

# Centre for Agricultural Renewable Energy and Sustainability

## C.A.R.E.S.

### *Prospectus and Business Plan*

2009-2014



## **A Centre of Excellence for OAC, University of Guelph**

The Centre: “Centre for Agricultural Renewable Energy and Sustainability” (CARES)

### **1.0 Background**

The “Centre for Agricultural Renewable Energy and Sustainability” (CARES) established at the University of Guelph, Ridgetown Campus is a hub for applied and adaptive research, training and education, technology transfer, and rural community development in bio-energy and the bioeconomy. Through extended interaction with its constituent community, CARES will build on the historic background and current skills of Ridgetown Campus to support the agriculture and agri-food sector by integrating an applied research program. This program will advance innovation and adoption of bioenergy through risk minimization, bench-marking and creation of value added components.

The fundamental goal of CARES is to create an applied research and demonstration facility that allows full testing and integration of new technologies, with the purpose of providing direct benefits at the farm gate level. Currently, no such centre with an integrated applied agricultural focus exists in Canada. While a few on-farm energy projects containing research components currently exist, there is a need for a much more strategic and integrated approach.

This concept has been developed in collaboration with the following founding organizations:

SOBIN (Southwestern Ontario Bioproducts Innovation Network)  
Community Futures Development Corporation of Chatham-Kent  
University of Guelph, Ridgetown Campus  
University of Guelph  
Ontario Ministry of Agriculture, Food and Rural Affairs  
Municipality of Chatham-Kent  
Agricultural Adaptation Council  
Ontario Seed Corn Growers

Together with the support of over 40 stakeholder groups, these founding partners orchestrated the official establishment of the Centre for Agricultural Renewable Energy and Sustainability (CARES) in early 2009.

SOBIN in particular was instrumental in the conception of CARES. The mission of SOBIN is to strengthen the economy of Southwestern Ontario by accelerating the development and adoption of bioproducts, energy conservation and alternative energy sources within and across its industry clusters. Three main goals of SOBIN for achieving this include: 1. Strengthening the agricultural industry by fostering the creation of new value-added markets for agricultural products – such as energy, chemicals and materials – and reduce costs of operations through new bioproducts. 2. Enhancing the chemical industry by helping to generate new cost-effective sources of feedstock for eco-friendly chemical production and develop new biobased chemical products for export. 3. Advancing the automotive industry by introducing effective new bioproduct materials to the industry and its suppliers, including plastics and paints, which will lower production costs, improve performance and create more environmentally friendly outputs.

Essentially, SOBIN is working to build linkages and partnerships between the Agriculture, Chemical and Automotive industries to see these goals achieved. To accomplish this, SOBIN has been working on developing three main initiatives: 1. Working in partnership with the University Western Ontario’s Sarnia-Lambton Research Park to facilitate the development of biobased chemical opportunities. One of the main achievements in this area has been the establishment of the Bioindustrial Innovation Centre (BIC) – which will focus on the development

and commercialization of industrial scale opportunities for incorporating biobased feedstock into chemical and fuel production. 2. Involvement in the creation of Ontario BioAuto Council (OBAC). This council has been established to help facilitate the commercialization of biobased components in automobile manufacturing. The council has a \$5 million investment fund in place to help fund the late stage commercialization of biobased materials by private industry. 3. Working on the development of CARES (Centre for Agricultural Renewable Energy and Sustainability) – to create a centre to demonstrate and help commercialize agricultural renewable energy technologies that will focus on increasing farm gate and rural income.

While all three of these initiatives have their own particular focus, there will be synergies to be gained by building further linkages between them. For instance, by-products associated with some of the processes developed through CARES may have value to processes investigated by the other initiatives? (i.e. the potential for something like glycerin, or the oil gums from biodiesel production to be a feedstock for the creation of other value added chemicals or biocomposites – thereby linking CARES projects with BIC or OBAC projects.

### *1.1 The identified need*

Finding new sources of clean, sustainable energy is often cited as one of the greatest challenges facing society today. Governments, educational institutions and private sector enterprises are seeking solutions through research, development, technology transfer and commercialization activities in areas such as biofuels and other forms of bioenergy. At the same time agricultural producers are faced with increasing economic challenges due to volatile commodity prices and sky-rocketing input costs. Furthermore, agriculture is coming under increasing pressure to recapture and recycle nutrients and improve water quality. Agriculture has also been targeted as a significant sink for carbon sequestration. Renewable energy production, carbon-sequestration, nutrient re-cycling, and clean water in agriculture are pursuits highly amenable to integration. Agriculture underpins many rural economies, and these economies need to diversify to regain stability and stimulate growth. A significant portion of this new green economy is expected to come from agriculture. For these new economies to positively impact rural communities, revenues need to stay in these communities. Hence it is critical that primary producers are enabled to participate as far up the value chain as possible. Currently producers have no central body to turn to for help to engage in this integrated approach, and are largely left to their own devices and taking most of the risk.

### *1.2 The identified solution*

CARES will employ an applied systems approach to refine and integrate renewable and sustainable energy technologies in a manner that will benefit rural Ontario. CARES will help to mitigate risk that farm operations encounter when adopting and implementing new sustainable energy technologies. The efforts of CARES within the area of applied systems and the subsequent generation of benchmark data will help producers make informed investment decisions when considering the adoption of renewable energy technologies. This assistance and risk management provides a vital service to agricultural producers that will ultimately result in additional and diversified income at the farm gate.

With acknowledgement that much research in the area of renewable energy exists globally, CARES seeks to collect, synthesize and apply this multifaceted information and use it to advance the above implementation goals as well to address the larger socioeconomic and biophysical issues associated with agricultural renewable energy projects. Local production and utilization of renewable energy represents a paradigm shift that will have regional and global consequences. CARES will be a clearing house for technical and policy information, make it widely available to the many stakeholders in agricultural renewable energy. In addition, CARES will function to inform public policy with the respect to the role of agriculture in the emerging bioeconomy.

Critical to the success of any far-reaching and multidisciplinary initiative is its geographic location. Strategically situated in a key agricultural area, CARES is also near the end-users (e.g. greenhouse, energy and petrochemical industries) and stakeholders (e.g. local governments, producers, community groups and agri-businesses) that it intends to serve. CARES will have a unique opportunity to demonstrate to these groups that agricultural renewable energy technologies are real world, economically feasible applications. CARES will create a broad range of programs and services that encourage collaboration with regional partners in order to deliver business and community development initiatives and create a highly skilled workforce.

CARES will bring together an interdisciplinary and highly skilled group of faculty. These participants are from the University of Guelph community (including Ridgetown Campus and other regional campuses), as well as from academic institutions across Canada and the world. CARES will support the highest quality educational programming and applied research in renewable energy relevant to the public, private and non-profit sectors. This allows us to transfer and apply knowledge that will improve the socioeconomic quality of life of people in rural Ontario and ultimately throughout Canada and beyond.

## **2.0 Mandate**

CARES will operate in keeping with OAC's research mandate "to support the research needs of its traditional clientele, while developing new uses and applications of living things ("bioresources") to improve the quality of our environment, maintain the competitiveness and well-being of Ontario and serve the global community."

CARES will operate under OAC's education mandate to continue to improve the broad educational experience of students in OAC programs, and increase access to learning opportunities through enhanced skills training and lifelong professional education.

CARES also seeks to enhance rural development and contribute to a cleaner environment by developing integrated technologies that produce renewable energy and manage nutrients and waste. CARES will accomplish this by building on, and contributing to, the expertise of the University of Guelph. The activities of CARES have immediate relevance for the public, private, and not-for-profit sectors.

## **2.1 Objectives**

The centre will operate within the framework of agricultural renewable and sustainable energy. Specifically, CARES aims to:

- a) *Develop a hub of applied research, teaching and technology transfer of renewable energy*
- b) *Integrate farm (biomass, nutrient, water) and energy systems to manage agricultural footprints and add value at the farm gate.*
- c) *Produce environmentally responsible and sustainable energy*
- d) *Promote long term sustainable rural development*

## **2.2 Activities Related to the Objectives**

### **2.2.1, Applied research, Teaching, Technology Transfer**

The Centre will provide the focus for applied research within the University of Guelph system. CARES will provide linkages and access to a full spectrum of research by acting as a conduit to basic research and by conducting applied and adaptive research on all aspects of renewable and

sustainable energy within the agricultural setting. These efforts will lead to the development of linkages between researchers within the University and the regional campuses, as well as other academic and research institutions nationally and globally.

CARES will advise in curriculum development in the area of agricultural renewable energy for certificate, diploma and degree programs at Ridgetown Campus, and in a range of professional and continuing education initiatives. Unique ways to integrate the Centre's activities into experiential learning for undergraduate and graduate students will also be explored.

CARES will be a source of current, comprehensive information on renewable energy for a range of audiences through publications, newsletters, electronic media, demonstrations and conferences as well as collaboration with visiting scholars. Specifically, CARES will transfer technologies to producers and other stakeholders by completing risk/benefit and economic analyses and by using this benchmark data and other information to create databases and protocols.

### *2.2.2 Managing agricultural footprints*

CARES will integrate rural production systems with renewable energy technologies to foster carbon neutral and/or environmentally responsible energy as well as secondary products. Our efforts will result in the optimization of the biophysical components (i.e. nutrient, water and carbon cycles) in the agricultural setting.

### *2.2.3 Production of energy*

In order to facilitate research and technology transfer goals and to assist in the Centre's long-term self-sufficiency, energy will be produced at Ridgetown Campus. The first proposed energy projects (Appendix A) will include biofuels and biogas production as well as the creation and utilization of bioenergy crops (e.g. hybrid *Miscanthus*).

### *2.2.4 Sustainable rural development*

In order to reduce risk exposure to agricultural producers, CARES will evaluate the many types of renewable energy and closed-loop technologies intended for the agricultural setting. In addition, CARES will work on the development of products, processes and services which will directly lead to increased rural development. These efforts could include:

- Commercialization of farm-level energy production technologies
- Demonstration of integrated farm energy system for revenue generation and sustainability
- Production of value-added co-products from integrated biomass production and processing
- Identification of new business opportunities along the farm-energy value chain
- Evaluation of the socioeconomic impact of on-farm renewable energy production and utilization

## **3.0 Structure**

### *3.1 Participating Partners*

Centered at Ridgetown Campus, CARES will involve faculty from several university departments and regional campuses. In addition, CARES may involve faculty or personnel from other universities or external bodies including government agencies and private sector partners.

The following groups are, or will likely, participate or be strategically linked with CARES.

Academic:

Internal:

- various departments (e.g. Land Resource Science, Environmental Biology, Plant Agriculture, College of Physical and Engineering Sciences, Applied Plant Science and Food, Agricultural and Resource Economics) working on CARES projects at Alfred, Guelph, Kemptville, and Ridgetown Campuses
- Centre for Bioproduct Discovery and Development
- alliances with other strategically linked internal projects and initiatives

Regional:

- St. Clair College, Lambton College, University of Windsor, University of Western Ontario, University of Waterloo

National:

- Three additional nodes of CARES: OLDS College, Alberta; Alma College, Quebec; Nova Scotia Agricultural College, Nova Scotia

Business and Organizations:

- Regional: Chatham-Kent Energy, Southwestern Ontario Bioproducts Innovation Network, AGRIS Co-operative Ltd, Ag Energy Co-operative, Renewable Energy Systems Inc and other business partners,
- Provincial: Ontario Field Crop Coalition, Ontario Federation of Agriculture, Christian Farmers Federation of Ontario, other commodity organizations, automotive, energy, greenhouse, and petrochemical industries
- National: Canadian Federation of Agriculture, Canadian Pork Council and other national commodity organizations

Government:

- Regional: Municipality of Chatham-Kent, conservation authorities
- Provincial: OMAFRA, Ministry of the Environment
- National: Agriculture and Agri-Food Canada, Natural Resources Canada, Environment Canada, Industry Canada, non-governmental organizations

### 3.2 Board of Directors

A Board of Directors is comprised of members from government, industry and the University of Guelph. The Executive Director considers advice from an advisory committee and takes direction from the Board of Directors (Figure 1). The initial composition of the Board will consist of representatives from:

- Ontario Ministry of Agriculture, Food and Rural Affairs (*Advisory*) – Director of the Research and Innovation Branch and Gabrielle Ferguson, Environmental Programs Specialist
- Municipality of Chatham-Kent, Economic Development Services – Kim Cooper, Acting Agricultural Co-ordinator, Economic Development Services
- Southern Ontario BioProducts Innovation Network – Matt McLean, Executive Director
- Ag Energy Co-operative Ltd. – Mike Bouk, Executive Director
- Cedarline Farms – Greg Devries, Owner/Producer
- The Research Park – Don Hewson, Managing Director, The Bioindustrial Innovation Centre and Industrial Liaison
- Ontario Agricultural College, University of Guelph – Robert Gordon, Dean of OAC
- Natural Resources Canada – Claude Faucher, Manager, Renewables Integration & Assessment
- Olds College, Alberta – Abimbola Abiola, Chair, School of Innovation
- University of Guelph, Ridgetown Campus – Art Schaafsma, Director

The *advisory* members act as advisors to the Executive Director and do not possess voting privileges. In addition to the advisory seats, nine positions exist on the Board of Directors. The Board of Directors will always include at least one representative from SOBIN.

Members of the Board of Directors will be appointed to a renewable term of four years. A director may be removed before expiration of his or her term via a resolution passed by at least two-thirds of the members of the Board of Directors. In the final year of the Board of Directors' term, the existing board will appoint a nominating committee. This nominating committee will put forward appropriate nominees for election or appointment to the new Board of Directors.

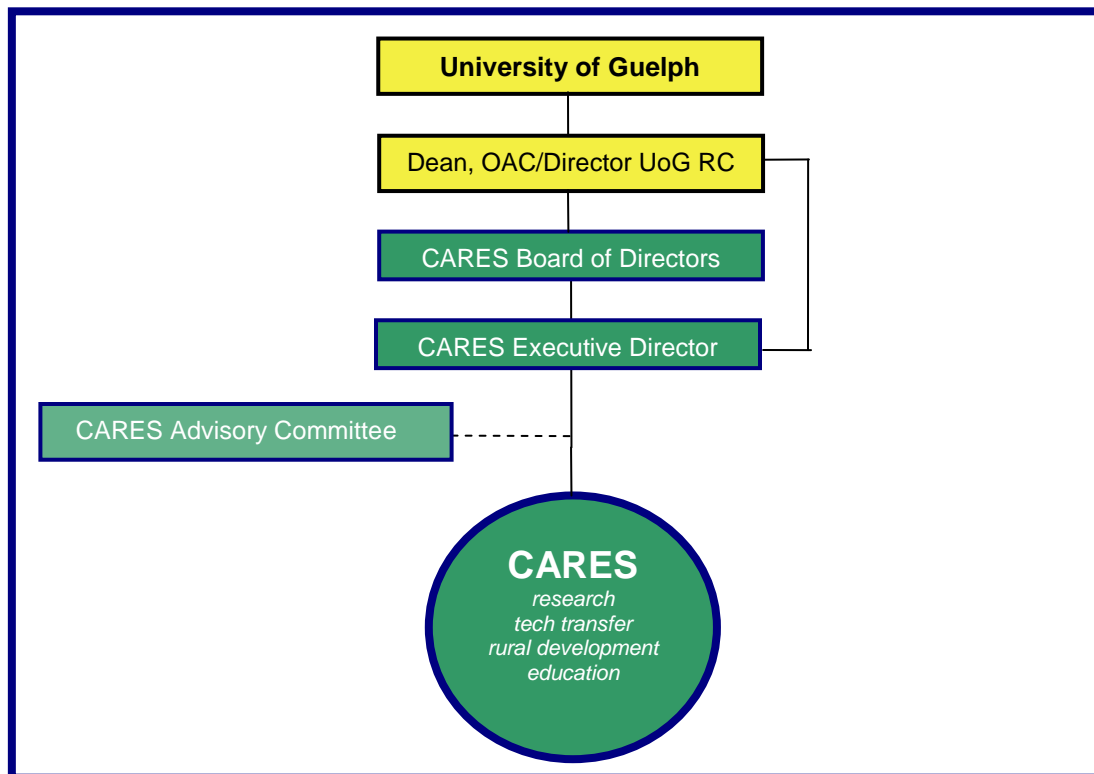


Figure 1: Structure and Governance of CARES

### 3.3 Advisory Committee

The Advisory Committee will consist of five members appointed by the Board of Directors based upon CARES initiatives to a two year term that is renewable. This committee will meet at least twice per year and report annually to the Executive Director. The Advisory Committee is responsible for providing feedback on research and technology transfer goals to the Executive Director and the Board of Directors. This committee will also provide recommendations on new research that is proposed to be completed within CARES. The Advisory Committee is composed of research scientists from the University of Guelph as well as other universities or research groups. In addition, membership may consist of end-users, stakeholders and technology providers.

### 3.4 Contracts, Memoranda of Understanding, Agreements

All types of agreements will comply with University of Guelph policies and practices.

### *3.5 Relationship to Ridgetown Campus*

1. Allocation of space - CARES and its associated projects seek to make use of 15 acres of land situated on the Ridgetown Campus that has limited use for other applications. It will potentially be used for project within the mandate of CARES such as bioenergy crops, operation of anaerobic digesters and biofuels research (Appendix A). Approval from ARIO for use of infrastructure will be sought as CARES projects and initiatives unfold.
2. Use of facilities - Research labs, engineering shops, the feedmill and other on-campus facilities will be utilized as in-kind contributions from Ridgetown Campus towards CARES. CARES will be included in Ridgetown Campus' land use plan that is prepared on a regular basis.

## **4.0 Governance**

### *4.1 Relationship with the University of Guelph*

CARES will be an entity under the University of Guelph and be located on the University of Guelph's Ridgetown Campus. Thus, all decisions, direction, and continuance will be at the sole and absolute discretion of the University of Guelph. CARES will join a long list of approximately fifty, research centres, institutes and groups at the University of Guelph ([www.uoguelph.ca/research/expertise/centres.shtml](http://www.uoguelph.ca/research/expertise/centres.shtml))

Information about CARES will be communicated on the homepage of the University of Guelph. A website will be developed where the CARES mandate, research results and other relevant data and information will be retained.

### *4.2 Management*

An Executive Director will be a research scientist seconded from the University of Guelph to oversee and manage day-to-day operations of CARES. The interim Executive Director is Dr. Rob Nicol, Department of Land Resource Science. Initially, this Executive Director will also be the lead researcher and provide all management for CARES. The Executive Director will report indirectly to the Dean of OAC, University of Guelph through the Director of the Ridgetown Campus.

Nominations will be accepted for the position of Executive Director. The Board of Directors will vote using the simple majority option and the Board will then make a recommendation to the Dean of OAC for final approval. The Executive Director will be appointed to the position for a five year term.

The Director of Ridgetown Campus acts as the University officer responsible for CARES. Currently this position is held by Dr. Art Schaafsma.

### *4.3 Budget*

CARES will have an appropriate annual budgeting process which will be available for scrutiny by the officers of the University of Guelph. Once CARES is established, any project and its accompanying budget will be scrutinized for approval by the CARES Board of Directors as well as the officers of the University of Guelph. Due to the fact that CARES could potentially have numerous projects operating at one time, budgets will need to be submitted on a project-by-project basis. CARES will be economically self-sufficient.

The Executive Director of the Centre will be responsible for the appropriate management of resources of the Centre and will be held accountable for the appropriate use of funds of the Centre.

## **5.0 Accountability**

### *5.1 University Policies and Practices*

CARES will comply with the University of Guelph's policies and practices.

### *5.2 Terms of Existence*

The term of existence for CARES is limited to the successful obtainment of funds and projects related to the core mandate which focuses on increasing farm-level alternative energy developments for Ontario. As long as there is an interest in these types of renewable energy systems, CARES will continue to have a presence.

Review of the Centre – If the energy or economic situation for agricultural activities in this region substantially changes from CARES original mandate, the Board of Directors will order a review of the operations and will scrutinize the Centre's reason for existence.

Termination of the Centre will be based upon the results of the annual review and/or an ongoing lack of operating budget over three consecutive years.

### *5.3 Mechanism for Review*

The Executive Director will oversee an annual review of the Centre's activities and progress and communicate this to Senate via an annual report. This review will be published and disseminated to the CARES Board of Directors, Dean of OAC and other University of Guelph representatives. The annual review will address such items as:

- CARES profile
- CARES participants/stakeholders/governance
- Annual highlights
- Research highlights
- Financial report
- Progress report

### *5.4 Liability*

CARES will follow the University of Guelph's liability guidelines. Specifically, CARES reduce liability issues for the University of Guelph by:

- Complying with the University of Guelph's policies and guidelines for worker safety including: fire safety; emergencies; incident reporting and investigation; personal protective equipment; safe work procedures; equipment policy; hazardous materials; biosafety; non-hazardous waste management; and, occupational health.
- Ensuring that all protocols and agreements are properly documented and signed
- Ensuring that all CARES employees be provided with the required Health and Safety training such as WHMIS, WSIB and Occupational Health and Safety.

In addition, all research projects will first be approved by the Office of Research, University of Guelph.

**Appendix A: CARES Great Lakes**

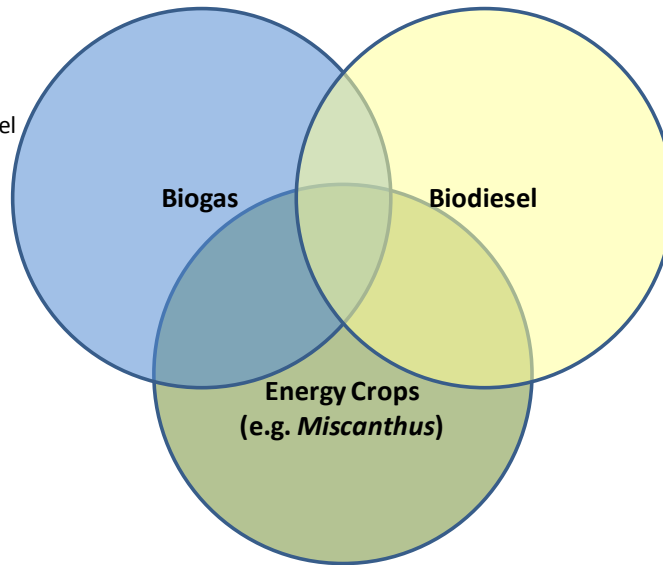
# CARES

*Anaerobic Digester Inputs :*

kitchen waste  
roadside biomass  
manure  
garden waste  
glycerin from biodiesel  
biodiesel waste

*Anaerobic Digester*

*Outputs:*  
heat  
methane  
nutrients  
digestate



*Biodiesel Inputs:*

soybeans  
ethanol waste  
coffee grounds  
digestate  
other oilseeds

*Biodiesel Outputs:*

heat  
protein  
oil  
biodiesel  
glycerin  
gum

*Energy Crops Outputs:* combustion feedstock,  
biogas feedstock, mulch, livestock litter,  
manufacturing material

# CARES Five Year Business Plan

The final few pages of this document outline the necessary resources, infrastructure and financing required for the operation of CARES over the next five years. In addition, potential funding sources and projected revenue generation have also been outlined. The plan is divided into two main components: CARES Canada and CARES Great Lakes.

## I. CARES Canada

As mentioned previously in this document, efforts are under way through the coordination of the Canadian Federation of Agriculture (CFA) to develop and establish CARES on a national front. CARES Canada, would be a national body linking together developments and efforts in the area of agricultural renewable energy and sustainability from four nodes across the country represented by:

Prairies: Olds College, Alberta  
Great Lakes: U of G Ridgetown Campus, Ontario  
St. Lawrence: College d'Alma, Quebec  
Atlantic: Nova Scotia Agriculture College, Nova Scotia

It is proposed that the National administrative office for CARES Canada be located at the Great Lakes node. The details in regards to resources and funding for this is outlined as follows:

### 1. National administrative office for CARES Canada

Proposed Location: Housed at the Rudy Brown Development Centre, Ridgetown Campus, year 1 and 2 use existing office space, with integrated plan to expand existing facilities to accommodate expected growth in personnel and activities

#### a. Fund and hire a Canadian Chief Executive Officer – new position

##### Roles:

- Fiscal accountability to CARES Board of Directors, OAC and UoG
- Coordinate national CARES fundraising efforts and project reporting/accountability with Federal government grants, and Canadian Federation of Agriculture.
- Leverage Federal opportunities with provincial bodies to support regional nodes
- Develop and manage national communications, networks, technology translation and transfer activities and platforms for national CARES interests.

Qualifications: connected to agricultural industry, min ag degree, MSc or MBA preferred plus business/marketing/ management/fundraising experience

Target hiring completion: December 2009

##### Projected Cost:

	Per Annum	Five Years
Salary and Benefits:	\$150 K	\$750 K.
Admin assistant (shared half time with SOBIN)	\$ 25 K	\$125 K
Conferences, meetings, travel and communications	\$100 K	\$500 K

##### Sources of funding:

2009: 6-8 month secondment from OMAFRA, and OMAFRA seed funding  
2010-2015: Growing Forward/ACAAF, national agency funds \$1,375 K

**b. Fund and hire a Knowledge Translation Transfer officer for CARES Canada**

Roles:

- Develop national CARES KTT platform
- Set up and maintain Ret Screen platform and National CARES Web site. The **RETScreen Clean Energy Project Analysis Software** is a unique decision support tool developed with the contribution of numerous experts from government, industry, and academia. The software, provided free-of-charge, can be used worldwide to evaluate the energy production and savings, costs, emission reductions, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs). The software (available in multiple languages) also includes product, project, hydrology and climate databases, a detailed user manual, and a case study based college/university-level training course, including an engineering e-textbook. (<http://www.retscreen.net/ang/home.php>)
- Coordinate and plan KTT networking events and platforms to ensure CARES is connected with the intended end user
- Develop CARES-appropriate curriculum for diploma and applied degree to be used across Canada

Qualifications: connected to agricultural, Min ag degree, MSc ag communications, extension

Target hiring completion: December 2009

Projected Cost:

Salary and Benefits:	Per Annum \$100 K	Five Years \$500 K.
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Sources of funding:

2009-2014: KTT position from OMAFRA/UoG contract, partner funding

**II. CARES Great Lakes**

As outlined in detail throughout the prospectus portion of this document, CARES Great Lakes has been established at the University of Guelph, Ridgetown Campus as a hub for applied and adaptive research, training and education, technology transfer, and rural community development in bio-energy and the bioeconomy.

Described below are the financial details for both the infrastructural requirements of the seven renewable energy enterprises and the Highly Qualified Personnel positions being implemented at CARES Great Lakes over the next five years.

**Enterprises:**

**1. Biodiesel**

Target completion: July 2009

Capital Costs:

\$ 200,000 - Proposed financing from ARIO

<u>Estimated Annual Revenue:</u>	\$504,000	600,000 L biodiesel
	\$ 7,200	glycerin
	\$ 61,365	AAC funds
	\$ 34,000	UoG overhead rebate
	\$ 28,645	SOBIN
Total:	\$635,200	

<u>Estimated Annual operating:</u>	\$498,000	input costs
	\$110,000	labor
	\$ 20,000	equipment lease to own

Net Annual before P, I & T.           \$ 7,200

Simple Payback Period: 4 yrs of lease payments.

If remaining \$200K capitalized by ARIO:

Future Annual re-investment into CARES is approx \$20,000

## 2. Oilseeds Processing

Target completion: October 2009

Capital Costs:

\$1.0 mm

<u>Estimated Annual Revenue:</u>	\$430,000	Toll processing rate \$0.43/L
	\$ ???	heat energy offset

Total: \$430,000

<u>Estimated Annual operating:</u>	\$180,000	electricity costs
	\$150,000	labour

Net Annual before P, I & T.           \$100,000

Simple Payback Period: 10 years if financed.

If remaining \$1mm capitalized by Growing Forward or other grant:

Potential annual re-investment into CARES is \$100,000

## 3. BIOGAS - 250 KW Anaerobic Digester – PlanET proposal

Target completion: Spring 2010

Capital Costs:

\$2.5 mm

Less – OMAFRA grant \$0.4 mm – Net capital cost \$2.1 mm

<u>Estimated Annual Revenue:</u>	\$280,000	electricity sales at 14.5 cents/kW.h
	\$ 85,000	FOG tipping fees
	\$ 26,000	Heat energy offset

Total: \$391,000

Estimated Annual operating:       \$108,000

Net Annual before P, I & T.           \$283,000

Simple Payback Period: 7.4 years if financed.

If remaining \$2.1 mm capitalized by Growing Forward or other grant:

Annual re-investment into CARES is \$283, 000

#### 4. Perennial Biomass (Miscanthus)

Target completion: 2013 winter first harvest

Capital costs:

New Directions Renewable Fuels program pays for land lease costs and establishment costs for Miscanthus for first three years.

Year four: estimated net value of Miscanthus at 10 T/acre is about \$750/acre after land costs

At 66 acres annual gross revenue to invest into CARES - \$49,000

#### 5. Vegetable Greenhouse Commercialization Support

Target completion: January 2011

#### 6. Wind turbine: RES V27 225 KW

Target completion: 2010 spring

Capital Costs:

\$380,000

Estimated Annual revenue: \$72,000 electricity sales at 14.5 cents/kW.h  
Estimated annual operating: \$12,000 parts and labour

Net annual before P, I & T. \$ 50,000

Simple Payback Period: 7.6 years if financed.

If \$380,000 capitalized by Growing Forward or other grant:

Annual re-investment into CARES is \$50,000

### Highly Qualified Personnel

#### 1. Microbiologist anaerobic– new position

Role: Champion for Applied Research, KTT and education to support biogas generation and optimization

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation - from other enterprise/project revenue, and BBRM)  
\$190 K federal Growing Forward (\$ 130 K and inflation - from other enterprise/project revenue)

## 2. Greenhouse technology specialist – new position

Role: Industry champion for Applied Research, KTT and education to support Vegetable Greenhouse crop production with an energy focus

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation - from other enterprise/project revenue, industry support)

\$190 K federal Growing Forward (\$ 130 K and inflation - from other enterprise/project revenue)

## 3. Bio Fuels Scientist – Incumbent Dr. Rob Nicols, currently BBRM contract

Role: Champion for Applied Research, KTT and education to support biodiesel, novel bio oils, algae, chemistry – value added processing.

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation – from other enterprise/project revenue, BBRM)

\$190 K federal Growing Forward (\$ 130 K and inflation other enterprise/project revenue)

## 4. Energy systems Engineer – new position

Role: Technical team leader for Applied Research, KTT and education to support on farm energy production, conservation and utilization,

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation – from other enterprise/project revenue, BBRM)

\$190 K federal Growing Forward (\$ 130 K and inflation other enterprise/project revenue)

## 5. Biomass agronomist – new position

Role: Production team leader for Applied Research, KTT and education to support Agronomy, Production, harvest, and storage of bio-industrial crops,

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation – from other enterprise/project revenue, and OMAFRA contract)

\$190 K federal Growing Forward (\$ 130 K and inflation other enterprise/project revenue)

**6. Process engineer – new position**

Role: Production team-leader for Applied Research, KTT and education to support handling and pre-processing and refining processes of bio-industrial crops.

Budget: \$,000's

	2010	2011	2012	2013	2014
Professional:	100 (0)	80 (20)	60 (40)	40 (60)	20 (80)
Technician	60 (0)	50 (10)	40 (20)	30 (30)	10 (70)

Target Sources

\$300 K federal Growing Forward (\$ 200 K and inflation – from other enterprise/project revenue, and OMAFRA contract)

\$190 K federal Growing Forward (\$ 130 K and inflation other enterprise/project revenue)

**Table 1. Total estimated capital costs for initial CARES Infrastructure and projected funding source.**

	Upfront Capital Cost	Capital Source					Total
		ARIO	OMAFRA	OSGA	CK - hydro	RES in-kind	
Biodiesel	\$ 200,000	\$ 200,000					
Oilseed Crush	\$ 900,000			\$ 450,000			
Biogas	\$ 2,500,000	\$ 200,000	\$ 400,000				
Miscanthus	\$ 100,000		\$ 100,000				
Wind	\$ 500,000	\$ 100,000				\$ 120,000	
CK - Hydro upgrade	\$ 250,000				\$ 250,000		
<b>Sub-Total</b>		<b>\$ 500,000</b>	<b>\$ 500,000</b>	<b>\$ 450,000</b>	<b>\$ 250,000</b>	<b>\$ 120,000</b>	
<b>Total</b>	<b>\$ 4,450,000</b>		Ratio	0.4089888			<b>\$1,820,000</b>

Total ask from Green Infrastructure Fund \$4,450,000 less \$1,820,000 or \$2,630,000

**Table 2. Projected annual net revenue to leverage for CARES activities research.**

Assumptions: Project fully capitalized, after operational costs, no revenue from heat recovery

source year	2009	2010	2011	2012	2013
Biodiesel	\$ 7,200	\$ 7,200	\$ 7,200	\$ 20,000	\$ 20,000
Oilseed Crush	\$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Biogas	\$ -	\$ 150,000	\$ 283,000	\$ 283,000	\$ 283,000
Miscanthus	\$ -	\$ -	\$ -	\$ 25,000	\$ 49,000
Wind	\$ -	\$ 25,000	\$ 50,000	\$ 50,000	\$ 50,000
RES	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
OMAFRA Transfer	\$ 39,000				
<b>Total</b>	<b>\$ 81,200</b>	<b>\$ 317,200</b>	<b>\$ 475,200</b>	<b>\$ 513,000</b>	<b>\$ 537,000</b>

END NOTES:

Ridgetown Ask.

Total federal ask for Ridgetown node of CARES spread over next five years:

CARES Canada at Ridgetown	\$1,250 K
CARES Ridgetown Salary	\$1,700 K
Infrastructure:	\$3,000 K

Total ask Ridgetown from feds is \$6 million over next four years.

Need to raise \$1,400 K for other salary support and any operating funds out of revenues and OMAFRA kitty.