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Nature & Resources Costing over \$1 billion, the Karahnjúkar hydroelectric dam in Iceland is a hugely controversial project. Mark Lynas journeyed to the blasting face, hoping to work out for himself whether this industrial elephant is green or brilliant-white.

Damned nation

I had only been in Iceland three days and it was all going wrong. I was there to investigate the massive Karahnjúkar aluminium smelter project, a huge hydroelectric dam currently being built in a remote area of the country's eastern highlands. Highly controversial during its planning stages, Karahnjúkar triggered national demonstrations, international email and fax campaigns and even a hunger strike by the singer Björk's mother. Having previously watched dam projects destroy natural landscapes and human societies in places like India and Brazil, it already seemed pretty clear to me that big dams were generally bad things.

Yet I found myself sitting in the

office of Mr Thorsteinn Hilmarrsson, press officer for the Icelandic national power company Landsvirkjun, being convinced that Karahnjúkar was actually beneficial. 'A lot of the debate has been "either-or",' he was saying, 'as if either you use rivers for energy-intensive industry or you leave nature unspoilt and have tourism.' But in Iceland, Hilmarrsson pointed out, the construction of roads – a by-product of energy development – was helping promote tourism.

And how, he asked, do tourists get to the country, anyway? 'They come by plane, and planes are made with aluminium.' You could either have this smelted with coal in somewhere like Australia, he went

on, which would result in 10 times more greenhouse gas emissions, or you could manufacture it with clean hydro power in Iceland. Using renewable power instead of coal to fuel aluminium smelters would lead to an overall drop in world carbon emissions (a fact recognised through the so-called 'Icelandic clause' of the Kyoto agreement on climate change). This goal – together with the promotion of economic growth in remote areas of Iceland that are facing depopulation as people move to Reykjavik in search of jobs – underlie the government's policy of developing energy-intensive industry. As Hilmarrsson explained it, Karahnjúkar seemed to make perfect sense. ▶





MARK LYNAS

The immense scale of the project was only clear from a lookout point high up on the other side of the valley. The bulldozers looked like yellow ants labouring away in the distance

Stop making sense

A few days later I was several hundred kilometres northeast of Reykjavik, bumping along a dirt track towards the dam site itself in a jeep belonging to Sigdur St Arnalds. With infectious enthusiasm St Arnalds – an engineer by training and now handling the on-site PR for the project – was outlining some of Karahnjukar's vital statistics. The biggest reservoir, Halslon, will reach 57 square kilometres in area and be formed by the highest rockfill dam in Europe – a massive rampart reaching 190 metres in height. Seven smaller dams will complete the project. Together, the dams will funnel water through 16 underground tunnels to a powerhouse buried 600 metres below, deep within a mountain.

With a generating capacity of 4,400 gigawatt hours per year, the resulting electricity will power a new aluminium smelter that will be constructed and run by the US company Alcoa at Reydarfjordur on Iceland's east coast. The whole thing will cost over \$1 billion.

To say the landscape was bleak would be an understatement. Located just 20 kilometres north of Europe's largest glacier Vatnajökull, a freezing wind blew across the high plateau and low cloud hugged the grey hills. Much of Iceland's interior is heavily desertified – a legacy of centuries of overgrazing, thin volcanic soils, low temperatures and strong winds – and there appeared to be little vegetation to speak of across much of the proposed reservoir area. A few forlorn patches of green broke up the sand and gravel flats, but overall the impression was pretty uninspiring. Wilderness it may have been, I thought, but of what value? Nor would the Karahnjukar project result in any displacement of people – a frequent problem with big dams elsewhere; for obvious reasons, no one lives

anywhere near the place.

'We don't have many wild animals here,' St Arnalds was saying. 'We imported reindeer 250 years ago from Norway, and they now run wild in east Iceland. Karahnjukar will affect a third of the stock, and reindeer that calve in the area will have to move to other valleys.' Other than that, it was thought that 600 nesting sites for pink-footed geese would also be submerged, but overall the geese numbers are rising and around 50,000 currently nest in Iceland as a whole. (They are even plentiful enough for hunting to be allowed.) Nor would there be much impact on fish; the huge glacial rivers affected by the Karahnjukar project are too muddy and cold to support significant aquatic ecosystems at present. In fact, I was informed, the biggest of these rivers, the Jokulsa a Dal, might even find itself supporting a new salmon population in clearer water from lower tributaries once the dirty main flow was diverted into a neighbouring valley.

Moving mountains

I was astonished by the sheer scale of what was happening. Huge yellow bulldozers – over a dozen of them on each side of a gaping canyon – were plying up and down the hillside, scraping black earth off the bedrock and then pushing it over the edge into the raging torrent of the Jokulsa a Dal river. Diggers and earthmovers were also labouring away – almost to the summit of Karahnjukar mountain itself, and had already scoured a huge triangular scar from the flanks of the peak. Roads criss-crossed the whole area, and lines of lorries and trucks roared up and down among clouds of dust. We travelled down one of the new roads into the canyon itself, our engine noise almost drowned out by the roaring of the water, and then switched on our headlights as we entered a dark tunnel.

The tunnel floor was covered with running water and a layer of brown mud, and the air was thick with diesel smoke from the

bulldozers and trucks working inside – despite a huge ventilation pipe running the length of the ceiling. I squelched through the mud up to the blasting face, where two men in red overalls were working high up on a cherry-picker, carefully inserting sticks of explosive into newly-drilled holes. Dozens of wire fuses hung out from the rock, and empty cardboard boxes labelled ‘dynamite: 32mm X 100mm’ lay discarded in puddles around the tunnel edge. Back in the jeep, we drove into a side tunnel that led out to the sheer canyon edge – squeezing ourselves against the rock walls as a huge dumper truck lumbered past to empty its load into the river below. Dust fell regularly from high above, where unseen bulldozers were still pushing hundreds of tonnes of dirt over the edge.

The immense scale of the project was only clear from a lookout point high up on the other side of the valley. The bulldozers looked like yellow ants labouring away in the distance, and the Vatnajökull ice-cap lay across the horizon like an enormous grey pancake. ‘The impact on wildlife in my opinion is extremely modest,’ St Arnalds was

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saying, as a squall of sleet hit the windscreen of our jeep. ‘There are some fish, but compared with other areas it is pretty poor.’ I asked about whether the project was destroying wilderness. ‘Not destruction, but the reduction of wilderness to a certain extent,’ he corrected me.

In the long-term, tourism traffic would be at least as significant an intrusion. All the new roads had opened up the area, which, with its waterfalls, canyons and untouched valleys, was becoming known as the ‘new Golden Circle’ of Iceland. (The old one, encompassing Geysir and the Gullfoss waterfall and accessible from Reykjavik, is already crowded with coach parties.)

All in all, I was left with the impression that the Karahnjúkar project was far less damaging than one might have expected for such a large scheme, and that the overall impact might even be beneficial with regards to mitigating global climate change. These happy thoughts stayed with me until, once back in the UK, I did some further research. Then I discovered, stumbling across some documents I had previously overlooked, that the reality was rather different. Confirmation of the truth was to be found not in a report penned by some green campaign group, but in the project’s original environmental impact assessment (EIA), commissioned by Landsvirkjun itself.

Take two

The first thing I learned was how easy it is to miss the real ecological value of an area when all you do is drive around it for a day in a jeep. What had seemed bleak and lifeless to me turned out to be rare heathland habitat, harbouring several types of endangered mosses and lichens, as well as other plants vital for reindeer and goose grazing. Around 280 species of small animals have been identified at Karahnjúkar by researchers from the Icelandic Institute of Natural History. These species include three insects never previously found in Iceland – two of

which may be completely new to science altogether. Not only will nine square kilometres of this precious heathland be directly submerged (including the only known site for one of the nationally rare lichens), but soil erosion from the lake edge will result in wind-blown sand and dust drying out wetlands and killing vegetation far outside the project’s immediate area.

In addition, the EIA identifies many unique geological features that will also soon be submerged – including unusual moraine deposits, two major waterfalls (one of which will eventually be lost forever under the lake’s sedimentation), hot springs, and the top of the spectacular Hafrahvammagljúfur canyon (‘Iceland’s Grand Canyon’).

The idea suggested to me by my dam-site host that fish will flourish in the new, clear water of the Jokulsa a Dal river once its main glacial flow has been diverted does not bear much scrutiny either. Late each summer the lake will overflow and the massive glacial river will roar once again – flushing out any new life downstream. And with less sediment overall, the river’s estuary will become vulnerable to erosion by the sea. This is bad news for the greylag geese, which use the estuary as a moulting ground, as well as for harbour seals – the population of which is already in steep decline and may crash further once the main dam is built. In fact, Karahnjúkar’s impact on wildlife could be so negative that Birdlife International, WWF and several other groups are campaigning for a case to be opened against Iceland under the Bern Convention on the Conservation of European Wildlife and Natural Habitats (both pink-footed and greylag geese are ‘protected fauna species’ under the convention’s annex III).

Then there are the dam’s downstream effects on the second affected river – the Jokulsa i Fljotsdal, which will carry all the extra water from the power station down to the lowland valley lake of Lagarfljot. The lake’s level will rise, ▶



MARK LYNAS

its colour will get darker, and the water temperature will drop by half a degree, thus undermining the aquatic ecosystem and reducing the food supply for fish and ducks. Taking into account all these wider impacts, the project will in total affect 3,000 square kilometres of territory – nearly 3 per cent of Iceland's entire landmass.

It's hardly surprising, then, that the country's planning agency originally turned the Karahnjukar project down only to find itself overruled by Iceland's environment minister, who gave it the go-ahead on political grounds after ordering some minor changes.

What's more, Karahnjukar's supposed benefits in terms of global warming also turn out to be largely non-existent. As the conservation organisation the International Rivers Network (IRN) points out, last year Alcoa actually closed three US-based aluminium smelters (two of which were driven by hydropower) due to cost considerations and overcapacity. The electrolytic processes involved in aluminium smelting also lead to emissions of tetrafluoromethane and hexafluoromethane – greenhouse gases that are thousands of times more powerful in trapping the sun's heat than carbon dioxide.

The truth is, Alcoa is moving to Iceland because the energy there is cheaper. 'If Alcoa were really concerned about climate impacts it could go for more recycling,' suggests the IRN's policy director Peter Bosshard, who is also the author of the recent report *Karahnjukar: a project on thin ice*. Bosshard calculates that achieving a higher recycling rate for the 100 billion drinks cans Alcoa produces every year could easily generate more aluminium than several new smelters like the one planned in Iceland. 'It is crazy to start destroying large tracts of wilderness just for cheaper aluminium,' he states.

A monstrous environmental folly

Indeed, if one looks at the whole aluminium issue holistically, as

Landsvirkjun press officer Thorsteinn Hilmarsson insists, more pitfalls quickly become apparent. Hilmarsson pointed out that aluminium is vital for the planes that transport tourists to Iceland. Yet the mining campaign group Project Underground has calculated that Americans throw away enough aluminium every three months to rebuild the US's entire commercial air fleet. Moreover, recycling aluminium uses only 5 per cent of the energy it takes to extract new metal from bauxite. None of the bauxite for the smelter will be mined in Iceland, so it will have to be shipped from overseas – causing extra fossil fuel emissions in the process. Nor is bauxite mining environmentally benign where it does take place: communities near mines in the Brazilian state of Para have complained about contamination from toxic red sludge; while in Surinam villagers petitioned the country's president in protest against the destruction and contamination of their lands by the company Suralco – itself a subsidiary of Alcoa (see box, right).

The principal political justification for Karahnjukar is the creation of jobs in the eastern Icelandic fjords. The fjords constitute one of Iceland's remotest and least-developed areas; the local population declined by 10 per cent during the 1990s. But with a price tag of \$1.4 billion for the hydropower scheme alone, and another \$1.1 billion for Alcoa's smelter, the Karahnjukar project is a cripplingly expensive way to create employment. Even if the Icelandic government is correct in estimating that Karahnjukar will create 1,000 permanent jobs in the region, this still adds up to a price tag of \$2.5m per job – easily enough for each worker to retire in luxury and the wilderness to be left untouched. Indeed, it's doubtful whether high-income Icelanders will even want to work in an industrial smelter. A large proportion of the construction jobs on the dam site have so far been

ALCOA

With 127,000 employees in 40 countries and 2002 revenues of \$20.3 billion, Alcoa is a giant corporation even by today's globalised standards. It is also well-connected



politically; former CEO Paul O'Neill was (until being sacked) George W. Bush's treasury secretary.

Alcoa's massive Rockdale plant is one of Texas's biggest polluters, and spews out thousands of tonnes of greenhouse gases and sulphur dioxide a year. In Brazil Alcoa gets cheap power for a smelter in the Amazon from a dam that displaced 35,000 people and flooded 2,820 square kilometres of tropical rainforest when its floodgates were closed in 1984. Alcoa is now bidding for new dam concessions in other parts of the Amazon region. But Alcoa's, and the world's, biggest mine is Australia's Huntly mine – responsible for the clearing of vast areas of Western Australia's Jarrah Forest. While the company's *Sustainability Report 2003* boasts about the 'rehabilitation' of the forest after mining is completed at Huntly, the Western Australian Forest Alliance talks about 'vast areas of state forest' being 'devastated by bauxite mining'.

If the project succeeds in creating the estimated 1,000 permanent jobs, it will have cost \$2.5m per job

filled by foreign labourers.

And the figures don't seem to add up either. The project's profitability was originally estimated on the basis of a high aluminium price. Yet prices globally continue to fall because of over-supply. One Icelandic economist has calculated that rather than being profitable the scheme will instead lose around \$36m a year. In essence, the government of Iceland may find itself using taxpayers' money to indirectly subsidise aluminium production by a foreign multinational while destroying its own backyard in the process.

So why go ahead at all? As the now-defunct World Commission on Dams pointed out, narrow vested interests – among banks, government bureaucracies and national power companies – often play a key part in advancing big dam projects. But over and above this, the issue is systemic. Capitalist economics cannot function without continual growth in both material consumption and corporate profit – and there is very little of either in just recycling old Coke cans. The dam will be built. The monster must be fed. ■