

The Outlook for Bio-Fueled Power Generation

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Introduction

The United States Combined Heat and Power Association (USCHPA) fosters the use of CHP for electric power and thermal energy in the United States by creating a favorable legislative, regulatory, institutional, and market environment. USCHPA and the combined heat and power (CHP) industry have made great progress since 1999 when we were founded. We have moved steadily toward the national goal of doubling CHP capacity by 2010, with our latest scorecard showing that we are 90 percent there with four years left to go. We believe we are at the starting gate of the development of a hybrid national energy system that relies on CHP, recycled energy, and clean, bio-fueled distributed generation. All offer the common threads of energy independence and reduced greenhouse gas emissions. The USCHPA recognizes this opportunity and is broadening the scope of our membership and activities to include other clean, distributed energy practices along with CHP. Bio-fuels are defined here as any fuel derived from organic matter and not from fossil fuels, including forest and agricultural products and wastes, animal waste, and municipal solid waste.

Outlook on Renewable Energy

We have seen that, despite much focus on the potential for renewable electricity generation, the progress of biomass and other bio-fueled generating capacity has slowed. The continuation of production tax credits and the introduction of renewable portfolio standards (RPS) in many key states have done much to provide incentives for bio-fueled power. However, the production tax credits continue to be re-established with very short windows that do not allow the investment horizons necessary for ideal project development. Neither production tax credits nor most RPS statutes have paid attention to the opportunities to capture waste heat, "recycled energy." Many of the RPS statutes were established to favor wind and solar energy, while biomass, efficiency, and CHP may offer equal environmental values and greater near-term potential energy contributions. Despite this under-emphasis in policy, clean DG, CHP, and recycled energy have much promise to provide substantially for our future energy supply.

Our outlook for clean DG is one promising an increase of ten times the current installed base of 10 GW of bio-fueled power, resulting in 100 GW of new bio-fueled distributed generation by 2025 (see Table 1). A recent study of opportunity fuels for combined heat and power found that there was an economic market potential for over 32 GW of new bio-fueled CHP among commercial and industrial sites nationwide¹. Studies on the pulp and paper industry² indicate that by converting to new gasification technology and employing more forest waste from surrounding areas, paper mills can contribute an additional 21 GW of new CHP capacity. The rapidly-expanding bio-fuels industry itself is a major user of on-site combined heat and power, much of which uses natural gas but could be a significant source of bio-fueled power generation in the future. Also significant are an estimated 37 GW of new wholesale power generation fueled by biomass, mostly by smaller distributed-sized plants, as well as over 10 GW of new waste to energy facilities using municipal solid waste to generate power and steam. These will combine with continued growth in landfill, farm, and wastewater biogas facilities to create this new clean energy resource.

These preliminary projections support our belief that bio-fueled distributed generation and CHP will be a significant contributor towards achieving the goal reflected in the 25x'25 vision. We also believe that the goals of the U. S. Department of Energy and Department of Agriculture to satisfy 7 percent of our electricity demands from biomass are challenging yet achievable. While the Biomass R&D Technical Advisory Committee has noted that not much progress has been made to attain this goal³, they feel strongly that the goal is necessary and can be attained. Finally, we also believe that the 15 GW of biomass by 2015 goal of the Western Governor's Association⁴ is within our grasp. With our expanded scope, we at USCHPA believe that we can facilitate much of the progress toward achieving these goals by enlisting its many members on the ground level establishing bio-fueled power projects.

Adding to this goal we expect to continue our pursuit of growing use of CHP and recycled energy, to the extent that by 2025, we will have achieved 20 percent of the U. S. capacity represented by CHP, recycled energy and clean DG.

¹ Resource Dynamics Corporation, Opportunity Fuels and Combined Heat and Power: A Market Assessment, August 2006, prepared for U. S. Department of Energy and Oak Ridge National Laboratory

² Larson and Raymond, Commercializing Black Liquor and Biomass Gasifier/Gas Turbine Technology, TAPPI Journal, 1997

³ Biomass R&D Technical Advisory Committee, Vision For Bioenergy and Biobased Products in the United States, March 2006.

⁴ Western Governor's Association, Clean and Diversified Energy Initiative, Biomass Task Force Report, January 2006.

At the 20 percent level, we expect to represent that distributed energy as a whole is furnishing the many benefits that accrue with these applications, including fostering energy independence and reducing climate change.

Table 1. Projected Bio-Fueled Power Generation Capacity, by Sector (Year 2025)

Sector	Application	Renewable Fuel Source	Projected New Capacity (GW) by 2025
Commercial and Industrial Facilities (except Pulp & Paper and Biofuels Production)	CHP	Biomass (Forest and Agriculture Residues)	26.0 ¹
		Landfill and Digester Gas (Farms, Wastewater)	1.5 ¹
Pulp and Paper Mills	CHP	Black Liquor, Bark, and Other Mill Wastes	21.3 ²
Bio-fuel Production (for transportation uses)	CHP	Corn and other Biomass	NA ³
Wholesale Power Generators	CHP and Non-CHP	All Biomass, except Municipal Waste	37.3 ⁴
Solid Waste Disposal	CHP and Non-CHP	Municipal Solid Waste	10.1 ⁵
		Landfill Gas	2.0 ⁶
TOTAL			98.2

¹Resource Dynamics Corporation, 2006, with estimated potential for pulp and paper mills subtracted, leaving 27.5 GW for both biomass and biogas.

²Larson and Raymond established that there was up to 30 GW of potential, independent estimates by RDC (1999) confirmed 25 GW, which would replace the 3.7 GW existing in 2005 (EIA), for a net increase of 21.3 GW.

³The authors recognize that this sector could be host to a potentially large share of bio-fueled power, but have yet to develop credible estimates for this rapidly-expanding sector.

⁴Biomass R&D Technical Advisory Committee established a 7 percent goal for industrial and utility uses of biomass for heat and power generation. The figure used here represents 7 percent of the projected utility power generation fuel use in 2025, with the existing 3.2 GW (EIA 2005) subtracted.

⁵EIA 860 shows existing waste to energy at 2.5 GW in 2005 (also confirmed by U. S. Waste to Energy Association). The estimate for 2025 is a four times increase in this level.

⁶EIA 860 shows 0.9 GW of landfill gas power generation in 2005. This estimate is a doubling of this level, reflecting current high levels of activity but slowing of new landfills.

Policy Requirements to Support Outlook

To attain these targets, we will need significant change in our national energy policies. Production tax credits are an effective incentive to establish bio-fueled capacity, but must have eligibility periods matched to the lead-times required to bring such projects on line. A two-year production tax credit eligibility period cannot provide meaningful incentive to a project requiring three years to bring on line. Proper project planning also requires incentives to enable recovery of waste heat by finding suitable thermal hosts nearby. We also believe these credits should be extended to efficient combined heat and power applications regardless of fuel type and should be applied to the thermal as well as electrical production from the units. Over time, with proper incentives, we believe that CHP and bio-fueled capacity will grow and displace natural gas imports for power generation and heating as well. Secondly, while states such as California and Massachusetts have established model RPS programs that are leading to significant installation of bio-fueled power generation, others have formed programs that appear ambitious but really do little to create new biomass incentives as much of the renewable capacity targets have already been met, such as in New York and Maine. A national RPS would encourage renewable capacity to be developed where the resources are, minimize cost impacts to consumers, and foster energy independence by promoting domestic energy sources.

Finally, climate change has become a priority for many states, as evidenced by the California Global Warming Solutions Act of 2006 (AB 32) that seeks to limit climate change while likely employing a market-based method of trading emissions credits to avoid curbing economic growth. It appears that climate change is a growing national priority, and will need to be addressed soon. Cap and trade programs or other market-based means that minimize increased carbon emissions while allowing economic growth will support lower carbon or carbon-neutral energy sources such as CHP and clean DG.