CROWN HYDRO
for our clean energy future

FAQ

What are our current sources of electricity?
In the Midwest, we get about 75% of our electricity from burning coal, 16% from nuclear fission, and the remainder from natural gas, oil, hydro, wind and solar.

What percentage of our electricity currently comes from hydro energy?
We get about 5% of our electricity from hydro. Nationwide, the number is closer to 7%, and worldwide it is about 20%. The use of hydro energy – especially small, local sustainable hydro – is growing in nearly every country in the world, including Brazil, Venezuela, China, India, and even Iraq. Hydro is currently the largest source of renewable energy in the world – about 65% of the total output.

How much pollution does hydro energy produce compared to other sources of electricity?
Like wind and solar, hydro energy produces zero emissions. Coal, on average, releases one ton of carbon dioxide (CO_2) per megawatt hour of energy produced, as well as significant amounts of sulfur dioxide, carbon monoxide, nitrogen oxide, volatile organic compounds, particulate matter, mercury, and other toxic elements like arsenic. Natural gas generates slightly more than half the CO_2 emissions of coal.

What are the environmental and human health impacts of these emissions?
CO_2 is the primary pollutant causing global climate change, and coal-fired power plants emit 40% of CO_2 in the U.S. Coal plants are the largest man-made source of mercury pollution in the U.S. and the largest contributor of hazardous air pollutants. Two simple examples of human health impact: the Minnesota Department of Health reports one in five women of childbearing age have high enough levels of mercury in their bodies to cause birth defects; and the American Lung Association reports 24,000 people a year die prematurely because of pollution from coal plants.

How does hydro energy work?
The flow of water is the source of the energy. The water flows through a turbine, causing the shafts to turn. The shafts connect to a generator that converts the mechanical energy into electricity.

Does Crown Hydro use a dam?
Crown Hydro will be a diversion, or run-of-river project. This means the water flows away from, and returns to the river by a natural elevation drop with no negative ecological impact. The elevation drop is augmented by the existing Upper St. Anthony Falls Lock and Dam. In effect, it adds hydro energy production to an existing lock and dam that currently does not produce any energy.

What is the capacity of the turbines and how much energy will this facility produce?
The Crown Hydro project will have two 1.7 megawatt turbines, for a total of 3.4 megawatts of capacity. The facility is expected to function at 60% capacity, so production is estimated to be just over 2 megawatts. It will produce about 18,000 megawatt hours of electricity per year, enough to provide clean electricity for at least 2000 homes.

How much of a difference will this make?
Crown Hydro will make a small and important difference. First, it will provide clean electricity for at least 2,000 homes – that's between 1% and 2% of the 160,000 households in Minneapolis. The same amount of electricity from coal would emit, on average, 18,000 tons of CO_2 per year, as well as other toxic elements. Second, it will serve as a model for future small hydro projects. This proposal combines a revitalized historic use, state-of-the-art technology, state and federal tax incentives, private investment, and the use of the public assets of land and water. This formula can be repeated in other sites in Minnesota and across the country to produce even more clean energy.

Are there any state or federal laws that promote or require the production of clean renewable energy?
Citizen activists and a range of environmental leaders and organizations have invested considerable time and effort to influence our state and federal government to support our society's commitment and transition to clean energy. The federal government offers a production tax credit and the State of Minnesota offers a production incentive for renewable energy. In 2007, the Minnesota state legislature passed one of the highest renewable energy standards in the country. It requires that electric utilities generate or procure 25% of their electricity from renewable sources by 2025.

Does Crown Hydro qualify for the state and federal incentives, and does the energy it will produce count toward achieving the Minnesota 25% by 2025 Renewable Energy Standard?
Yes.

We hear so much about wind energy. Why don't we hear more about hydro?
There are a few reasons for this. First, there is an overall higher capacity for wind than hydro. Second, many people think we've reached our maximum capacity for hydro. Third, some impoundment hydro energy facilities have negative ecological impacts. There is still capacity for more hydro here in Minnesota and around the country, and Crown Hydro and all other proposed new hydro sites in Minnesota are zero-impact diversion facilities. And there are some significant advantages to hydro – it's cheaper and more immediately accessible. There is still significant investment to be made in infrastructure for wind, including transmission lines. The fact is, to address our climate crisis we need to take full advantage of *all* clean and renewable energy sources.

What happens to the energy that Crown Hydro will produce?
As an independent power producer (IPP), Crown Hydro has a power purchase agreement with Xcel Energy and will serve its customers. Xcel Energy is a public utility (PU) regulated by the public utilities commissions in the states in which it operates. Consumers are afforded the same protections regardless of whether a PU generates the energy itself or buys it from a privately owned or cooperative IPP. The Public Utility Regulatory Policies Act (PURPA), which promotes greater use of renewable energy, mandates that PUs buy power from IPPs at the "avoided cost" rate. This is the cost that the utility would incur if it were to generate or purchase from another source. Xcel Energy, which provides about half the electricity in Minnesota, has committed to providing 30% of its energy from renewable sources by 2020.

How does hydro energy compare in cost to other electricity sources?
On average, it is less expensive to produce than wind or biomass, significantly less expensive than photovoltaic or concentrating solar or natural gas, and similar in cost to coal. The actual production cost of hydro is dependent upon costs for equipment, construction, development, operation, maintenance and insurance. From a consumer perspective, when Crown Hydro starts producing energy and it goes onto the grid, we won't be able to purchase it separately from other sources of electricity. Costs of burning fossil fuels do not take into account the external costs to the environment and human health. Societal and political awareness of these costs is prompting a movement toward a carbon tax, which will completely change the cost structure.

Where will the Crown Hydro project be located, and what is the site used for now?
The project will be below the western bank of the Mississippi, beside St. Anthony Falls, in the Mill Ruins park area. Currently, there is a demonstration hydro facility, with water being diverted into an intake structure, through existing tunnels, and back to the river out of the tailrace, without capturing any energy. The site for the new intake structure is on vacant land directly adjacent to the current intake structure. The tailrace will be in the same location as the current tailrace. The other areas involved in the project are the tunnels and below-ground powerhouse.

What will the Crown Hydro facility look like?
The intake structure will look very much the same as the existing structure. The tailrace will be virtually the same as it exists now, which is visible and attractive. The generating equipment will be placed 42 feet below ground, inside a structure called the powerhouse, and will not be visible. There will be virtually no change to the existing landscape, and when construction is complete it will be unnoticeable by neighbors and visitors.

What equipment will be inside the powerhouse?
There will be two turbines, each with a direct shaft to a generator. The turbines are 8 feet in diameter and 10 feet tall.

Will we be able to hear it or feel it?
No. The powerhouse is completely below ground, and with an 8-foot-thick concrete roof and 2-foot-thick exterior walls. The generator will produce a sound level of about 80 decibels – the sound of a busy street. Given the distance and the layers of earth, limestone and sandstone, it will be impossible to hear over the flowing water. The turbines rotate at about 360 rpm – more slowly than a car idles – and is engineered to be vibration-free.

Does it change the temperature of the water?
No. The water is returned to the river with no change in temperature.

How much will it reduce the flow of water over the falls?
There have been two in-depth studies of water flow. The first was by Wenck Associates was engaged by Crown Hydro. The second was by Emmons & Olivier Resources engaged by the MPRB. Both used research from the University of Minnesota St. Anthony Falls Lab, and both confirmed that the total impact of Crown Hydro's water diversion will not be visually discernable. Additionally, Crown Hydro has agreed that the MPRB will have the discretion and authority to shut off diversion to maintain flow. The current demonstration intake structure diverts about 150-250 cubic feet per second of water. The Crown Hydro intake structure will be adjustable for water flow, and cannot exceed the maximum diversion of 1,000 cfs. The river flow at St. Anthony Falls is as high as 58,000 cfs during a 10-year period, with an annual average flow of 12,000 cfs. A transducer that measures the water level in the upper pool will transmit a continuous signal that will reduce the diversion as flow decreases, and shut off completely when the river flow declines toward 1000 cfs, thus ensuring adequate flow over the spillway. Crown Hydro has worked very closely with the Army Corps of Engineers and the FERC, using data from the U.S. Geological Survey, to ensure compliance with the mandated pool depth standards and flow over the Falls.

How will this affect the existing tunnels?
The tunnels are carved through sandstone, beneath the limestone cap. Over the decades there has been some erosion and even collapses in other areas. This project will line the tunnels with steel and concrete to strengthen and preserve them. In addition, the Federal Energy Regulatory Commission (FERC) license mandates that Crown Hydro conduct regular inspections and adhere to the highest standards of safety and structural soundness.

Who owns and maintains the tunnels?
The question of ownership of the tunnels was left open in a district court decision 2 decades ago. Federal law grants usage rights to FERC licensees where power is being produced. No specific governmental unit or organization is responsible for maintaining the tunnels. Crown Hydro will assume stewardship of the tunnels, and maintain insurance to indemnify the Minneapolis Park and Recreation Board and any other public entities.

Will the existing tailrace accommodate the increase in diverted water?
The tailrace will be made slightly deeper and wider, and reinforced to ensure structural soundness. As with the tunnels, Crown Hydro will assume stewardship, provide regular inspections, and completely indemnify the MPRB.

When does the facility run?
The facility is designed to run at times of average and above-average water flow, about 60% of the time. Crown Hydro and the Minneapolis Park and Recreation Board (MPRB) worked to carefully develop a detailed plan, based on cubic feet per second of water over the spillway, to ensure good visual impact of the falls.

Why doesn't Xcel Energy just add capacity to its existing plant?
Xcel has its own business reasons to pursue renewables from independent power producers as well as adding to its own production capacity to meet state mandated renewable goals. Crown Hydro spent several years working to secure the FERC license – a typical timeframe for that process – and currently owns the right to produce energy at this site.

Will the project be on public land?
Yes. Typically the use of public land is required for hydro projects like this, as many waterways are public assets.

What are the costs involved in this project?
The largest costs are equipment and construction, and there have also been significant development costs. The estimated total cost for completion is about $20 million. There will be ongoing costs for operation, maintenance, insurance, and potentially a land lease and property taxes.

How is the project funded?
Crown Hydro has been awarded a $5.1 million Xcel Energy Renewable Energy Development grant. The remaining approximately $15 million comes from a single private investor, Minnesota businessman Bil Hawks. Mr. Hawks became an investor in the project in 2002.

What are the sources of revenue for the project?
The revenue sources include a power purchase agreement with Xcel Energy. The PUC asks that terms of a PPA remain confidential. There is also a state tax incentive and a federal production tax credit.

Why does Crown Hydro need approval from the Minneapolis Park and Recreation Board?
The MPRB owns land where the project will be located. Crown Hydro is seeking a 50-year lease to align with the term of the FERC license – as of 2009, there are 40 years remaining.

How much will Crown Hydro pay the MPRB to lease the land?
Crown Hydro has offered to share its revenues from the power purchase agreement, as well as other government incentives, for approximately $300,000 each year. Crown Hydro is willing to structure this in different ways, to be most advantageous to the park board.

Will this project require the closing of the parkway, or any change in the Mill Ruins Park area?
Any changes that occur will be below ground. There will be changes to some of the tunnels and below-ground area during construction, and there may be a brief period of time when the road above may be closed for safety reasons. The ecological, geologic, historic, and archaeological impacts will be studied as part of the FERC licensure, and any mitigation required will be addressed in a programmatic agreement.

Can the park board do this project on its own, without a private company?
A FERC license was granted to Crown Hydro in 1999. In 1999 and 2000, the MPRB considered purchasing the license from Crown Hydro and developing the project on its own but decided against it. At that time, the MPRB encouraged Crown Hydro to continue to pursue the project on its own, and said they were interested in negotiating a lease for the necessary land with a revenue-sharing agreement. The MPRB and Crown Hydro were able to craft an agreement that provides needed revenue to the park system, with no investment or risk on the part of the park board. The project could not be developed without private investment.

Is this an appropriate private use of public land?
Typically the use of public land is required for clean, renewable hydro projects like Crown Hydro, as most waterways are public assets. As an independent power producer, the energy will be sold to a public utility, so is subject to the same consumer protections. Minnesota statute 103G.535 says "*the public health, safety, and welfare of the state is promoted by the use of state waters to produce hydroelectric power*" and further "*an agreement for the development or redevelopment of a hydropower site must contain provisions to assure the maximum financial return to the political subdivision.*" Crown Hydro has offered generous public revenue sharing.

Will this project have an impact on historic resources?
Due in part to concerns about historic resources, the proposed location of Crown Hydro was moved from below the Crown Roller Mill, then adjacent to the Cataract Mill Ruins, then finally to the current site below the parking lot. While this question has yet to be definitively answered, an archaeological impact study prepared by HZ United concluded that there is little likelihood that mill remains will be found within the current proposed construction area for Crown Hydro. The project is sited within the St. Anthony Falls National Register of Historic Places (NRHP) Historic District, inside the St. Anthony Falls Waterpower area, and the West Bank Milling Area. The FERC license requires that Crown Hydro work with the State Historic Preservation Office (SHPO) to develop a plan to determine if there is historic impact and to define that historic impact. Then Crown Hydro must work the SHPO, with input from the Federal HSPC and the Minneapolis HPC, to determine if and how it can be mitigated – and vital historic resources protected – by appropriate measures in accordance with the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA). This process begins after the lease is secured.

How far along is Crown Hydro in the process of gaining the necessary approvals to create this facility?
A license from the Federal Energy Regulatory Commission (FERC) is required to develop hydroelectric power in the United States. It is the most difficult step in the approval process, and Crown Hydro was granted a 50-year license in 1999. This license was obtained with the strong support of Minnesota's U.S. senators and congressional delegation, Xcel Energy, the State of Minnesota, and the Minnesota Public Utilities Commission. Because of the importance of the project site on the Mississippi River, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the National Park Service all had input on the licensing of the project. In connection with the license, a Programmatic Agreement under Section 106 of the National Historic Preservation Act was signed by FERC, state, local and national historic preservation organizations, Crown Hydro, the Park Board, the City of Minneapolis, the Army Corps of Engineers, the National Park Service and others. A federal Environmental Assessment under the National Environmental Policy Act was completed by FERC before it issued the license. Going forward, Crown Hydro will need additional approvals from the FERC, an agreement on land use with the Park Board, and an agreement and a permit from the Minnesota Department of Natural Resources (DNR). An environmental assessment worksheet (EAW) will also be completed. In addition, Crown Hydro would work closely with agencies such as the Minnesota Pollution Control Agency (MPCA) and historic preservation organizations. Crown Hydro may also work with a Citizens Advisory Council (CAC) possibly convened by the Park Board under its ordinances.