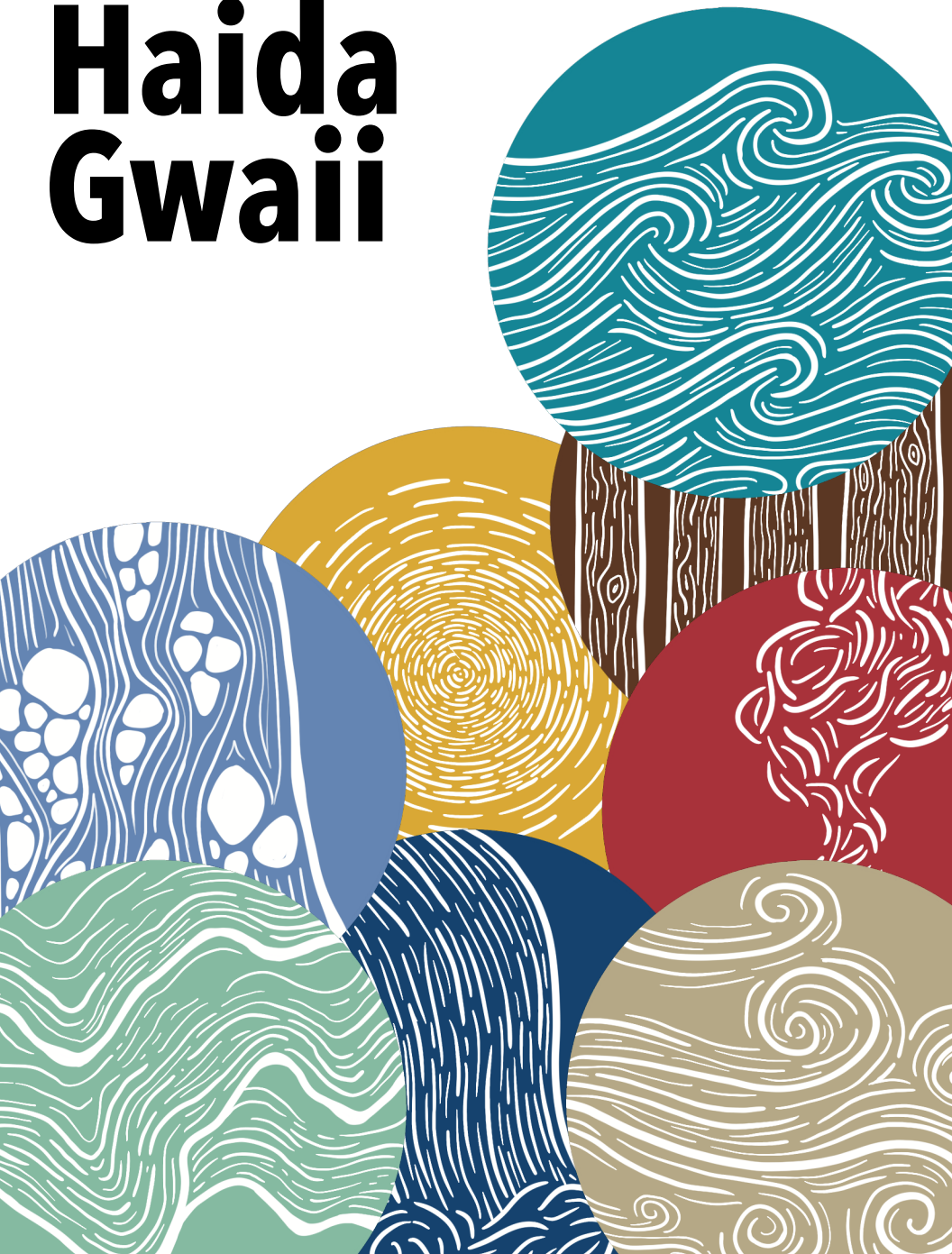


# Renewable Haida Gwaii



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**Production team:**

Kara Sievwright: research, writing, images, and graphic design  
K'aayhlt'aa Haanas Valine Brown: lead, editor  
Swiilawiid's Communications + Resources Committee: Guusdagang Mary Hart, Niisii Guujaaw, Gwaliga Hart

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## Introduction

There is no quick or easy solution to our diesel problems, and all energy sources have impacts. When compared to coal, diesel or natural gas, renewable energy sources produce less greenhouse gas (GHG) emissions. Even when including manufacturing, installation, operation, and decommissioning of renewable energy projects, emissions are much less than fossil fuels. Supporting energy projects and companies that are dedicated to human and environmental justice, and actively work to reduce their impact can support better balance.

As individuals we can reduce energy consumption in our homes (and save money) with basic measures, such as ensuring our homes are well insulated, reducing air leaks, replacing old windows and doors, and installing energy efficient appliances and heat sources. We can also become more independent by growing and harvesting our own food, and supporting local food producers.

Most importantly, we can continue to work together to strengthen Haida Gwaii's commitment to energy sovereignty. The most meaningful way to transform the Islands' electrical systems and significantly reduce the amount of energy Haida Gwaii consumes is through a variety of small-scale renewable energy projects. With local decision-making and ownership, we can build a series of smaller projects that meet our needs and uphold our values.

# Solar

Solar power is the conversion of sunlight into electricity. Solar Photovoltaic (PV) panels—often referred to as “solar panels”—absorb sunlight to generate direct current (DC) energy that then can be stored in a battery or directly converted to AC electricity. Solar hot water systems convert sunlight into heat through solar collectors that can heat water or provide space heating.



## On Haida Gwaii

Solar panels are visible in every community on Haida Gwaii. Several homes and remote cabins are powered by solar. Many larger-scale solar projects have been installed by local governments and non-profit organizations on public buildings, such as the youth centres in Gaw Tlagee and Hlgaagilda Lnagaay.

## Advantages

Solar panels and battery storage are becoming more efficient and can generate electricity for 20 years or more with minimal maintenance. The technology is well-tested and market-ready. Solar panels can be more productive in cooler climates and can generate electricity on cloudy days. Solar panels can be added to the roofs of buildings or on fields or other cleared areas, close to communities, so there is little impact on surrounding ecosystems. While the price of electricity continues to rise, the cost of solar technology is decreasing. Though many households on Haida Gwaii still cannot afford the upfront cost of solar or may not own their own home, local governments and organizations are exploring grants, co-ops, and other programs to get

more solar panels installed on local homes and buildings, as well as larger projects such as solar farms.

## Considerations

The main concerns with solar are the use of toxic chemicals and rare and heavy metals in the manufacturing. As well as the exploitation of workers, and the lack of responsible recycling systems. To reduce some of these impacts, you can support companies that have strong workers' rights policies and records, a transparent supply chain, are dedicated to reducing their manufacturing impacts, and show accountability by reporting on their carbon emissions. Also consider the lifecycle of the materials when planning projects.

# Wind

Wind energy harnesses the kinetic energy from the wind and converts it into electrical energy. Wind blows the blades of a turbine around a rotor that spins a generator to create electricity. Cables carry the electricity down the tower to a substation and then on to transmission lines. Wind turbines are usually tall, about 80 meters, to take advantage of the more consistent wind speeds at higher elevations.



## On Haida Gwaii

Currently a few off-grid remote homes on Haida Gwaii use wind turbines. The Haida Nation explored offshore wind technology in the Hecate Strait. However, the size and end-use of the electricity to power fracked gas (LNG) plants on the mainland, along with the ecological, cultural and financial impacts were not consistent with the Haida Nation's values.

## Advantages

Wind power is a well developed, popular, and readily available technology that continues to become more efficient. Though wind is an intermittent energy source, Haida Gwaii has abundant wind, particularly on the north and east coasts. On the right site, wind energy can operate for 25-30 years.

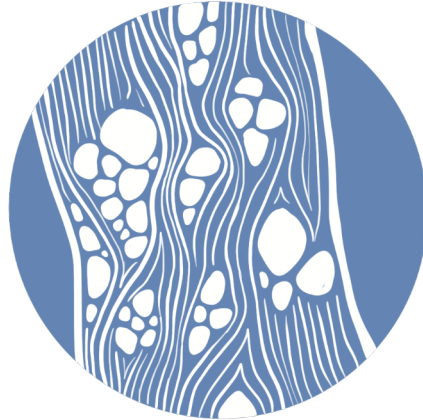
## Considerations

For residential use, wind energy is best suited for remote areas because it requires unobstructed exposure, and clear and consistent winds. Large onshore wind farms can take up a lot of land which can lead to loss of habitat and biodiversity. Wind farms built in bird migration routes, important bird areas and bat habitat have contributed to bird and bat deaths, but this can be avoided with proper site screening, smaller scale projects, wildlife assessments, field studies, and post-construction studies. Offshore wind farms need to consider the impacts on the ocean due to construction, operation, and maintenance, and take into account the increasingly fragile ocean ecosystem.



# Run of River (ROR)

Run-of-River (ROR) hydro projects—sometimes called small-hydro or micro-hydro – utilizes the natural flow of a stream or creek and any elevation differences to help harness energy via turbine(s). A portion of the stream is diverted through a pipe downstream, which turns a turbine attached to a generator that creates electricity. The water is then released back into the stream.



## On Haida Gwaii

Private companies and local governments have explored larger projects but currently, ROR is only used on a residential scale on Haida Gwaii.

## Advantages

ROR can be a readily available source of energy for sites that have the right balance of water flow and steepness and where transmission and connection to the grid is accessible and affordable. While community-scale projects can take many years to get operational, with some maintenance and the right conditions, ROR projects can last 80 years or longer. Unlike traditional reservoir-based hydro, ROR does not flood land but since there is no storage, this also means that electricity depends on a reliable source of flow.

## Considerations

ROR has ecological effects on the stream in the diverted portion, which can effect aquatic habitats and have a negative effect on fish and other animal communities. The cost and impacts of access roads, maintenance and transmission lines to remote areas is also a consideration. Small and large ROR projects must have good and careful planning, assessment, and design.

**Run of River projects utilize the natural flow of a stream or creek to help harness energy via turbine(s).**



# Hydro

Hydroelectricity harnesses the power of falling water to produce electricity. In reservoir-based hydro, a dam is built across a river to create a reservoir. When water is released from the reservoir, it passes through a turbine which is connected to a generator. High voltage transmission lines take this energy to a station which controls the energy flow to homes and businesses.



## On Haida Gwaii

A 6MW reservoir-based hydroelectric generation station at Gawu Kuns Siiwaay 'Yuujuu *Moresby Lake* (Mitchell Inlet) built in 1990 provides up to 80% of energy for the south grid of Haida Gwaii.

## Advantages

Hydro projects can produce energy for 50-100 years and does not waste or deplete water sources

## Considerations

Hydro projects, especially large projects, can have significant social and ecological impacts including the flooding of Indigenous homelands, food-producing land, and important wildlife areas. They can also produce GHGs since carbon dioxide and methane are released when vegetation decomposes under water. These social and ecological impacts can be reduced by refurbishing existing projects and building smaller hydro projects, with community support and ownership.

**Social and ecological impacts of hydro projects can be reduced by refurbishing existing projects and building smaller projects, with community support and ownership.**



# Tidal

Tidal energy harnesses the power found in the rise and fall of the tides. Some tidal energy projects make use of kinetic energy from water currents to turn turbines, similar to how wind turbines operate. Other tidal projects use barrages or dams across a tidal estuary and are similar to hydro dams in that they capture the potential energy from water moving between high and low tide. Other types of tidal power that combine the kinetic and potential energy of tides are still in development.



## On Haida Gwaii

A local company has created a unique prototype that uses a tidal-powered pump to push water to a reservoir. During slack tide, the water from the reservoir flows down into a hydro turbine that would be connected to a generator to produce electricity.

## Advantages

Tidal energy is a predictable and continuous energy source. Haida Gwaii's large fluctuating tides, make it an ideal place to utilize energy from the tides.

## Considerations

Depending on the device and the location, tidal energy should have low ecological effects, but all ocean energy projects do have some repercussions. There can be construction and operation impacts, as well as limited site availability. Although there have been tidal energy projects around for many decades, newer, more effective technologies are still considered developing technologies.



**Haida Gwaii's large fluctuating tides, make it an ideal place to utilize energy from the tides.**

# Wave

Wave energy devices capture the energy of ocean surface waves and converts it to power. Wave energy devices use a few different methods but they all aim to capture energy from the difference in wave height and the dynamics of water movements in the wave. Wave energy devices can be on or just below the surface of the water, anchored to the ocean floor, or on the shoreline.



## On Haida Gwaii

While the Pacific west coast has been identified as having significant wave energy potential, there are currently no wave energy projects on Haida Gwaii. There are a few projects off the west coast of Vancouver Island.

## Advantages

Wave energy is generally predictable, reliable, and can be more efficient than other types of renewable energy. Wave energy is most intense in the winter when the demand for energy is highest and may be a good option for remote areas not connected to the grid.

## Considerations

Wave energy should have a low ecological impact, but because wave technology is not yet fully in use, the effects are not really known. Underwater noise pollution, risks to marine mammals and fish, and remote or rough conditions could be of concern. Research and funding for wave energy devices is lacking when compared to other renewable energy sources.



**Wave energy is most intense in the winter when the demand for energy is highest and may be a good option for remote areas not connected to the grid.**

# Geothermal

Geothermal energy is generated by hot water or steam created by heat from below the Earth's surface. Lower temperature geothermal sources can be used to heat and cool buildings with heat pump systems. Hot water or steam from higher temperature sources can be extracted with a drilled well and used to power turbines to create energy.



## On Haida Gwaii

The airport in K'il Kun *Sandspit* is heated by extracting groundwater from wells.

## Advantages

Unlike the sun or wind, heat from the earth is constant. Ground-source heat pumps are similar to air-source heat pumps, but instead of using heat in outside air, they use heat of the earth to provide heating, cooling, and hot water which can make them more efficient.

## Considerations

Geothermal systems can be used to heat most buildings, but are quite expensive to set up, and are most economical for larger buildings. Geothermal plants are expensive to drill and are only appropriate in certain areas, usually in tectonic plate boundaries, because high temperatures can be accessed closer to the earth's surface. Drilling into the earth also can cause small earthquakes in the area. Geothermal energy generally has low carbon dioxide emissions, but it can produce other emissions such as sulphur dioxide and hydrogen sulphide.



Unlike the sun or wind, heat from the earth is constant.

# Biomass

Biomass energy can be generated by burning organic materials such as wood or wood waste from the forestry industry in a boiler. This can produce heat and/or it can generate electricity by producing steam that rotates turbine blades. Biomass energy can also be generated by converting organic materials to fuel. Landfill gas, made up of methane and carbon dioxide, is produced by decomposing garbage. This gas can be piped to a plant that burns the gas and produces electricity or it can be purified and used as an alternative to fossil fuels.



## On Haida Gwaii

There are currently two large biomass boiler systems in *Gaw Tlagee* and *'Waan Kun* that burn waste wood on Haida Gwaii providing heating to public buildings. Local organizations are exploring the feasibility of biomass. There are some also some smaller biomass boilers that heat residential buildings.

## Advantages

Biomass systems that utilize waste to generate heat and electricity can be more environmentally friendly than burning fossil fuels, especially if the waste is nearby. On Haida Gwaii, wood waste from logging, dry land sorts and sawmills is often burned in open piles or left to decay. Utilizing this waste for heat and energy could be a better option.

## Considerations

Wood is a limited resource. If supply of waste wood can't meet demand, trees would have to be cut down to fuel biomass energy, which will lead to increased deforestation. Biomass from purpose-grown crops or trees can increase emissions, deforestation, and take away from food production. Harvesting trees just for the purpose of biomass energy, releases carbon that would stay locked up in forests, and could divert wood otherwise used for wood products. Biomass energy should not be an excuse to harvest or consume more, but should only utilize biomass that would otherwise be wasted or burned.



Wood is a limited resource.

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