Sustainable energy case studies

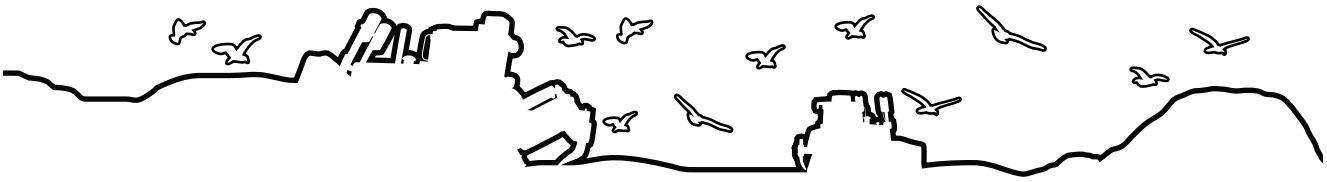
This handout includes four case studies designed to allow students to explore and learn about sustainable energy in B.C.

Students should read through each case study and consider how each relates to the concepts of sustainability and interconnectedness.

This handout includes:

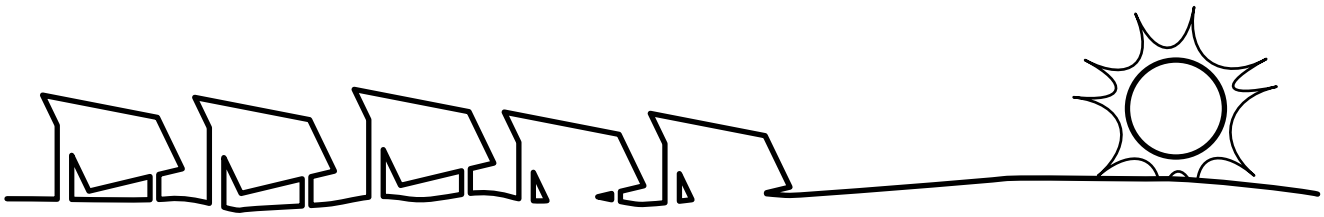
- Salmon Arm Landfill case study
- T'Sou-ke First Nation case study
- Upper Bonnington Dam case study
- Bear Mountain Wind Park case study

Salmon Arm Landfill case study



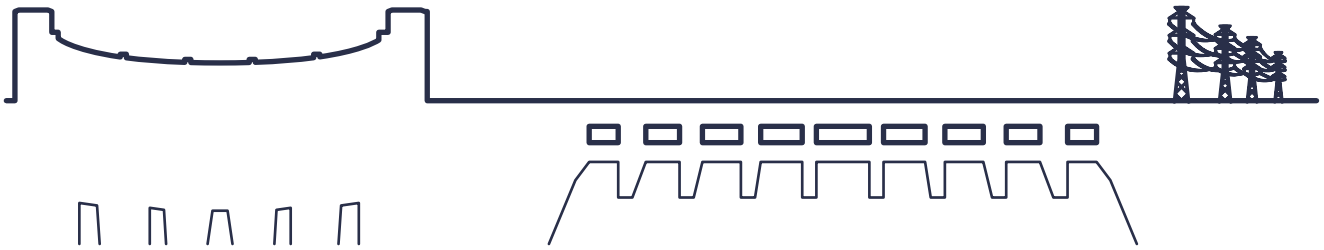
Location	• Okanagan Shuswap
Type	• renewable natural gas (RNG)
Technology	• The Salmon Arm Landfill uses organic waste from the community as a source of biogas (mostly methane). • Biogas from the organic waste is collected and stored as it awaits purification and upgrading. • The biogas is then purified and upgraded to biomethane by burning the gas at a high temperature to remove non-methane organic gases such as carbon dioxide. • Forty thousand gigajoules of biogas is injected into FortisBC's natural gas pipeline system each year.
Benefits	• locally sourced, carbon neutral form of renewable energy • low cost of raw materials • decreases amount of greenhouse gas emissions when safely stored and injected into existing pipeline system • creation of local jobs in energy sector • decreases reliance on non-renewable energy sources • relatively small area required for entire facility
Considerations	• requires significant quantities of organic waste to be collected on a consistent basis • possible leakage of methane into atmosphere (methane is a potent greenhouse gas prior to use as an energy source) • relatively small contribution to existing energy grid

T'Sou-ke First Nation case study



Location	• Vancouver Island
Type	• photovoltaic solar power
Technology	• Photovoltaic cells on the community buildings of T'Sou-ke First Nation absorb sunlight. • The photovoltaic cells are composed of semiconductors that convert the sunlight directly into useable electricity by energizing and releasing electrons in the cells. • Seventy-five kWh of electricity is incorporated into a local energy grid as either DC (direct current) or AC (alternating current) power.
Benefits	• locally sourced, carbon neutral form of renewable energy • virtually unlimited supply of sunlight • decreases greenhouse gas emissions • creation of local jobs in energy sector • decreases reliance on less renewable energy sources • T'Souke First Nation has integrated the photovoltaic cells into their existing infrastructure, such as homes and greenhouses
Considerations	• photovoltaic cells cannot store energy for future energy needs • dependent on amount of available sunlight • requires a significant up-front cost to purchase and construct the photovoltaic solar systems • relatively small contribution to existing energy grid • large area required for large scale operation

Upper Bonnington Dam case study



Location	• the Kootenays
Type	• run-of-the-river hydroelectric power
Technology	• Running water, a source of kinetic energy, is diverted from the Kootenay River through a large tube called a penstock to a powerhouse. • Inside the powerhouse the water spins a turbine. • The spinning of the water creates electricity in the form of AC power (alternating current). • The water is then returned back to the Kootenay River. • Sixty-six MW of electricity is generated for the local energy grid.
Benefits	• locally sourced, carbon neutral form of renewable energy • virtually unlimited supply of water • decreases greenhouse gas emissions • creation of local jobs in energy sector • decreases reliance on less renewable energy sources • large quantity of energy generated by the facility
Considerations	• hydroelectric power requires water to be moving • changes in the natural flow of the Kootenay River as a result of the dam may have had an impact on the aquatic ecosystems in the local region • a breach in the dam may lead to significant environmental impact both upstream and downstream

Bear Mountain Wind Park case study

Location	• Peace River
Type	• horizontal axis wind turbines
Technology	• Wind blowing across the Peace River valley, a source of kinetic energy, spins angled propeller blades atop 34 large towers. • The blades are connected to a nacelle, a protective casing with a gearbox, generator and drivetrain inside. • The gearbox converts low-speed rotational force from the spinning blades into high-speed rotational force for the electrical generator. • The 102 MW of electricity generated is then incorporated into the local power grid.
Benefits	• locally sourced, carbon neutral form of renewable energy • virtually unlimited supply of wind • decreases amounts of greenhouse gas emissions • creation of local jobs in energy sector • decreases reliance on less renewable energy sources • large quantity of energy generated by the park
Considerations	• turbines generate noise pollution which can impact local community members • dependent on amount of available wind • flying animals, such as birds and bats, may be harmed by the spinning turbines • large area required for large scale operation