Is hydropower green? Not really
‘Nothing alters a river as totally as a dam.’

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Harnessing energy from flowing water has helped advance societies since the days of the Roman Empire. “Hydropower” launched the Industrial Revolution, shaped modern Europe and fueled an emerging America.

Hydropower’s attractions surged in the mid-19th century, when dams were first fitted with turbines to produce electricity, setting off a building frenzy that filled American rivers and streams with thousands of dams.

Water energy at St. Anthony Falls made early Minneapolis a thriving center for mills to saw timber floated in from northern forests, and later to grind wheat into flour, making the city’s milling district world-famous.

It all makes sense. Hydropower’s fuel — water, moved by gravity — just keeps rolling along. No need for an expensive mine or long coal hauls. Amid present-day worries over climate change, emission-free hydroelectricity is seen by some as “clean, green and renewable” — unlike gas-fired and especially coal-fired plants that spew greenhouse gases by the millions of tons.

The actual generation of power by hydro is undeniably clean, so its preferability over plants burning dirty coal is a no-brainer.

But is hydropower, in the larger sense, “green”?

Far from it, as more and more are coming to realize.

Hydropower relies on dams that impound water and create vertical pressure to spin turbines. Dams and reservoirs have profound environmental effects that are coming under intense scrutiny, with one prominent national group, American Rivers, pushing hard — and successfully — for dam removal.

“Nothing alters a river as totally as a dam,” writes author and river advocate Patrick McCully.

Minnesota native Denny Caneff at the Wisconsin River Alliance in Madison adds that the relatively small amount of power generated from hydro is “disproportionate [to] the environmental harm that it causes.”

A dam, in essence, is a curtain of concrete that severs a river. The reservoir it creates is wholly unlike the river it replaces, and the change is certainly not for the better.

University of Minnesota biosystems researcher Chris Lenhert’s recent report for the McKnight Foundation on effects of the Ford Dam reads like a rap sheet on how the dam’s reservoir has radically altered the Mississippi Gorge through Minneapolis.

“The dam submerged one of the Mississippi’s largest high-gradient, boulder-and-cobble streambeds and almost entirely blocked upstream movement of fish and mussels,” Lenhert said, adding that many mid-channel islands in the Gorge were destroyed — and, with them, prime eagle habitat.

The idea was to promote barge navigation, a plan that went bust. Some now say the dam, which annually costs taxpayers more than $1 million to maintain, should go. The only remaining commerce at the Ford Dam is a privately owned hydro plant that produces a piddling amount of electricity (less than a tenth of a percent of all power generated in the state).

Caneff said the downside effects listed in Lenhert’s report apply to most every dam.

Here’s how:
As they impound water, dam reservoirs slow a river's flow. Its sediment load is dropped, creating a silted bottom that chokes out aquatic vegetation. Reservoirs trap toxics like PCBs and heavy metals along with nutrients that grow algae in water that's warmer than the river it covered up.

Dams are mostly built at river constrictions where gradients and rocky bottoms create riffles and rapids that oxygenate and clean the water. Gravel in pooled eddies is ideal fish spawning habitat.

Impermeable dams block fish movement, so species in the pool are far fewer than in the larger river. Mussels and clams, whose filtering is a vital for water quality, disappear, as they have in the Mississippi Gorge.

All of these effects are present at nearby River Falls, Wis., where critics have stalled the city's application to relicense its two power dams on the Kinnicinnic River.

Friends of the Kinni and a local chapter of Trout Unlimited cite another casualty of the dams: The falls that is River Falls’ namesake has been submerged under the languid reservoir. That’s similar to Ford Dam’s reservoir, which covered a 5-mile stretch of world-class rapids through the Mississippi Gorge. Removing the dams would restore free-flowing rivers and natural features.

It’s the same at Taylors Falls, Minn., and neighboring St. Croix Falls, Wis. Both were named for a falls that’s under the reservoir of Xcel Energy’s hydroelectric dam, which flooded one of the most scenic and environmentally valuable places on the entire St. Croix.

It was the St. Croix, by the way, that was central in a curious tale of intrigue about replacing hydropower with coal. You see, it’s usually the other way around.

In the 1950s, Xcel’s predecessor, Northern States Power Co. (NSP), was pivoting from hydro to coal and nuclear baseload generators. NSP had gone through a bruising battle over its St. Croix Falls hydro plant and wanted to avoid a similar public maelstrom over another hydro project planned for farther up the river. This one would flood a huge area all the way to Danbury, Wis.

NSP was eyeing a large coal-fired plant at Stillwater, but an upstart politician, Gaylord Nelson of nearby Clear Lake, Wis., wouldn’t hear of it. Nelson, who later served two terms as Wisconsin’s governor and three terms as a U.S. senator, was also eyeing the St. Croix. But his vision was some kind of set-aside protection. He didn’t want a tall, carbon-spewing stack piercing the St. Croix's skyline.

NSP dispatched emissaries to a remote cabin near Mellen, Wis., with a deal: Nelson would drop his objection to the coal plant, and NSP would donate 30,000 acres it owned for the planned second reservoir on the St. Croix.

Nelson “cut a deal with the devil and accepted,” said one who attended the meeting. The Allen S. King Plant today still sends smoke up its very tall stack at Stillwater, and a legacy achievement of the late Sen. Nelson is a St. Croix that’s a federally protected Wild and Scenic River.

Another downside to hydropower is the social disruption of the reservoirs.

Near Hayward, Wis., the 15,300-acre Chippewa Flowage, renowned for trophy muskies, was built in 1925 to stabilize flow on the Chippewa River for downstream hydropower plants. The project proceeded over strong but futile objections of the Lac Courte Oreilles band of Chippewa, whose lands were flooded.

Construction in 1933 of the massive dams and reservoirs of the Tennessee Valley Authority meant relocating 15,000 families and destruction of whole towns.

North Dakota’s Garrison Dam displaced Mandan and other bands on the Fort Berthold Reservation and South Dakota’s Oahe took thousands of prime farmland acres from the Cheyenne. All the tribes strongly opposed the projects and refused to sell land, but it didn’t matter because the builders had eminent domain on their side.

Same for the colossal Columbia River hydro projects — some 125 hydro plants in all — in the Pacific Northwest that displaced scores of American Indian tribes in four states. Worse, operating the system profoundly altered a salmon-based Indian culture whose history spans 3,500 years.
Such projects are still being built, and the social disorder they cause has a connection to the Twin Cities, because here's where the electricity is consumed. This is a very large concern of Michael Nobel at the nonprofit Fresh Energy in St. Paul.

Here's why:

Manitoba Hydro of Winnipeg operates a giant system of hydropower dams and reservoirs on the Nelson River that flows north to Hudson Bay. A raging controversy concerns the Cree Nation, which is seeing its pastoral culture shredded and livelihoods shattered by sprawling reservoirs in that system.

Xcel Energy has a long-term power-supply contract with Manitoba Hydro. So in a very real sense, the electricity used here is contributing directly to Cree suffering.

What especially worries Nobel is that Manitoba Hydro plans to aggressively expand its network of dams and reservoirs, further devastating the Cree. Some suspect that Xcel will seek much of the future supply from Manitoba as its aging baseload plants in Minnesota are retired within the next 20 years.

Assessing whether hydropower can be classed with solar and wind as “clean and green renewable energy” is, Nobel said, complicated at best.

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