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Linking Human Rights and Environmental Protection

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Karahnjukar – a Project on Thin Ice

An Analysis of the Karahnjukar Hydropower and Reydaral Aluminum Smelter Project in Iceland

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Peter Bosshard, International Rivers Network, June 2003

Executive Summary

Iceland's Central Highlands, one of the largest remaining wilderness areas in Europe, are under threat. Iceland's National Power Company, Landsvirkjun, plans to develop a large dam project that would generate electricity for an aluminum smelter. The project is an example of old-style, government-promoted heavy industrialization. If implemented, it will have serious environmental impacts, and face considerable geological, economic and legal risks.

The Karahnjukar Hydropower Project will consist of nine dams, three reservoirs, seven channels and 16 tunnels. It will supply electricity to the Reydaral smelter, an aluminum smelter with an annual capacity of 322,000 tons that is being developed by US transnational Alcoa Inc.

The Karahnjukar project will divert two large and several smaller rivers in Iceland's Central Highlands, and will destroy or spoil about 60 waterfalls and invaluable geological features, including the unique Dimmugljufur canyon.

Through submergence, river diversions, groundwater changes and erosion, the project will impact more than three percent of Iceland's land mass, including areas with rare vegetation, and the habitats of seals, reindeer, fish, and pink-footed geese. It is located near the world's volcanically most active area, and has geological risks that, according to experts, have not been adequately assessed.

Alcoa is marketing the Iceland dam and smelter project as an example of its efforts to reduce the emission of greenhouse gases. However, Iceland has managed to negotiate an exemption clause from the Kyoto protocol, and this provides a loophole for the

considerable greenhouse gas emissions of aluminum smelters in Iceland. The planned smelter falls considerably short of important international emissions standards.

The tariff Alcoa will pay for the power from Karahnjukar will depend on future aluminum prices. The project will only become cost-effective if the present downward slide of the aluminum price can be reversed. An independent evaluation that was based on more cautious assumptions than the economic analysis commissioned by the developer concluded that the project has a negative net present value of \$425 million, and will result in annual losses of \$36 million.

The Karahnjukar project did not receive a high ranking in the interim report of Iceland's Master Plan for Hydro and Geothermal Energy Resources. It is clearly a political project, promoted as an effort to support the economy of East Iceland. EFTA's Surveillance Authority considered that such "investment aid" could be approved as "regional aid". Old-style state subsidies for energy-intensive industrialization do not adequately address the problems of a region that does not primarily need jobs, but educational and cultural opportunities. Government support for education, infrastructure and eco-tourism would appear to be a more promising alternative.

There is no global need for the aluminum that would be produced by the new Reydaral smelter. Alcoa, the world's largest aluminum manufacturer, has not increased production in recent years. The company is shifting some of its smelting capacity to low-cost countries such as Iceland as a cost-saving strategy. Furthermore, Alcoa produces aluminum sheet for 100 billion beverage cans

The Karahnjukar Hydropower Project will consist of nine dams, three reservoirs, seven channels and 16 tunnels . . . It will dam and divert two large and a series of smaller rivers to the North of the Vatnajoekull Glacier, the largest glacier in Iceland (and Europe).

a year. At the present recycling rate, this requires about 700,000 tons of aluminum to be smelted from new ingot every year – or twice the capacity of Reydaral. The new smelter, with all its environmental impacts, could easily be substituted by higher recycling rates.

The Karahnjukar project will cost an estimated \$1,086 million. Landsvirkjun intends to raise the respective funds from international financial institutions, including the European and Nordic Investment Banks, and from private banks. 120 non-governmental organizations from around the world have called on financial institutions not to fund a project that has massive environmental impacts, is politically motivated, and does not bring benefits that would justify its serious impacts. Financial institutions should fully assess the risks of the Karahnjukar project, including to their reputation, when considering funding this dam project.

1. Basic information

"Energy resources are the largest single underdeveloped natural resource in this country", says Thorsteinn Hilmarsson, head of corporate communications at Iceland's National Power Company, Landsvirkjun. Hydropower plants are already powering two aluminum smelters in Iceland. Landsvirkjun has plans to develop additional dams that would allow the country's smelting capacity to increase more than fivefold. This would make Iceland the largest aluminum producer in Western Europe.¹

Since 1975, several aluminum producers have considered building smelters in East Iceland. In 1991, Landsvirkjun had already

¹ See Thorsteinn Hilmarsson, Energy and aluminum in Iceland.

begun construction of a dam for a smelter of the Atlantacorporation when the developer withdrew its proposal. In May 2000, Landsvirkjun and Norsk Hydro signed a memorandum of understanding for the development of an aluminum smelter that would be supplied with power from a new dam at Karahnjukar in the Central Highlands. In March 2002, Norsk Hydro pulled out of the project in what it called a “strategic re-evaluation”. Alcoa, the world’s largest aluminum producer, stepped in. In June 2002, Alcoa signed a memorandum of understanding with Iceland’s government and Landsvirkjun for the development of the Karahnjukar dam and a smelter at Reydarfjoerdur in East Iceland. On March 15, 2003, Alcoa, Iceland’s government and Landsvirkjun signed the project contract.

The Karahnjukar Hydropower Project (KHP) will consist of nine dams, three reservoirs, seven channels and 16 tunnels. It will dam and divert the Joekulsa a Bru and Joekulsa i Fljotsdal rivers and a series of smaller rivers to the North of the Vatnajoekull Glacier, the largest glacier in Europe. The main dam will have a height of 190 meters. Tunnels with a total length of more than 70 kilometers will divert the rivers to the powerhouse. The power plant will have a capacity of 630 MW, and is expected to generate 4,700 GWh of electricity per year. Most of the power will be used by Alcoa’s 322,000 ton Reydaral smelter (see below). The smelter is expected to create 455 jobs in East Iceland, and an additional 300 jobs in ancillary services.

According to the power contract, the Karahnjukar project must be completed by October 2007. It will cost an estimated \$1,086 million. In comparison, the value of

the existing assets of Landsvirkjun amounts to about \$1,500 million. Once KHP is completed, 80 percent of the country’s power generation will be dedicated to producing aluminum.²

In March 2003, Landsvirkjun signed a contract of approximately \$500 million with Italy’s Impregilo S.p.A. for the construction of the Karahnjukar dam and headrace tunnel. Impregilo has a long record of dam projects with cost and time overruns such as Yacyreta (Argentina), Nathpa Jhakri (India), and Ghazi Barotha (Pakistan). The contracts for the construction of the Karahnjukar power house are presently being tendered.

2. Environmental impacts of the Karahnjukar project

According to Iceland’s Planning Agency, KHP’s main reservoir, the Halslon reservoir, “would destroy a vegetated area with a high conservation value”.³ The area is one of the largest continuous vegetated regions at an altitude of more than 500 meters in the Central Highlands. The main environmental impacts of the Karahnjukar project are on soil, vegetation, wildlife, and landscape.

The Halslon reservoir will submerge an area of 57 square kilometers. The project’s river diversions will impact an area of approximately 2,900 square kilometers, or three percent of Iceland’s land area. KHP will partly flood one of Iceland’s

largest and most spectacular canyons, the Dimmugljufur. About 60 waterfalls and invaluable geological features will disappear in the reservoir or will be spoilt by river diversions.

“It has not been demonstrated that the gains resulting from the proposed development of the Karahnjukar Power Plant would be such to compensate for the substantial, irreversible negative impact that the project would foreseeably have on the natural environment and the utilization of the land.” (Planning Agency, Ruling, August 2001)

² International Water Power & Dam Construction, Investing in Iceland, October 2002, p. 32.

³ Planning Agency, Ruling.

The project will destroy tracts of lush vegetation that represent some of the most intact remains of the country's original highland vegetation. Most of this vegetation has been lost in Iceland due to overgrazing and other unsustainable land use practices. KHP will submerge areas of high conservation value, and will impact other areas through changes in the groundwater regime, and through erosion. The water level of the Halslon reservoir will fluctuate widely, and a large zone of mud will form during the drier seasons. As the mud dries, the strong and frequent Icelandic winds will pick up silt and sand and deposit them in the adjacent areas. This will damage vegetation and wildlife habitats even outside the direct impact zone, and will cause significant erosion. Landsvirkjun plans to pump millions of cubic meters of exposed soil into the reservoir in order to diminish erosion. According to a report by conservation organizations, the reservoir will impact 35 rare moss and lichen species, including two globally threatened species.⁴

During summer, Iceland is home to the world's largest concentration of pink-footed geese. The Icelandic Institute of Natural History estimates that 2,200 pairs – approximately six percent of Iceland's breeding population – could be negatively affected by KHP; 500 nesting sites will be destroyed by the Halslon reservoir. The project thus violates the guidelines of the RAMSAR Convention, which protect sites that contain more than one percent of a given population.

The decrease in the amount of sand carried by the dammed rivers will cause erosion of the shoreline at the mouth of the river, and will affect an important rookery of harbor seals. Iceland's population of harbor seals has declined sharply over the last 20 years, and the Karahnjukar project will add to the pressure on the survival of this species. The erosion of the shoreline will also damage

important nesting areas of several bird species.

The project region is one of the most important breeding and spring grazing areas of reindeer in Iceland. The degradation of the area is expected to lead to local extinction of this species. Reindeer were imported to Iceland in the 18th century, were naturalized 200 years ago, and are today part of Iceland's wilderness heritage.

The hydrological changes brought about by the Karahnjukar project will have negative impacts on migratory fish species, including arctic char, trout, stickleback, and Atlantic salmon.

The rivers feeding the Halslon reservoir carry a high sediment load. Sedimentation will considerably shorten the lifespan of KHP, and like other large dams, the project can therefore not be considered sustainable.

On August 1, 2001, the Icelandic Planning Agency considered "that the value of the natural features in the impact area of the project is high, and that the impact of the project would in many cases be substantial and irreversible". As the Agency maintained, "it has not been demonstrated that the gains resulting from the proposed development of the Karahnjukar Power Plant would be such to compensate for the substantial, irreversible negative impact that the project would foreseeably have on the natural environment and the utilization of the land".⁵ As a consequence, the Planning Agency rejected the Environmental Impact Assessment for the project.

Landsvirkjun appealed against the decision of the Planning Agency, and on December 20, 2001, Iceland's Ministry for the Environment overturned the decision and approved the project, subject to a series of conditions. The Ministry ruled that Landsvirkjun had to

⁴ BirdLife International et al., *Hydropower Development in Iceland*, p. 9.

⁵ Planning Agency, Ruling.

- ?? build long walls to reduce the transport of sand from the reservoir,
- ?? change the location of the spillway of the Halslon reservoir,
- ?? increase water flows during the tourism season so as to make the waterfalls more visible,
- ?? and refrain from diverting several smaller rivers.⁶

Remarkably, the Ministry agreed with the Planning Agency's conclusions on serious negative environmental impacts – for example on the loss of vegetation and the damage to the waterfalls and the Dimmugljufur canyon – but argued that they did not violate “legislation, rules or international agreements”. Furthermore, the Ministry argued that the “negative impact on the environment should not be weighed against economic benefit”.⁷ Rather, the assessment of economic benefits should be left to Landsvirkjun. Landsvirkjun has an obvious vested interest in the project going ahead. Since the utility is insured against any losses by its owners, it can afford to disregard the economic risks of the project.

In 1999, Iceland's government initiated a process for the preparation of a Master Plan for Hydro and Geothermal Energy Resources in Iceland. An interim report on this Master Plan was supposed to serve as the basis of the parliamentary debate on the Karahnjukar project. The interim report was basically ready by early February 2002, but was not released until after the parliament passed legislation on the project in April 2002. According to this report, the natural value of the area affected by KHP is the highest among the 15 project sites considered so far. When the loss of natural value and the environmental impacts are jointly considered, only two choices are less acceptable than

KHP.⁸ (See Chapter 7 for the economic ranking of the Karahnjukar project by the interim Master Plan.)

3. Legal cases

The Karahnjukar project is still embroiled in a series of lawsuits and complaints. In February 2002, three Icelandic citizens and the Iceland Nature Conservation Association (INCA) sued the Minister for the Environment over her decision to approve the project. The Reykjavik District Court ruled in favor of the Iceland Government on May 21, 2003, while still acknowledging several breaches of procedure and insufficient access to information. The plaintiffs have three months to appeal to the High Court.

On March 17, 2003, BirdLife International, the Iceland Nature Conservation Association, the Wildfowl & Wetlands Trust and World Wide Fund for Nature called on the Standing Committee of the Bern Convention to open a case file on the detrimental impacts of hydropower development in Iceland on habitats and species of European conservation importance at its meeting of December 2003. They also proposed a recommendation urging the Icelandic government to rectify the breaches of the Bern Convention.⁹ In a letter to the Icelandic government, the Bureau of the Convention's Standing Committee expressed fears that “the cumulative impact of a high number of projects may put into risk habitats and species protected by the Convention”, and inquired whether any global environmental impact assessment of the hydropower development policy in Iceland had been carried out.¹⁰

⁶ Ministry for the Environment, Ruling, December 20, 2001, pp. 163ff.

⁷ Ibid., p. 154.

⁸ Tilraunamat á 15 virkjunarkostum í vatnsafli. Verkefnisstjórn um gerð rammaáætlunar um nýtingu vatnsafls og jarðvarma. Apríl 2002.

⁹ See BirdLife International et al., Hydropower Development in Iceland.

¹⁰ Letter of Eladio Fernandez-Galiano, Head of Natural Heritage and Biological Diversity

On April 16, 2003, 31 Icelandic institutions and citizens lodged a complaint against the Republic of Iceland before the EFTA Surveillance Authority in Brussels for breaches of European Economic Area law regarding the environmental impact assessment of KHP and access to information. The claimants asked that the case be sent to the EFTA Court.¹¹ In June 2002, an Icelandic economist also filed a complaint with the EFTA Surveillance Authority against indirect tax subsidies for Landsvirkjun (see Chapter 7). These complaints have not yet been dealt with.

4. Environmental impacts of the aluminum smelter

“We expect [the Reydaral smelter] to set new standards in both efficiency and sustainability”, Alain Belda, the chairman of Alcoa’s board, announced in 2002.¹² According to Belda, Alcoa will “sharply limit the emissions into the air using best-in-class technology”.¹³

Considering the actual design of the Reydaral smelter, this statement is disingenuous.

On March 14, 2003, Iceland’s Environmental and Food Agency (EFA) approved the environmental operating license for Alcoa’s planned Reydaral smelter. The license was granted on the basis of the environmental impact assessment that Norsk Hydro had earlier prepared for its own

Norsk Hydro planned to use a wet scrubber for its Iceland smelter, which would have resulted in SO₂ emission of only 0.455 kg/ton. In comparison, the SO₂ emissions of the Alcoa smelter allowed by the environmental license amount to 12 kg/ton. The standards of the US Environmental Protection Agency are 8 kg/ton, and the WHO guidelines for Europe define a limit of 5kg/ton markedly lower than the emissions of the Alcoa smelter.

smelter project. The most important environmental problems of aluminum smelters are sulfur dioxide (SO₂) and fluoride emissions. The Alcoa license falls short of international standards or Icelandic law in both respects.

The most important reference on international pollution standards is the World Bank’s Pollution Prevention and Abatement Handbook of April 1999. According to this Handbook, “modern smelters using good industrial practices are able to achieve” sulfur dioxide emissions of 1 kg per ton of aluminum produced on an annualized basis.¹⁴ Reaching such emission levels requires the use of a so-called wet scrubber system. Norsk Hydro planned to use a wet scrubber for its smelter, which would have resulted in SO₂ emissions of only 0.455 kg/ton. In comparison, the SO₂ emissions of the Alcoa smelter allowed by the environmental license amount to 12 kg/ton. Norsk Hydro’s 420,000 ton smelter would have emitted 190 tons of SO₂ per year, while Alcoa’s 322,000 ton

smelter will emit nearly 3,900 tons of SO₂ per year. According to the World Bank’s Pollution Handbook, the EU limit value for aluminum smelters with low particulate levels is 12 kg/ton (the limit allowed by EFA for the Alcoa smelter). The standards of the US Environmental Protection Agency are 8 kg/ton, and the WHO guidelines for Europe define a limit of 5 kg/

ton – markedly lower than the Reydaral emissions.¹⁵

Fluoride emissions from many aluminum smelters around the world have caused

Division, Convention on the Conservation of European Wildlife and Natural Habitats, to the Icelandic Institute of Natural History, 13 May 2003.

¹¹ See www.inca.is/files/K_final_complaint.doc

¹² Alcoa Inc. Annual Report 2002, p. 2.

¹³ Alcoa, 2002 Sustainability Report, p. 6.

¹⁴ World Bank Group, Pollution Prevention and Abatement Handbook, April 1999, p. 264.

¹⁵ Ibid., p. 233.

serious problems for public health, agriculture and wildlife. Based on Norsk Hydro’s environmental impact assessment, the proposal for the Alcoa smelter license stipulated a limit of 0.2 micrograms/cubic meter for fluorides. When Alcoa realized its smelter could not reach this level, EFA raised the limit in the environmental license to 0.3 micrograms/cubic meter. This is not consistent with Icelandic law on environmental impact assessments, which requires that licenses must be in full agreement with the results of environmental impact assessments. Experts believe that Alcoa could most likely comply with the lower fluoride limit if the company used a wet scrubber in the Reydaral smelter.

5. The Karahnjukar project and climate change

Both Alcoa and Landsvirkjun have repeatedly defended the Karahnjukar project as a contribution to combating climate change. “Further power-intensive industrial development can be said to be the most direct and effective way Iceland can contribute to the fight against the greenhouse effect”, Landsvirkjun’s Thorsteinn Hilmarsson asserted in January 2003.¹⁶ This statement must be qualified in several respects.

Alcoa’s aluminum production has stagnated since 2000. The company has a smelter capacity of 3,948,000 tons per year. Of this capacity, 445,000 tons are lying idle.¹⁷ Rather than developing the Karahnjukar dam and Reydaral smelter, Alcoa could more fully exploit its existing capacity (or increase the use of recycled

aluminum – see below). In 2002, the company closed three smelters in the US due to cost considerations. Two of these smelters were also powered by hydropower plants. Developing new smelters such as Reydaral is part of Alcoa’s cost-saving strategy. Company chairman Alain Belda confirmed in the 2002 Annual Report that the Iceland project and similar efforts “will accelerate Alcoa down the cost curve in primary, replacing older, less competitive capacity with newer, more efficient operations”.¹⁸

Aluminum smelters emit large amounts of carbon dioxide and other greenhouse gases in the electrolytic process. Tetrafluoromethane and hexafluoroethane, two greenhouse gases emitted by aluminum smelters, have global warming potentials that are 6,500-9,200 times higher than carbon dioxide.¹⁹

Alcoa can produce aluminum in Iceland cheaply because the country’s government negotiated an exemption clause from the obligations under the Kyoto Protocol at the 7th Conference of the Parties to the UN climate convention in Marrakesh in 2001. If this exemption clause had not excluded the

“Iceland was authorized to increase its [greenhouse gas] emissions by 10% from the 1990 level, more than any other country. Due to the Icelandic clause, the international community has allowed Iceland to increase its emissions by up to 60%, thereby accommodating the Alcoa project.” (Thorsteinn Hilmarsson, head of corporate communications at Iceland’s National Power Company)

CO2 emissions of new industrial projects in Iceland, the country would not be able to fulfill its obligations under the protocol. As a recognition of its low level of greenhouse gas emissions, Landsvirkjun’s Hilmarsson explains, “Iceland was authorized to increase its emissions

by 10 percent from the 1990 level, more than any other country. Due to the Icelandic clause and the accepted increase from 1990 emission levels, the international community

¹⁶ Thorsteinn Hilmarsson, Energy and aluminum in Iceland, January 12-14, 2003.

¹⁷ Alcoa Inc. Annual Report 2002, p. 33.

¹⁸ Ibid., p. 2.

¹⁹ Jim Vallette, Behind the Shining: Aluminum’s Dark Side.

has allowed Iceland to increase its emissions by up to 60 percent, thereby accommodating the Alcoa project.”²⁰ While touting the Karahnjukar project as a means to protect the global climate, Alcoa is actually using a loophole that will exempt it from reducing its emissions under the Kyoto Protocol.

Alcoa has “no official position on the Kyoto treaty”, but has committed to voluntarily reducing greenhouse gas emissions by 25 percent from 1990 to 2010.²¹ At the same time, the company has supported lobbying efforts against effective global climate policies. Alcoa supported the European “Aluminum for Future Generations” initiative that called for voluntary rather than mandatory action on climate change. Alcoa Australia is also one of the companies that lead the lobbying efforts against the signing of the Kyoto protocol by Australia.²²

6. Geological risks

On March 17, 2003, the eminent Icelandic geologist Gudmundur E. Sigvaldason published a memorandum on the geological risks of the Karahnjukar project. Sigvaldason was the director of the Nordic Volcanological Institute in Reykjavik for 25 years, and has also chaired the Icelandic Science Fund.

In his memorandum, Sigvaldason pointed out that the project area was affected by an “unusual interplay between climate, mantle

viscosity and crustal deformation”.²³ Due to climate change, the ice mass of Vatnajökull, Europe’s largest glacier, is diminishing rapidly, and as a consequence, the earth’s crust in the area is uplifted by an average of 1-2 centimeters per year. Sigvaldason stresses that the mantle beneath Iceland is 10-100 times less viscous than at any big dam site in a continental environment, and that with 16 faults within a depth of 100 meters, the ground underneath the dam site is heavily fractured. “The observed heavy fracturing of the crust at the dam site combined with ongoing crustal deformation due to fluctuations in glacier loading is a serious matter of concern for the proposed project”, the geologist warns.²⁴

“The dam site is located [near] the volcanically most productive area on Earth. (...) Again and again we are caught by surprise with completely unexpected seismic and/or volcanic activity. Any prudent political authority would never consider to stake huge amounts of taxpayers money on a project built on such dubious grounds.” (Gudmundur E. Sigvaldason, former director, Nordic Volcanological Institute and former chair, Icelandic Science Fund)

Sigvaldason further points out that a large volcano near the project site “has not been studied to provide a clear picture of its previous activities and the mode of its eruptions”, and “the project leaders do not even know if the volcano is still active”.²⁵

Concluding his memorandum, Sigvaldason warns: “The dam site is located at the eastern edge of Europe’s largest glacier.

Beneath and beyond its western part is the area of emergence of the North-Atlantic mantle plume, which, with Hawaii, is the volcanically most productive area on Earth. Our understanding of the mode of behaviour of the mantle plume and its interaction with the adjacent rift zones are still fragmentary and, therefore, unpredictable. Again and again we are caught by surprise with

²⁰ Thorsteinn Hilmarsson, Energy and aluminum in Iceland, January 12-14, 2003.

²¹ Personal communication from Jake Siewert, Alcoa Inc., May 9, 2003.

²² Peter Gerdes, Australien stemmt sich gegen das Kyoto-Protokoll, in: Neue Zuercher Zeitung, March 11, 2003.

²³ Gudmundur E. Sigvaldason, Concerning the Risk of the KH-Project, p. 1.

²⁴ Ibid., p. 2.

²⁵ Ibid., p. 2f.

completely unexpected seismic and/or volcanic activity. Any prudent political authority would never consider to stake huge amounts of taxpayers money on a project built on such dubious grounds.’²⁶

In February 2002, Grimur Bjoernsson, a geophysicist with Iceland’s National Energy Authority, pointed out major geological risks that had not been sufficiently addressed in the evaluation of the Karahnjukar project. Bjoernsson warned that the dam will be built on a crust that is much thinner than continental crusts, and that the project will be located in the vicinity of volcanic zones. In March 2003, four prominent Icelandic citizens sent an open letter to the government asking that Bjoernsson’s concerns should be adequately addressed before the project goes ahead.

7. Economic risks

According to official documents, Landsvirkjun has contracted an annual sale of 4,704 GWh of electricity from the Karahnjukar project. 4,231 GWh (or about 90 percent) are so-called firm energy, the provision of which Landsvirkjun guarantees. The remaining 473 GWh are so-called secondary power.²⁷ (Strangely, a website on KHP that Landsvirkjun maintains indicates that the project has a power generating capacity of only 4,450 GWh per year.²⁸) As is standard

The government’s Master Plan demonstrated that the Karahnjukar project was not particularly attractive in economic or let alone environmental terms. This indicates that Karahnjukar is a political project. Investing government resources in education opportunities would do more for the economic and social development of East Iceland than the old-fashioned model of state subsidies for the promotion of heavy industries.

practice in the international aluminium industry, the power rate that Alcoa will pay is linked to the future development of the aluminium price. The formula for calculating payments has been kept secret.

Landsvirkjun commissioned Sumitomo Mitsui Banking Corporation (SMBC) to evaluate the economics of the Karahnjukar project. SMBC assumed that the project will be funded with 25% equity and 75% debt. The equity will require a nominal return of 11% per year, and the debt will carry a nominal interest of 5.5% per year. (Without a government guarantee for Landsvirkjun, the cost of debt would be much higher.) Based on this assumption, the weighted average cost of capital will amount to 6.9% per year (nominal) or 5.0% per year (in real terms).²⁹

SMBC’s economic evaluation finds that the return of KHP will be above the required minimal rate of 5.0% if project construction

is not delayed by more than one year, if costs do not increase by more than 7% (above a contingency of 14% in the budget), and if the aluminum price reaches an average level of \$1,350 per ton (in 2002 dollars) over the lifetime of the project.³⁰ Based on statistical models, SMBC concludes that there is a chance of 79% that the required minimal annual rate of return of 5.0% will be achieved.³¹ (In a disclaimer, SMBC clarifies that it provides

its report “on the basis that the technical, economic and legal assumptions provided are valid and materially correct” – an important qualification.³²) Incidentally, the interim

²⁶ Ibid., p. 3.

²⁷ Sumitomo Mitsui Banking Corporation, Final Report on the Karahnjukar Hydroelectric Project, p. 7.

²⁸ <http://www.karahnjukar.is/En/category.asp?catID=169>, viewed on May 5, 2003.

²⁹ SMBC, Final Report on the Karahnjukar Hydroelectric Project, p. 3.

³⁰ Ibid., pp. 4ff.

³¹ Ibid., p. 11.

³² Ibid., p. 4.

report on the Master Plan for Hydro and Geothermal Resources that was published in April 2002 only gave KHP an intermediate ranking in economic terms.

Based on an earlier version of SMBC's report, Thorsteinn Siglaugsson, a respected Icelandic economist, prepared an independent evaluation of the economics of KHP on behalf of INCA in 2002. Siglaugsson's report concludes that the cost of equity, and thus the average cost of capital of the project, is higher than assumed by SMBC, and that the aluminum price trends used by Landsvirkjun were overly optimistic. If real aluminum prices drop by an average rate of 1.0% (an assumption that is widely shared by industry experts) and if Landsvirkjun can charge Alcoa a constant price of \$0.019 per kWh of electricity (which is rather optimistic), Siglaugsson concludes that the project can sustain a cost of capital of only 3.25%. This implies an average annual loss of \$36 million, and a negative net present value of \$425 million.³³

In order to counter criticisms of KHP, the owners of Landsvirkjun commissioned three experts to re-evaluate the utility's analysis of the project's economics. Their report was published in January 2003, and confirmed that the project would yield an internal rate of return of 5.5%. The premises of the report already appear to be out of date. The experts assumed the initial price of aluminum to be \$1,563/ton; on May 5, 2003, it stood at \$1,354/ton. In addition, the Icelandic currency has appreciated by over 10 percent, and is expected to remain strong. These factors alone reduce the rate of return from 5.5 to 4.0 percent, which would not cover the capital cost of the project.

These figures suggest that Landsvirkjun, and indirectly Iceland's public, will end up subsidizing aluminum production by Alcoa. The project also entails indirect subsidies and costs for Iceland's society that are not

³³ Thorsteinn Siglaugsson, Estimate of Profitability.

disclosed in the above evaluations of the project. The owners of Landsvirkjun – the state and two municipalities – guarantee the repayment of all Landsvirkjun loans for a fee of only 0.25%. In comparison, state guarantees are valued at 4.5% in Norway. Further, Landsvirkjun does not pay income or equity taxes, and generally does not pay for the publicly owned land it uses. On March 14, 2003, the European Free Trade Area's Surveillance Authority "deemed the aid elements of the project to be investment aid".³⁴ The EFTA body thus agreed that the Karahnjúkar project was being subsidized by the state.

In June 2002, the Icelandic economist Sigurdur Johannesson filed a complaint with the EFTA Surveillance Authority against indirect tax subsidies for Landsvirkjun. EFTA has not yet dealt with this complaint.

In April 2003, the OECD published its annual economic survey of Iceland. This report points out that "the major power-intensive investment projects" will likely cause an increase in inflation and interest rates. As a consequence, the OECD advocates a "restraint in public expenditure".³⁵ In other words, the Karahnjúkar project may well crowd out other public expenditures. OECD also noted that "buoyant expectations regarding the power-intensive industrial development projects have been pushing up the exchange rate, thereby endangering Iceland's recently favourable competitive position".³⁶ The dam and smelter project is thus making life more difficult for the country's other export sectors.

³⁴ EFTA Surveillance Authority, PR(03)04: The EFTA Surveillance Authority authorises aid to an aluminium plant in Iceland, March 14, 2003, <http://www.eftasurv.int/information/pressreleases/2003pr/dbaFile3758.html>.

³⁵ OECD, Economic Survey of Iceland, 2003, pp. 8f.

³⁶ Ibid., pp. 7f.

The economics of KHP are mediocre at best, and entail a risk of large losses for the public and negative impacts on the economy at large. The government's Master Plan demonstrated that the project was not particularly attractive in economic (or let alone environmental) terms. This indicates that Karahnjúkar is a political project. East Iceland's population declined by about 10% during the 1990s, and the promotion of the economic interests of this region is an important part of the official rationale for the project. The main problem of East Iceland is however not unemployment, and Landsvirkjun acknowledges that the smelter project will need to rely on immigrant workers. According to a study by the University of Iceland, the dwindling attractiveness of the region has more to do with a lack of cultural activities, educational opportunities, and jobs for educated women. In a detailed analysis, Julius Solnes, a professor of civil and environmental engineering and Iceland's first Minister for the Environment, found that compared with the promotion of heavy industries, government support for education, infrastructure and eco-tourism in East Iceland "emerges as a much better solution from an environmental and socio-economic point of view".³⁷

The report of the World Commission on Dams has documented that the narrow vested interests of power utilities, funding agencies, government bureaucracies and politicians were an important factor in the promotion of large dams around the world. OECD's Economic Survey of Iceland also raises the issue of vested interests in the location of infrastructure projects and other regional policies. "Clearer accounting of the costs of these policies", the report says, "would also facilitate public decision-making, ensuring that efforts to maintain regional populations

³⁷ Julius Solnes, Environmental quality indexing of large industrial development alternatives using AHP, p. 301.

reflect the national will, rather than more narrow interests."³⁸

8. Financing strategy

Landsvirkjun is owned by the Icelandic state (50%) and the cities of Reykjavik (44.5%) and Akureyri (5.5%). The utility enjoys a strong credit rating because the owners guarantee all its obligations. According to the rating agency Standard&Poor's, "on a stand-alone basis, Landsvirkjun's credit quality is barely investment grade, but in the absence of any privatisation or abolition of its guarantee status, the ratings are expected to move with the sovereign's credit ratings".³⁹

In the past five years, Landsvirkjun has funded its investments through a so-called Euro Medium Term Note (EMTN) programme and bonds. In May 1998, the utility arranged a \$1 billion EMTN programme with an international banking syndicate. Under this bond-like programme, Landsvirkjun can periodically issue notes up to the total amount of \$1 billion. These notes are sold by the banks of the original syndicate, or by other banks that are commissioned by the original dealers. So far, Landsvirkjun has issued 23 notes for a total amount of \$672 million. The utility can thus still issue notes of more than \$300 million under the existing EMTN programme as long as banks are prepared to sell them. Merrill Lynch was the arranger of the 1998 programme; the other dealers were ABN AMRO, JP Morgan, UBS Warburg Dillon Read, and Daiwa Securities SMBC.

Landsvirkjun has also issued eight bonds for a total amount of \$243 million since 1998. Most bonds were privately placed; some were publicly issued. The bulk of the

³⁸ OECD, Economic Survey of Iceland, 2003, p. 13.

³⁹ Standard&Poor's, Research: Icelandic Electric Company Landsvirkjun Outlook Revised to Stable in Line With Sovereign, 20 November 2002.

Landsvirkjun bonds was sold by ABN AMRO. Other active sellers of bonds and EMTN notes included Banque AIG and Commerzbank. Landsvirkjun has not taken up any loans since 1997.

The cost of the Karahnjúkar project is estimated at \$1,086 million. According to the utility's chief financial officer, Landsvirkjun plans to raise the funds for KHP from the following sources:

- ?? a “large, longer-dated revolving facility”, i.e. a type of loan that would allow Landsvirkjun to borrow and repay flexibly;
- ?? long-term funding from the European and Nordic Investment Banks (EIB, NIB) “in the early stages of the project”;
- ?? and “EMTN’s, both private and public”.⁴⁰

On March 13, 2003, 120 NGOs from 47 countries sent an appeal to the European and Nordic Investment Banks and all the private banks that had funded Landsvirkjun since 1998. They stressed “that the Karahnjúkar Hydropower Project should not go ahead, and that alternative options for Iceland’s economic development that do not threaten the country’s natural heritage should be promoted”. The NGOs called on all public and private financial institutions “not to fund the Karahnjúkar Hydropower Project, either directly or through Landsvirkjun”.⁴¹

⁴⁰ Stefan Petursson, Further growth of power investments in Iceland, September 2002. See also Sumitomo Mitsui Banking Corporation, Final Report on the Karahnjúkar Hydroelectric Project, p. 12.

⁴¹ International NGO Appeal to Public and Private Financial Institutions regarding the

The European Investment Bank – the largest official financial institution that could possibly fund KHP – will play a special role in Landsvirkjun’s financing strategy. On April 7, 2003, the EIB informed International Rivers Network that it had “not received a formal request to finance this project”.⁴² According to EIB’s project cycle,

“We believe that the Karahnjúkar Hydropower Project should not go ahead, and that alternative options for Iceland’s economic development that do not threaten the country’s natural heritage should be promoted. We call on the European Investment Bank, the Nordic Investment Bank, and other public and private financial institutions not to fund the Karahnjúkar Hydropower Project, either directly or through Landsvirkjun.” (Appeal of 120 NGOs from 47 countries to financial institutions, March 2003)

projects at the initial stage can be submitted to the Bank formally or informally, and the Bank encourages sponsors to present projects to the Bank “at the earliest possible stage, especially in the case of infrastructure schemes and projects mounted under public-private partnership”. On April 11, IRN inquired whether KHP had been submitted informally for consideration by EIB. The Bank reassured IRN that it was dealing with this question, but was not able to answer it by May 27.

Germany’s Commerzbank has so far been the only private bank to express interest in financing KHP.⁴³ Like EIB, Commerzbank has been reluctant to clarify this interest in more detail.

Kárahnjúkar Hydropower Project in Iceland, March 13, 2003, (<http://www.irm.org/index.asp?id=/programs/europe/030313.pr.karahnjukar.html>) .

⁴² Yvonne Berghorst, EIB, personal communication, April 7, 2003.

⁴³ Dennis Phillips, Commerzbank, personal communication, April 17, 2003.

9. Conclusion and recommendations

“I am strongly opposed to grand scale, old fashioned economic solutions that are based on simplistic exploitation of natural resources”, the noted Icelandic scientist Gudmundur E. Sigvaldason said about the Karahnjukar project in March 2003. “This in particular when the Icelandic nation has not exploited its rapidly increasing human capital expressed in a work force of young Icelanders educated in the best universities of the Western World and returning home with the highest degrees of learning.”⁴⁴ In a letter to Alcoa dated January 9, 2003, the Iceland Nature Conservation Association called the project “government subsidized destruction of nature”.

The interim report of the government’s Master Plan ranked Karahnjukar as one of the least acceptable projects in environmental terms, and as not one of the most favoured projects on economic terms. KHP is clearly a political project. An independent analysis has concluded that Karahnjukar might well cause massive financial losses to Landsvirkjun and Iceland’s society. These government resources could be invested more wisely to promote regional interests than by subsidizing an aluminum smelter, for example by supporting higher education opportunities in East Iceland.

On a global scale, there is no need for the Karahnjukar project and the Reydaral smelter. There is a large oversupply of smelter capacity, and Alcoa alone has idle

⁴⁴ Gudmundur E. Sigvaldason, Concerning the Risk of the KH-Project, p. 1.

smelting capacity to the tune of 445,000 tons. In addition, global aluminum consumption is wasteful. In its 2002 Annual Report, Alcoa proudly points out that it makes sheet “for 100,000,000,000 (that’s 100 billion!) aluminum beverage cans every year”.⁴⁵ The recycling rate for beverage cans in the US – Alcoa’s most important market – has fallen steadily in recent years and dropped below 50 percent in 2001. At the present recycling rate, Alcoa will require more than 700,000

“I am strongly opposed to grand scale, old fashioned economic solutions that are based on simplistic exploitation of natural resources. This in particular when the Icelandic nation has not exploited its rapidly increasing human capital expressed in a work force of young Icelanders educated in the best universities of the Western World and returning home with the highest degrees of learning.” (Gudmundur E. Sigvaldason, former director, Nordic Volcanological Institute and former chair, Icelandic Science Fund)

tons of aluminum from new ingot per year, or more than twice the capacity of the Reydaral smelter, only for producing beverage cans.

It is not acceptable to destroy an area of high conservation value for a reservoir and smelter project that could easily be substituted by

higher recycling rates, that is motivated by the cost-saving strategy of an aluminum producer, and that does not adequately address the social and economic problems of the region it is supposed to support. The Iceland Nature Conservation Association, International Rivers Network, Friends of the Earth International and the CEE Bankwatch Network put forward the following proposals to the government of Iceland, Alcoa, and financial institutions⁴⁶:

The Icelandic government should

- ?? ensure that the Master Plan for the power sector is finalized through a transparent, participatory and timely process;

⁴⁵ Alcoa, Annual Report, 2002, p. 10.

⁴⁶ For a more detailed list of recommendations, see BirdLife International et al., Hydropower Development in Iceland, pp. 19ff.

- ?? withdraw support for the Karahnjukar project due to unacceptable environmental impacts and questionable economic benefits;
- ?? and replace the outdated paradigm of damming and diverting rivers by an integrated river basin management approach as supported, for example, by the World Commission on Dams.

Alcoa should

- ?? withdraw from the Karahnjukar project and the Reydaral smelter;
- ?? and support effective measures to increase aluminum recycling rates.

Public and private financial institutions should

- ?? not provide any funds for the Karahnjukar project or the Reydaral smelter;
- ?? not provide any funds to Landsvirkjun as long as KHP features prominently in the pipeline of the power utility;
- ?? and develop guidelines on the aluminum sector that prevent the funding of new smelting capacity or power projects linked to smelters that have unacceptable environmental impacts and/or that could be easily substituted by higher recycling rates.

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Friends of the Earth International is a federation of environmental organizations from 68 countries, and campaigns on the most urgent environmental and social issues of our day. www.foei.org

The *CEE Bankwatch Network* monitors activities of international financial institutions in Central and Eastern Europe, and proposes constructive alternatives to their policies and projects. www.bankwatch.org

The *Iceland Nature Conservation Association* advocates the conservation of nature through public education, the monitoring of government agencies, and improved legislation. www.inca.is

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