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An aluminium smelter in Reyðarfjörður, Eastern Iceland

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Introduction

This study of the EIA for an aluminium smelter in Reyðarfjörður on the east coast of Iceland deals with a proposal made by Hraun ehf private limited company) in 1999 for a 480 000 tons/y aluminium smelter in Reyðarfjörður to be built in three phases relating to output capacity, namely, 120, 360 and 480 thousand tons per year.

The study deals with the EIA, which was performed in accordance with the Icelandic EIA Act dating from 1993. It should be noted however that a new EIA Act became applicable as of June 2000, introducing new requirements regarding both process and documentation. Moreover, this study does not deal with the revised plans presented in May 2000 by Reyðarál hf (limited company) for an aluminium smelter in Reyðarfjörður.

Background information – project development and the EIA context

The project proposal for an aluminium smelter in Reyðarfjörður was made by Hraun ehf, acting on behalf of a company to be set up by Hydro Aluminium Metal Products of Norway in conjunction with a group of Icelandic investors. Hraun ehf was formed after the public announcement of the tender for a 480 000 tons/y aluminium smelter in Reyðarfjörður. The Noral declaration, as the tender was called, was signed by Hydro Aluminium Metal Products in Norway, the National Power Company in Iceland and the Icelandic Ministry for Industry and Commerce on June 29th 1999.

The EIA for the aluminium smelter was presented by STAR (Project Management of Location Assessment in Reyðarfjörður), on

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behalf of Hraun ehf. The parties to STAR were the municipality of Fjarðabyggð, the Invest in Iceland Agency, and the Energy Marketing and Power and Industry Committee of the Municipalities in eastern Iceland. The Environmental Impact Statement (EIS) was prepared by a consultancy group formed by three consultancy firms, Hönnun, VST, and Hönnun og ráðgjöf (Hraun ehf & STAR 1999).

The development aim

The stated objective of the project was to build up an economical, power intensive industry that would utilise local sustainable energy resources, thus helping to reverse the de-population trends prevalent across the communities on the east coast of Iceland (Hraun ehf & STAR 1999).

The background to the project

The predominant factor in the potential utilisation of hydro-power energy in Iceland lies in the natural geography of the river system that runs north from the Vatnajökull glacier in eastern Iceland. Indeed, the potential for the utilisation of this energy source has been studied since 1970 (The National Power Company 1999). Potential users of such an energy source have been identified as power-intensive industries on Iceland's east coast (Reyðarfjörður), as well as power-intensive industries elsewhere in Iceland. Additionally, the direct export of electricity to Europe via a submarine cable has also been considered as an option of some potential. The creation and maintenance of sustainable power intensive industry in Reyðarfjörður has been on the agenda of Icelandic governments for the last 20 years, both with regard to the utilisation of energy resources and as a regional policy instrument in itself. An important factor in this context is the fact that mid-eastern Iceland has suffered from significant de-population since the mid-1980s. Young people have vacated the area moving predominantly to the Reykjavík area, which benefits from a greater diversity in educational and employment opportunities. On Iceland's east coast, the economy is mainly based around the fishing industry, agriculture and related services. An aluminum smelter located in Reyðarfjörður is expected to be a significant addition to the economy of the region and to bring about a change in population and migration trends across the area (Hraun ehf & STAR 1999).

Two aluminium smelters are already operating in Iceland, a 160 000 tons/y smelter at Straumsvík in Hafnarfjörður, and a 60 000 tons/y smelter at Grundartangi in Hvalfjörður, which is now in the process of expanding its capacity to 90 000 tons/y. Both these factories are however located close to Reykjavík in south-western Iceland.

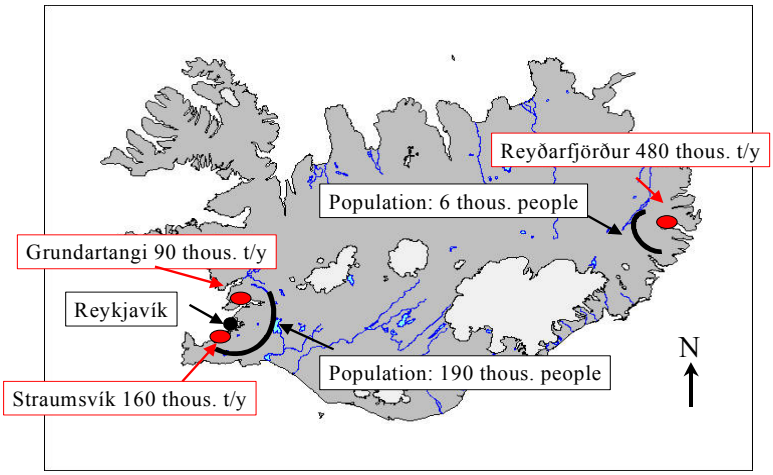

Figure 1. Location of the aluminium industry in Iceland and population in commuting areasindustry in Iceland commuting areas

An EIA for the enlargement of the aluminium smelter in Straumsvík from 100 to 200 000 tons/y was completed in 1995 (The Planning Agency 1995), whilst a further EIA for a new 180 000 tons/y aluminium smelter in Hvalfjörður was completed in 1996 (The Planning Agency 1996). These factories use energy from hydro-power plants in south and north-western Iceland, in addition to energy from a geothermal power plant in south-western Iceland. In 1998 the population of the commuting area encompassing these two factories was around 190 000. The plans dealt with in the context of this paper for an aluminium smelter in Reyðarfjörður, were for a 480 000 tons/y facility, which would be the largest factory of its kind in Iceland. In 1998 the population of the commuting area surrounding the proposed factory was approximately 6 000 people (Statistics Iceland 2000).

On June 29th 1999, Hydro Aluminium Metal Products in Norway, the National Power Company in Iceland, and the Icelandic Ministry for Industry and Commerce signed a declaration on the Noral project. The Noral project was planned to consist of a 480 000 tons/y aluminium smelter in Reyðarfjörður, hydro power plants in eastern

Iceland and other necessary infrastructure, including harbour facilities in Reyðarfjörður. The first phase of the project included a 120 000 tons/y aluminium smelter in Reyðarfjörður, a 210 MW hydro-power plant in Fljótsdalur, north of Vatnajökull, and other necessary infrastructure. The overall aim of the signatories was to advance preparations sufficiently to allow for a final decision on the project to be taken by June 1st 2000 (Hydro Aluminium Metal Products in Norway et al. 1999).

The characteristics of the project

The construction of the 480 000 tons/y aluminium smelter in Reyðarfjörður on the east coast of Iceland was planned in three phases relating to production capacity, namely 120, 360 and 480 000 tons/y.

The first phase – creating an annual production capacity of 120 000 tons: Construction was scheduled to start in 2001 and was to last 24 months. Operations were scheduled to commence in the latter part of 2003. The project cost was estimated at ISK 30 billion (USD 420 million). The energy needed for the first phase would be 1,660 GWh/y, corresponding to around 25% of present energy production in Iceland. The first phase would provide approximately 270 man-years of employment, whilst the maximum number of workers required during the construction period was estimated to be approximately 800.

The second phase –- creating a total annual production capacity of 360 000 tons: Construction was scheduled to begin in 2008-2012. The cost of the second phase was estimated at ISK 55 billion (USD 770 million). The energy levels needed for the aluminium smelter after the second phase would be 4,990 GWh/y, corresponding to around 70% of the present energy production of Iceland. The first and second phases combined would provide approximately 570 man-years of employment, and the maximum number of workers required during the construction period of phase two was estimated to be approximately 1,000.

The third phase – creating a total annual production capacity of 480 000 tons: Construction was scheduled to begin in 2011-2015. The cost of the third phase was estimated to be ISK 26 billion (USD 360 million). The energy levels needed for all three phases combined would be 6,640 GWh/y, corresponding approximately to the total maximal output of energy production in Iceland at current levels. The completed smelter would give approximately 720 man-years of employment, and the maximum number of workers required during the

construction period of phase three was estimated to be approximately 500.

The total cost of the EIA was around ISK 50 million (The Minister of Industry and Commerce's response to an enquiry in the Parliament December 8th 1999).

EIA, planning and operating licence processes

The EIA Act of 1993 did not include formal procedural requirements at the scoping stage. The formal EIA process therefore commenced when the developer submitted a final EIS to the Planning Agency for review.

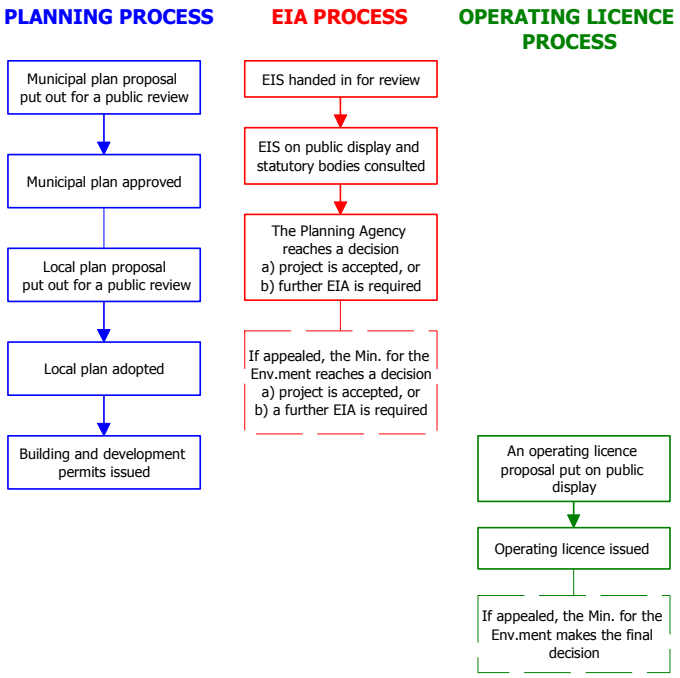

Figure 2. EIA, planning and operating licence processes in Iceland

The Planning Agency then proceeded to distribute the EIS for public comment, whilst itself undertaking a consultation process with the requisite statutory bodies. After the five weeks public consultation period, the Planning Agency had a further three weeks to reach its decision on the EIS. The decision could either be that the project was

accepted, with or without attached conditions, or that a further EIA was needed in order to address certain specified issues. The Planning Agency's decision could be appealed to the Minister of the Environment.

The positive EIA decision of the Planning Agency, or if appealed, that of the Minister for the Environment, is a necessary precondition for the attainment of building and/or development permits issued by local authorities, and for operating licences issued by environmental health authorities. These permits have to take full account of the final EIA decision and conditions stipulated therein.

The construction of aluminium smelters is subject to the attainment of an operating licence. The operating licence procedure could at this time only begin however when the final EIA decision had been issued. The operation licence procedure includes public consultation and provision for an appeal to the Minister of the Environment, based on the Environmental and Food Agency's decision.

The construction of aluminium smelters is also subject to the attainment of development and building permits. Such permits have to be in accordance with the local authority's municipal plan, and a local plan for the site in question. These plans may exist prior to the EIA process, be in preparation during the EIA process, or follow the period when the EIA decision has been reached. Permits themselves cannot however be issued before the EIA decision has been reached.

The EIA contents and quality

The scope of the EIS

The EIS dealt with environmental impacts during construction and operation of the aluminium smelter (Hraun ehf & STAR 1999). The main issues were:

1. Air and air pollution
    a. Climatic and geographic conditions
    b. Reference limits for pollutants
    c. Emission limits for the factory
    d. Selection of purification equipment
    e. Air pollution buffer zones
2. Sea and marine life
    a. Disposal of spent pot liners
    b. Drainage

3. Flora and fauna
4. Landscape and geological formations
5. Land use
6. Population and business
    a. Population and built-up areas
    b. Housing and services
    c. Traffic
    d. Noise
7. Cultural relics
8. Risk of natural disasters
9. Related development

Alternatives, cumulative impacts and related development

Location: The location of the factory was chosen before the EIA was carried out. Moreover, the decision to site the factory on the Reyðarfjörður had also been taken before the EIA was made. The chosen location was at Hraun, on the north shore of Reyðarfjörður. Other sites such as Leirur near the village of Búðareyri, and Eyri on the south shore of the Reyðarfjörður were examined but rejected.

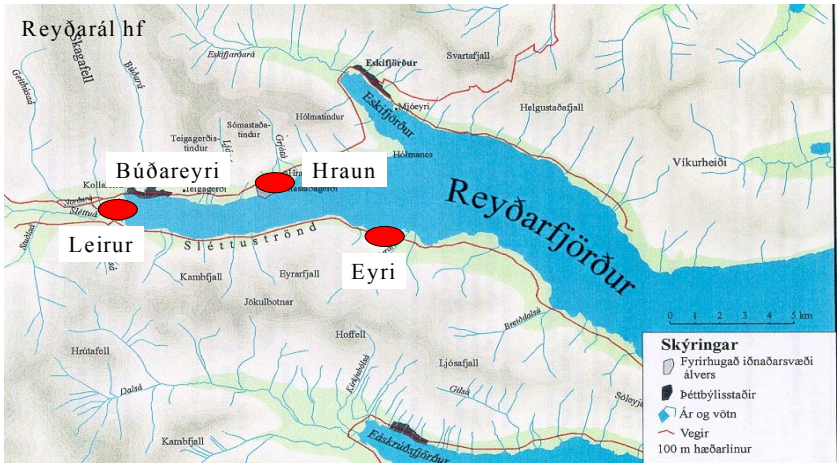

Figure 3. Location for alternatives for the 480 thous. tons/y aluminium smelter in Reyðarfjörður, east Iceland

Hraun was chosen mainly with regard to air dispersion, as meteorological readings had shown that air dispersion conditions at there were better than at Leirur at the end of the fjord. Additionally, it should be noted that landscape and harbor conditions were better at Hraun than at the other sites. As such, this site was the only one dealt with in the EIS (Hraun ehf & STAR 1999).

Technique: The proposed factory presented in the EIS was to be equipped with dry-scrubbing equipment in its first phase. In addition, the best available technology would be used in the reduction process in order to minimise pollution. To decrease pollution from sulphur, anodes with a low sulphur content would be used. Both dry- and wet-scrubbing facilities would also be installed in the second and third phases. In addition, emissions ventilation would be increased threefold when the anodes in the reduction pots needed to be replaced, in order to reduce the amount of unfiltered emissions released into the pot room (Hraun ehf & STAR 1999).

The EIS incorporated the conclusions of a forecast of air distribution emissions, undertaken by the Norwegian Institute for Air Research, which focused on the potential dispersion of sulphur dioxide, fluorides and PM10 in the context of varying production alternatives, namely 120, 360 and 480 000 tons of aluminium/y. Calculations were presented for these four alternatives with a dry scrubber, and with both dry- and wet scrubbers, using the anticipated design values for smelter emissions. Emissions from the various production alternatives were calculated according to the PARCOM[1] definition of best available technology and its emission guidelines for new pre-bake lines built after 1999. A forecast based on the experience of Hydro Aluminium Metal Products in Norway regarding emissions from aluminium smelters (HYDRO emission levels) was also presented (Hraun ehf & STAR 1999).

Cumulative impacts and related development: Plans for the aluminium smelter in Reyðarfjörður were in accordance with the Noral declaration. In accordance with the Noral declaration other projects awaiting development included new power plants, high voltage power lines and a harbour in Reyðarfjörður (Hydro Aluminium Metal Products in Norway et al 1999).

[1] Iceland is a signatory to the Oslo-Paris Convention, PARCOM[1], an international agreement on the prevention of marine pollution from land-based sources. PARCOM provides guidelines for governments, establishing certain levels which are to be reached by the year 2005 for aluminium smelters constructed after 1999.

According to the Noral declaration, energy for the first phase of the aluminium smelter was to be provided by the new 210 MW power plant at Fljótsdalur. This project, was however exempt from the EIA process, as it had been licensed in 1991, and was thus exempt from the constraints of the EIA Act of 1993 (The National Power Company 1999).

The Planning Agency recommended to the developer that the EIAs concerning the new harbour at Hraun in Reyðarfjörður, high voltage power lines to the aluminium smelter itself, and the EIA concerning the development of the Bjarnarflag geothermal power station – all of which were deemed to be prerequisites to the commencement of the first phase of the construction of the aluminium smelter – should be made public simultaneously (The Planning Agency 1999a and 1999b). This recommendation was not however accepted.

Quality of the EIS

The EIA Act of 1993 did not include formal requirements on documentation or process procedures during the scoping stage of the environmental impact assessment. The Act set out only general requirements as to the content of EISs, which in themselves were complemented by general EIA guidelines published by the Planning Agency. The EIS for the 480 000 tons/y aluminium smelter in Reyðarfjörður was considered to conform to these requirements. The EIS did address the most significant impacts of the aluminium smelter. The location in Reyðarfjörður did however, due to geographical and certain prevalent climatic conditions, call for more detailed information and analysis.

The EIA process

The EIA process for the Reyðarfjörður aluminium smelter can be divided into three parts: Firstly the preparation process, secondly the review process and thirdly, the decision-making process, which involved both the Planning Agency and the Minister for the Environment who had to rule on the appealed decision of the Planning Agency.

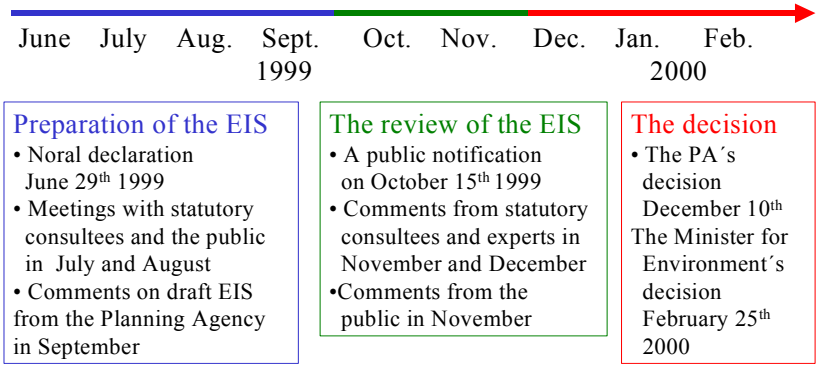

Figure 4. The EIA process for a 480 thous. tons/y aluminium smelter in Reyðarfjörður, east Iceland

The preparation of the EIS

On June 29th 1999 the Norwegian company, Hydro Aluminium Metal Products, the National Power Company in Iceland and the Icelandic Ministry for Industry and Commerce jointly signed a declaration on the Noral project. This project consisted of a 480 000 tons/y aluminium smelter in Reyðarfjörður, hydro power plants in eastern Iceland and other necessary infrastructure, including harbour facilities on the Reyðarfjörður. The first phase of the project consisted of a 120 000 tons/y aluminium smelter, a 210 MW hydro-power plant at Fljótsdalur north of Vatnajökull and other necessary infrastructure. The overall aim of the signatories was to advance preparations sufficiently to allow for a final decision on the project a year later that is by June 1st 2000. According to the time schedule in the Noral declaration, the EIS should be submitted for review and an application for an operating licence for the aluminium smelter tendered before September 1st 1999. By February 1st 2000 it was expected that approval of the EIA from the relevant authority would be secured.

In July and August 1999 meetings were arranged in Reyðarfjörður on behalf of the developer to inform statutory consultative bodies, companies, NGOs and other interested parties on the scope of the project, giving all concerned an overview of the EIA process for the aluminium smelter. As part of this consultation process the developer had also sought advance comment from such parties (Hraun ehf & STAR 1999).

Draft EISs were presented to the Planning Agency on two occasions, in August and September 1999. The Planning Agency gave its comments to the developer on the content of the draft EIS in Septem-

ber. The main comments dealt with issues regarding the scope of the project itself. As laid out in the Noral declaration, the overall intention of the project was to construct a 480 000 tons/y aluminium smelter in three phases. Though the draft EIS introduced the notion of a 480 000 tons/y aluminium smelter however, it proceeded to deal primarily with the environmental impact of the first phase, that is to say with those factors relating to the construction of a 120 000 tons/y aluminium smelter. For their part, the Planning Agency, even at this stage, stressed the importance of laying out the implications of stages two and three of the proposed project, and in particular their expected environmental impacts, along with the proposed mitigation measures to be undertaken. The Planning Agency, however, recommended that, given the existing material on the project's environmental impact, at this stage the EIS would only deal with the first phase, that is to say with the 120 000 tons/y aluminium smelter (The Planning Agency 1999a and 1999b). The developer did not accept this proposal.

The Planning Agency pointed out at the same time that the construction and operation of an aluminium smelter in Reyðarfjörður was likely to have a considerable impact on the community and local business in the area, and therefore that it would also be necessary to deal with these issues in the EIS. Moreover the Planning Agency also stressed the importance of dealing with the impact on land use in the areas surrounding the factory site, as an air pollution zone around the factory would inevitably set restrictions in this regard. In addition, it suggested that the EIS would also have to address issues relating to the impact assessments on air, land and sea pollutants in this context (The Planning Agency 1999a and 1999b). These recommendations were however not fully accepted.

The review of the EIS

In October 1999, the developer submitted to the Planning Agency for review a final EIS for a 480 000 tons/y aluminium smelter. The EIS was accepted for review, although the Planning Agency's comments on the draft EIS had not been fully taken into account. The Planning Agency circulated the EIS for public display and presented it to the relevant statutory consultative bodies.

During the review period, the Planning Agency consulted the municipality of Fjarðabyggð, the Iceland Nature Conservation Agency, the Institute of Regional Development, the Farmer's Association of Iceland, the Iceland Tourist Board, the Marine Research Institute, the Board of Public Health for Eastern Iceland, the Environ-

mental and Food Agency of Iceland, the Icelandic Maritime Administration, the Icelandic Meteorological Office, the Directorate of Freshwater Fisheries, and the National Museum of Iceland (The Planning Agency 1999c).

The Planning Agency also sought an expert opinion on the potential effects to the community, and the opinion of the Ministry of the Environment on the project's consistency with the United Nations Framework Convention on Climate Change, and the Kyoto Protocol. In addition, the Planning Agency also sought the opinion of the Icelandic Meteorological Office regarding the risk of avalanches and landslides.

In their comments, the statutory bodies consulted remarked upon, among other things, the data on climatic conditions and currents in Reyðarfjörður, given the special geographical conditions there. They also remarked upon the lack of available information with respect to the expected buffer zones for air pollution relating to the different construction options and construction stages, and on the lack of consultation during the EIS preparation. Moreover it was pointed out by the statutory bodies that the accumulation and distribution of pollutants could prove to be a more serious problem in the Reyðarfjörður area than it had appeared to be from the experience garnered in the operation of aluminium plants in south-western Iceland, and therefore that grounds existed for more stringent requirements in relation to pollution prevention in Reyðarfjörður than had previously been the case for activities of this sort in Iceland (The Planning Agency 1999c).

The general public was given five weeks from the public announcement of the EIS to submit comments to the Planning Agency. 75 remarks were received from the public at large, most of which expressed concern for the environment in Reyðarfjörður, i.e. in relation to the risk of air and sea pollution due to environmental conditions, stating that conditions in Reyðarfjörður were unfavourable for heavy industry. Additionally, concern was raised regarding issues of community structure, i.e. that such economic activities as were being proposed would inevitably create substantial excess demand for labour in the region, causing temporary problems for existing businesses in the region. The majority of the seventy five submissions however commented on the fact that connected developments such as the construction of the proposed hydro-power project in Fljótsdalur was exempt from EIA requirements, due to an existing development permit dating back to 1991, which as we have seen proceeded the EIA Act (The Planning Agency 1999c).

In response to comments made by the statutory bodies and by the general public, the developer submitted a substantial number of supplementary documents to the Planning Agency (The Planning Agency 1999c). The Planning Agency then proceeded to consult further with the Iceland Nature Conservation Agency, the Marine Research Institute, the Environmental and Food Agency of Iceland, and the Icelandic Meteorological Office on the basis of the developer's supplementary material. The submitted supplementary documents however primarily contained more detailed information on the environmental impact assessment of the first phase of the aluminium smelter, and thus were not considered to be open to public consultation.

The decision of the Planning Agency and the decision of the Minister for the Environment

The Planning Agency's decision on the EIS was announced on December 10th 1999 (The Planning Agency 1999c). The decision was, that a further EIA was required on issues such as:

- More detailed climatic data to be used for the calculation of air pollution.
- Comparison of wet and dry scrubbing of emissions from the first phase of the smelter.
- Proposals for buffer zones for the different construction options and construction stages.
- More detailed information on currents and possible stratification of the sea, disposal of spent pot liners, pollution by PAH substances on land and at sea.
- Removal of landfill material, the risk of mudslides on the construction site of the aluminium smelter, land use in Reyðarfjörður and in the municipality Fjarðabyggð.
- The impact on the population in the Eastern Fjords and on the industries already present in the area.
- Plans for environmental monitoring.

The provisions of the EIA Act state that any party can appeal the decision of the Planning Agency to the Minister of the Environment. Hraun ehf, and the Nature Conservation Association of Eastern Iceland in addition to one private individual, did proceed to appeal the decision of the Planning Agency to the Minister. The Minister's decision was to invalidate the appealed decision of the Planning Agency

regarding the EIA of the 480 000 tons/y aluminium smelter in Reyðarfjörður. In addition, the process of the case, which began with the notification of the developer was declared null and void in its entirety (The Ministry for the Environment 2000).

In the Minister's decision it was stated that it was not clear that the developer was ever made aware, before the appealed decision was published, that the notification of its proposed project was limited to an environmental impact assessment for a 480 000 tons/y aluminium smelter, with the legal consequence that it would not be possible to assess the separate stages individually. It is stated that on the contrary the developer could have understood, after consultation with the Planning Agency during the review period, that it would be possible to separately assess the environmental impacts of the first phase independently from those of the other phases of the project.

Indeed it is the Planning Agency's understanding that, according to the EIA Act, it is possible to separately assess the environmental impacts of the first phase of the factory independently of the other phases of the project, and that the developer in this case was made aware of that, prior to notification.

Furthermore the Minister's decision declares that the developer's appeal and its subsequent comments on the decision of the Planning Agency, clearly revealed its position from the outset. Namely that it wanted an independent EIA of the first phase of the proposed aluminium smelter, independent of its later phases. It is stressed that the developer has, on the merits of each case, certain rights of decision in cases, which concern the environmental impact assessment of its project, including the right to withdraw its request at any time. Taking this into consideration, the Minister was of the opinion that it would be a highly unnatural conclusion if the case in question was maintained in a channel which was contrary to the developer's plans on how it intended to carry out the proposed project (The Ministry for the Environment 2000).

Conclusion

When assessing the experience of the Environmental Impact Assessment process as it relates to the 1999 proposal to construct a 480 000 tons/y aluminium smelter in Reyðarfjörður it has to be kept in mind that this project was not carried out, and therefore that the lessons learned only relate to the EIA process and the EIS as such, but not for example to how the EIS dealt with the actual main impacts of the

project as seen under construction or operation. After the EIA process, the proponents of the project issued a new statement and a new EIA process was entered into, where the timeframe, phasing of the project and various other substantial elements had been revised and altered. To what extent that decision was a result of the EIA process in 1999 will not be speculated upon here. A number of other matters however certainly influenced the decision that eventually was taken. Not the least of which were issues relating to the needs of other business players in the local economy and a potent political concern for environmental issues, both of which were raised in Parliament during the autumn of 1999.

As such, a simple listing of some important elements influencing the EIA process carried out in 1999 can be drawn up:

The time frame of the project preparation did put constraints on data collection and analysis. The time frame of the EIA process had already been determined by the Noral declaration signed by Hydro Aluminium Metal Products of Norway, the National Power Company in Iceland and the Icelandic Ministry for Industry and Commerce, in the Summer of 1999.

Criticism raised by consultees and by the general public during the review of the EIS also goes some way to demonstrating a lack of consultation during the EIS preparation. At this time there were no requirements in the EIA Act for a scoping document or indeed for consultation during preparation of the EIS. The new EIA Act, passed by Parliament in the Spring of 2000, does require developers to issue a scoping document or an EIA programme, which is subject to public consultation according to the EIA Act and in general accordance with EIA regulations.

Comments made by the public bodies consulted and by the general public themselves however came relatively late in the EIA process. They did however play an important role in the evaluation of the quality of the EIS and thus proved to be important in the Planning Agency's decision on the EIS. This underlines the importance of information and comments from experts and the general public during the preparation of large development projects. Moreover the EIA process gave the general public as well as experts access to the decision making process, both with regard to access to information, and through the ability to make comments on the proposed project.

The case also demonstrates the importance of scoping each EIA project specifically on a case by case basis taking into consideration the area and particular circumstances in question. It is important to

note that experience of the EIA process for aluminium smelters in Iceland already existed prior to that of the project under review here. Nevertheless it is probably the case that the specific social and geographical conditions in Reyðarfjörður were never sufficiently understood, and in particular that they differed considerably from those pertaining in and around the locations of the previous aluminium smelters. As such, it should have been recognised that the very nature of the proposed location called for more comprehensive and more detailed information gathering and analysis than had been included in the previous EIAs. The preparation of a special scoping document, as is now required by the new EIA Act, should however address this aspect of concern.

On the whole, the EIA process led to a comprehensive understanding of what the main issues regarding the environmental impact of an aluminium smelter in Reyðarfjörður would be, and it has been one of the main bases for the scoping of a new EIA for an aluminium smelter in Reyðarfjörður, which started in the summer of 2000.

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