The dam issue settles down to balance

By Tom Nevin

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A poser is facing political leaders, engineers and social planners: should developing countries meet their energy needs by building one or two really big dams, or a network of a few hundred smaller ones?

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Building a large dam is a monumental trophy to parade to current admirers and future generations. Inside every engineer is a large dam trying to get out, some in the profession admit. With egos at play, the goal of lighting up a dark continent by the most appropriate and cost-effective means can be lost.

The Democratic Republic of Congo (DRC) is one of Africa's most watered countries. A lattice-work of hundreds of rivers threads the country, contributing to making the awesome Congo River.

Conservatively, more than 100,000MW of electrical energy is stored in those rivers, and the Congo River is capable of generating nearly half of that.

Yet, about 90% of the DRC's 79.4-million population have no access to electricity while its political leaders dither over whether to build a big dam or lots of smaller ones.

At the recent International Commission on Large Dams convention in Johannesburg, two academics warned that hydro-

electric schemes should be tailor-made to fit needs as they arise.

New Zealand consulting engineer Bryan Leyland, and director of dam engineering at the British consultancy Atkins, Andy Hughes believe there is a place for big and small dams in tackling the DRC's dire energy shortage.

"New Zealand's development is comparable to what emerging nations are experiencing now," Leyland says. "Disparate communities developed their own hydro schemes and distribution systems, and these provided an offload for later connection to the slowly expanding grid.

"You can start off in key areas with hydro schemes for small towns or larger ones, and at the same time expand the grid - so it's both."

New Zealand had a smattering of small power stations that gradually developed into a constellation of modestly sized energy providers, while bigger facilities were built for more voracious industrial consumers as demanded.

Hughes says he agrees that a mixture is often required. "You have to think about the definition of large dams. Most dams will be multipurpose, not just for hydropower, but with other purposes such as irrigation, flood control, domestic water supply, and leisure activity, such as boating, fishing and waterskiing. Most dams in SA are multipurpose."

He says hydro schemes are most often slated for the fact that those living closest them benefit least, in younger democracies.

More often than not, the power hums overhead on the transmission lines making its way to a distant mine, refinery, manufacturing plant, or rich neighbour.

Neither Hughes nor Leyland buy the assertion that poor populations must be deprived of electricity because they cannot afford it.

"If the cellphone revolution has taught us anything it's that if people, even paupers, want something badly enough, they'll find the means of paying for it," Leyland says.

"In Zambia, for instance, a man in an outlying district with a generator charges 15 US cents to charge your phone, and that's quite a lot of money required virtually daily in that country's dire economic environment. But, somehow, everyone finds the means to stay connected," Leyland says.

"Why can't the same be said for electricity? Strangely enough, people find they can get along without power, but not without their cellphone," he says.

Hughes maintains that politicians obfuscate the arguments about the best methods to provide power to the people by measuring costs and effect in the wrong way.

"Everything being equal, nuclear build costs $5,000/kW and that might be a true figure. But somewhere else, a rural area perhaps, the cost could be completely different.

"What do you add into that figure before you arrive at a number when you switch on a light and say that's what it actually costs?

"Much of the time cost and time overruns are our own fault because we let them run away from us, especially in regions where they're least easily controlled. We land up in a complete mess with contractors over poor workmanship.

"People quote figures in delivering so much per kilowatt and then it actually comes to far more - and that's because they had it wrong in the first place," he says.

Hughes says the engineering profession is being destroyed by incorrect planning and wrong-headed tendering practices.

"We employ the wrong contractors. We're overrun by Chinese money that then dictates we'll have Chinese contractors," he says. "Contractors have been foisted on me on a job we're doing in Asia right now and it frightens me to death. And there's nothing I can do about it, because people want the cheapest thing, rather than looking at the whole live cost of doing it properly," Hughes says.

"Until the contractor listens, you say you'll withdraw the money. That's all you can do. But that's not good engineering. It's not good project management in terms of providing a scheme. It's wasting time and money."

He says big schemes can be efficient and very valuable. But the bigger it gets, the more opportunities there are for spanners to go into the works. And the locals should always benefit.

"You must realise that it's not just the dam, but a lot of infrastructure that goes with it," says Hughes.

"The larger dams are the more socially and politically difficult. If you want something quickly, it's easier to produce a small- to medium-size dam because they don't have the effects people get anxious about. So, you look for the optimum site that will give you the smallest dam for the biggest storage potential. It's a matter of balance.

"If you don't have enough water in the area, there's no point in building a big dam. Hydrological studies are vital for big dams to be sure there's enough water to fill it in the right frequency."

The pendulum seems to be swinging the way of small dams until Leyland sweeps the idea aside.

"Cheap, small hydro power is the stuff of dreams," he says.

"The reality is far different. China went on a massive small hydropower binge about 30 years ago. Some 30% of the schemes were total failures, many others had serious faults.

"I have been in the small hydro power business for 50 years and cheap, they are not. Large hydro schemes can usually be built for between $2,000/kW and $3,000/kW. Most have storage and can provide continuous power.

"The average small hydro scheme costs $3,000/kW-$5,000/kW with no storage. The major problem with small hydro in the developing world is finding people able to design, build, operate, and maintain them," he says.

The debate switches to the seven-dam Grand Inga hydro-electrical complex whose latest price tag is $100bn.

"For 42,000MW, that sounds cheap," Leyland says.

"Nuclear power, for instance, starts at $5,000/kW. That's twice the cost per kilowatt of Inga.

"And SA's looking at a whole new fleet of nuclear. I don't understand why Inga is considered expensive."

For the engineering community, the issue is not size. They will build whatever the planners ask them, and will relish any opportunity to flex their creative muscles.

Even Leyland, who has built up a solid international reputation for his smaller-generation solutions, hankers after the big one.

"If I had the chance to do so, I would build a really big dam," the engineer says.

Source: Business Day