W.8.b.

Memorandum Date: February 27, 2008
Board Order Date: March 12, 2008

TO: Board of County Commissioners

DEPARTMENT: CAO/Economic Development Standing Committee

PRESENTED BY: Mike McKenzie-Bahr, Community and Economic Development Coordinator

AGENDA ITEM TITLE: ORDER/IN IN THE MATTER OF ACCEPTING $250,000 IN GRANT FUNDING FROM THE ALTERNATIVE TO FIELD BURNING RESEARCH FUND TO IDENTIFY OPTIONS FOR ENERGY PRODUCTION FROM GRASS SEED STRAW AND AUTHORIZING THE APPROPRIATION OF THE GRANT FUNDS

I. MOTION

It is moved that we accept the $250,0000 grant from the Department of Agriculture, authorize the County Administrator to sign the Intergovernmental Grant Agreement and appropriate the funds.

II. AGENDA ITEM SUMMARY

The Board of Commissioners on December 12, 2007 passed resolution 07-12-12-1, authorizing the application for $250,000 in grant funds from the Department of Agriculture Alternative to Field Burning Research Fund in order to conduct a feasibility study to 1) identify short-term, mid-term and long-term options for adding value to grass straw through renewable energy and fuel production, with the goal that implementation of the options would build economic alternatives for grass straw that would supplant current practice and 2) initiate a pilot project in Lane County using grass straw as a bioenergy source.

The Department of Agriculture, in cooperation with the Oregon Seed Council – which reviews all grant applications to the fund – has awarded the County $250,000 to conduct the above feasibility study.

The Board is being requested today to accept the $250,0000 grant from the Department of Agriculture, authorize the County Administrator to sign the Intergovernmental Grant Agreement and appropriate the funds to the County Community & Economic Development program.

III. BACKGROUND/IMPLICATIONS OF ACTION

A. Board Action and Other History

The Lane County Board of Commissioners has been looking for ways to decrease the amount of grass straw burned each year. Approximately 90% of the 50,000 acres of grass straw burned each year is from ryegrass.

Grass straw from other types of grass is used in a variety of value added products, which for economic reasons has eliminated that straw being burned. The seed industry has looked at other uses for the ryegrass straw, but none have proved to have enough economic value that it makes financial sense for the growers to do anything but plow it under for several years and burn it every third year or so to add nutrients to the ground.

Commissioner Peter Sorenson and the County Economic Community and Economic Development Coordinator met with Katy Coba, Director of the Oregon Department of Agriculture, and Dave Nelson, Executive Director of the Oregon Seed Council on October 18, 2007 to identify a win-win solution to add value to the ryegrass straw. The opportunity presented by using the grass straw for energy production was the focus of the meeting as was discussion of the Alternatives to Field Burning Research Financial Assistance Program, which provides grant funds for projects to study methods to add value to the grass straw as an alternative to burning it. Additional meetings were then held to identify specific short term, mid-term and long term projects that the Alternatives to Field Burning Fund could be used to research.

County staff prepared Board Order 07-12-12-1, that was adopted by the Board and authorized submission of a grant application. The Oregon Seed Council approved a companion resolution to the Board Order supporting the County's request for funding.

One of the things that earned the County this support is that Lane County, through the Forest Service Partnership Grant, has put together the Willamette Valley Biomass Working Group. The group includes representatives of Lane Microbusiness; Resource Innovations, Institute for a Sustainable Environment, University of Oregon; Northwest Cooperative Development Center; Oregon Environmental Council; Trillium FiberFuels; Novus Group; Sylvatex, Lane Council Of Governments; the Good Company, and Lane County Community and Economic Development. The group is working with the community to identify renewable energy uses for local biomass. Initially the group was looking at opportunities for woody biomass waste products, like slash, but it efforts have grown to include other waste products, including grass straw.

County staff, with input from, the Willamette Valley Biomass Working Group, the Department of Agriculture, the Oregon Department of Energy, researchers at Oregon State University and other experts in renewable energy technologies, wrote and submitted a draft grant proposal for the Alternatives to Field Burning Research fund.

The draft proposal was vetted at a series of meetings set up by the Department of Agriculture, where County staff, assisted by Larry Brice of Novus Group, presented the project elements. The meetings were attended by staff and researchers from the Department of Agriculture and Department of Energy and members of the Seed Council - who reaffirmed their committed to assisting with elements of the project. Those meetings led to refinement of the project elements and support for the project by all the various stakeholders. A final grant application was then submitted. (Since that time, the project has also received support from the Department of Environmental Quality, Environmental Quality Commission).

On February 14, Lane County received official notification that the grant was awarded. The final grant application is attached to this memo.

B. Policy Issues

Should the county accept state grant funds to research solutions to ryegrass straw field burning?

C. Board Goals

This project meets the Board Goal to "Maintain a healthy environment with regard to air quality, water quality, waste management, land use and parks." In addition, if projects are created from the feasibility study findings, it will also meet the goal to "Work for a strong regional economy to expand the number of family-wage jobs available in Lane County."

D. Financial and/or Resource Considerations

No County funding is being required as match to this grant. The grant contains funds to pay for the time spent by County legal and fiscal staff on processing contracts and invoices for this project. Funding is also included to offset some of the time that Community and Economic Development staff will spend on this project. This project will not impact the time spent on other C&ED projects

E. Analysis

This grant offers a tremendous opportunity to bring a number of experts from around the state together to study ways to add value to grass straw. Numerous recent studies and reports have identified the opportunities for biomass, like waste straws, to be converted to energy and liquid fuel. Agricultural biomass energy conversion projects are successfully launching throughout the world. New and refined technologies are being applied in projects in California, Kansas, Missouri, Iowa, Tennessee, and Georgia to name a few

The feasibility study to be funded with this grant will determine the current energy opportunities for Ryegrass straw and identify if there is an economic alternative to field burning. If such projects are found to feasible, the State of Oregon currently is leading the nation in financial incentives for renewable projects, increasing the likelihood that if feasible, such a project could be funded.

IV. TIMING/IMPLEMENTATION

Upon Board acceptance of this grant, the process will start to finalize contracts with the myriad of experts who will be conducting elements of the feasibility study. County staff has spent time over the past three months identifying and interviewing experts in renewable energy technologies, project analysis, and other skills that will lead to a successful project. Most of the project partners have already been identified and are ready to participate in the project. We are still finalizing the scope of work and final dollar amounts with all of the contractors. And may end up with some different contractors than those presented in the grant application. This Board Order does not award the contracts for this project as that is already delegated to the County Administrator by rule. Project work will begin in late March and be completed in December 2008. A project timeline is included in the grant application attached to this report.

V. RECOMMENDATION

The Lane County Community & Economic Development Coordinator recommends the Board of Commissioners approve the motion to accept the grant in order that the feasibility study can be conducted.

VI. FOLLOW-UP

The Lane County Community & Economic Development Coordinator will give the Board periodic updates on the status of the project and present a mid-term and final report to the Board on the project findings.

VII. ATTACHMENTS

A: Board Order
B: Grant Application

IN THE BOARD OF COUNTY COMMISSIONERS
OF LANE COUNTY, OREGON

ORDER NO.

) IN THE MATTER OF ACCEPTING
) $250,000 IN GRANT FUNDING FROM
) THE ALTERNATIVE TO FIELD BURNING
) RESEARCH FUND TO IDENTIFY
) OPTIONS FOR ENERGY PRODUCTION
) FROM GRASS SEED STRAW AND
) AUTHORIZING THE APPROPRIATION
) OF THE GRANT FUNDS

WHEREAS, The Lane County Board of Commissioners in Board Order 07-12-12-1, recognized that the grass seed industry is very important to the State, Willamette Valley and Lane County, where we benefit from seed production revenue and an industry multiplier effect that creates jobs in other industries; and

WHEREAS, a grass seed by-product, known as grass straw, is used in a variety of value added products currently, and some of the grass straw from annual ryegrass is burned each year and controversy exists about the effect of the smoke; and

WHEREAS, Lane County has put together a biomass working group, including representatives of Lane Microbusiness; Resource Innovations; Northwest Cooperative Development Center; Trillium FiberFuels; Novus Group; the Good Company, and Lane County Community and Economic Development to identify economic uses for local biomass, including grass straw, as a value added product for renewable energy production, and said is collaborating with the Oregon Seed Council to identify and develop renewable energy alternatives for use of grass straw, and

WHEREAS, Lane County requested $250,0000 from the Field Burning Research Fund in order to conduct a feasibility study to 1) identify short-term, mid-term and long-term options for adding value to grass straw through renewable energy and fuel production, with the goal that implementation of the options would build economic alternatives for grass straw that would supplant current practice and 2) initiate a pilot project in Lane County using grass straw as a bioenergy source, and

WHEREAS, The Oregon Department of Agriculture has presented an Intergovernmental Grant Agreement, ODA-2196-IG PCA 37004, awarding Lane County $250,0000 from the Field Burning Research Fund to conduct said feasibility study,

NOW THEREFORE, IT IS HEREBY ORDERED THAT: the Lane County Board of Commissioners approves accepting the $250,0000 grant, and

IT IS FURTHER ORDERED that the County Administrator is authorized to sign the Intergovernmental Grant Agreement, ODA-2196-IG PCA 37004, and other grant documents as needed, and

IT IS FURTHER ORDERED that $205,000 of the grant funds be appropriated to Fund 260 - General Expense: Community Development Projects - Materials and Services and $45,000 of the funds be appropriated to Fund 260 County Administration: Economic Development.

DATED this 12th day of March, 2008.

Faye Stewart Chair,
Lane County Board of Commissioners

APPROVED AS TO FORM
Date 3/4/08 lane county
OFFICE OF LEGAL COUNSEL

Submitted to the Agricultural Research Foundation to the Oregon Seed Council and Oregon Department of Agriculture Alternatives to Field Burning Research Financial Assistance Program.

"Lane County Ryegrass Straw Conversion to Renewable Energy and Biofuel Production Project/Feasibility Study"

Fiscal Year 2007-2008

Project Type: Short-term Research

Lane County
Lane County Community & Economic Development
Mike McKenzie-Bahr, Coordinator
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Funding History: None

Funds Requested: $250,000

Abstract

Lane County is requesting $250,000 from the Field Burning Research Fund for a short-term research project to identify near-term viable options for adding economic value to Ryegrass straw through renewable energy and fuel production. Specifically, our research will answer: Is it possible to convert Ryegrass straw into energy as an economic alternative for seed growers to field burning?

We have identified nine research elements as follows:
Research Element 1: Harvesting, Bailing and Transportation Costs and Issues
Research Element 2: Anaerobic Digester Energy Conversion Process
Research Element 3: Pyrolysis Energy Conversion Process
Research Element 4: Cellulosic Ethanol Energy Conversion Process
Research Element 5: Pellets for Boilers Energy Conversion Process
Research Element 6: Pilot Project Research on Elements 2-5
Research Element 7: Facility Siting Elements Costs and Issues
Research Element 8: Financial Model Comparison and Return on Investment (ROI)
Research Element 9: Recommendations from Finding

Agricultural biomass energy conversion projects are successfully launching throughout the world. New and refined technologies are being applied in successful projects in California, Kansas, Missouri, Iowa, Tennessee, and Georgia to name a few[1]. While these projects provide examples and base knowledge for the conversion of agricultural biomass, including straws, into energy, each geographic region has different inputs and capacities for biomass. In order to understand the potential for the use of Ryegrass straw as an energy feedstock, it is imperative to conduct a specific research study in Oregon.

Our project will build on existing research and the collection of new data through a multi-partner collaboration with the University of Oregon, Oregon State University, and other public and private partners leading to a determination of financially feasible options for the conversion of Ryegrass straw to energy.

One of the key elements of our research, the financial model, will include site specific location options; the capacity needed by a bioenergy facility to process grass straw; and will take into account tax and energy credits and a life cycle sustainability audit to include the value of Ryegrass straw as an energy feedstock compared to burning it.

Objective(s)

We will determine the feasibility of the conversion of Ryegrass straw to energy as an alternative to straw burning. Our research will focus on the following energy conversion processes that have already been identified as processes that can convert other sources of agriculture waste to energy:

- Anaerobic Digestion
- Pyrolysis
- Conversion to Cellulosic Ethanol
- Conversion to pellets for Boiler System Technology

[1] Biomass Magazine Online. BBI International Media, Grand Forks, North Dakota, 2007.

The Feasibility research will include:

- What tonnage of Ryegrass Straw can growers supply as a feedstock seasonally and annually?
- How, where, and when will the straw be collected, stored, pretreated, and transported?
- What energy conversion processes offer the best potential for Ryegrass straw?
- What construction, operations, and maintenance costs will be associated with new or improved facilities to accommodate these processes?
- Is there enough feedstock production to equal the quantity that will be needed to make energy production cost effective?
- Where might plants be located and what are the advantages of those sites?
- What is the potential Return on Investment (ROI) for the energy conversion options?
- Is it possible to incorporate the technology into a sustainable harvesting, baling, and transportation system for Ryegrass straw?

Justification

In 2006 an estimated 131,800 acres of Annual Ryegrass were harvested in Oregon. Approximately 66% of up to 50,000 acres of grass straw burned each year in Oregon is from Ryegrass. The straw from other types of grasses is used in a variety of value added products. These products have created economic reasons that have greatly reduced the burning of these straws. The seed industry has looked at other uses for Ryegrass straw, but none have proved to have enough economic value to make financial sense for the growers to do anything but plow it under for several years and burn it every third year or so to add nutrients to the ground. A viable economic option for the use Ryegrass straw may now exist. Numerous recent studies and reports have identified the opportunities for biomass, like waste straws, to be converted to energy and liquid fuel. To determine the current energy opportunities for Ryegrass straw, we are proposing to conduct a feasibility study of looking at four technologies that could turn Ryegrass straw to energy while providing an economic alternative to field burning.

In the white paper "Conversion of Oregon Biomass to Liquid Transportation Fuels" by the Biomass Conversion Technologies Working Group (BCTWG) from Oregon State University last revised on November 9, 2007, the BCTWG identifies a strong potential for the conversion of lignocellulosic biomass to liquid fuel but also determines the need for continued study:

> *"This White Paper does not provide a detailed description of the types, amounts, and distribution of lignocellulosic biomass found within Oregon. Furthermore, a technical and economic discussion of the collection and transportation issues associated with Oregon biomass is beyond the scope of this White Paper... We have described in this White Paper that the state of Oregon has abundant and unique forms of cellulosic biomass such as grass straw, wheat straw, and softwood forestry residues that can be converted to liquid transportation fuels such ethanol and Fischer-Tropsch diesel... However, since these biomass feedstocks are unique to Oregon, development and deployment of process technology tailored to these feedstocks is of regional interest and so must be initially supported at the state level by the state of Oregon... "*

According to the study, "Feasibility of a Producer Owned Ground-Straw Feedstock Supply System for Bioethanol and Other Products" by Idaho National Laboratories completed in September of 2006:

> *"Biomass feedstock collection, preprocessing, and transportation are integral components of biomass utilization. Feedstock cost constitutes about 35-50% of the total production cost of ethanol or power. The actual percentage depends upon geographical factors such as*

biomass species, yield, location, climate, local economy, and the type of systems used for harvesting, collection, processing, and transportation..."

Such a study has not been done specific to Ryegrass straw in the Willamette Valley, which is why an element of our research is potential methods and costs for the collection, preprocessing, and transportation of Ryegrass straw. This will help determine the geographic distance from which it is feasible to transport Ryegrass straw to an energy processing facility while still providing a revenue-neutral or even revenue-positive option for the growers of Ryegrass.

The University of Davis, Biogas Energy Project, has identified rice straw as a potential co-digestion agent for anaerobic digestion of food waste. Wheat Straw has also been found to work well in a manure-based digester. No one has done a similar study for Ryegrass straw. Lane County has applied for funding to study the financial feasibility of constructing and operating a Lane County owned anaerobic digestion facility to process local food waste into energy. In this study we would research if Ryegrass straw improves digestibility of food waste while creating enough energy to make the collection of ryegrass straw feasible.

The Canadian Resource Efficient Agricultural Production (REAP) project has been working on research and development for liquid and solid biofuel applications for over fourteen years. Though their research focuses on Switchgrass, their research shows that the conversion of Switchgrass to fuel pellets has a higher net energy gain and landuse efficiency than firing with coal, conversion to cellulosic ethanol, and grain/corn ethanol, and that cellulosic ethanol is more efficient than corn/grain ethanol[2]. The results of REAP's research show that the "direct combustion of densified fuels represents the best biofuel cycle in terms of energy, land use, and economics." It also claims that perennial grasses hold the potential to become a major source of renewable energy and greatly benefit rural areas[3]. While this information shows a potentially high value for the conversion of Ryegrass to boiler pellets and/or cellulosic ethanol, it is necessary to conduct specific research to determine if Ryegrass has similar energy yields.

The existing research shows that establishing the value of bioconversion processes must include linking feedstock harvest/collection/transport/storage (ie feedstock assembly) and preprocessing processes with conversion processes in order to evaluate technology options and trade-offs. The lack of specific local information for many of these elements, justifies the need to research all the elements that determine the specific cost of Ryegrass straw energy development as an alternative to field burning.

Materials and Methods

In this section, we present the nine research elements of our feasibility study and the questions we intend to answer. This is followed by the data that will be collected and analyzed; the specific activities we will undertake to accomplish the study; and the deliverables that we will bring together into the final report.

The grants funds we are requesting will be used by the County to accomplish the needed research by contracting out the research elements. We have identified the specific expertise needed to accomplish this project. Some of that expertise we have already brought together for this project (see Additional Partners). Others will be chosen through an RFP process.

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[2] Samson, Roger., "The Potential for Biomass Energy Crop Production in Canada", Resource Efficient Agricultural Production. www.reap-canada.com

[3] Samson, Roger, Ibid.

We anticipate starting the study upon signing of a funding contract, approximately March 1, 2008. By June 16, 2008, we will present an interim report. The final report will be presented in two sections: the first section on September 1, 2008 and the second section, which will include recommendations and next steps, on December 1, 2008. (See Proposed Project Schedule).

Research Element 1: Harvesting, Bailing and Transportation Costs and Issues
Financial Model - What will it cost for Harvesting, Baling, Transportation and Storage of Ryegrass straw? What will it cost for Nutrient replenishment/Pest control for fields where the grass straw is removed?

Data that will be collected/analyzed and the specific activities we will undertake:
We will perform a literature search and conduct interviews with industry members to determine the costs of harvesting, nutrient replenishment/pest control, baling, hauling, and storage.

Deliverables – A chart detailing the costs of harvesting, nutrient replenishment/pest control, baling, hauling, and storage.

Research Element 2: Anaerobic Digester Energy Conversion Process
Pretreatment – What are the pretreatment options and costs to maximize the use of Ryegrass straw in an Anaerobic Digester?
Treatment – What is the best Anaerobic Digester process for Ryegrass straw? Will Ryegrass straw mixed with food waste enhance AD performance for both feedstocks? What type of pilot project can we conduct to test Ryegrass and AD performance?
Energy Facility Outputs – What are the potential energy outputs, how much of each output will be generated and what are their uses? What are other outputs and their potential beneficial uses?
Financial Model – What are all the expenses and revenues associated with constructing and operating an Anaerobic Digester for Ryegrass straw?

Research Element 3: Pyrolysis Energy Conversion Process
Pretreatment – What are the pretreatment options and costs to maximize the use of Ryegrass straw for Pyrolysis? What type of pilot project can we conduct to test Ryegrass as a feedstock for Pyrolysis?
Treatment – What is the best Pyrolysis process for Ryegrass straw?
Facility Outputs – What are the potential energy outputs? How much of each output will be generated and what are their uses? What are other outputs and their potential beneficial uses?
Financial Model – What are all the expenses and revenues associated with constructing and operating a Pyrolysis facility for Ryegrass straw?

Research Element 4: Cellulosic Ethanol Energy Conversion Process
Pretreatment – What are the pretreatment options and costs to maximize the use of Ryegrass straw to produce Cellulosic Ethanol? What type of pilot project can we conduct to test Ryegrass as a feedstock for Cellulosic Ethanol production performance?
Treatment – What is the best Cellulosic Ethanol Conversion process for Ryegrass straw?
Facility Outputs – What are the potential energy outputs? How much of each output will be generated and what are their uses? What are other outputs and their potential beneficial uses?
Financial Model – What are all the expenses and revenues associated with constructing and operating a cellulosic ethanol facility for Ryegrass straw?

Research Element 5: Pellets for Boilers Energy Conversion Process
Pretreatment – What are the pretreatment options and costs to convert Ryegrass straw into pellets for use in boilers. Will Ryegrass straw pellets enhance boiler performance? What type of pilot project can we conduct to test Ryegrass pellets as a feedstock for boilers?
Treatment – Which is the best Cellulosic Ethanol Conversion process for Ryegrass straw?
Facility Outputs – What are the potential energy outputs? How much of each output will be generated and what are their uses? What are other outputs and their potential beneficial uses?
Financial Model – What are all the expenses and revenues associated with constructing and operating a pellet making system for Ryegrass straw?

Data that will be Collected and Analyzed & Specific Activities we will undertake common to Research Elements 2-5:
Pretreatment –We will evaluate methods for receiving Ryegrass at the site and pretreatment requirements specific to each conversion technology.

Treatment –We will perform a literature search and conduct interviews to assess the specifications, and performance of Ryegrass in energy & biofuels plants in North America and Europe. We will determine the type of equipment to be used, efficiencies and costs for each conversion technology.

Facility Outputs – For each conversion technology, the type of energy outputs, the estimated quantity of each output that will be generated using industry standard calculations based on the amount of feedstock. We will develop technical scenarios for utilizing each of the energy outputs from each process. Other outputs, including nitrogen and biosolids, will be determined and their potential beneficial uses will be analyzed.

Financial Model –We will develop a financial model for the development of a Ryegrass straw to energy project for each conversion/processing technology. Capital expenditure, operations and maintenance, revenue, expenses, avoided costs, environmental credits, state and federal tax credits, funding sources, and costs of capital will be incorporated to assess the return on investment of the projects. Additional data will be collected from relevant projects and interviews with technology process and energy experts.

Deliverable – The deliverable for Research Elements 2-5 is to provide a report analyzing the various distributed energy technologies that may be applicable to the goals of this project. This report will evaluate the opportunity for energy production from the energy conversion technologies, as well as the financial, regulatory and technical element to using the technologies in the conversion of grass straw to energy.

Research Element 6: Pilot Project Research on Elements 2-5
Using the information gathered in Study Elements 2-5, we will work with researchers in each of the energy conversion methods identified to determine specific pilot research projects to conduct that will identify the best short-term, mid-term and long-term project opportunities. We have already identified researchers for pilot research projects for Anaerobic Digestion, Pyrolysis and Cellulosic Ethanol and will work with OSU to identify additional pilot project opportunities.
Our potential pilot project list currently includes:

- Anaerobic Digestion Projects
    1) MWMC digester – with food waste
    2) On-Farm – with food waste

3) At slaughter house – with animal carcasses

- Pyrolysis
  1) Tech Fuels - National Energy Technology Laboratory in Albany Oregon. bench test of Ryegrass straw
- Ethanol

1) Trillium Fiber Fuels - bench test of biochemical conversion of Rye grass straw to ethanol

2) Will Klausmeier Ph.D. working with team at OSU - Test of thermochemical conversion of Ryegrass straw to ethanol.

- Pellets

1) UO Resource Innovations is working with several pellet makers. We are currently contacting them to identify one or more to test turning Ryegrass straw to pellets.

Deliverables –
This deliverable will include summary steps from each pilot project and data that includes the costs to convert grass straw to energy and the energy generated for each technology tested.

Research Element 7: Energy Facility Siting Elements
We will review the potential sites for a Ryegrass Straw to Energy Conversion processing plant in Lane County. We will take into account the potential for its inclusion in the envisioned "Integrated BioEnergy Business Park." We will also determine issues of smell, noise, and other potentially undesirable aspects of production. We will review planning and zoning restrictions and local, state, and federal regulations for energy production facilities. With all these factors in mind we will determine the best potential site for a facility. The siting of the facility will also include a study of the farthest distance from which it is still profitable to transport Ryegrass straw in Oregon.

Research Element 8: Financial Model Comparison and Return on Investment
ROI – What Tax and Energy Credits (including Carbon Credits) are available for each step of the process? What is the life cycle sustainability value of Ryegrass straw as a product compared to burning it? What type of private and public funding is available for these type of projects?

Data that will be collected/analyzed and the specific activities we will undertake:
We will develop a matrix to compare the relative projected costs and benefits of the alternative energy conversion models. We will identify which alternatives have the greatest potential revenue for the growers and processors of Ryegrass straw. We will also identify potential project funding sources.

Deliverables – The deliverable of this Research Element will include projected costs of each of the researched energy conversion technologies. It will include a revenue and expense report for each alternative that can be used to determine long-term project feasibility. And a summary of funding sources that are being used successfully to finance renewable energy projects.

Research Element 9: Recommendations from Research Findings
The element will include the answers to the all research questions asked in this feasibility study. It will answer: What have we learned? and What are the next steps?

Deliverables – This section will include an analysis of our finding regarding construction costs and annual operations; conclusions regarding SWOTs; conclusions regarding risks and benefits of a Ryegrass straw to energy project and identification of next steps to be taken. This project deliverable

incorporates project recommendations into the development of a strategy that includes next steps to take.

Additional Funding Sources

Lane County has recently applied for a grant of $50,000 from the Renewable Energy Feasibility Fund, to be matched by $25,000 in County funds, to study the financial feasibility of constructing and operating a Lane County owned anaerobic digestion facility to process local food waste into energy. A portion of these funds will be used to determine the potential use of bulking agents in the process of Anaerobic Digestion. In addition some of those funds will be used to develop site specific characteristics for the siting of an anaerobic digester. Though the REFF funds are limited to studying food waste and anaerobic digester issues, those funds do make the Smoke Funds study stretch farther.

This grant will give Lane County and its partners the specific information needed to apply for future grants and loans from sources that include the Oregon Energy Loan Program, Biorefinery grants, Biomass Research and Development grants, Renewable Energy grants and loans, and Value-Added Producer Grants. As the project develops, the processing facility will potentially become eligible for energy and biofuel production tax credits and exemptions and the Ryegrass growers will become eligible for Feedstock commodity tax credits and subsidies.

The Larger Research Project

Lane County is currently engaged in several projects that build on a local vision of an Integrated Bioenergy Business Park where renewable energy facilities are co-located in order to maximize the uses of infrastructure and facility outputs. As part of that process, Lane County formed the Willamette Valley Biomass Study Group, a multi-discipline team working to identify opportunities for biofuels from local biomass materials. Members include Lane County Community and Economic Development; Resource Innovations - UO Institute for a Sustainable Environment; Lane MicroBusiness; Northwest Cooperative Development Center; Lane Council of Governments; Oregon Environmental Council; Trillium FiberFuels, Inc.; Mater Engineering, Ltd.; Ater Wynne; Novus Group; Good Company; Sylvatex and Essential Consulting Oregon.

The Study Group is currently working with a $95,000 USFS Working Partnership grant, awarded to Lane County, to study bio-energy and biofuels opportunities from woody biomass. As mentioned above, the County has also recently applied for a $50,000 grant from the Renewable Energy Feasibility Fund. We are currently also preparing grant applications for several other funding sources and have been meeting with private venture and equity funding organizations.

Proposed Project Schedule and Report Due Dates

Research Elements	Start Date	Interim Report	Final Report
1: Harvesting, and Transportation	March 1, 2008	June 16, 2008	Sept.1, 2008
2: Anaerobic Digester Conversion	March 1, 2008	June 16, 2008	Sept.1, 2008
3: Pyrolysis Conversion	March 1, 2008	June 16, 2008	Sept.1, 2008
4: Cellulosic Ethanol Conversion	March 1, 2008	June 16, 2008	Sept.1, 2008
5: Pellets for Boilers Conversion	March 1, 2008	June 16, 2008	Sept.1, 2008
6: Pilot Project Research	March 1, 2008	June 16, 2008	Dec. 1, 2008

7: Facility Siting Elements	March 1, 2008	June 16, 2008	Dec. 1, 2008
8: Financial Model Comparison and ROI	March 1, 2008	June 16, 2008	Dec. 1, 2008
9: Recommendations from Finding	N/A	N/A	Dec. 1, 2008

Funding Availability

Lane County Community and Economic Development manages numerous grant projects. Our standard grant draw down procedure is once a contract is in place with a grant funder, the County fronts the funds for the work to be done and then applies for reimbursement from the grant funder on a schedule worked out in cooperation with the funder. The County anticipates doing that same thing in this project, drawing down funds as project milestones – like interim and final reports – are met.

Project Partners

Lane County - Mike McKenzie-Bahr – Lane County Community & Economic Development Coordinator – 20 years of Business and Community Development, grant management and feasibility study experience. – He will be the project manager, administer contracts for project team, assign tasks, assist with each project elements and gather finished study materials into a Final Report. He will serve on the Project Management Team.

Marcus Kauffman, Program Manager, Resource Innovations, Institute for a Sustainable Environment, University of Oregon – He holds a Master's of Community and Regional Planning with an emphasis on rural community development from UO – He will lead the interview team for "Harvesting, Bailing and Transportation Costs." He will also assist preparing study results into the Final Report. He will serve on the Project Management Team.

Martin Desmond – Lane MicroBusiness- Business consultant and small business classes & workshops instructor. Serves on state Forest Biomass Working Group, chairs Economy & Market Development Subgroup. - He will assist preparing of "Financial Model Comparison and Return on Investment."

Eric Bowman, Northwest Cooperative Development Center – Business Consultant. Co-author: "Mapping the Route to a Cooperatively-Owned Future for Emerging BioEnergy Industries." – He will be preparing element on cooperative business models and bioenergy opportunities as part of "Financial Model Comparison"

Milo Mecham, Principal Planner, Lane Council of Governments. He leads the local and regional planning issues and programs at LCOG – He will lead "Energy Facility Siting Elements" data gathering team and assist with infrastructure finance-related analyses.

Larry Brice, President, Novus Group – 30 years of business management experience including large project development and raising capital- Former member of Governor Kitzhaber Committee for Economic Development. He will prepare "Financial Model Comparison and Return on Investment" and assist on "Facility Outputs," elements. He will serve on the Project Management Team.

William H. Klausmeier, Ph.D, President, Sylvatex – He has served as the research monitor for the World Bank's Brazilian ethanol program and done ethanol and biofuels projects for the World Bank, the U.S. Agency for International Development, the Rockefeller Brothers Fund and private clients. He will provide research on the suitability and adaptability of current conversion processes to grass straw.

Joshua Skov, MA, LEED AP, Principal, Good Company – Holds an M.A. in Economics from the University of California, Berkeley, he is an adjunct instructor in the Department of Planning, Public Policy and Management at UO and has expertise in infrastructure project due diligence and feasibility assessment for community, business and environmental issues and opportunities – He will be main preparer of "Recommendations from Feasibility Study Finding" and assist on "Facility Outputs" elements. He will serve on the Project Management Team.

Dean Foor, PE, Essential Consulting Oregon (ECOregon) – Holds a B.S. in Civil Engineering, B.S. in Geomatic Engineering, and Certificate in Fermentation Science. Mr. Foor has more than 17 years of project management and engineering experience – He will lead the team that prepares "Anaerobic Digester Facility Options" elements and assist on "Facility Outputs" elements.

Kevin Caldwell, TecFuels LLC – TecFuels is a renewable energy development company based in Salem Oregon. Current Research and Development efforts are with a combination of public agencies and private sector partners at the National Energy Technology Laboratory in Albany Oregon. He will lead the team that prepares "Pyrolysis" elements and assist on "Facility Outputs" elements.

Chris Beatty, President, Trillium Fiber Fuels – Holds a Master of Science Degree, Materials Science, Stanford University and is a courtesy faculty appointment at OSU Chemistry Department. Trillium FiberFuels currently has a lab scale cellulosic ethanol process running based on ryegrass straw. He will lead the team that prepares "Cellulosic Ethanol Conversion" elements and assist on "Facility Outputs" elements.

Dave Nelson - Oregon Seed Council - Currently the Executive Secretary of the Oregon Seed Council. Mr. Nelson has served on the council for over 15 years in different positions including treasurer and executive director. Nelson also serves on the Oregon Department of Agriculture Fine Fescue Commission. Nelson will serve as a source of information and coordination with the Ryegrass straw growers for interviews and industry specific information. He will serve on Project Management Team.

Additional resources who will provide expertise, data and guidance

Stephanie Page, Oregon Department of Agriculture, Renewable Energy Specialist – She will act as liaison between the Department of Agriculture and the project team, providing guidance and access to expertise among state organizations.

Greg Rorrer PhD, – Holds a PhD in Chemical Engineering from Michigan State University and is a professor of chemical engineering at OSU School of Chemical, Biological, and Environmental Engineering. He has an established research program in biochemical engineering and biomass conversion. He is co-leader of the Biomass Conversion Technologies Working Group (BCTWG) at Oregon State University. He will serve as a source of information for the technical aspects of energy conversion for Ryegrass Straw.

Ken Williamson, PhD, Oregon State University – The Department Head for Chemical Engineering in the School of Chemical, Biological, and Environmental Engineering at OSU. He will provide information and research on the development of technology and efficiency for the processing of biomass to energy. He is interested in the both the Bioeconomy and Sustainable Technologies Research Center side and the Environmental Quality Commission which is interested in alternatives to field burning.

Michael Russo, PhD, University of Oregon – Head of the Department of Management for the Lundquist College of Business at the University of Oregon. His research interests include the management of environmental issues and he has worked as an energy planner specializing in commercialization of wind and solar energy. Russo will supervise an MBA Candidate team that will assist in the development of the financial models for the energy processing facilities.

Peter Ruffier – Eugene Wastewater Director -Metropolitan Wastewater Management Commission – Will provide data and review on wastewater and siting issues on MWMC lands.

Robert Sprick – Operations Supervisor, Wastewater Division – City of Eugene, Metropolitan Wastewater Management Commission – Will provide anaerobic digestion facility operation expertise.

Eugene Water and Electric Board – Will provide data and expertise for energy production opportunities and potential energy source revenues.

Proposed Budget

We have attached two budget documents: 1) Budget By Category, which shows the proposed expenditures by Research element and contractor and 2) Scope of Work and Budget by Project Participant. This second budget outlines the scope of work that each project participant will undertake.

Budget By Category – Attached as separate sheet.

Scope of Work and Budget by Project Participant

Lane County

Research Element 7: Facility Siting Elements Costs and Issues	
Public Works Research	$5,000
Administration and Management	
CAO	$15,000
Travel	$15,000
Supplies and Materials	$5,000
Contingent	$5,000
Total Budget	**$45,000**

Resource Innovations, Institute for a Sustainable Environment, University of Oregon

Research Element 1:Harvesting, Bailing & Transportation Costs & Issues Research and Author	$5,000
Research Element 9: Recommendations from Finding Author	$10,000
Project Management	$10,000
Total Budget	**$25,000**

Lane MicroBiz

Research Element 8: Financial Model Comparison and ROI Financial Modeling	$5,000
Total Budget	**$5,000**

Lane Council of Governments

Research Element 7: Facility Siting Elements Costs and Issues Research and Author	$10,000
Total Budget	**$10,000**

Northwest Cooperative Development Center

Research Element 9: Recommendations from Finding Author Final Section- Business Models	$5,000
Total Budget	**$5,000**

Novus Group

Research Element 2: Anaerobic Digester Energy Conversion Process Energy Output Section	$2,000
Research Element 3: Pyrolysis Energy Conversion Process Energy Output Section	$2,000
Research Element 4: Cellulosic Ethanol Energy Conversion Process Energy Output Section	$2,000
Research Element 5: Pellets for Boilers Energy Conversion Process Energy Output Section	$2,000
Research Element 6: Pilot Project Research on Elements 2-5 Energy Output Section	$2,000
Research Element 8: Financial Model Comparison and ROI Author	$15,000
Research Element 9: Recommendations from Finding Author Final Section	$5,000
Project Management	$5,000
Total Budget	**$35,000**

Sylvatex

Research Element 3: Pyrolysis Energy Conversion Process	
Preliminary Screening of Technology	$2,000
Research Element 4: Cellulosic Ethanol Energy Conversion Process	
Preliminary Screening of Technology	$2,000
Research Element 5: Pellets for Boilers Energy Conversion Process	
Preliminary Screening of Technology	$2,000
Research Element 6: Pilot Project Research on Elements 3,4,5	
Preliminary Screening of Technology	$2,000
Research Element 9: Recommendations from Finding	
Author Technology Section	$2,000
Total Budget	**$10,000**

Good Company

Research Element 3: Pyrolysis Energy Conversion Process	
Section Author	$3,000
Research Element 4: Cellulosic Ethanol Energy Conversion Process	
Section Author	$3,000
Research Element 5: Pellets for Boilers Energy Conversion Process	
Section Author	$3,000
Research Element 6: Pilot Project Research on Elements 3,4,5	
Section Author	$3,000
Research Element 9: Recommendations and Findings	
Section Author	$8,000
Total Budget	**$20,000**

Essential Consulting Oregon (ECOregon)

Research Element 2: Anaerobic Digester Energy Conversion Process	
Energy Output, Preliminary Screening, Section Author	$10,000
Research Element 6: Pilot Project Research on Elements 2-5	
Pilot Assistance	$5,000
Total Budget	**$15,000**

TecFuels LLC

Research Element 3: Pyrolysis Energy Conversion Process	
Research and Findings	$5,000
Research Element 6: Pilot Project Research on Element 3	
Pilot Lead	$10,000
Total Budget	**$15,000**

Trillium Fiber Fuels

Research Element 4: Cellulosic Ethanol Energy Conversion Process	
Section Author	$5,000
Research Element 6: Pilot Project Research on Elements 2-5	$15,000
Pilot Lead	
Total Budget	**$20,000**

Oregon Seed Council

Research Element 1: Harvesting, Bailing & Transportation Costs & Issues Expertise	$5,000
Research Element 9: Recommendations and Findings Expertise	$5,000
Total Budget	**$10,000**

Oregon State University

Research Element 6: Pilot Project Research on Elements 2-5 Pilot Lead	$10,000
Total Budget	**$10,000**

Metropolitan Waste Management Commission

Research Element 6: Pilot Project Research on Element 2 Pilot Lead	$10,000
Total Budget	**$10,000**

Unknown

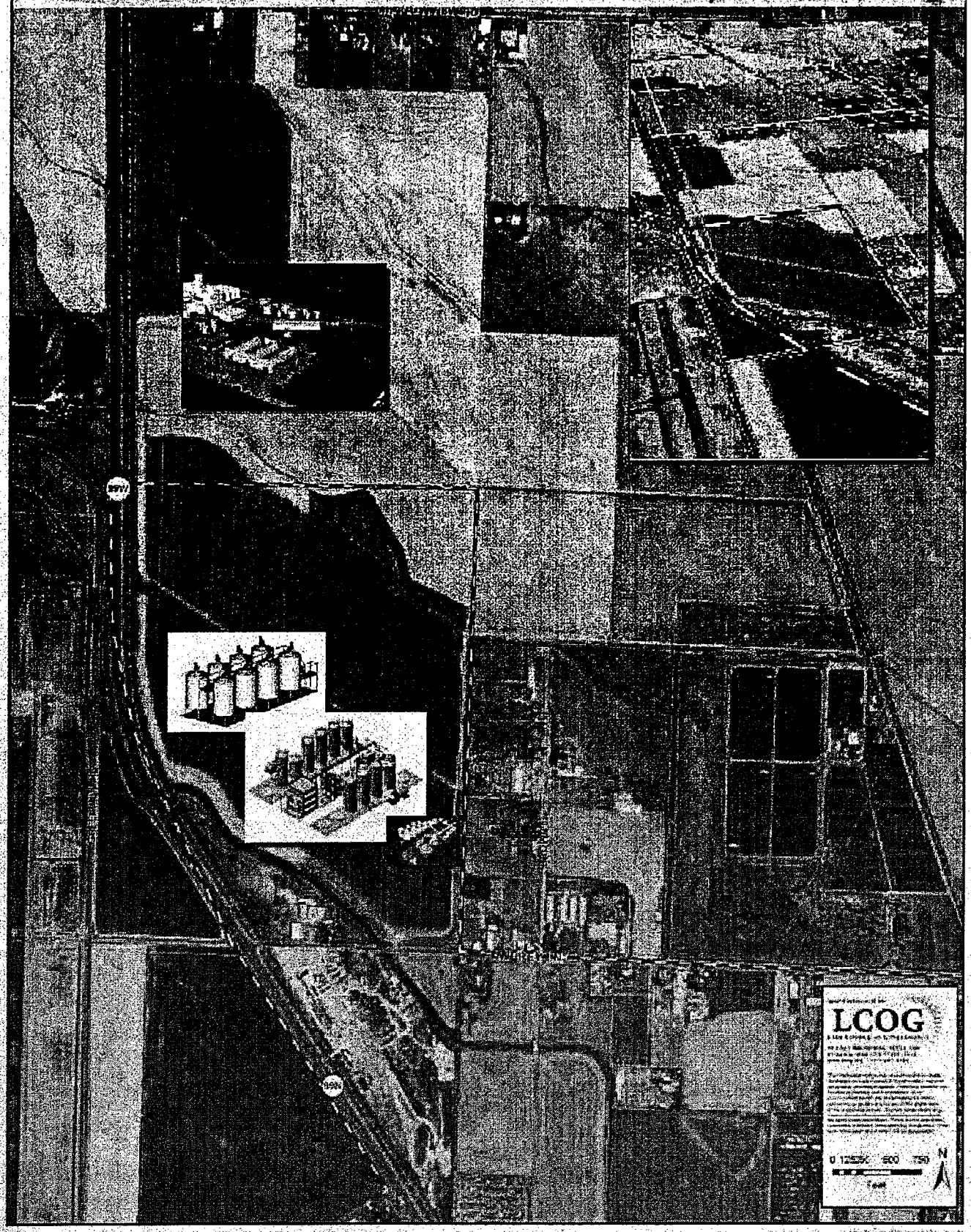
Research Element 5: Pellets for Boilers Energy Conversion Process Research and Findings	$5,000
Research Element 6: Pilot Project Research on Element 5 Pilot Lead	$10,000
Total Budget	**$15,000**

"Lane County Ryegrass Straw Conversion to Renewable Energy and Biofuel Production Proejct/Feasibility Study" Budget

Partner	RE 1: Harvesting, Baling, & Transportation	RE 2: Anaerobic Digester Conversion	RE 3: Pyrolysis Conversion	RE 4: Cellulosic Ethanol Conversion	RE 5: Pellets for Boiler System Technology	RE6: Pilot Project Research	RE 7: Energy Facility Siting	RE 8: Financial Model Comparison and ROI	RE 9: Recommendations from Findings	Administration	Project Management	Travel	Supplies Materials	Contingent	TOTAL
Lane County							$ 5,000			$ 15,000		$ 15,000	$ 5,000	$ 5,000	$ 45,000
Resource Innovations	$ 5,000								$ 10,000		$ 10,000				$ 25,000
Lane MicroBiz								$ 5,000							$ 5,000
Lane Council of Governments							$ 10,000								$ 10,000
NCDC									$ 5,000						$ 5,000
Novus Group		$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000		$ 15,000	$ 5,000		$ 5,000				$ 35,000
Sylvatex			$ 2,000	$ 2,000	$ 2,000	$ 2,000			$ 2,000						$ 10,000
Good Company			$ 3,000	$ 3,000	$ 3,000	$ 3,000			$ 8,000						$ 20,000
Esential Consulting Oregon (ECOregon)		$ 10,000				$ 5,000									$ 15,000
TecFuels, LLC			$ 5,000			$ 10,000									$ 15,000
Trillium Fiber Fuels				$ 5,000		$ 15,000									$ 20,000
Oregon Seed Council	$ 5,000								$ 5,000						$ 10,000
OSU						$ 10,000									$ 10,000
MWMC						$ 10,000									$ 10,000
Unknown					$ 5,000	$ 10,000									$ 15,000
TOTAL	$ 10,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 67,000	$ 15,000	$ 20,000	$ 35,000	$ 15,000		$ 15,000	$ 5,000		$ 250,000

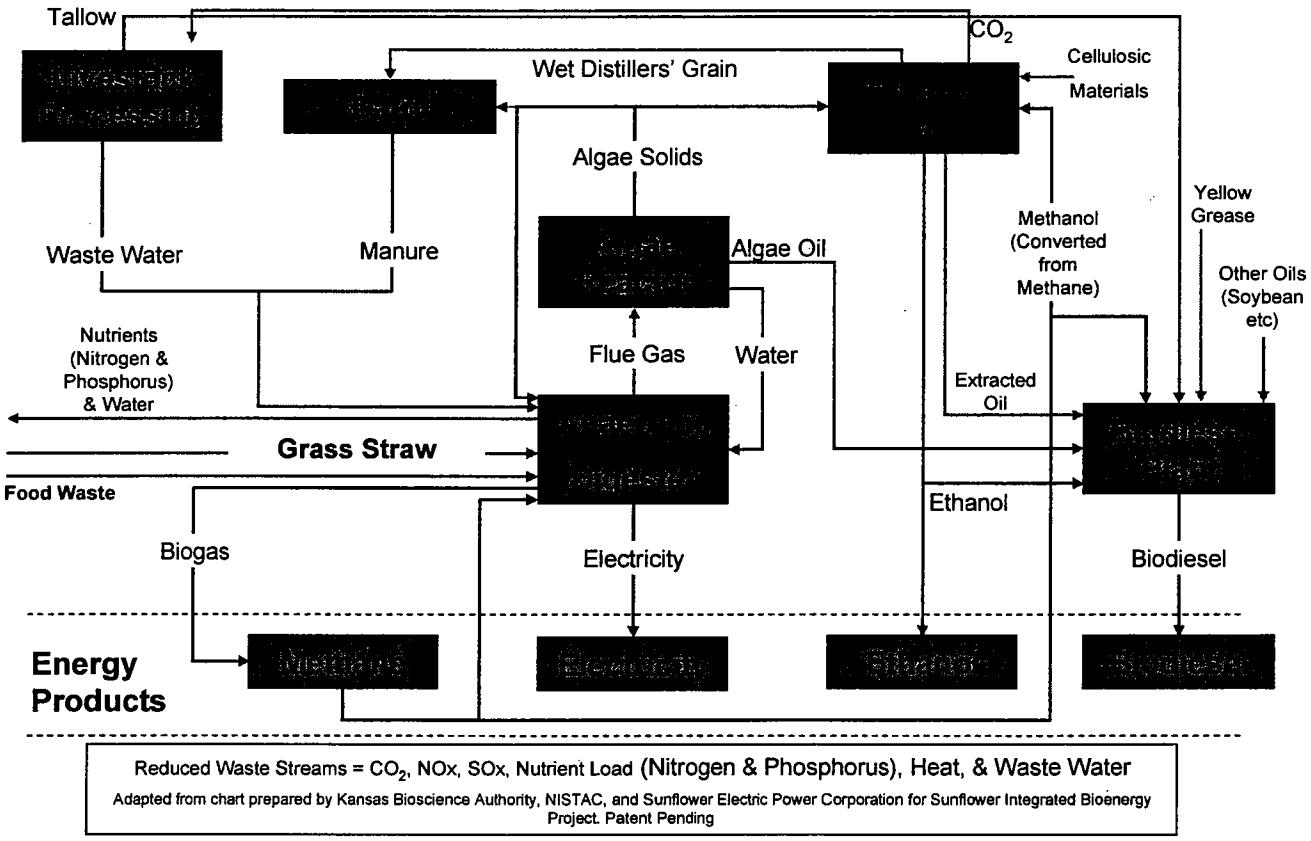
Integrated Bioenergy Business Park

Conceptual Rendering



Integrated Bioenergy Business Park

Conceptual Process



Reduced Waste Streams = CO_2, NOx, SOx, Nutrient Load (Nitrogen & Phosphorus), Heat, & Waste Water

Adapted from chart prepared by Kansas Bioscience Authority, NISTAC, and Sunflower Electric Power Corporation for Sunflower Integrated Bioenergy Project. Patent Pending