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Grass Energy: Fuel for a Rural Renaissance?

by

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The biomass energy activities at the recent UVM/ Governor's Institutes engineering camp demonstrate what Jock Gill has been talking about.

On July 3, students came to Votey Hall with displays of bagged biomass pellets, posters about various "cocktails" of mixed biomass they'd tested, and homemade pellet burners. Jock was there to explain biomass potentials, lead a tour to a biomass-fueled boiler room, and visit an early Vermont experiment in commercial ethanol production.

Jock lives in Peacham, but he's often found at conferences, forums, schools, and farms throughout the state. He's the guy with the trim white beard, glasses, and mischievous grin – the one talking a mile a minute about his passion, grass.

Jock is the founder of Grass Energy Collaborative (GEC), the leading proponent of grass biomass energy in Vermont and the main reason it's now on our policymakers' radar.

Grass is hardy stuff, he explains. It's not a row crop, and it's a perennial, which limits nutrient run-off problems. It can be planted and harvested with relative ease and with typical farm equipment, and it can be used as a livestock feed or an energy crop, as needed.

It's a highly-efficient solar energy collector, a time-proven living technology that turns the sun's rays into solid stuff that's easily converted back into energy. And using grass for energy contributes very little to global warming, because each year's new crop reabsorbs the carbon dioxide that burning last year's released.

Due to their high yields, the most promising energy grasses are reed canary grass, switchgrass, and giant miscanthus. The latter has produced up to 26 dry tons per acre in test crops at the University of Illinois. Jock hands around astonishing photos of miscanthus test plots, dense thickets that tower above researchers and the 12-foot striped poles they carry.

Jock's rough calculation is that, at six dry tons per acre, with one ton of grass yielding as much energy as 100 gallons of #2 heating oil, Vermont's 100,000 acres of currently unused open land could provide the equivalent of 60 million gallons of oil annually. Hypothetically, $180 million worth of local product and local jobs.

Talking with Jock can be a disconcerting experience. He approaches ideas not by a straight line but by more of a lateral counter-clockwise helix in which big concepts about economic paradigms and the global energy future are mixed with data on BTUs per ton, ash characteristics, and the technology of burners and boilers. And a typical chat is followed by a barrage of e-mails, as Jock sends breaking news on test burns, biomass policies, and technological innovations.

Grass can be used to create ethanol, but Jock believes its best use is the simplest: as a pellet fuel burned for heat. Pellets can be automatically loaded into room heaters or centralized boiler systems, and they burn efficiently, leaving very little ash.

Of course, the best way to extract energy from biomass is to create both electricity and heat, simultaneously. With co-generation, also known as combined heat and power – called co-gen or CHP – much less of the energy escapes up the chimney. Unfortunately, CHP has historically been viable only with a fairly large-scale burner, boiler, and generator, too big and expensive for single homes.

But! says Jock, in Europe, micro-CHP systems are already on the market for domestic use. So he envisions a future in which every home and school has its own CHP system. You'll make your own electricity with your furnace, fueled by whatever biomass is locally available and cheapest, whether wood, grass, waste paper, corn, or combinations thereof. Using the "electranet" concept promoted by Al Gore – a sophisticated version of the net metering we're already doing in Vermont – we'll each draw electricity from or provide it to the grid as needed.

Jock sees the use of locally-grown energy crops as part of a coming "rural renaissance," a rebirth of strong, self-sufficient communities. By buying energy locally, we'll use our energy dollars to pay salaries for Vermont jobs. And through the "multiplier effect" – money spent locally gets re-spent locally – each dollar would functionally add $3 to our regional economy.

Jock admits that using grass energy crops poses challenges and questions; we need more research on grass strains, transportation costs, farm practices and

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economics, “cocktail” mixtures, and pelletizing and combustion technology.

So how does Vermont get from here to the energy-independent, revitalized rural economy of the future?

The recent UVM/Governor’s Institutes camp suggests part of the answer. At little expense, university and high school students experimented with a variety of ingredients such as grass, mixed vegetation, paper, and cardboard, testing combustion, energy yield, ash characteristics, and burner configurations.

“UVM has a terrific opportunity for leadership in biomass research and development,” Jock says. He points out the test burners made by the students from Mt. Abraham High School, laughs, and asks rhetorically, “If high school students can do it, why can’t adults?”

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