Welcome! What's Happening Today?

We want to hear from you.

The University of Victoria is undertaking a study to determine the feasibility of constructing a Biomass Thermal Energy Plant at the Gordon Head Campus.

This open house is the first step in an eight-month exploratory process in which you and others in the community are being asked for input.

Purpose of Today

The purpose of this open house is to launch the study, and to:

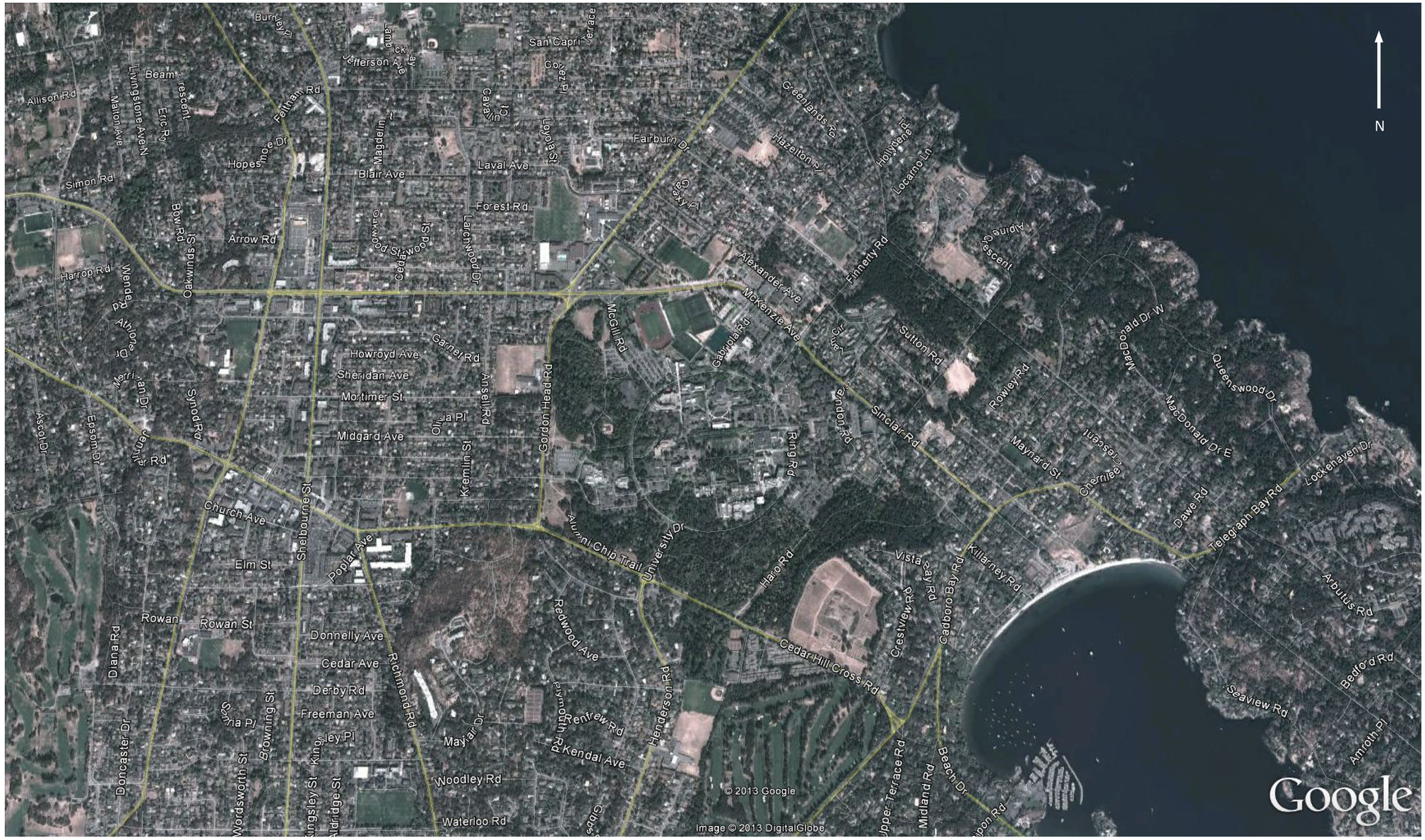
- **Inform** about the project, including the study process and opportunities for involvement;
- **Educate** about biomass; and
- **Get your input** on priorities and aspirations for a possible biomass plant at the UVic Gordon Head campus.

Using Your Input

Your input is important.

What we hear today will be integrated into the study findings and considered in the development of recommended options for a potential biomass plant.

Where Do You Live?



PLACE A DOT OVER YOUR HOME

IF IT FALLS OUTSIDE THIS MAP, PLACE A DOT AT THE EDGE IN THE DIRECTION OF YOUR HOME.

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Energy and the University of Victoria

Our Role in the Energy System and Sustainability at UVic

UVic recognizes that we have a relationship with energy, but that most parts of the energy life-cycle are invisible to us.

Through this feasibility study, UVic is taking a step toward taking greater responsibility for our relationship with energy, including its upstream and downstream (i.e. post-consumption) impacts, such as greenhouse gas emissions that cause climate change.

Climate change in BC is expected to: put pressure on ecosystems and natural resources; increase water shortages; increase frequency and intensity of extreme weather events; support the expansion of the mountain pine beetle; cause droughts and pest infestations that impact agriculture; stress fisheries, including Pacific salmon; and more.

> *The university recognizes that one of the greatest challenges of our time is to make decisions that simultaneously consider and advance ecological balance, economic prosperity, and social development.*
>
> *University activities shall strive to embody approaches that enhance community well-being; further diversity and equity; restore or maintain the functioning of natural systems; and are fiscally responsible.*
>
> University of Victoria Sustainability Policy

WHICH ENERGY AND CLIMATE ISSUES OR OPPORTUNITIES MATTER TO YOU?

UVic Sustainability Action Plan

UVic has identified sustainability as a priority, and the UVic Sustainability Action Plan sets out sustainablity goals, including the following vision and targets that relate to this study:

Vision for Energy and Climate:

A campus that utilizes renewable energy sources for all of its energy needs.

Targets for Energy and Climate:

- Become carbon neutral by 2010 (which has been achieved through the purchase of carbon offsets);
- Reduce overall greenhouse gas emissions by 20% over the 2007 baseline, by 2011; and
- Increase UVic's renewable energy portfolio.

One Outcome of the Sustainability Action Plan

One of the implemented actions of this plan was the development of an energy strategy that focuses on conservation, efficiency, and the use of renewable energy sources for the Gordon Head Campus.

How Did We Get Here?

The Integrated Energy Master Plan

A Driver for this Study

Developed in 2011, the UVic Integrated Energy Master Plan serves as a road map to guide UVic in meeting its targets for energy, carbon, and costs.

It identifies how to:

- incorporate new energy sources;
- capture waste heat and achieve energy use reductions; and
- evaluate the potential for peak energy demand reductions and the feasibility of energy supply options.

In the Integrated Energy Master Plan, a biomass heating plant is recommended for UVic as a "significant carbon reduction potential within the payback period."

Other opportunities were explored for energy reduction, energy recovery, and renewable energy generation. UVic continues to explore opportunities and applications for these energy strategies on campus.

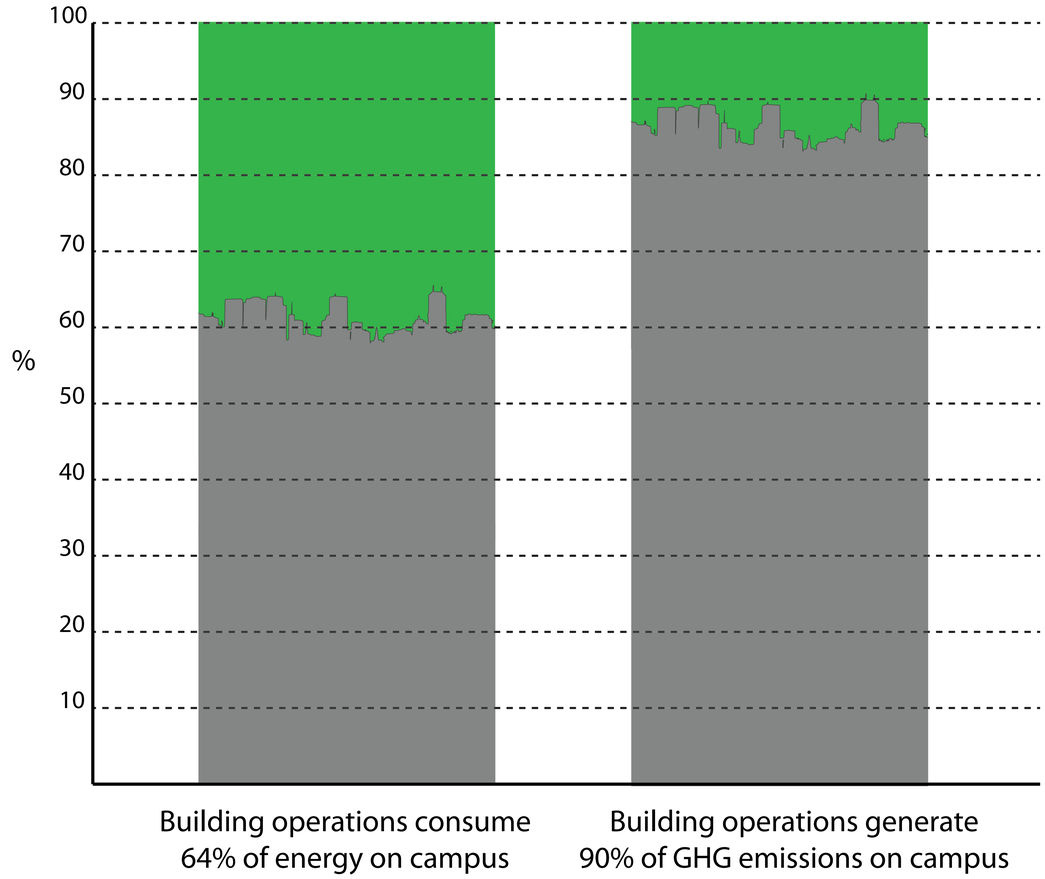
They include:

- heat recovery from CRD sewage;
- heat recovery from the Enterprise Data Centre;
- energy from solid organic waste;
- wind;
- geoexchange systems;
- solar thermal technologies;
- solar photovoltaic cells; and more.

Buildings and Energy on Campus

While UVic buildings typically perform between standard and good practice when compared with national and international benchmarks, the demand for academic and student accommodation is expected to grow at UVic over the coming years. All buildings will need to perform with much greater energy efficiency for UVic to achieve its energy and carbon reduction targets.

Campus Buildings: Consumed Energy and Greenhouse Gas (GHG) Emissions



The Opportunity

Individual buildings at UVic consume 64% of energy on campus, however they are responsible for 90% of greenhouse gas emissions.

UVic currently heats the majority of its buildings with high temperature hot water generated by boilers fueled by natural gas. These boilers account for over **70% of UVic's greenhouse gas emissions.**

A biomass plant fueled by wood waste may allow UVic to significantly exceed its emission reduction targets, eliminate the need to pay in excess of **$700,000 per year** in carbon offsets and tax, and reduce what we pay in energy and operational expenses.

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Ecological Benefits of Biomass

Greenhouse Gas Emissions: The Policy Context

UVic Leadership

UVic's Sustainability Policy and Action Plan, Integrated Energy Master Plan, Strategic Plan, and other plans and policies identify targets and offer strong direction to reduce GHG emissions.

While buildings at UVic generally incorporate best practices for energy conversation, we need to look at other sources of energy to reduce greenhouse gas emissions and meet our reduction targets.

The BC Greenhouse Gas Reductions Target Act

This act requires public organizations like UVic to be carbon neutral. Currently, the university achieves carbon neutrality by purchasing **$410,000+ per year** in carbon offsets. The act also commits BC to reduce its greenhouse gas emissions by 33 percent below 2007 levels by 2020, and by 80 percent below 2007 levels by 2050.

UVic recognizes that achieving these targets will require not only incremental improvements, but also bold steps that result in meaningful outcomes.

Many Ecological Benefits

Ecological benefits associated with a biomass plant at UVic could include:

- Greenhouse gas reductions of an estimated **9,000 tonnes** of carbon dioxide per year;
- Conservation of an estimated **4 million m^3 per year** in natural gas; and
- Diversion of **clean wood waste** from the regional landfill.

It would also help to support the continued position of UVic and the region as leaders in sustainability.

Resilience

Decreasing dependence on fossil fuels by focusing on a local, renewable source such as biomass also helps build self-reliance and reduce vulnerabilities to potential future interruptions in supply and price shocks.

Estimated Eco-Savings

17,00-20,000 tonnes
of biomass recycled/year

=

9,000 tonnes
saved in GHG/year

=

27,000 MWh
produced thermal energy/year

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What is Biomass?

What is Biomass?

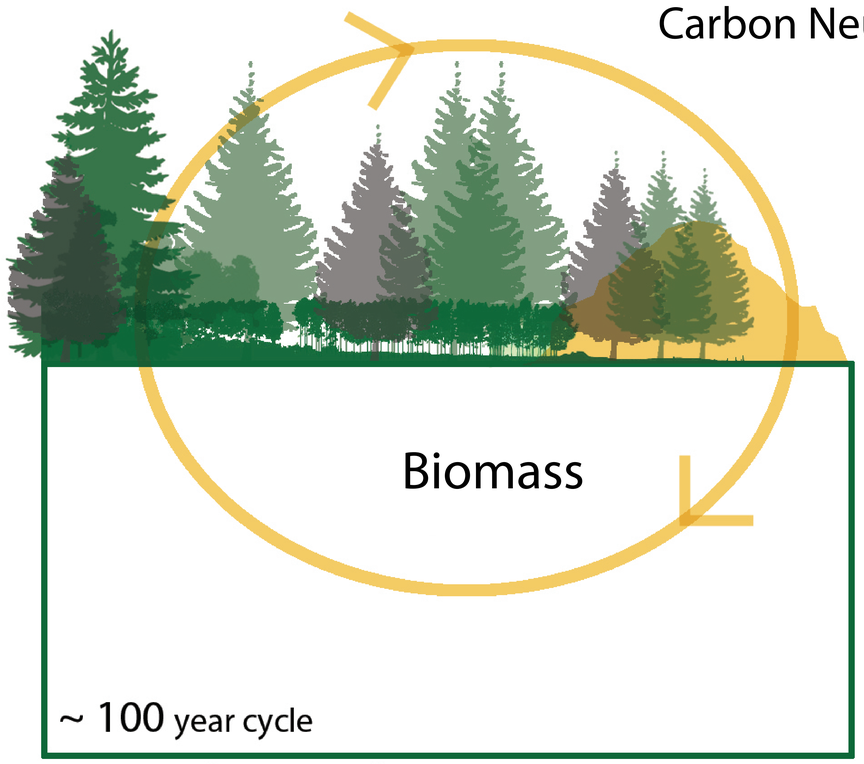
Biomass is a renewable, locally available resource. It is biological material from living organisms that would otherwise be dumped in landfills, openly burned, or left as fodder for forest fires.

For a plant at UVic, biomass would likely include clean wood waste such as recycled clean wood, construction waste, and tree trimmings.

Fuel Use and Energy Savings

Biomass-fired power generation involves the combustion of biomass to create thermal energy, or heat.

While burning biomass releases about the same amount of carbon dioxide as burning fossil fuels, the life-cycles of biomass and fossil fuel are completely different. Fossil fuels release carbon dioxide captured millions of years ago, emitting "new" greenhouse gases into our atmosphere when they are burned. Biomass, on the other hand, emits only what would be released during the normal life-cycle of wood. As such, biomass is considered a "carbon neutral" form of renewable energy.



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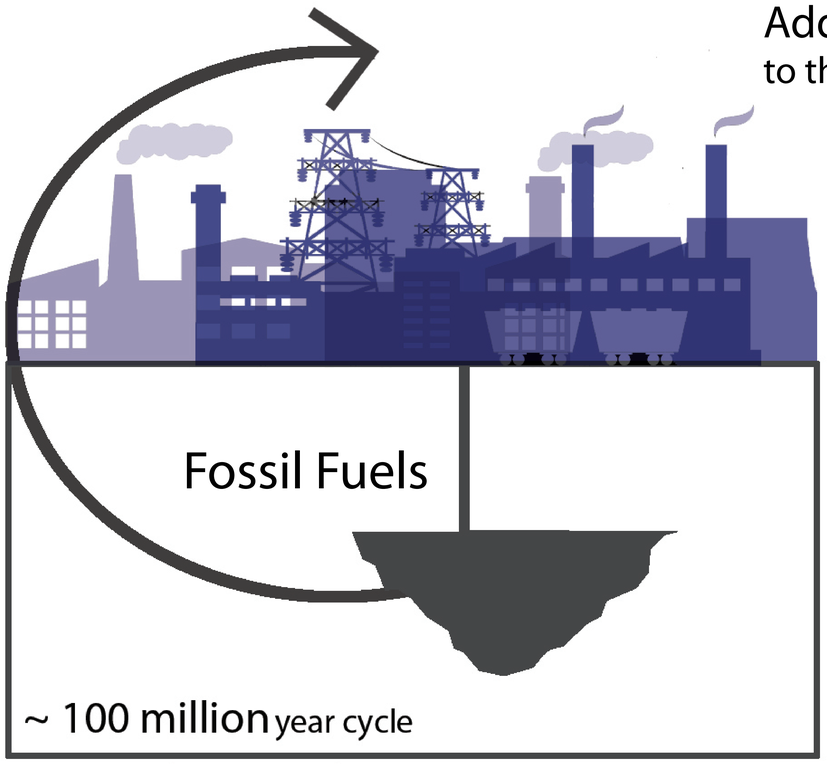

Atmospheric Carbon:
No net increase due to the natural carbon cycle

Atmospheric Carbon:
Net increase due to release of stored carbon

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What is a Biomass Plant?

How a Biomass Plant Works

Biomass Fuel Sources

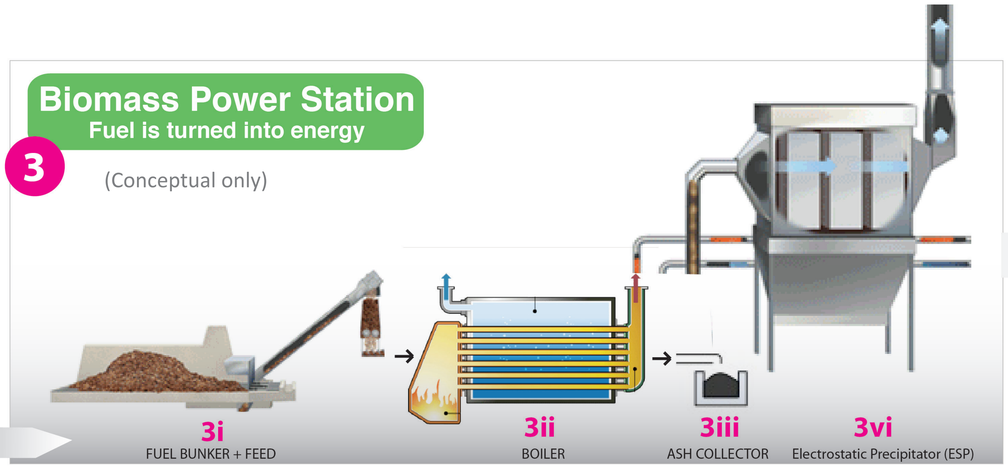
+ Locally sourced
+ Recycled clean wood
+ Construction waste
+ Urban wood waste

1 Locally sourced wood waste is collected.

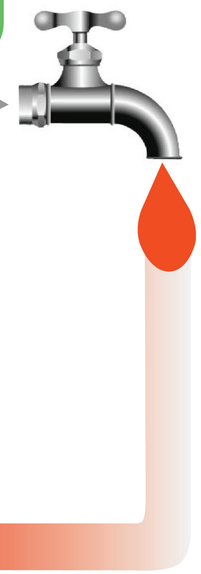
2 Wood Waste is delivered to Biomass Plant.

3 **Biomass Power Station**
Fuel is turned into energy

(Conceptual only)



4 Hot water is produced and fed to campus.



UVic

5 University of Victoria Central Plant receives the hot water and distrbutes it for heating, domestic hot water and lab uses.

Precedents and Examples

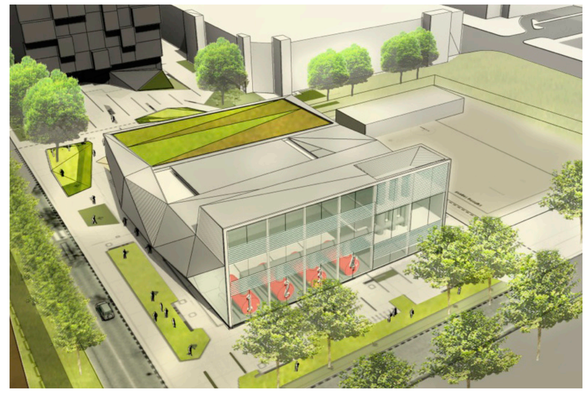
Form and Aesthetics

There are many precedents in British Columbia and around the world that show us how biomass plants can:

- **sensitively blend with its surroundings** and
- offer an **appealing aesthetic** while
- **showcasing sustainability.**

WHICH AESTHETIC CONSIDERATIONS ARE IMPORTANT TO YOU?

UNBC Bioplant - British Columbia

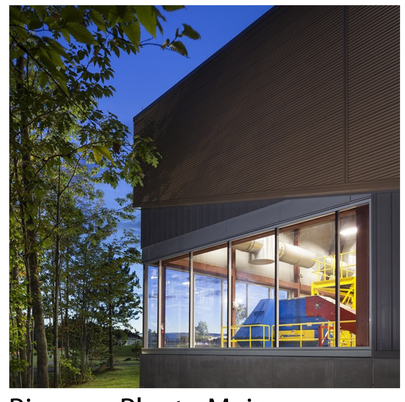


UBC District Energy Centre - British Columbia

UBC Bioenergy - British Columbia

Heating/Energy Plant - Netherlands

Biomass Plant - Vermont



Biomass Plant - Maine

Biomass Feasibility Study Process

A Technical and Community Engagement Process

This process falls within three key phases that take place between now and October 2013. The process will culminate in an understanding of whether a biomass plant is a valid option at UVic.

we are here

	Phase 1: Understanding Priorities	Phase 2: Understanding Options		Phase 3: Developing a Preferred Option
Timing	March 2013	April-August 2013	September 2013	October 2013
Key Engagement Milestones and Purpose	**Open House 1:** • inform • educate • obtain input on priorities and aspirations	**UVic Research Committee Meetings** • explore interests and opportunities	**Open House 2:** • obtain input on options, toward the creation of a preferred option	**Open House 3:** • demonstrate how community input and technical criteria were used in creating a preferred option
Key Technical Components	• assess existing campus energy distribution system	• determine biomass plant system capacity • assess fuel sources, costs, and quantities • assess sites and building requirements • undertake preliminary biomass plant designs		• conclude feasibility study

Community Engagement

Our Goal for Participation

To work directly with the campus community and external community throughout the process to ensure that community priorities and aspirations are consistently understood and considered.

Our Promise

We will work with you to ensure that your priorities and aspirations are considered in the options developed, and provide feedback on how community input influenced the decision.

For more information...

Learn more about UVic's framework for community engagement, including the community engagement plan for this Biomass Feasibility Study, by visiting the "current initiatives" web page of the Office of Campus Planning and Sustainability website:

www.uvic.ca/sustainability/planning

What We Know & What We Need to Learn

What We Know Today

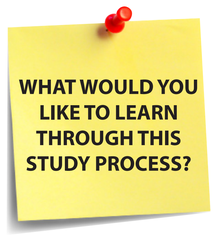
There are a few "givens" associated with how a potential biomass plant would be designed and operated. The key givens are:

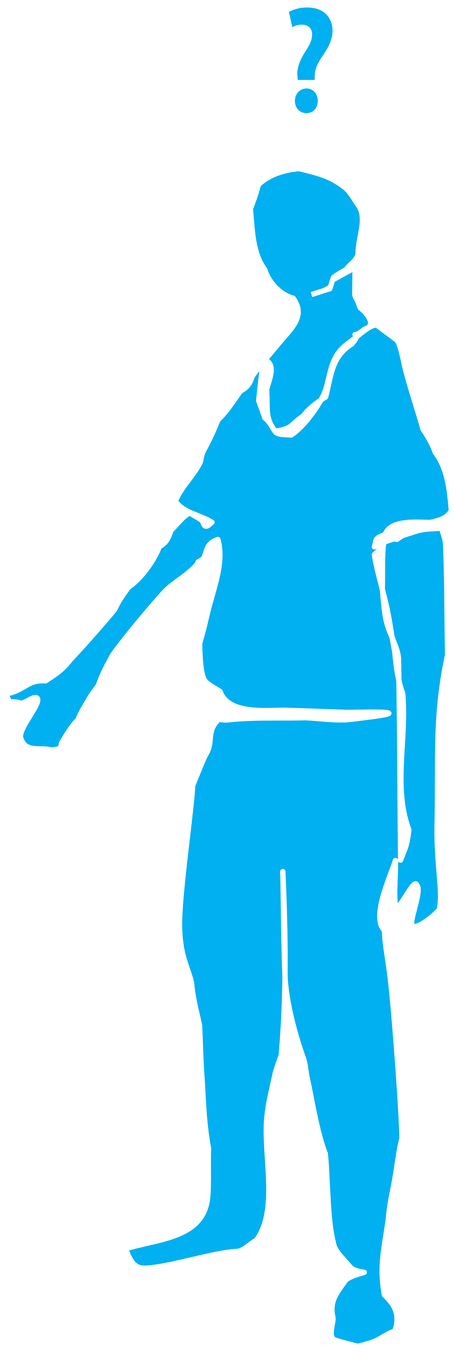
- The biomass would be sourced primarily from **clean wood waste**, including material that is currently being deposited in the regional landfill;
- The biomass plant would likely require **approximately 2500 square metres (or 0.6 acres) of land**; and
- The biomass plant would incorporate **advanced emissions controls.**

What We Still Need to Learn

The feasibility study will explore questions such as:

- What is the best way to provide energy to as many buildings as possible on campus?
- Should the biomass plant be designed to generate electricity as well as heat?
- Taking into account UVic's Sustainability Policy as well as the university's interests in renewable energy research and education, what are the best potential locations for the biomass plant?
- Which of the university's research and education interests should the energy plant be designed to accommodate?





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Research and Learning Benefits

Potential Opportunities

UVic is already involved in a number of facets of renewable energy, for example through the Institute for Integrated Energy Systems, the Faculty of Engineering's renewable energy research programs, and the Department of Biology's research into the production of biodiesel from algae.

Incorporating education and research possibilities in the plant's design will be explored as part of the feasibility study. Potential examples include:

Combustion Efficiency

- Opportunities exist to research ways of improving the efficiency of biomass combustion, for example through improved fuel conditioning, control of combustion air, boiler design, or by means of condensing economizers.
- This research would need to be integrated with an evaluation of uses of lower-temperature energy that would be provided by such an economizer.

Pollution Control Technologies

- A biomass plant at UVic would be equipped with advanced pollution controls.
- There are opportunities however to collaborate on applied research with firms that are improving on the current state-of-the-art technology, by developing technologies suited for smaller biomass systems.

Carbon Dioxide Capture

- Capture of carbon dioxide from flue gases by algae has the potential to further reduce the greenhouse gas emissions of a biomass energy system.
- Oil can be recovered from algae, and readily converted to biodiesel. Research areas for UVic could include developing strains of algae that produce greater quantities of oil, or that release their oil more readily.


source: flickr - hendrix college

Beneficial Uses for Wood Ash

- Research into higher-value uses for wood ash, including blending with compost to increase its value, and pelletizing the ash along with a carbon-rich binding agent to form a slow-release fertilizer for forestry replanting operations would be valuable.

Control Systems Design

- Opportunities will exist to incorporate intelligent controls into the biomass energy system that are able to respond to, and anticipate, changing demand in the buildings served. These advanced controls could incorporate:
  - feed-forward strategies to increase energy production in advance of demand;
  - options for integrating the central control system with the control systems of older buildings to maximize efficiency; and
  - heuristic logic systems that learn from patterns of energy use of campus buildings, to refine the operation of the entire system over time.

WHAT OTHER RESEARCH AND LEARNING OPPORTUNITIES EXIST?

What Are Your Priorities & Aspirations?

What are your other priorities and aspirations for a potential biomass plant at UVic?

Thank you!

Thank you for attending the open house and sharing your input.

What we hear today will be integrated into the study findings and considered in the development of recommended options for a potential biomass plant.

Stay involved!

- **Attend two open houses in the fall.**
- Check the **project website** for updates at: www.uvic.ca/biomass
- Sign up for the **project listserv** at the front door.
- Send questions or comments by **email** to: biomass@uvic.ca

Fill out a comment form.

Finally, tell us how you felt about the open house by filling out a comment form on one of the tables. We want to ensure future open houses build on the strengths of this one.