# Hybrid power

HATCH

Photo courtesy of Tugliq, photographer Justin [illegible]

# Power alternative

Power self-reliance. With so much riding on developing sustainable energy solutions for the future, companies and remote communities need to factor cost contingencies, carbon emissions, and tax obligations into the planning mix.

Hybrid power is a strong alternative to traditional fossil power generation in mining projects and remote communities. It provides a greener approach to the kind of energy self-reliance that today's industrial plants, port terminals, data centers, or net-zero buildings are seeking.

We've developed a new approach. It's helping operations like yours integrate solar, wind power, and energy storage together with power from other sources, like conventional fossil-fuel generating facilities. It's a hybridized solution that delivers renewable power for less than the levelized cost of liquid fuels, like oil or diesel.

Choosing hybrid alternatives reduces carbon gas emissions. It lowers the cost of energy and increases price certainty. And, perhaps most importantly, it can provide you with the energy independence and power resilience you need, especially when it's properly integrated as a microgrid system.

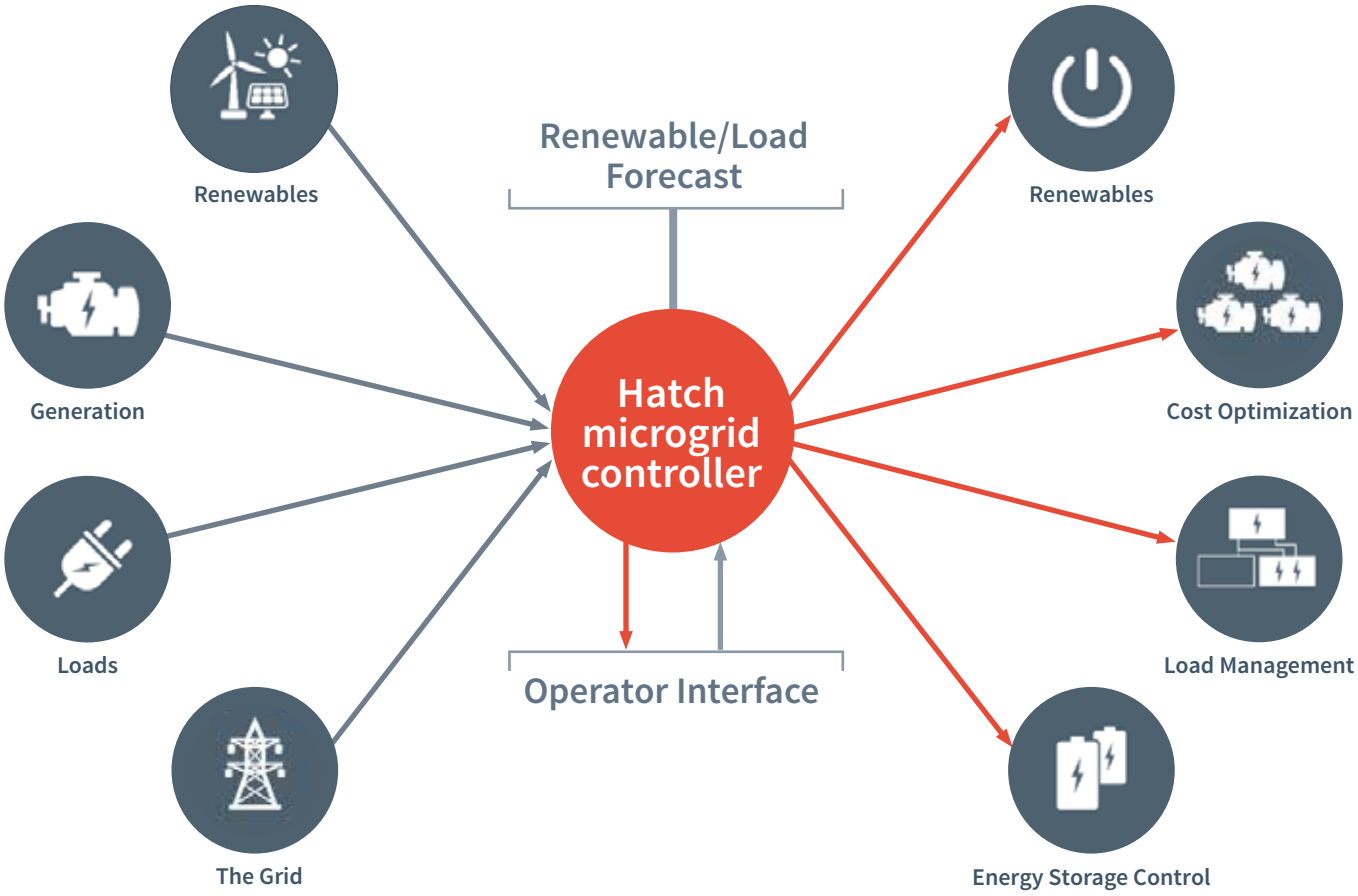
Less cost. Greater reliability. Smaller carbon footprint. Now, you can have the best of all three worlds.

Glencore Raglan Mine, Tugliq Energy Co., and Hatch fast-tracked the Raglan project during a short summer construction window. Our project management team rose to the challenge, delivering the wind turbine on time, on budget, as per scope, and with a flawless safety record

# The components of a hybrid system

A hybrid power system typically combines renewable power sources, a fleet of fossil fuel generators, and energy storage. It uses a microgrid controller to strategically dispatch energy production assets, meeting the load by ensuring the stability of the grid.

A fast microgrid controller reduces renewable-power variability significantly by charging and discharging the energy storage components. This results in a stable electrical network that is less susceptible to load-shedding and blackouts. The controller selects and runs each power system asset in its most efficient, effective way, minimizing overall operating and maintenance costs.



Hatch worked on a hybrid integration study for the remote Inuit village of Kangiqsualujjuaq in Canada's Arctic. We reduced energy costs and maximized the use of wind energy to offset the carbon emissions from diesel fuel

# Good neighbor, good value

## You're committed to the sustainability of the environments and communities in which you operate. With hybridized power generation, you can walk the talk.

Renewable power assets have benefits beyond environmental stewardship and green energy. They typically survive well past the life of the operation they're built to service. They can be an ongoing contribution to the community, helping diversify the economy with electricity and a variety of well-paying employment opportunities.

Renewable power can also be a way to monetize carbon credits, creating a source of revenue for the owners of the assets.

Funded by the Government of Peru, Hatch has provided technical and monitoring services for a nationwide program to electrify 172,000 households for the first time ever

# Smart installation design, ample energy supply

The sun doesn't always shine. The wind doesn't always blow. Hybridization offers a viable way to lower energy costs and address some of the main issues associated with renewable power production.

Smart installation design incorporates load-shifting and energy-storage techniques to provide an adequate supply of power. Your costs are offset by savings on fossil-fuel purchases.

Our resource measurement, tracking, and forecasting models are widely used in the renewable market. We can size renewable power installations to address peak demand and load during primary hours. At other times, the appropriate use of large-scale energy storage can reduce the need for thermal power generation.

Our installation designs also include energy storage such as compressed gas, water reservoirs, flow or lithium-ion batteries, flywheels, and other methods. Demand is time-shifted in a way that's optimal to the process, allowing things like desalination facilities to run during off-peak hours.

# Removing the CAPEX burden

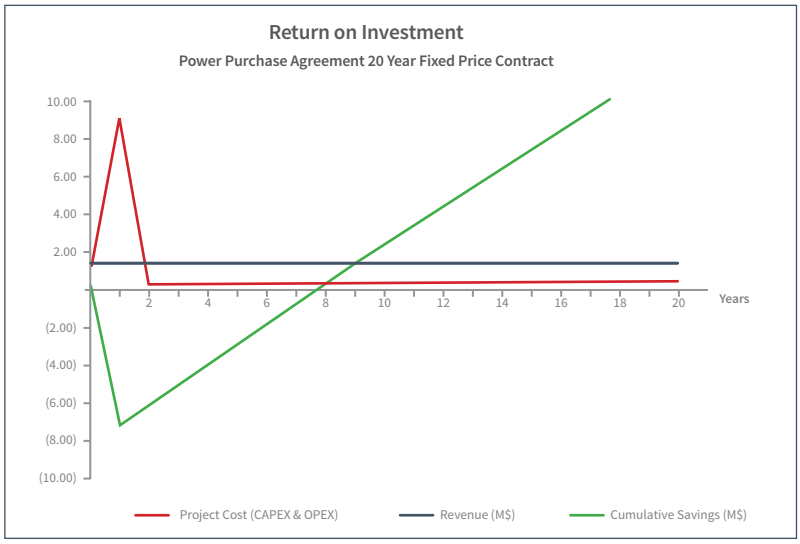
## Renewable assets have large, upfront capital costs. But once they're established, the ongoing operations are often economical to run.

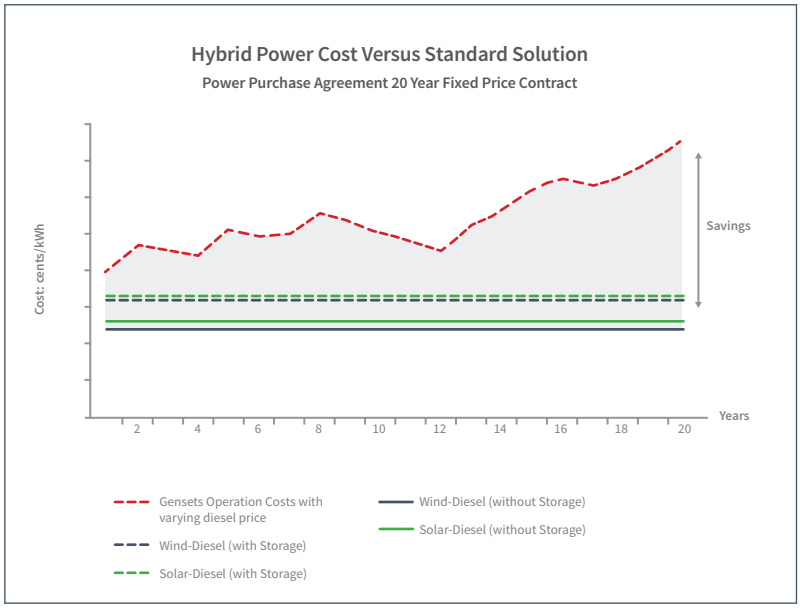
Whether it is wind-diesel or solar-diesel with or without energy storage, a complete hybrid power system can provide significant energy savings over the lifetime of a project.

The economics of a hybrid power project can be structured as a capital investment with a typical five-to-seven-year return on investment.

In some cases, the renewable CAPEX cost can be removed altogether to make hybridization an attractive alternative to fossil-fuel-fired generation. A customized power purchase agreement can be struck, allowing renewable energy to be delivered to your company at a price that is less than the cost of the fossil fuels you buy now.

In this way, the burden of the renewable-energy CAPEX is removed from your balance sheet. Capital is freed up, risk is reduced, and the predictable, lower cost of renewable power becomes more attractive than the variable cost of fossil fuels.



# Reliability & grid stability

By their very nature, wind and solar resources are intermittent and often unpredictable. It's no surprise that this can lead to reliability and system integrity issues.

Hybrid power systems can handle the on-and-off contingencies, manage the integration of large amounts of renewable power, and ensure that power is reliably maintained.

Our systems are designed with storage, microgrid controllers, and backup generators. They have automatic mechanisms for frequency control and voltage support, so the demand for power is always met without interruptions. You get reliable power, as green and cost-effective as conditions allow. Anywhere. Anytime.

Power that is generated and sold through the state-of-the-art rooftop solar array of the new Oakville-Trafalgar Memorial Hospital will help fund the hospital foundation through Ontario's Feed In-Tariff (FIT) program.

## The Hatch microgrid controller (HμGrid)

Hatch has developed a controller (HμGrid) that uses intelligent, real-time software to monitor and manage a microgrid on both short- and long-term bases. It maximizes the use of the renewable power source, making the most efficient use of the power system assets. HμGrid helps to improve the quality and reliability of the power supply, compensating for renewable resource variability and reducing outages and brownouts. The controller has been successfully implemented at the Glencore Raglan mine site located within the Arctic Circle in Northern Canada.

## Higher-quality implementation, lower operational risks

We bring the same care and control to the design and implementation of hybridized generation solutions that we do to all our engineering projects.

Our energy practice professionals are familiar with the delivery of renewable energy assets, including large utility-scale wind and solar installations. The solutions we propose for you are vetted on economic viability and field history. Only technologies with extensive track records are used for base-case assumptions.

# Project experience

You need a partner who knows the landscape: physical, technological, and market-related. The hybridization of renewable and traditional power-generating assets may be relatively new, but our reputation for high-quality engineering services is not.

Our track record in the renewable-power space goes back nearly a hundred years to the advent of hydropower in North America. Now, our experience extends to the development of major wind and solar installations around the world. We devise cost-saving renewable energy solutions for industrial operations like yours, and deliver them with confidence.

## Glencore's Raglan Mine

Hatch was a key player, helping Glencore find the right energy mix for its Raglan Mine. Working together with Tugliq Energy Co., owner of the 3 MW wind turbine and energy-storage components that have operated at Raglan since 2014, we implemented this hybrid solution to coordinate with Raglan's diesel generators.

This first-of-its-kind project uses Hatch's proprietary microgrid controller technology to monitor and smooth-out wind-power variations to ensure stability. The hybrid power system has reduced the need for diesel generation by approximately 2.4 million litres of fuel per year.

We contributed all the engineering phases of this project: conception, feasibility, construction, and operation optimization. Its success paved the way for more widespread adoption of greener energy alternatives.

The Glencore Raglan Mine is saving 2.4 million litres of diesel fuel per year by incorporating Tugliq's wind power into the energy mix and using Hatch's microgrid controller

Photo courtesy of Tugliq, photographer Justin Bulota

Multiple studies were conducted for clients in the Caribbean to reduce energy costs by using renewable energy and hybrid systems

## Bugwazi Mine solar photovoltaic power plant

Barrick Gold Corporation is exploring the possibility of constructing a solar photovoltaic (PV) power plant at the Buzwagi mine site in Tanzania. The goal is to reduce diesel consumption and incorporate renewable power at the site.

Currently, the mine site is serviced by an electrical grid that is not sufficiently reliable and must be supplemented by as much as 20 MW of diesel generation. Peak load demand is approximately 20 MW with an average of approximately 15 MW. The solar PV facility will need to be integrated with existing generation and located in the water-harvesting area at the site.

We developed the preliminary designs for the facility, addressed any potential issues with respect to its integration, and supported Barrick in the request-for-proposal process to procure the solar photovoltaic plant.

## Red Dog wind farm in Alaska

A detailed prefeasibility study was conducted to integrate a 12 MW wind farm into a remote mining location for Teck Resources Limited, Alaska. The scope of work included technology and wind assessments, a power management and control study, electrical and civil engineering, logistics and constructability studies, and cost estimates.

## Caribbean solar projects

The Inter-American Development Bank needed assistance to help selected clients use more renewable energy and be more energy efficient. Several studies were carried out for sites in the Caribbean area with high power tariffs. Renewable power generation was added to replace a portion of the grid power supply at hotels, airports, agricultural processing plants, manufacturing plants, and a university. By selecting hybrid power systems, we could efficiently reduce energy costs for selected clients.

## Solar photovoltaic power plant at Barrick's Nevada mine

To reduce diesel-fuel consumption and associated costs, Barrick Gold Corporation is considering the construction of a solar photovoltaic power plant at a remote process-and-storage facility. We have been chosen to develop preliminary designs for the facility, address any potential issues with respect to its integration, and support the RFP process to procure the solar photovoltaic plant.

# About Hatch

Whatever our clients envision, our engineers can design and build. With over six decades of business and technical experience in the mining, energy, and infrastructure sectors, we know your business and understand that your challenges are changing rapidly.

We respond quickly with solutions that are smarter, more efficient, and innovative. We draw upon our 9,000 staff with experience in over 150 countries to challenge the status quo and create positive change for our clients, our employees, and the communities we serve.

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