions each year (equivalent to the emissions of over 25 million cars).”⁴⁴ In implementing the national goal, President Obama called upon the Departments of Energy, Commerce, and Agriculture, and the Environmental Protection Agency (“EPA”), along with several other Executive Office Councils, to coordinate their policies.⁴⁵ Combining the more energy efficient CHP technology with the “elimination of transmission and distribution losses from the central station generator results in reduced primary energy use and lower [greenhouse gas] emissions.”⁴⁶

Separate heat and power systems emit carbon dioxide and other air pollutants such as nitrogen oxide, sulfur dioxide, and volatile organic particles,⁴⁷ but a CHP system significantly reduces such pollutants.⁴⁸ This air pollution reduction is achieved because the CHP technology reuses its fuel’s energy several times, thus reducing the amount that is emitted into the atmosphere.⁴⁹ A company can produce its own electricity through a CHP system with low air pollution, while a power plant “is responsible for two-thirds of the nation’s annual sulfur dioxide (SO₂) emissions, one-quarter of the nitrogen oxide (NOx) emissions, one-third of the mercury (Hg) emissions, and one-

42. *Id.*

43. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 5. A gigawatt is a unit of electric power.

44. *Id.* A Quad is a unit of energy used by the Department of Energy.

45. Press Release, The White House, Exec. Order—Accelerating Investment in Industrial Energy Efficiency (Aug. 30, 2012), <http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency>.

46. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 7.

47. *Benefits*, *supra* note 32.

48. *Id.*

49. *Id.*

third of the carbon dioxide (CO₂) emissions.”⁵⁰ In areas of the country with older cities, any new developments may need emission offsets as required by the Clean Air Act, and CHP can help these areas offset such emissions.⁵¹ CHP systems provide many energy and environmental benefits to companies and their surrounding regions, while at the same time providing more efficient heat and power production onsite.

2. Financial Benefits for Businesses

An increase in energy prices has made it more difficult for businesses to prosper in today’s economic circumstances.⁵² During economic downturns, less investment in environmentally-friendly technologies is natural. The CHP technology not only allows companies to continue to save money in an economic downturn, it also reduces environmental harm from greenhouse gases.⁵³ When paying so much for energy, a company wants to be assured that the power being purchased is reliable. Power from a power plant or other power source transferred over the electrical grid is 99.99% reliable, but power produced from a CHP system has the so-called “six nines” power reliability of 99.9999%.⁵⁴ While such a percentage difference may seem small, for companies in today’s electronic and digital age, such a difference in reliability could cost a company “a million dollars a minute when the power goes out.”⁵⁵

Besides a better bang for your buck in terms of greater power reliability at a lower cost, a CHP system pays for itself over time. When deciding whether to proceed with a CHP installation, a company usually compares the cost of the CHP system, such as installation, fuel, and maintenance, with the cost of purchased power and thermal energy to run a separate heat and power

50. *Id.*

51. *Id.*

52. See Raymond Keating, *Energy Cost Index 2012: Ranking the States*, SMALL BUS. & ENTREPRENEURSHIP COUNCIL, 1 (Jun. 2012); *Benefits*, *supra* note 32; see, e.g., Scott Gerber, *How the Fiscal Cliff Will Force Big Biz to Turn Against Small Biz*, TIME (Dec. 28, 2012), <http://business.time.com/2012/12/28/how-the-fiscal-cliff-will-force-big-biz-to-turn-against-small-biz/>.

53. *Benefits*, *supra* note 32.

54. *Id.*

55. *Id.*

system.⁵⁶ A CHP system is not ideal for “short-term energy efficiency programs because its payback period is long and its upfront costs are high compared to many other efficiency measures.”⁵⁷ With the proper investment and wide access to this technology, however, businesses can recover installation costs and benefit financially from the technology over the years as the CHP system pays for itself in the form of lower energy costs.⁵⁸

Power and heat provided by CHP systems lower energy costs because they replace “higher priced purchased electricity and boiler fuel.”⁵⁹ CHP systems using natural gas also lower a company’s fuel costs. Instead of purchasing fuel separately for power generation and thermal power generation, the CHP system combines the power and thermal generation into one system, allowing the company to reduce its natural gas purchases.⁶⁰ By making the CHP technology more widely available in the American economy, it will introduce another energy source into the market and allow for more energy competition, potentially lowering the cost of energy for electric and thermal power.⁶¹ Such financial benefits for companies will allow them to be more competitive in today’s continuously struggling economy, particularly if the right incentives are provided to encourage investment in CHP.⁶²

C. A History of Federal Government CHP Incentives

Over the past several decades, the federal government has established various financial incentive programs that have affected the CHP technology in different ways. In 1978, during the oil crisis in America, Congress passed the Public Utilities Regulatory Policies Act, which pushed for more energy efficiency.⁶³ It required electric utilities to connect with

56. *Id.*

57. *See* Chittum & Kaufman, *supra* note 14, at iii-iv.

58. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 9.

59. *Id.*

60. *See Benefits*, *supra* note 32.

61. *See id.*

62. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 3, 5.

63. *Id.* at 11.

“qualified facilities,” which included CHP systems, after they met minimum established standards.⁶⁴ “Congress also provided tax credits for investments in [CHP] equipment under the Energy Tax Act of 1978 . . . and the Crude Oil Windfall Profits Tax Act of 1980.”⁶⁵ The Energy Tax Act provided a ten percent tax credit for boilers and other equipment that were wasting heat, “and the Windfall Profits Tax Act extended the [ten] percent credit to remaining CHP equipment for qualified projects.”⁶⁶ In the early 2000s, the financial incentive structure of the CHP technology began to shift as the states restructured and deregulated the electrical market, and power producers did not have to connect with “qualified facilities” as previously required by the Public Utilities Regulatory Policies Act.⁶⁷ Also at this time, the natural gas market was highly volatile, which decreased investment in CHP systems that relied on it as a fuel source.⁶⁸

Currently, there is a federal tax credit of ten percent specifically for CHP properties as an “energy property.”⁶⁹ The CHP system must produce at least twenty percent of its energy as thermal energy and twenty percent of its energy as electricity, must be at least sixty percent energy efficient, and must be installed by January 1, 2016.⁷⁰ There is also a loan program for institutional entities implementing CHP, per the Energy Secretary’s standards.⁷¹ The law required the Secretary to include criteria in the standards such as the improvement in energy efficiency, reduction of greenhouse gas emissions, use of renewable electric or thermal energy power, reduction in use of fossil fuels, and the need for financial assistance.⁷²

64. *Id.*

65. *Id.* at 12.

66. *See generally* Energy Tax Act of 1978, Pub. L. No. 95-618, 92 Stat. 3174 (1978) as reprinted in *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 12.

67. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 12.

68. *Id.* at 12-13.

69. 26 U.S.C. § 48(a)(2)(A)(ii) (2009); 26 U.S.C. § 48(a)(3)(A)(v).

70. 26 U.S.C. §§ 48(c)(3)(A)(ii)-(iv).

71. 42 U.S.C. § 6371h-1(a)(7) (2007); 42 U.S.C. § 6371h-1(g)(3).

72. 42 U.S.C. § 6371h-1(g)(3).

The American Recovery and Reinvestment Act of 2009 (“ARRA”) established two types of financial incentives for CHP projects.⁷³ First, ARRA established a CHP grant program that awarded \$100 million to various CHP projects, which was extremely popular and caused many CHP grant requests to be denied because the program ran out of money.⁷⁴ Second, Section 1603 of ARRA replaced the payment of tax credits given after the CHP system was installed with upfront payments for energy properties.⁷⁵ A study conducted by the ACEEE found that Section 1603’s upfront payment “significantly reduce[d] the challenge of securing financing, as any amount to be financed is reduced by the amount of the Section 1603 payment.”⁷⁶ By the end of 2010, much of the ARRA grant money was disbursed, and its complete impact on CHP technology has yet to be fully understood.⁷⁷ Nonetheless, its impact on CHP installations in the form of affordability, investment, and availability cannot be understated.

President Obama expressed his commitment to CHP technology by issuing an Executive Order on August 30, 2012 that aims to tackle the many barriers hindering the use of the CHP technology.⁷⁸ Its goals are first, to spur private investment in CHP to reduce its costs, and second, to hold workshops to determine the best state policies and investment models that states can use to effectively promote the technology in the private sector.⁷⁹ While CHP reduces a company’s overall energy costs,⁸⁰ the technology is still expensive to install due to a severe lack of public and private investment.⁸¹ Even if companies recognize the immense financial benefits of operating CHP systems and state governments recognize the environmental benefits of CHP, without more effective CHP state financial

73. Chittum & Kaufman, *supra* note 14, at 14-15.

74. *Id.* at 15.

75. *Id.*

76. *Id.*

77. *See id.*

78. *See* Press Release, *supra* note 45.

79. *Id.*

80. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 3.

81. *See* Press Release, *supra* note 45.

incentive plans, the technology will continue to face a significant barrier given America's current economic situation.⁸²

III.

ANALYSIS: HOW DO THESE FINANCIAL INCENTIVE PROGRAMS WORK?

There are many different ways to financially incentivize CHP programs, but several programs stand out as common among those used, such as rebate programs and grant programs, or more creative CHP feed-in tariff programs.⁸³ "State financial incentives are an important instrument" for CHP technologies because incentives make them more widely available to businesses of all sizes.⁸⁴ The following analysis will discuss how each of the three financial incentive programs operate, analyze states that operate each incentive program, and determine the pros and cons of each incentive program. This will help determine the viability of each incentive program and its importance in making CHP installations more economically feasible as a means of cheaper renewable energy and an environmentally friendly technology.

A. Rebate Programs

A rebate program allows states to reimburse companies operating CHP systems and is usually established on a per kW basis.⁸⁵ For example, California operates a Self-Generation Incentive Program that provides rebates for electric utility customers with CHP systems.⁸⁶ In providing financial assistance to utility customers on a per kW basis, also known as performance-based incentives, the program not only makes the

82. Chittum & Kaufman, *supra* note 14, at 6-7.

83. See *Financial Incentives for Energy Efficiency*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., <http://www.aceee.org/topics/financial-incentives-energy-efficiency> (last visited Jan. 19, 2013) (Noting that other financial incentive programs include loans, income tax deductions, tax exemptions, and lower sales taxes).

84. *Clean Distributed Generation*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., <http://www.aceee.org/sector/state-policy/clean-distributed-generation> (last visited Jan. 19, 2013).

85. See Chittum & Kaufman, *supra* note 14, at 47.

86. See *Clean Distributed Generation*, *supra* note 84.

CHP technology more widely available, but also encourages higher capacity CHP systems because it reimburses more money for larger kW systems.⁸⁷ As discussed below, rebates are an excellent way to help offset installation costs of CHP systems, but sometimes these programs require a company to pay into a separate fund to receive the rebate on a prorated basis.⁸⁸

1. A State Example: New York

The ACEEE ranks New York State as number two on its Scorecard because New York had 101 new CHP system sites between 2005-2010.⁸⁹ According to the EPA's CHP funding website, New York has fourteen financial incentive programs: seven rebate/production incentive programs, one loan program, three grant programs, two tax programs, and one utility rate program.⁹⁰ One of New York's rebate programs is the Energy Smart New Construction Program, which is available to government entities, nonprofits, hospitals, and schools.⁹¹ In total, \$91 million is available to reimburse companies for "technical assessment of energy-efficiency measures in building designs" and covers up to 75% of the capital costs of buying and installing CHP systems.⁹² Another New York rebate program is the Industrial and Process Efficiency Performance Incentives program, operated by the New York State Energy Research and Development Authority ("NYSERDA"), which provides performance-based financial incentives to companies operating energy cost-saving technologies, such as CHP systems.⁹³ One

87. See *Industrial and Process Efficiency Performance Incentives*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Jan. 15, 2013), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY56F&re=0&ee=1.

88. See *id.*

89. Chittum & Kaufman, *supra* note 14, at 58.

90. See *Database of CHP Policies and Incentives*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/chp/policies/database.html> (last visited Mar. 3, 2013).

91. See *Energy Smart New Construction Program*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Dec. 16, 2012), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY08F&re=0&ee=1.

92. *Id.*

93. See *Indus. and Process Efficiency Performance Incentives*, *supra* note 87.

downside to this incentive program is that to be eligible for the rebate, a company must pay into the Systems Benefits Charge because the rebate is prorated for those eligible.⁹⁴ Such a restriction means the company must be able to have expendable finances to pay money into the fund before receiving the rebate.

2. A State Example: Massachusetts

The ACEEE ranks Massachusetts as number four on its Scorecard because Massachusetts had thirty-four new CHP system sites between 2005-2010.⁹⁵ Massachusetts has seen new utility regulations, such as decoupling regulations and a requirement for “all-cost effective energy efficiency,” along with an Alternative Energy Portfolio Standard, which have helped make the CHP technology more widely available to companies in the state.⁹⁶ The Alternative Energy Portfolio Standard was enacted as part of the Green Communities Act in 2008⁹⁷ and is a performance-based incentive established at \$175 per kW, but varies depending on the CHP system capacity.⁹⁸ Because CHP systems qualify as energy efficient systems, businesses are also eligible for an upfront rebate of \$750 per kW.⁹⁹ CHP systems below a 150 kW capacity receive the upfront \$750 per kW rebate, and CHP systems above a 150 kW capacity receive up to \$750 per kW depending on the system’s energy efficiency, the project risk, and investment threshold, among other factors.¹⁰⁰ Such a rebate program “helps to keep economic analysis trending favorably toward CHP projects.”¹⁰¹

94. *See id.*

95. *See* Chittum & Kaufman, *supra* note 14, at 47.

96. *Id.*

97. *See* MASS. GEN. LAWS ch. 25A, §11F (2008).

98. Chittum & Kaufman, *supra* note 14, at 47.

99. *See generally* 2008 Mass. Legis. Serv. Ch. 169 (S.B.2768) (West); Dwayne Breger, *Massachusetts Policies for Combined Heat & Power (CHP): Alternative Portfolio Standard and the Energy Efficiency Rebates*, MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES, 3 (2012), available at http://ccap.org/assets/Massachusetts-Policies-for-CHP_CCAP-Breger-Oct-2012.pdf.

100. *See generally* MASS. GEN. LAWS, *supra* note 97; Breger, *supra* note 99, at 3.

101. Chittum & Kaufman, *supra* note 14, at 47.

B. Grant Programs

Grant programs provide companies with upfront cost relief for CHP systems that help to offset the purchase and installation costs. As the following sections will demonstrate through examples, the grants often come with strict requirements that companies must meet in order to become eligible to receive the upfront incentives. Sometimes these strict requirements can place additional burdens on companies trying to install CHP systems,¹⁰² but often the grant is a larger amount of money than a company would receive through a rebate program.¹⁰³ Unlike rebate programs, grant programs are not a performance-based financial incentive, but simply an upfront payment that companies can directly apply to the purchase and installation of their CHP system. The following examples help demonstrate the requirements for grant programs and how they make the CHP technology more affordable for companies.

1. A State Example: Massachusetts

One of Massachusetts' grant programs, established by the Green Communities Act, provides local governments with varying grant amounts, which are funded by the Regional Greenhouse Gas Initiative ("RGGI"), to apply to environmentally-friendly technologies including CHP, solar water heat, solar space heat, photovoltaics, wind power, biomass, and hydroelectric power.¹⁰⁴ The Green Communities Act states that local governments must meet several requirements, such as reducing energy usage by twenty-percent within five years, procuring fuel efficient vehicle fleets, establishing standards for new construction that lessen life-cycle energy costs, requiring "as-of-right" siting for renewable energy generation, and

102. See MASS. GEN. LAWS, *supra* note 97.

103. Compare *Industrial and Process Efficiency Performance Incentives*, *supra* note 87 (granting up to five million dollars in electric incentives and one million dollars in natural gas incentives) with Chittum & Kaufman, *supra* note 14, at 47 (providing a rebate of \$175 per kW).

104. See generally MASS. GEN. LAWS, ch. 25A, § 10 (2008); see also *Green Communities Grant Program*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Apr. 26, 2013), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA101F.

expediting the permitting processes for the facilities that are within the “as-of-right” areas.¹⁰⁵ A grant program that provides money to local governments is also indicative of how CHP grants can benefit both an institution’s wallet and the surrounding environment. The program has disbursed more than \$20 million in grants so far.¹⁰⁶ Grant programs allow for an institution, in this case a local government, to receive money to implement CHP systems, to save money on energy purchases, and to reduce to emissions of greenhouse gases.

2. A State Example: New York

According to the EPA’s list of states’ funding sources, of New York’s fourteen financial incentive programs, three of them are grant programs provided by NYSERDA.¹⁰⁷ “NYSERDA’s robust CHP programs include production incentives, technical assistance, technology transfer efforts, and demonstration projects.”¹⁰⁸ For example, as of 2008, NYSERDA ran a Public Benefit Fund where the state’s utility companies placed a surcharge on their customer’s bills. The utility companies then collected the money and turned the funds over to NYSERDA, and NYSERDA then funneled the money into grant programs supporting CHP.¹⁰⁹

Another example of NYSERDA’s CHP financial incentive programs is the Distributed Generation and Combined Heat & Power grant program, which has allowed New York to support the CHP technology in the form of financial incentives and technical aid.¹¹⁰ Since 2006, the Distributed Generation and Combined Heat & Power program invested \$94 million into CHP technology, about \$70 million of which has resulted in installing

105. See MASS. GEN. LAWS ch. 25A, § 10(c) (2008).

106. See *Green Communities Designation and Grant Program* MASS. EXEC. OFFICE OF ENERGY AND ENVTL. AFFAIRS, <http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/> (last visited Feb. 28, 2013).

107. *Database of CHP Policies and Incentives*, *supra* note 90.

108. Chittum & Kaufman, *supra* note 14, at 56.

109. *Utility Incentives for Combined Heat and Power*, U.S. ENVTL. PROT. AGENCY COMBINED HEAT AND POWER P'SHIP, 17-18 (Oct. 2008), available at http://www.epa.gov/chp/documents/utility_incentives.pdf.

110. See *Clean Distributed Generation*, *supra* note 84.

permanent CHP systems with a totally capacity of roughly 192 MW.¹¹¹ One of New York's newest grant programs is the Industrial and Process Efficiency Program Opportunity Notice (PON) 2456.¹¹² It provides facilities with financial incentives to institute electric and natural gas efficiency measures, which allows the facility to receive up to \$5 million in electric incentives and \$1 million in natural gas incentives.¹¹³

New York's grant programs provide yet another state example of successful CHP implementation at various levels of government and private sector facilities. Grant programs provide companies incentives to pay for the cost of CHP installation and set minimum system efficiency requirements for companies to meet in order to receive a state grant.¹¹⁴ Utility companies, however, may have to establish a surcharge on citizens, which would in turn be provided to the state to fund the grant program.¹¹⁵ Providing financial relief to companies instituting CHP systems may increase the cost of utilities for consumers.¹¹⁶ One way to minimize the spread of this cost is to institute a surcharge on *companies* that do not use energy and environmentally-efficient systems like CHP to fund the grant programs. While companies may still pass the increased surcharge onto their consumers, it will affect less people because their consumer base may be smaller than a utility company's consumer base, which is likely larger due to the broad need for electric and gas. Although this solution may face political and practical obstacles, it would further incentivize CHP installations.

111. *See id.*

112. *Industrial and Process Efficiency Program Opportunity Notice (PON) 2456*, NYSERDA, 1 (last viewed Jan. 2013).

113. *Id.*; New York's utility companies have also attempted to provide financial incentives to companies operating CHP system. For example, "National Grid, the state's largest natural gas utility, strongly supports CHP, and the state's gas utilities offer discounted rates to CHP projects." Chittum & Kaufman, *supra* note 14, at 58.

114. *See* MASS. GEN. LAWS ch. 25A, § 10.

115. *See Utility Incentives for Combined Heat and Power*, *supra* note 109, at 17-18.

116. *See id.*

3. A State Example: New Jersey

The ACEEE ranked New Jersey as number seven on its Scorecard because the state had eighteen new CHP sites between 2005 and 2010.¹¹⁷ One of New Jersey's CHP grant programs is the Clean Energy Solutions Large Scale CHP-Fuel Cells Program, which offers grants for CHP systems, but includes strict requirements.¹¹⁸ All CHP systems must be new installations, have a capacity greater than 1MW—which is considered a large CHP system in New Jersey—and have a system efficiency rate of at least sixty-five percent.¹¹⁹ CHP systems that are between 1MW and 3MW are eligible to receive fifty-five cents per watt, and CHP systems that are greater than 3MW are eligible to receive thirty-five cents per watt.¹²⁰ What is interesting about this portion of the Clean Energy Solutions Large Scale CHP-Fuel Cells Program is that it reimburses companies less money per watt the larger the system. This seems counter intuitive, as one would think the state would want to incentivize larger systems over smaller systems because they produce more clean energy. Thus this program does not appear to maximize the financial incentives as much as it potentially could for larger systems. It is not clear why the program takes this approach, but it is an approach other state programs also use.¹²¹

The maximum amount of the grant a company can receive for installing a CHP system is three million dollars or thirty-percent of the project costs, whichever cap is reached first.¹²² The CHP equipment must also be commercially accessible and

117. Chittum & Kaufman, *supra* note 14, at 54.

118. See *Financing Programs – Clean Energy Solutions Large Scale CHP-Fuel Cells Program*, N.J. ECON. DEV. AUTH., http://www.njeda.com/web/Aspx_pg/Templates/Npic_Text.aspx?Doc_Id=1706&menuid=1550&topid=722&levelid=6&midid=1357 (last visited Jan. 20, 2013).

119. See *id.*

120. See *Clean Energy Solutions Large Scale CHP and Fuel Cells Program*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Jan. 17, 2013), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ50F&re=0&ee=0.

121. See generally MASS. GEN. LAWS ch. 25A; Breger, *supra* note 99, at 3.

122. See *Clean Energy Solutions Large Scale CHP and Fuel Cells Program*, *supra* note 120.

permanently installed on the company's side of its utility meter.¹²³ Finally, the CHP systems must have a minimum five-year warranty and cannot exceed or fall below the company's electrical load, but must be sized to meet its electrical needs.¹²⁴ The program was only open for a two-month period, with a budget of twenty million dollars, and is currently closed to further grant disbursements.¹²⁵ While this grant program does provide financial incentives to companies to install CHP systems, the short timeframe in which to be aware of the grant and meet all of its strict requirements diminishes the program's effectiveness.

In addition to the Clean Energy Solutions Large Scale CHP-Fuel Cells Program, New Jersey issued a rule in 2010 that permits a company to sell excess electricity to a facility to which it is also selling thermal energy.¹²⁶ The new rule also enables qualifying CHP systems to use the existing electrical grid to transport the electricity it is selling, even when proceeding over public right-of-ways.¹²⁷ New Jersey, however, does have one important impediment to its CHP incentive programs: electric utility companies do not have a very strong incentive to work with companies toward their goal of installing a CHP system because the state's interconnection regulations give ample discretion to utility companies. The connection process is expensive and prolonged as a result because there is no uniform standard.¹²⁸ Also, the under-regulated utility standby rates continue to result in unreasonable fees.¹²⁹ Such regulatory

123. *See id.*

124. *See id.*

125. *See id.*

126. *See* N.J. STAT. ANN. § 48:2-13(e) (West 1999) (amended by N.J. STAT. ANN. 48:3-51 (West 2011)).

127. *See id.*

128. *See* Chittum & Kaufman, *supra* note 14, at 56.

129. *See id.* Standby rates are charges that a CHP facility must pay if there is an outage and the facility has to use electricity from the grid. *See also Policies and Resources for CHP Deployment: CHP-Friendly Standby Rates*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., <http://aceee.org/sector/state-policy/toolkit/chp/standby-rates> (last visited Feb. 28 2013). The CHP facility is often charged a two-fold fee: for the energy used by the CHP system as well as the energy used by the CHP facility. This fee is an impediment to CHP facilities when an outage occurs, which results in higher utility fees for purchased grid

impediments are examples of why the CHP technology is not more widely available. While New Jersey does have this utility standby rate regulatory impediment, the state's financial incentive programs have allowed it to be ranked number seven out of fifty states for encouraging new CHP sites.¹³⁰ This lends credence to the idea that CHP financial incentive programs have the effect of making the CHP technology more available than it otherwise would be.

C. CHP Feed-In Tariffs

In addition to rebate programs and grant programs, some states have displayed their creativity with CHP financial incentive programs by using feed-in tariffs. Feed-in tariffs have existed in other capacities, but are fairly new in the CHP setting.¹³¹ Feed-in tariffs are a guaranteed financial incentive for companies because it is a "long-term contract a generator may enter into with a utility to have the generator's power purchased at a set rate."¹³² A company producing energy via a CHP system, whether thermal or electric, can re-funnel and sell any excess energy produced that is beyond the facility's energy capacity back through the electric grid.¹³³ The company producing CHP energy receives money per kW of energy produced, and the rate is established for several years, thus guaranteeing the company a fixed income for its excess CHP energy.¹³⁴ Even though Europe has used feed-in tariffs for several years to incentivize the CHP technology, California remains the only state currently testing the feed-in tariff system as a CHP financial incentive program.¹³⁵ Specifically, the Sacramento Municipal Utility District developed a feed-in tariff for CHP systems, and it was popular enough that it is currently closed to new contracts because of oversubscription.¹³⁶ "Developers indicated that

electricity.

130. See Chittum & Kaufman, *supra* note 14, at 56.

131. See *id.* at 14.

132. *Id.*

133. See *id.*

134. See *id.*

135. See *id.*

136. See *SMUD's Feed-in Tariff*, SMUD, <https://www.smud.org/en/>

anticipation for new [feed-in tariffs] is very high, and that mainstream use of [feed-in tariffs] as policy tools would dramatically strengthen the entire U.S. CHP marketplace.”¹³⁷

California enacted the Waste Heat and Carbon Emissions Reduction Act, which established a feed-in tariff for CHP energy that is produced and re-funneled through the grid system.¹³⁸ Known as a “pay-as-you-save” program, it allows a company to install the CHP system for free and pay back the purchase and installation costs over a ten-year period “through on-bill financing at the difference between what an eligible customer would have paid for electricity and the actual savings derived.”¹³⁹ The Waste Heat and Carbon Emissions Reduction Act requires the CHP energy capacity be less than 20 MW,¹⁴⁰ the CHP system be at least 60% efficient,¹⁴¹ the CHP system have NO_x emissions that are less than 0.07 pounds per MW,¹⁴² and the CHP system be sized to meet the company’s generation thermal load.¹⁴³ The apparent successes of a CHP feed-in tariff program are that a company is guaranteed money for several years based on kW produced and it supplements a state’s energy production to keep pace with citizen’s energy uses. On the other hand, CHP feed-in tariff programs have several drawbacks, such as being extremely large and complicated projects that need to be carefully structured and implemented on a wide scale and requiring adequate electrical grid systems to allow for companies to re-funnel excess power.¹⁴⁴

residential/environment/solar-for-your-home/feed-in-tariffs/index.htm (last visited Feb. 28, 2012); Chittum & Kaufman, *supra* note 14, at 14.

137. Chittum & Kaufman, *supra* note 14, at 14.

138. See CAL. PUB. UTIL. CODE § 2842.4 (West 2009).

139. *Id.* at § 2842.4(c).

140. *Id.* at § 2842.4(b)(1).

141. *Id.* at § 2843(e)(1).

142. *Id.*

143. *Id.* at § 2843(a)(2).

144. See Chittum & Kaufman, *supra* note 14, at 14.

IV.

CHALLENGES: WHY SOME STATES DO NOT HAVE FINANCIAL INCENTIVE PROGRAMS

While the previous section focused on successful states with successful CHP financial incentive programs, this section examines those states without CHP financial incentive programs. This analysis will attempt to determine the effects that the absence of financial incentives has on the CHP technology and why these states do not have CHP financial incentive programs.

A. *General CHP Criticisms*

One of the biggest complaints about the CHP technology is that the system installation is very expensive and that a company will proceed with the installation only after considering the “ratio of upfront capital cost to future energy and other cost savings [because they are] the greatest determinant of a project’s viability.”¹⁴⁵ Also, typical CHP projects take about four to six years to pay back the initial capital investment into the technology, while facility managers look for projects with six-month paybacks.¹⁴⁶ Some argue that state financial incentives are not enough to make CHP more viable for companies because incentives do not mean there is a market for that type of power.¹⁴⁷ If one of the biggest problems is the immense cost of the project, financial incentives will alleviate some of the burden on companies and allow them to consider installing CHP systems, which is a huge step forward.

The CHP technology has been operational for over 100 years, but it currently only counts for about 9% of energy capacity, while it accounts for roughly 30% in other countries in Europe.¹⁴⁸ For example, Denmark’s CHP electricity production in 2009 was

145. Chittum & Kaufman, *supra* note 14, at 6.

146. *Id.* at 9.

147. *See id.* at 16. The CHP technology can be installed in another location because of its retrofitting capability should the company close or move its place of business.

148. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 3; *see also* Chittum & Kaufman, *supra* note 14, at iii.

forty-five percent of all electricity production.¹⁴⁹ This vast amount of CHP electricity production is a result of the government's strong support of the technology through "tax incentives and subsidies, and . . . investments in district heating infrastructure."¹⁵⁰ The Netherlands' CHP electricity production in 2009 was thirty-three percent of all electricity production, which is also a result of strong governmental support through various financial incentive programs, such as tax incentives and subsidies.¹⁵¹ America's CHP energy capacity certainly has room for improvement, and states can look to European countries such as Denmark and the Netherlands for guidance.

Many regulatory and economic problems over the last few decades have hampered the wide availability of this technology, such as "[t]he movement toward restructuring (deregulation) of power markets in individual states[, which] caused market uncertainty, resulting in delayed energy investments."¹⁵² The EPA estimates that it costs roughly \$1200 per kW to install a CHP system as a retrofit.¹⁵³ A study conducted by the ACEEE estimates that it costs between \$700-\$3,000 per kilowatt to install a new CHP system.¹⁵⁴ The high upfront costs for installing CHP systems have deterred companies from proceeding with installations.¹⁵⁵ Without adequate financial incentive programs on a state level, the proven technology will continue to go underutilized at the long-term peril of American's pocketbooks, in terms of higher energy costs, and the environment.¹⁵⁶

149. *Combined heat and power (CHP) (ENER 020) - Assessment*, EUR. ENV'T AGENCY (Apr. 02, 2012), <http://www.eea.europa.eu/data-and-maps/indicators/combined-heat-and-power-chp-1/combined-heat-and-power-chp-2>.

150. *Id.*

151. *Id.*

152. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 12.

153. *Benefits*, *supra* note 32.

154. Chittum & Kaufman, *supra* note 14, at 6.

155. *See id.*

156. Forecasted costs of climate change for businesses include higher energy costs to run air conditioners as temperatures rise. *See* Frank Ackerman & Elizabeth Stanton, *The Costs of Climate Change: What We'll Pay if Global Warming Continues Unchecked*, NAT. RES. DEF. COUNCIL, 9 (2008), available at <http://www.nrdc.org/globalwarming/cost/cost.pdf>.

B. A State Example: Florida

The ACEEE ranked Florida as number twenty-six on its Scorecard because the state only established three new CHP sites between 2005 and 2010.¹⁵⁷ Florida does not have any CHP-specific financial incentive programs; however, those companies interested in implementing CHP systems can take advantage of a renewable energy production tax credit¹⁵⁸ and a sales and use tax exemption for the purchases of CHP systems.¹⁵⁹ In addition to not having any CHP rebate or grant programs, Florida is also unable to implement a feed-in tariff system for energy produced by CHP systems because of a statute that prohibits the retail sale of electricity by any electricity generator that is a non-utility company.¹⁶⁰ Also, a power generator entity is required to share the same corporate identity as the entity receiving the power, which has prevented “entities that share a building from sharing power generated by a CHP system.”¹⁶¹ These are two examples of statutory hindrances that go to the heart of the CHP technology. Statutes that prohibit either a feed-in tariff or the sale of electricity in general greatly harm the ability to implement CHP systems because they disregard one of the benefits of the CHP technology: the ability to sell excess environmentally friendly power to other entities.¹⁶²

C. A State Example: Missouri

The ACEEE ranked Missouri as number forty-three on its Scorecard because the state only established one new CHP site

157. Chittum & Kaufman, *supra* note 14, at 35.

158. See FLA. STAT. ANN. § 220.193 (West 2013).

159. See FLA. STAT. ANN. § 212.08(c) (West 2013); *Renewable Energy in Florida*, AMERICAN COUNCIL ON RENEWABLE ENERGY, 2 (Sept. 2012), available at <http://www.acore.org/files/pdfs/states/Florida.pdf>.

160. See *PW Ventures, Inc. v. Nichols*, 533 So.2d 281, 283-84 (Fla. 1988) (interpreting FLA. STAT. ANN. § 366.02(1) (West 1985) to mean a seller of electricity must register as a public utility).

161. Chittum & Kaufman, *supra* note 14, at 35.

162. These examples show that some states may need to remove or amend existing statutes in addition to providing for new CHP financial incentive programs before the wide use of the CHP technology can be achieved.

between 2005 and 2010.¹⁶³ Like Florida, Missouri lacks any CHP-specific financial incentive programs.¹⁶⁴ In Missouri, many see utilities as the largest obstacle to CHP projects because of “a lack of a reasonable interconnection standards and lack of restrictions on standby rates.”¹⁶⁵ Without interconnection standards, companies find it difficult to connect to the electrical grid in a manner that allows them to re-funnel energy produced from the CHP system back to the utility company, under a feed-in tariff system, or to another purchaser of the power.¹⁶⁶ There has also been an unwillingness to negotiate between industrial energy consumers and utilities, which leaves only small-scaled projects as the way to get CHP systems into the state, but “the economics of small projects are rarely attractive.”¹⁶⁷ The problems in Missouri appear to go deeper than simply regulatory challenges. An unwillingness among entities within the state to work together to produce cheaper, more environmentally friendly energy means the attitude and mindset of these entities must be altered before they will even consider implementing the CHP technology on a large scale basis.¹⁶⁸

As explained above, both Florida and Missouri have demonstrated regulatory challenges, such as prohibiting the sale of energy by non-utility companies, lacking interconnection standards, not regulating utility standby rates, and having hostile attitudes by utility actors towards CHP-type projects. Such vast hurdles may go beyond the lack of CHP financial incentives, which tends to suggest the need for a political movement in these states that is both open to energy efficient and environmentally-friendly technologies and willing to alter the way in which the state views its utility system’s structure.¹⁶⁹

163. See Chittum & Kaufman, *supra* note 14, at 51.

164. See *id.*

165. *Id.*

166. See *supra* Sections III.B.3 and IV.C.

167. Chittum & Kaufman, *supra* note 14, at 51.

168. See *id.*

169. Such vast hurdles, however, are beyond the scope of this Comment.

V.

CHP'S TIME HAS COME

As shown throughout this Comment, CHP systems are expensive to install, economically rewarding over a long period of time, and environmentally friendly in terms of energy production and greenhouse gas emission reductions. The largest barriers to the wide implementation of CHP systems are the high upfront purchase and installation costs.¹⁷⁰ In an effort to make the CHP technology more available to public and private actors, the federal government should create an organization to form a CHP legislative blueprint and work with states to enact the blueprint.¹⁷¹ Furthermore, states should establish two of the three financial incentive programs through new legislation, as well as include CHP in their Renewable Portfolio Standards or Energy Efficiency Standards.

A. Create an Organization to Form a CHP Legislative Blueprint

Currently, the only “national” movement to create specific CHP financial incentives is the effort of the EPA to educate state officials about the benefits of the CHP technology.¹⁷² In establishing an organization to form a CHP legislative blueprint and disburse the materials to the states, one can use Regional Greenhouse Gas Initiative, Inc. as a model, a 501(c)(3) non-profit corporation that was established to aid the northeastern states in implementing the RGGI.¹⁷³ A similar organization should be created by the federal government to aid states in designing and

170. See *supra* Section II(B)(2). Any other state legislative barriers are beyond the scope of this Comment. But it should be noted that such barriers may need to be addressed, with at least an exception created for CHP systems to allow the technology to clear those legislative hurdles.

171. This organization created by the federal government should be part of the federal government's effort under President Obama's recent Executive Order to educate the states about the benefits of the CHP technology.

172. See Press Release, *supra* note 45.

173. See *RGGI, Inc., REG'L GREENHOUSE GAS INITIATIVE*, <http://www.rggi.org/rggi> (last visited Jan. 20, 2013). The Regional Greenhouse Gas Initiative is a regional cap-and-trade program that allows participating states to purchase and sell CO₂ allowances in an attempt to reduce over CO₂ emissions in the region. See *Program Design, REG'L GREENHOUSE GAS INITIATIVE*, <http://www.rggi.org/design> (last visited Jan. 20, 2013).

implementing CHP financial incentive programs, and if necessary, altering existing statutes to allow for the most supportive environment in which the CHP technology can thrive. The organization should consist of state and federal representatives, including those states that have already included CHP in their Renewable Portfolio Standards or otherwise incentivized CHP. The organization should also be part of the Executive Branch, should be funded as a part of Executive Branch agency budgets, and should work in tandem with President Obama's August 2012 Executive Order to disburse information to the states regarding industrial energy efficiency.

Regional Greenhouse Gas Initiative, Inc. provides documentation describing Model Rules that were adopted by the member states and explains the design elements for the CO₂ Allowance Auctions.¹⁷⁴ Similar documentation should be created by this CHP organization to establish the legislative blueprint for CHP financial incentives. The incentive programs included in the organization's model legislative blueprint would provide guidance to states by alerting them to the types of programs that help CHP flourish, while at the same time, allowing states to modify the specific program elements to meet their needs. As explained above, states utilize many different requirements for a company to be eligible for a rebate or a grant, so giving states the flexibility in creating their own specific program requirements is a necessity.

*B. Include All Three Financial Incentive Programs in the
Legislative Blueprint and Allow States to Choose Two of the
Three Programs*

The legislative blueprint created by the organization should include all three previously discussed CHP financial incentive programs: a rebate program, a grant program, and a feed-in tariff program. When the organization works with state officials

174. See generally *Regional Greenhouse Gas Initiative Model Rule*, REG'L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/design/history/model_rule (Dec. 2008); *Design Elements for Regional Allowance Auctions under the Regional Greenhouse Gas Initiative*, REG'L GREENHOUSE GAS INITIATIVE, (Mar. 2008).

to create CHP financial incentive programs for their state, the final legislation should include a combination of two of the three options listed in the legislative blueprint. There must be flexibility of only including two of the three programs because no “one size fits all” legislative blueprint will work among all fifty states. Such programs are best created with new legislation because, in the case of a feed-in tariff, the program is either extremely complex, or in the case of a rebate or grant, the program requires appropriations by the state legislature. As explained above, California is currently the only state with a CHP-specific feed-in tariff program, which is partially attributed to the complexity of the program.¹⁷⁵ Thus this program is not going to appeal to every state. California achieved the feed-in tariff program by passing new legislation known as the Waste Heat and Carbon Emissions Reduction Act.¹⁷⁶ Regarding grants, Pennsylvania also passed new legislation to establish the Alternative and Clean Energy State Grant Program.¹⁷⁷ The program established a \$165 million grant for various alternative energy efficient technologies, including CHP.¹⁷⁸ Regarding rebates, New Jersey established the New Jersey Renewable Energy Incentive Program, which offers a maximum CHP rebate amount of \$2.5 million depending on the size of the CHP system.¹⁷⁹

While some argue feed-in tariffs do not overcome the barrier of high installation costs of renewable energy systems,¹⁸⁰ pairing it with rebate and grant programs can help overcome this concern because rebate and grant programs are designed to lessen the upfront purchase and installation costs of the technology. If a state is unable to institute a CHP feed-in tariff program,

175. See PUB. UTIL. CODE § 2842.4, *supra* note 139.

176. See *id.* at Section III(C).

177. See generally P.A. SPECIAL SESSION H.B. 1 (2007), available at <http://www.legis.state.pa.us/CFDOCS/Legis/PN/Public/btCheck.cfm?txtType=PDF&sessYr=2007&sessInd=1&billBody=H&billTyp=B&billNbr=0001&pn=0086>.

178. See generally *id.*

179. See *Renewable Energy Incentive Program (REIP) for Biopower*, EPA COMBINED HEAT AND POWER P'SHIP, <http://www.epa.gov/chp/policies/incentives/nerenewableenergyincentiveprogramreipforbiopower.html> (last updated Jul. 15, 2013).

180. See Grinlinton & Paddock, *supra* note 18, at 948.

focusing solely on rebate and grant programs will still substantially reduce the costs of installing a CHP system. Rebate and grant programs will allow many interested, but undecided, companies to at least consider implementing the technology to decrease their energy costs, while protecting the environment at the same time.

C. Include CHP in States' Renewable Portfolio Standards or Energy Efficiency Standards

Only about half of states with Renewable Portfolio Standards or Energy Efficiency Standards recognize CHP as part of their standards.¹⁸¹ The Standards “are policies designed to increase generation of electricity from renewable resources.”¹⁸² By including CHP in the state’s Renewable Portfolio Standards or Energy Efficiency Standards, the state is requiring electricity producers to produce a certain amount of electricity from the CHP technology.¹⁸³ Including wind power in states’ Renewable Portfolio Standards has greatly increased the use of wind power as an alternative source of energy.¹⁸⁴ An increase in the use of CHP is also highly likely under those same circumstances. The

181. *Combined Heat and Power, A Clean Energy Solution*, *supra* note 15, at 16 (implying that not many states focus their renewable energy solutions on CHP, but instead focus on traditional renewable energy solutions, such as solar and wind power). Thirty states plus the District of Columbia have Renewable Portfolio Standards as of January 2012. *Most States Have Renewable Portfolio Standards*, U.S. ENERGY INFO. ADMIN. (Feb. 3, 2012), <http://www.eia.gov/todayinenergy/detail.cfm?id=4850>; Twenty-two states have Energy Efficiency Standards as of July 2012 and some states have both Renewable Portfolio Standards and Energy Efficiency Standards, *Energy Efficiency Standards and Targets*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS (Jul. 5, 2012), <http://www.c2es.org/us-states-regions/policy-maps/energy-efficiency-standards>; As of December 2008, CHP incentive programs did not include emissions trading, offsets, or renewable energy credit programs because “many in the CHP industry [were] unfamiliar with the nuances of these programs.” *Environmental Revenue Streams for Combined Heat and Power*, U.S. ENVTL. PROT. AGENCY COMBINED HEAT AND POWER P’SHIP., iv (Dec. 2008), available at http://www.epa.gov/chp/documents/ers_program_details.pdf.

182. *Most States Have Renewable Portfolio Standards*, *supra* note 181.

183. *Id.*

184. See Chi-Jen Yang, Eric Williams, & Jonas Monast, *Wind Power: Barriers and Policy Solutions*, CLIMATE CHANGE POLICY P’SHIP, 18 (Nov. 2008), available at http://www.nicholas.duke.edu/ccpp/wind_web.pdf.

inclusion of CHP in a Renewable Portfolio Standard or Energy Efficiency Standard achieves more than a practical result; it also shows that the state is serious about the technology being worthwhile enough to rely on as a form of alternative energy.

Not all states with Renewable Portfolio Standards or Energy Efficiency Standards included CHP in the Standards from the beginning. For example, Massachusetts' Green Communities Act created an Alternative Energy Portfolio Standard for CHP in 2008 that established a performance-based financial incentive as well as an upfront rebate for certain CHP systems.¹⁸⁵ Massachusetts' Alternative Energy Portfolio Standard illustrates the feasibility of including CHP in such Standards, even years after original Standards have been established. One obvious barrier to such a solution is a lack of political will in the state legislature to take the legislative steps needed to amend or pass new legislation incorporating the CHP technology into its Standards. Considering the previously discussed financial and environmental benefits of the CHP technology, this should not be a partisan issue, and states should add CHP to their existing Standards or create a Renewable Portfolio Standard or Energy Efficiency Standard that includes the CHP technology.

VI.

CONCLUSION

The CHP system drastically reduces greenhouse gas emissions and a company's energy costs.¹⁸⁶ CHP-focused financial incentives can provide a substantial step forward in implementing the technology on a larger scale. Some states, such as Florida and Missouri, have other regulatory barriers to the CHP technology,¹⁸⁷ which make it much more difficult for financial incentives alone to encourage the use of CHP systems.

185. See generally Council Consultants, *2013-2015 Energy Efficiency Plans: Performance Incentive Mechanism*, MASS. ENERGY EFFICIENCY ADVISORY COUNCIL (Jul. 23, 2012), http://www.ma-eeac.org/Docs/7_Presentations/2012/07_July%202012/EEAC_PerformanceIncentivesConsultant_072312F.pdf; Breger, *supra* note 99, at 3.

186. See *supra* Section II(B).

187. See *supra* Section IV(B), see *supra* Section IV(C). As previously stated, these regulatory barriers can vary greatly among states and are outside the scope of this Comment.

Nonetheless, states should continue to inquire into the CHP technology and incentivize CHP systems by reducing the financial burden of installing them. The establishment of an organization creating a legislative blueprint for a rebate program, a grant program, and a feed-in tariff program will allow states to become educated on what programs and regulations facilitate the best environment for the CHP technology to thrive. At a minimum, states should adopt two of the three programs. As more and more states incentivize CHP investment and CHP becomes more widespread, the nation's energy supply will become cheaper and more reliable. Until these steps are taken, America will not see a large growth in what is a proven energy efficient and environmentally friendly technology.