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• Coaltec installed a gasification system at P & J Farms, funded by a grant from the Xcel Renewable Energy Fund.

• The project was designed to gasify turkey litter from the farm and produce a useable energy product – to heat his barns and also produce power.

• The project successfully gasified the material, generated heat for the barn, and produced a biochar product from the solid byproduct.
The capacity of the system was approximately 1000 pounds per hour of input – with an output of about 3 MMBTU/hr. of energy and 200 pounds per hour of char.

While the gasification process worked, there were several lessons learned that identified the needs of an actual commercially viable project.
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• Issues such as:
  – Capacity – the operating cost for a farm-sited project is too high for this volume of product. The capacity must be higher.
  – The economics are very difficult unless there is a significant value for the byproduct – the char.
  – The feedstock is too variable – moisture content. The system needs to pre-dry the material in order for the gasifier to operate at a desired efficiency.
  – Power generation at this scale makes no sense. Small farms typically only have 110-v. power on site, so simply connecting to the grid is expensive. However, at a larger scale, the situation can be different.
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• We took the lessons learned from this project, along with a similar poultry project and continued to try to develop the concept.
• We feel there is a range of project sizes that make sense – the Fibrominn sized projects are too large due to sourcing and transporting feedstocks; the small individual farms are just too small for the economics to work.
Finally, these are not waste to energy projects. They are environmental projects with an energy byproduct. There is value in the energy, and it can be extracted in different forms. But, typically, the energy value is not enough to provide the revenues to make a project stand alone. It requires multiple revenue streams. In some cases, an industry will pay a tipping fee; but at this point, the poultry industry will not, so the char value is critical to make the economics work.
Coaltec gasification unit installed in Ohio in 2012.
• Using those lessons learned, we developed a project on a cattle operation in 2012.
• The capacity of the system is much larger, and the focus was on the solid byproduct – in this case, both the dried manure for animal bedding as well as the char.
• We have continued to work to develop the char market, as it has a huge impact. For example, a char sold for $125 per ton has the same revenue generated as a power purchase contract for $0.10 per kw.
• We are now selling char for multiples of that price, so are beginning to see a revenue stream that makes projects viable.
• It has been a long road to develop – as almost nobody is working with chars from manure. However, there are some unique characteristics that make manure-based chars valuable – it is just now a function of proving the market.
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• The final piece of the process is the energy component.

• We are using a portion of the energy for drying. But have one project where we are currently installing a power module, and have another being developed where the majority of the energy will be used for power production.
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- Every project is unique, and each requires a different approach toward a variety of factors.
- Some projects make sense to produce power – but even those do not usually provide a good return on investment without other revenues.
- Our business model is based on developing projects without subsidies, or above market contracts.
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– We feel there are multiple industries and feedstocks where we can develop projects and provide services to the customer.

– We currently have 7 systems installed – 3 with poultry manure as a feedstock – one of them is exclusively using turkey litter. We have just sold 4 more gasifiers to another poultry customer.

– To get to this stage has required years of work – especially in the development of Ecochar (our trademarked char product).
A critical piece of that development has been the work performed and the lessons learned with the assistance of various funding agencies.

While we feel very strongly that projects need to stand on their own and not be subsidized; it is extremely important that the development of technologies, and maybe just as importantly, the development of the application of those technologies; are provided with some outside financial assistance.