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ALUMINUM PLANT IN HÚSAVÍK ***SOCIO-ECONOMIC IMPACT ASSESSMENT***

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1 MAIN FINDINGS

1.1 *Baseline description*

For the purposes of this report, the impact area is defined as North East Iceland. It is divided into two sub regions, the Húsavík region and two others further away from the site; those of Akureyri (Eyjafjörður) and Þórshöfn (Þistilfjörður and Bakkafjörður). A commuting distance of approximately 45 minutes is used to define the extent of the labor shed.

Some population increase has occurred in the Akureyri region, or 9.6% during the period 1998-2008, but to the east of this district, a decrease has been seen most years in most municipalities. In the Húsavík region, there has been a population decrease of 15% over the same period, and in the Þórshöfn region the fall in population has been 22%. The impact area as a whole has been experiencing net out-migration, primarily to the capital area. The fact that there are relatively fewer people within the age group 20-39 years than the national average, but relatively more inhabitants over 60 years old, is among the demographic characteristics of the impact area,

In the impact area as a whole, the size of the labor market (16-74 years) is estimated at 16,650 persons, or just over 8,900 males and just over 7,700 females and comprises around 58% of the total population. In the Húsavík region the labor market is estimated 2,550 persons, around 1,400 males and 1,150 females. The Akureyri region has a much larger labor market, or around 13,750 persons.

According to a survey carried out in 2007, relatively more persons in the Húsavík region only have an elementary education and fewer have a diploma degree or other similar qualifications. Relatively more people in the Akureyri and Þórshöfn regions have vocational training. There is little difference between regions as far as university education is concerned.

While the registered unemployment ratio has been low, it has, however, been somewhat higher in the impact area than in the whole of Iceland. Fluctuations in the ratio have shown a similar pattern as for those in the country as a whole.

In the impact area, the structure of the economy is more similar to that of Iceland as a whole, than it was in East Iceland in 2002, prior to the Alcoa Fjarðaál project.

Differences in the state of health between residents in the capital region and those in other regions of Iceland can be observed, e.g. in the Húsavík region, according to a survey of The Public Health Institute of Iceland in 2007, and health levels appeared to be somewhat better in the capital region.

The impact area has 15 municipalities. The largest has just over 17,000 inhabitants (Akureyri) and the smallest only 60 (Tjörneshreppur just north of the site). Amalgamation of municipalities has aimed at forming larger units, since the most sparsely populated municipalities are less able to provide necessary services than their larger counterparts. To solve this, small municipalities usually cooperate with larger ones on providing certain services. The project is located within the boundaries of the municipality Norðurþing, which has merged in recent years and is relatively large by Icelandic standards; it is now the main municipality in the Húsavík region.

Services are generally of a high standard in the impact area, not least since it is the most densely populated area of Iceland outside the capital region. This applies to public services such as schools at all levels. Health services are good and the largest hospital outside Reykjavík is located in Akureyri. Conditions for recreation and outdoor life are very good, and the area is known for its exceptionally beautiful natural assets. Culture is diverse, as are business services in the impact area, especially in Akureyri.

Conditions regarding infrastructure are relatively good. However, a few necessary improvements are required. Among these is upgrading the road connecting Akureyri and Húsavík, which this report considers a precondition for the project along with various social impacts dealt with in this report. The first prerequisite is a road tunnel on highway 1 through the mountain ridge Vaðlaheiði, east of Akureyri. This will replace the present road over the mountain, that is sometimes impassable in winter due to snowstorms. This will also shorten the distance between the two towns by some 15 km. Secondly, the old single-lane, low-load capacity bridge on road 85 must be replaced by a new one. . This will also cut down the distance. These two projects together will shorten the distance between Akureyri and Húsavík by close on 20 km, so just over 70 km will separate them. The extension of Akureyri airport to 2,400 m will be completed in 2009 and this will create better conditions for international flights to and from the airport. Frequency of domestic flights between Akureyri and

Reykjavík is between 5 and 10 daily. The telecommunications infrastructure is owned and operated by private companies and its status is good in urban areas.

House prices in Akureyri are approximately 70% of those in Reykjavík and prices in Húsavík are around 40% of those in the capital.

There is a rich industrial tradition in the impact area, especially in Akureyri which was one of the main industrial towns in Iceland during the past century. Similarly, but to a smaller degree, Húsavík has been a processing centre for its region. In recent years, this industry has been diminishing, as well as the traditional industries in the rural areas. Services have, on the other hand, become stronger, especially in Akureyri, and to a smaller degree in Húsavík. Tourism has gained importance in the area, e.g. in the Húsavík region; at Húsavík itself and around Lake Mývatn. There are great expectations that a large workplace such as the proposed plant will strengthen the foundations of the local economy, increase the number of jobs available and their diversity.

1.2 Impact assessment

It is estimated that between 3,000 and 4,000 man-years will be created while constructing the plant in Húsavík. These will, however, be temporary jobs and unlikely to exert long term influence on the population of the area.

If the project commences in 2010, the Icelandic economy will still be in depression and the crowding-out effects of the construction are expected to be minimal. The project will have a positive effect on a large number of people, as well as on the economy as a whole. It will create jobs for thousands of people who would otherwise be out of work. If the project commences in 2012, the economic situation is more uncertain.

Applying an economic base model, indicates that the number of inhabitants will be 1,900 more with a plant of 300 man-years than without the plant. If the plant generates 450 man-years, it is estimated that inhabitants will number 2,850 more with the plant than without it.

Input-output analysis indicates that if 319 jobs are created in the plant (including summer-jobs), that means an additional 325 jobs. In total, 644 new jobs will be created with the 300 man-year plant. A population increase of 1,288 in the impact area is estimated. If the plant creates 450 jobs, the multiplier effect will be the same.

A total of 964 jobs will be generated, resulting in a population increase of 1,928 in the impact area.

It is anticipated that most employees of the plant (70-80%) will live in Húsavík. Furthermore, it is likely that a number of the specialists and managerial staff of the plant will live in Akureyri, as well as some of the ordinary workers. In total, a few dozen employees are expected to commute from Akureyri to Húsavík. Some will commute to Húsavík from neighboring communities and from close to the route between Akureyri and Húsavík.

The proportion of Icelanders working on the construction of the plant in Húsavík is likely to be higher than it was in the Alcoa Fjarðaál project in East Iceland, regardless of whether construction commences in 2010 or 2012. This is influenced by several factors. The low exchange rate of the Icelandic króna will make it less tempting for foreign staff to work in Iceland as wages and salaries will probably be paid in Icelandic króna, in accordance with Icelandic employment contracts. Furthermore, many Icelandic workers have gained experience in building aluminum plants during the past few years. Closeness to the relatively large labor market in Akureyri is yet another factor.

According to information on wage and salary levels in Alcoa Fjarðaál, it is clear that average wages and salaries in that plant are significantly higher than those of the impact area.

Based on experience from the Alcoa Fjarðaál project, education levels in the impact area can be expected to rise with the introduction of the plant.

It is not likely that the project will have a significant effect on general health levels in the impact area.

Various changes and adaptations of public services will result from the project. Population growth in the region will lead to increased demand for education and, additional housing will be required at preschool level in Húsavík. Due to a population decrease and demographic changes in recent years, the elementary schools in Húsavík and its vicinity will be able to accommodate a somewhat larger number of pupils. The total student population of upper secondary schools is not expected to increase significantly due to demographic trends. In the social services, more staff will be needed at the height of the construction work. Increased demand for diverse security

services is to be expected. This will probably be met by means of contracts between the respective parties, i.e. the state, the municipality Norðurþing and private companies providing services in this field. Heightened demand for health care is also anticipated. Emergency health services have to be readily available in the impact area. In Húsavík, such facilities are available, although they need to be strengthened. Furthermore, the hospital in Akureyri is able to provide additional emergency services. According to the spokesmen of these two institutions, they will be able to take on such additional tasks.

In order to provide adequate communications between Akureyri and Húsavík, two road construction projects on the route between the two towns are a necessary precondition for the building of an aluminum plant. Among the most important changes that will take place in the infrastructure of the area, will be the new import/export harbor for the plant in Húsavík, which will also serve the local economy. In 2009, an extension of the airport in Akureyri to 2,400 meters will be completed, resulting in significantly improved conditions for international flights to and from the area. There does not appear to be a need for specific arrangements regarding public utilities. The telecommunications system is run by private companies and necessary expansion will take place in step with demand for their services. Specific measures will need to be taken to deal with a higher volume of waste during the construction period and a new landfill site needs to be found in the Húsavík region for garbage that cannot be disposed of in the town's waste incinerator.

House prices are expected to rise in the Húsavík region, especially in Húsavík and vicinity (around 30%) as well as in Akureyri and vicinity.

It can be expected that 0-27,000 m² of additional residential housing will be needed in the Húsavík region.

Significant changes may be anticipated in matters relating to community and lifestyle. The impact of different systems of shiftwork arrangements in this large workplace will need to be considered in the context of a small labor market. It is likely that the plant's staff requirements will compete with the traditional local economy. Wages and salaries in the area are low in certain fields, especially in rural neighborhoods and probably many people will become aware of opportunities accompanying the introduction of the plant into the local economy along with consequent population

growth. All this, for example, is likely to encourage a certain boost in agricultural production. Experience from the Alcoa Fjarðaál projects shows that the planning of the workers' camps was generally successful and a similar approach is recommended for the Húsavík project.

If this project fails to materialize, two scenarios may be expected. Firstly, if the development of the local economy continues along a similar path as in recent years, with fewer jobs in primary production and various small scale industries, a continued population loss in rural areas and small villages can be expected. Secondly, and a more likely consequence, there will be a delay in harnessing the green energy of the Húsavík region while searching for some other industry to move to the area. A feeling of insecurity as to the future economic development of the region will continue, as well as uncertainty about the social impact of some other industry coming to the area.

The project appears to be in harmony with one of the major objectives of the Icelandic parliament's rural development policy for the period 2006-2009, i.e. that of strengthening specific regional centers as well as those parts of the country which have experienced depopulation during the past years.

2 INTRODUCTION

This report is compiled for Alcoa Fjarðaál as one stage in the assessment of how that company's proposed aluminum plant, at Bakki, by Húsavík would impact the area's environment.

The existing report on social impact was compiled according to suggestions for assessment strategy that HRV Engineering proposed in October 2008. In this, it is stated that RHA would handle the assessment of social impact and that the research would:

“Target the effect on the aluminum plant's construction and operation period, as well as considering the null option. The research would describe the social and economic situation in the district and estimate the probable changes required, should the building and operation of a plant in that area become a reality; and possible building phases will be taken into consideration. Also, comparisons will be made between estimated social and economic developments in the area, with and without an aluminum plant” (HRV Engineering, 2008, p. 20).

The division of chapters in this report is based on the above-mentioned estimates and a work contract with Alcoa Fjarðaál, dated 20 October 2008.

Three specialists from RHA, The Research and Development Center of the University of Akureyri, worked on this research i.e. Hjalti Jóhannesson, geographer, who was the project manager, Jón Þorvaldur Heiðarsson, economist, and Valtýr Sigurbjarnarson, geographer. Also involved in the research was Kjartan Ólafsson, sociologist and lecturer with the Department of Social Sciences and The Humanities. This report is translated English by Rafn Kjartansson and Frances Jane Milne McQueen. Research activities spanned the period June to December 2008.

Collection of data for these research purposes is based on gathering together as widely varying a pool of data as possible, and utilizing experience accumulated through research into the social impact incurred by the construction of an aluminum plant and power stations in the east of Iceland. RHA has participated in this process in recent years. Thus, the study has been supported by the integration of qualitative and quantitative research methods, helping researchers to better assess and understand those effects that come into being as a result of such projects (cf. e.g. Becker & Vanlay,

2008 and Halstead et al. 1984). Various existing sources and original data collected while working on this project are used, so that the same phenomenon may be accessed from some widely differing directions. The report is laid out in such a way that in the 3rd chapter, the impact area of the aluminum plant is defined and the larger picture described in general terms. Also, described are the main influencing factors upon which the research focuses. The 4th chapter is the second main chapter of the report. It contains a status description concerning individual impact factors i.e. the present position. The 5th chapter, another significant part of the report, deals with probable changes to the impact factors of chapter 4. Subtitles in this chapter i.e. the discussion of particular impact factors, is, however, more general since the effect on differing factors will be seen to converge, and an effect on one will lead to an effect on another or others. In chapter 6, a general comparison is made between the future of the impact area, on the one hand with an aluminum plant, and on the other with no plant. The effect on the future development of the area and the correlation of this project with official plans will be made, especially those regarding regional and communications planning.

It must be borne in mind that this report was in the process of being compiled when a serious economic crisis hit the Icelandic nation. Three of the largest Icelandic banks went under at the beginning of October and were nationalized. Also, the Icelandic króna fell dramatically during the year and most of all in the wake of the above-mentioned collapse of the banks. Thus, a dual emergency occurred; a banking crisis and a currency crisis with which the International Monetary Fund among others has had to concern itself. Because of this, all the economic aggregates for next year will differ widely from previous forecasts. Furthermore, official estimates named in the report, concerning the implementation of infrastructure projects, will change, house prices will go down and unemployment will increase, to name but a few examples. This will create increased uncertainty about how the aluminum plant project will affect society and will make it much harder to use experiences of similar projects in Iceland during past years to forecast what the impact is likely to be. The authors wish to take this opportunity to thank the many persons who were asked to help in the gathering of data and for their suggestions connected to this project.

3 THE IMPACT AREA AND DEFINITION OF IMPACTS

The impact area of the enterprise is the North East which is divided into the Húsavík section which is closest to the construction area and two other sections which lie further out, on the one hand Akureyri (Eyjafjörður), and on the other, Þórshöfn (Pistilfjörður and Bakkafjörður). It may be assumed that the definition of this impact area will provide the geographical framework within which the possible effect of an aluminum plant on society will be examined. Effects of the plant may be felt outside the boundaries of these areas and demarcation lines could be blurred between sections in cases of some particular effects. The sectional analysis, which is laid out here, is done, first and foremost, to maintain a certain order in the collection of data and its analysis for this report, as well as being a kind of hypothesis on the distribution of effects, based on previous research. The section closest to operations, the Húsavík area, is composed of four municipalities and is restricted to the potential of daily employment in the new jobs which would be created in the aluminum plant and during its construction. However, the areas in which people go about their daily work have tended to expand, due to better communications, and in some measure to improved weather conditions meaning that communications by road are less hazardous in the winter months. Here, changes for the better in communications make a huge difference to the frequency of journeys made by the inhabitants e.g. to work, to school and for daily shopping. In foreign research e.g. Dubois, Gløersen, Stead and Zonneveld (2006), it is often assumed that the norm for a drive to and from daily work is 45 minutes (each way). This estimation is assumed considerably longer for car journeys to the shops although this depends on e.g. what is on offer on the home ground and what kind of services are required. Thus, more specialized services are sought further afield (and less often) than those that are considered to be of a more general nature – and this is in keeping with the survey conducted by RHA in the year 2002 into the traveling habits of the Icelanders. (Hjalti Jóhannesson and Kjartan Ólafsson, 2004).

The following map shows that the Húsavík sector reaches out further to the east than to the west of the proposed aluminum plant. The reason for this is, among other things, the layout of the municipalities; the municipality of Norðurþing where the plant would be situated, reaches all the way to Raufarhöfn which is at a distance of 150 km from Húsavík. The limits within which one could drive to the aluminum

plant in 45 minutes, on the other hand, lie in the most easterly part of Kelduhverfi, i.e. at the river Jökulsá á Fjöllum. A municipality, however, is generally speaking, the smallest geographical unit for which diverse statistical data exists and therefore it is more advantageous to desist from splitting up municipalities when dividing up areas, as is the case here.

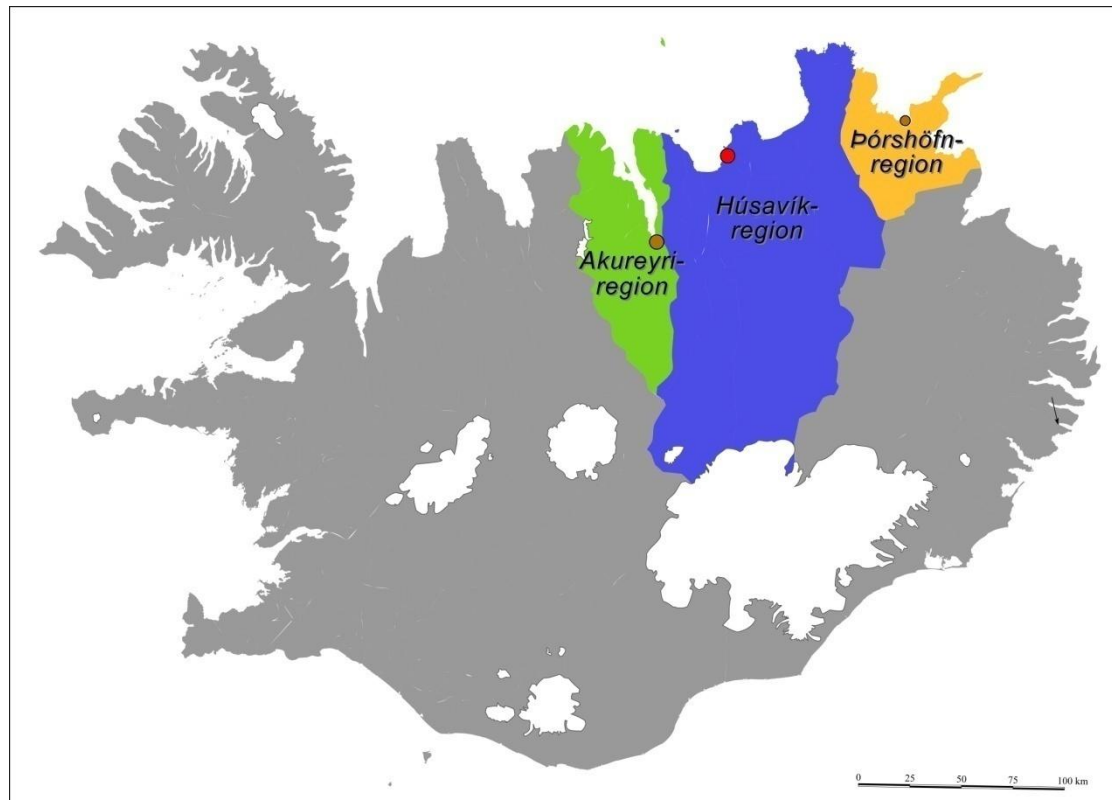


Figure 1. The impact area in North East Iceland and its division into three sub-regions for the purpose of this study

In those parts which lie further away from the proposed plant; i.e. the regions of Akureyri and Þórshöfn, the main concern is the project's possible impact, mainly in the context of utilization by inhabitants and companies in the region, of specialized services which are, in turn, connected to business expansion and increases in population resulting from the aluminum plant. Also, a limited number of people may seek work in the aluminum plant proper as well as in employment derived therefrom, despite greater traveling distances than assumed above. Outside the Húsavík area in particular, we may expect considerable impact from a larger population center with more concentrated services and easier access due to a highly developed infrastructure. Thus, the social effect is not limited to the impact area which is under scrutiny in this report; it would obviously make itself felt over a much wider area. Here, this, it seems, applies especially to the Akureyri region and the area surrounding Reykjavík;

the former due to its proximity to the construction site and the proportional size of the northern regions, and the latter because of its overwhelming role in the administration and service system to Iceland as a whole and also because it is the fulcrum of the country's communications network. The region comprises 15 municipalities of which four are in the Húsavík region (pop. 4,372), nine in the Akureyri region (pop. 23,854) and two in the Þórshöfn region (pop. 595).

The parameters of the impact area, which are detailed above, are based on experience gained in aluminum and power plant construction in the east of the country. Research into the social facet of the above-mentioned projects has indicated that this impact is more localized than was at first anticipated. Thus, the participation in construction work is, according to the surveys, small in areas lying more than a two-hour drive from the site (Kjartan Ólafsson et al. 2007, Hjalti Jóhannesson et al. 2008). Outside this traveling limit, the highest level of participation can often be traced to the most densely populated areas such as the capital and its surroundings as well as the Akureyri region.

The impact factors which will be examined in this research are as follows: population figures, the employment market, district communities, public services, services to industry, infrastructure, the housing market and the community in general and its way of life. When defining these factors, social assessments concerning the aluminum plant at Reyðarfjörður and findings from research conducted by RHA into the social impacts of other projects, were taken into account. Existing records were consulted from research by RHA and others into the social effects of aluminum and power plants in the east, dating from the year 2004. The status of these factors and some of their sub-divisions regarding the impact area before the construction of the plant will be dealt with, and estimates will be made of changes likely to occur in each of these factors, on the assumption that such a plant will become a reality in the vicinity of Húsavík.

4 BASELINE DESCRIPTION

Here we deal with the status of those topics or impact factors where we would be most likely to see changes connected with the construction and operation of an aluminum plant at Bakki, Húsavík. The discussion is based on the impact region which is described in Chapter 3, dealing in more detail with the area nearest to the plant, as we may, generally speaking, assume that the impacts will be greater there.

4.1 Population

This chapter outlines the main characteristics of the population living in the region, and its two sub-divisions. A fairly close analysis of the population and conditions of life in individual municipalities and communities close to the plant will be carried out. Information about the population is based entirely on data from the website of Iceland Statistics, (<http://www.statice.is/Statistics/Population>) and therefore references are not detailed specially, except in the case of figures or tables.

4.1.1 Demographic development

Demographic development in certain sub-areas of the construction project has been extremely varied, but as a whole, the population of the impact region is registered as being just under 29,000 on 1 January 2008. Some increase has been seen in the vicinity of Eyjafjörður, or 9.6% in 1998-2008, but to the east of Eyjafjörður there has been a decrease in population in most years and in most of the municipalities. Of those, the ones lying closest to the impact area show a decrease of 15%, while, for the same period, in those further away in Norðurþing, the fall in numbers is even greater, or just under 22%.

Table 1. Population in municipalities of the impact area Jan. 1 1998, 2003 and 2008 (municipal structure at the end of the period)

	1998	2003	2008	Change 98-08
Akureyri	15,329	16,053	17,278	12.7%
Norðurþing	3,471	3,219	2,973	-14.3%
Fjallabyggð	2,731	2,495	2,188	-19.9%
Dalvíkurbyggð	2,082	2,035	1,948	-6.4%
Grímseyjarhreppur	99	89	103	4.0%
Arnarneshreppur	210	187	171	-18.6%
Hörgárbyggð	403	372	417	3.5%
Eyjafjarðarsveit	936	975	1,007	7.6%
Svalbarðsstrandahreppur	342	374	389	13.7%
Grýtubakkahreppur	377	390	353	-6.4%
Skútustaðahreppur	466	453	399	-14.4%
Tjörneshreppur	78	66	60	-23.1%
Þingeyjarsveit	1,132	997	940	-17.0%
Svalbarðshreppur	121	120	115	-5.0%
Langanesbyggð	640	547	480	-25.0%
Impact area total	28,417	28,372	28,821	1.4%
Húsavík region	5147	4735	4372	-15.1%
Akureyri region	22,509	22,970	23,854	6.0%
Þórshöfn region	761	667	595	-21.8%

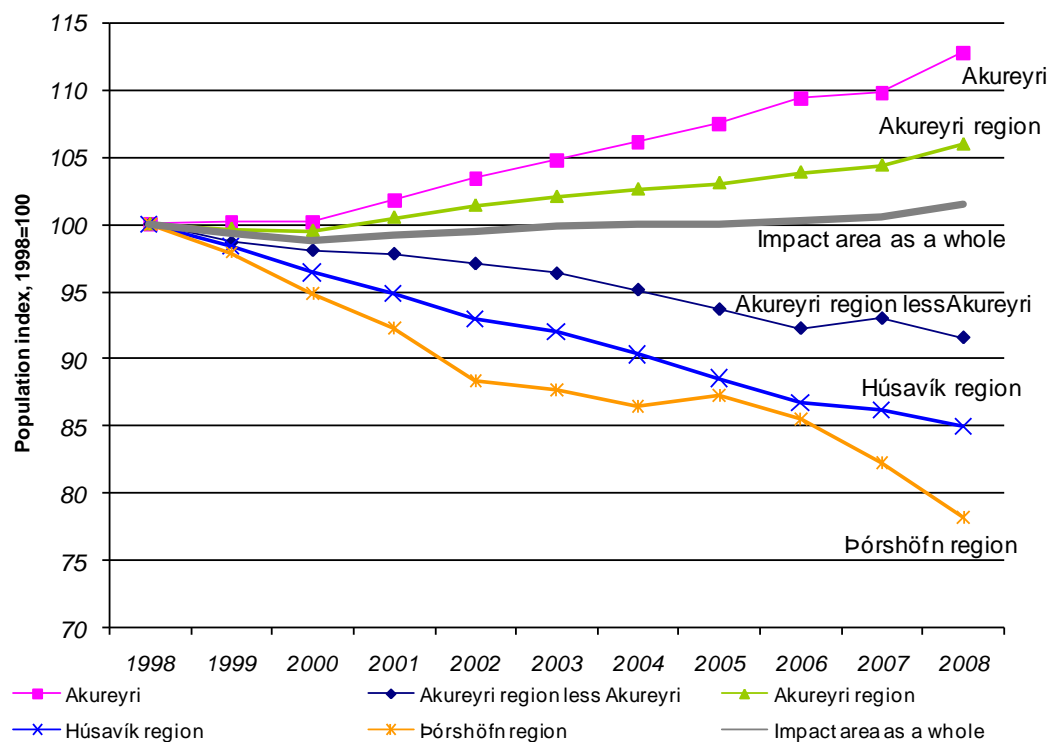
Source: Based on data from Statistics Iceland

Table 1 shows this uneven population development in individual municipalities in the years 1998, 2003 and 2008, or from a 25% fall in Langanesbyggð – which is a heavy fall, especially in Bakkafjörður – to a rise of 13.7% in Svalbarðsstrandahreppur. The merging of some districts hides, in reality, the magnitude of the fall in individual areas and the best example of this is Raufarhöfn, which saw a decrease in population of 40% over the period 1998-2006 when this municipality became part of Norðurþing. Unfortunately, this development is in keeping with the general trend over the whole country where the smaller country communities, furthest from the main population centers have experienced a drop in the number of their inhabitants, while larger towns and their surrounding municipalities have seen an increase in population figures.

If an analysis of population development in the impact area is carried out, dividing it into six different sections. Source: Based on data from Statistics Iceland

Figure 2), an interesting picture emerges, which is however, in reality, not at all unexpected. Source: Based on data from Statistics Iceland

Figure 2 shows a population index, describing development over the period 1998-2008, where the year 1998 has a value of 100:



Source: Based on data from Statistics Iceland

Figure 2. Population index in the impact area 1998-2008, 1998=100

According to figure 2 above, the population figures for the impact area have not changed greatly, showing a rise of 1.4%. However, there is a vastly different story to tell in the case of some of its sub-divisions. Thus, the population of the Húsavík region in 2008 is 85% of what it was in 1998 and the Þórshöfn region shows an even greater drop, population being only 78% of what it was in 1998. Things are more positive in the Akureyri region and its immediate surroundings with figures rising by 6% between the years 1998 and 2008. This increase is, however, limited to the town itself and the built-up areas in close proximity to it. If Akureyri is removed from the equation, we see a drop in figures for the Eyjafjörður district.

The size of the population centers also varies greatly. In Akureyri, which is the service and administration center for that part of the country, can be found most types of services that are to be found outside the Reykjavík region. Húsavík is by far the largest township in the Húsavík region and is the service center for Þingeyjarsýslur; also being the second largest town in the impact area.

Table 2. Population of urban settlements in the impact area 1998-2008

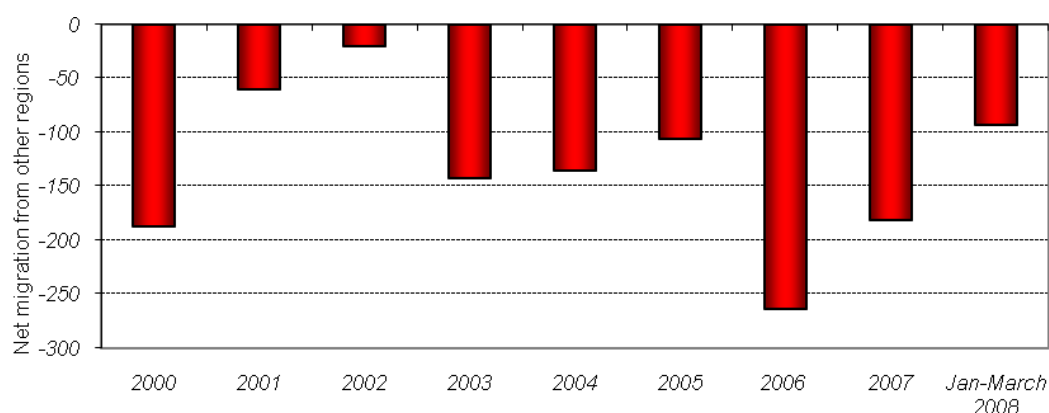
	1998	2003	2008	Change 98-08
<i>All urban settlements in Húsavík region:</i>				
Húsavík, Norðurþing	2,491	2,394	2,256	-9.4%
Raufarhöfn, Norðurþing	381	280	224	-41.2%
<i>Largest urban settlements in Akureyri region:</i>				
Akureyri	15,088	15,867	17,097	13.3%
Dalvík, Dalvíkurbyggð	1,508	1,491	1,410	-6.5%
Siglufjörður, Fjallabyggð	1,633	1,454	1,307	-20.0%
Ólafsfjörður, Fjallabyggð	1,098	1,041	881	-19.8%

Source: Based on data from Statistics Iceland

Table 2 shows that there is a drop in figures in almost all the urban settlements that are displayed there, with the exception of Akureyri and the small community at Laugar, Þingeyjarsveit. There are other instances of growth in small communities in the impact region, but they are all close to Akureyri.

4.1.2 Migration Source: Based on data from Statistics Iceland

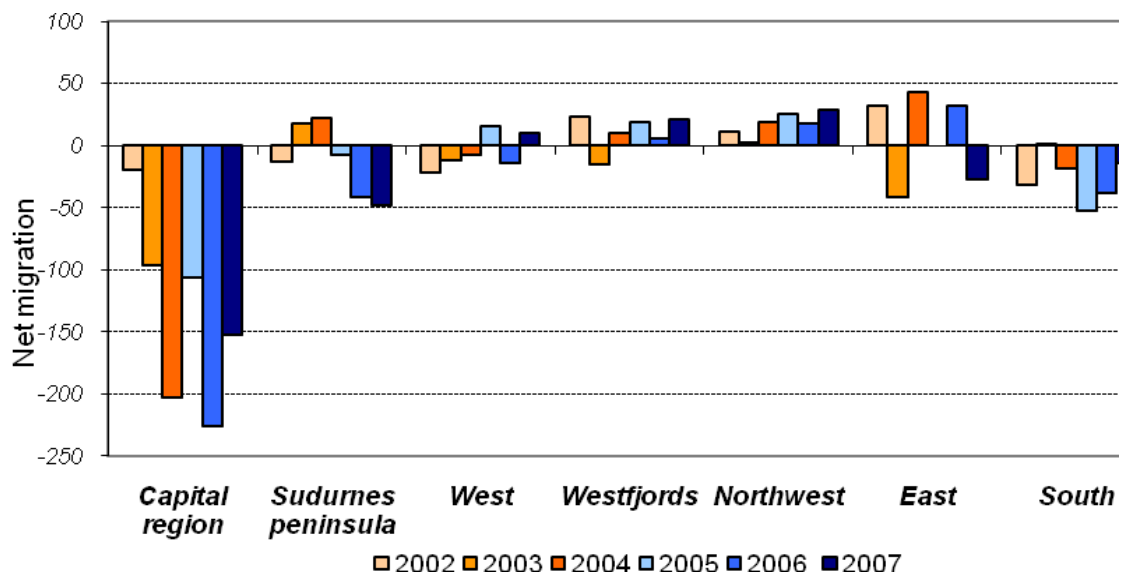
Figure 3 here below, shows the frequency of change in residence in the impact region, North East Iceland, compared to that of other areas of the country over the period 2000-2007 and also for the first three months of 2008. On the whole, the area showed a negative migration balance as opposed to other parts of the country, during all these years. In 2006, the number of people leaving the area exceeded the number of those moving to the area by 264; that year showing the greatest drop in population figures.



Source: Based on data from Statistics Iceland

Figure 3. The impact area, net in-migration from other regions 2000-2008

When we consider the status of North East Iceland as compared to other regions of the country, we see that this region has experienced a loss of inhabitants due to migration, especially to the Reykjavík area; a situation which is not entirely unexpected. On average, during this period out-migration from the north east, exceeds in-migration by 134. During recent years, other parts of the south and southwest have turned this situation around to some extent, especially Suðurnes where the number of people moving to the area exceeds the number of those leaving it by 12 per year. However, people do move, to some extent, to the north east (the impact area) from parts of Iceland which do not lie in close proximity to the capital, Reykjavík e.g. from the west fjords, the northwest and the east. This situation shows a pattern which has long been in existence and was, for instance, mentioned by Stefán Ólafsson (1997) in his research on migration in Iceland.

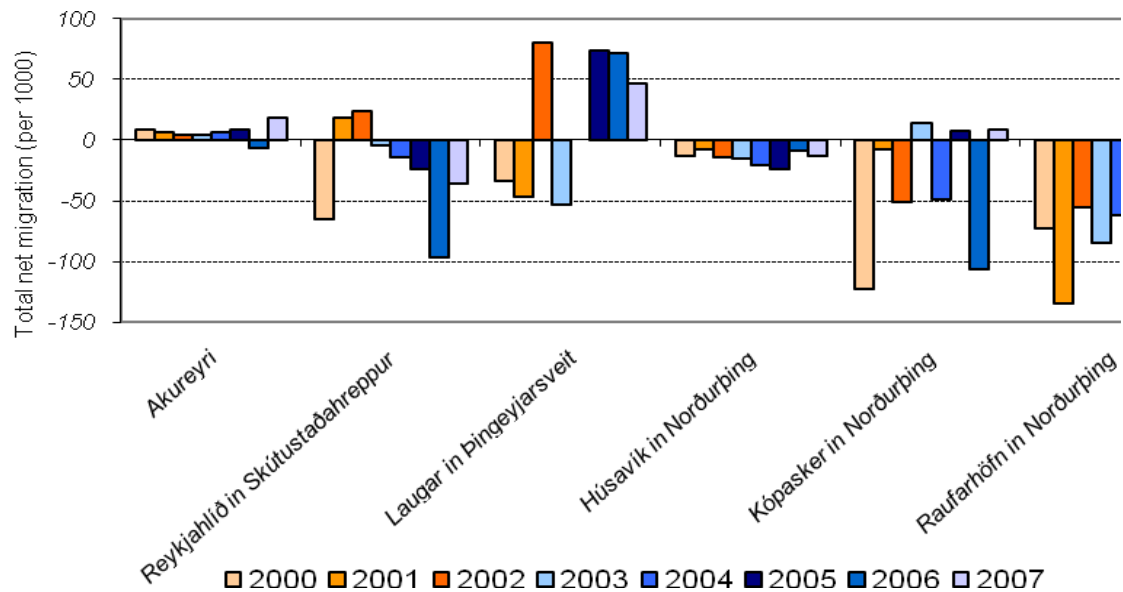


Source: Based on data from Statistics Iceland

Figure 4. The impact area (North East), net out-migration to other regions 2002-2007

Source: Based on data from Statistics Iceland

Figure 5 shows in-migration in excess of out-migration in some of the population centers in the impact region. It is blatantly clear that the smallest communities are, in general, suffering more due to out-migration, whereas more stability is seen in the larger communities.



Source: Based on data from Statistics Iceland

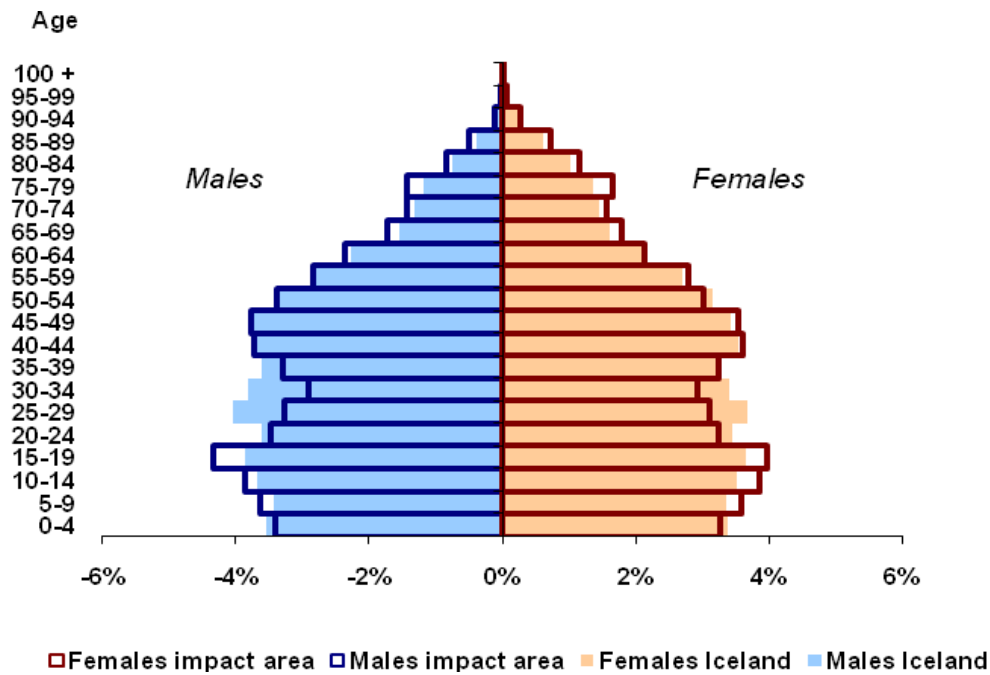
Figure 5. Urban settlements in the impact area, total net migration (per 1000 of mid-year population) 2000-2007

The small villages in the north east corner of the country, Kópasker and Raufarhöfn come off worst with regards to out-migration e.g. the shrimp processing factory, Gefla, in Kópasker was closed in 2003 in the wake of a serious economic downswing in 2002. The situation was also bad in Reykjahlíð, Mývatnssveit district and it may be pointed out that the Kísiliðja diatomite plant was closed on 30 November 2004, the factory's man-years being 45 all told (Halldór Arinbjarnarson, 2007). On the other hand, on 1 January that year, the population figure for the village was only 208 of which 151 were in the age group 16-74.

4.1.3 Age and gender structure

In the impact region, the composition of the population deviates somewhat from the patterns seen in the rest of the country as a whole. This is especially obvious when we examine the figures for inhabitants in the age group 20-39, where they are seen to be proportionally fewer in the impact area than in the rest of the country. On the other hand, the number of inhabitants over 60 is somewhat more numerous. Source: Based on data from Statistics Iceland

Figure 6 shows this status which is, in reality, a well known phenomenon in country communities in Iceland.

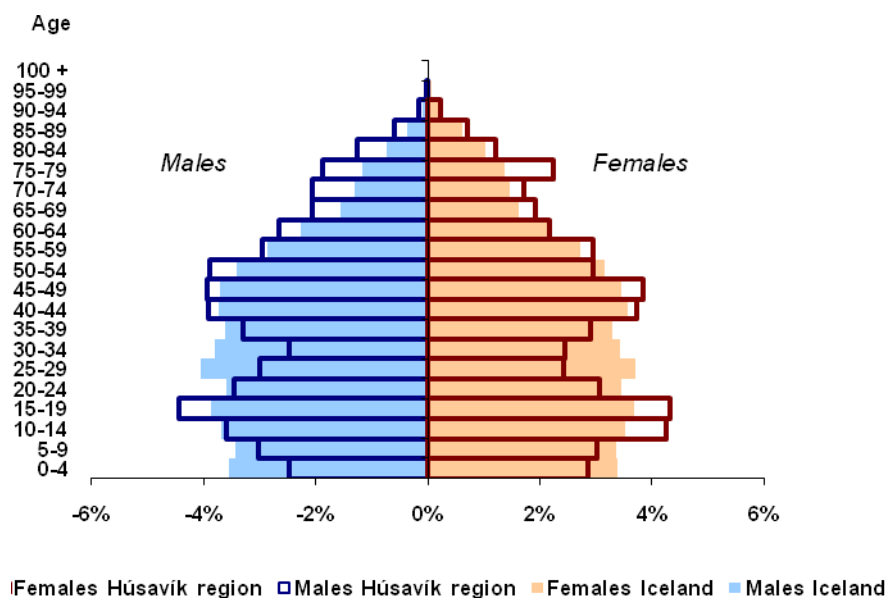


Source: Based on data from Statistics Iceland

Figure 6. Age and gender structure of the population Dec. 1 2007

Source: Based on data from Statistics Iceland

Figure 7 shows the same set of data for the 4 district communities which are in the Húsavík region and here we see an even greater disparity between these areas and the country as a whole. Individuals “in the prime of life” in the Húsavík region are proportionately fewer as opposed to older people. In addition, it shows that children of elementary school age are also proportionally fewer, which is not really a surprise when one takes into account that the group consisting of persons of potentially childbearing age is so small. Inhabitants aged 25-39 were in all, 16.6% of the population of the immediate area but just under 22% of the population of the whole country. Ten years ago, the figure for this age group was considerably more positive, or 21.5% in the immediate area while for the whole of Iceland it was 22.7%. Changes have, therefore, been rapid. .



Source: Based on data from Statistics Iceland

Figure 7. Age and gender structure of the population in the Húsavík region Dec. 1 2007

This situation is due especially to the out-migration of young people when they leave to seek further education or employment elsewhere, especially in the larger urban settlements where the choice and variety of services is greater. This development, in turn, makes it difficult to keep certain services going in areas where the population is smallest; services such as elementary schools, where a drop in the number of pupils is a major problem in running such schools in sparsely populated country areas e.g. close to the impact region (Hjalti Jóhannesson and Trausti Þorsteinsson, 2007).

When it comes to gender distribution, the proportion of males is a little higher than that of females, or a difference of 2.1 percentage points. This ratio has, however, been balancing out, as it was 3.7% in 2002 and about the same in 1997.

4.2 Labor market

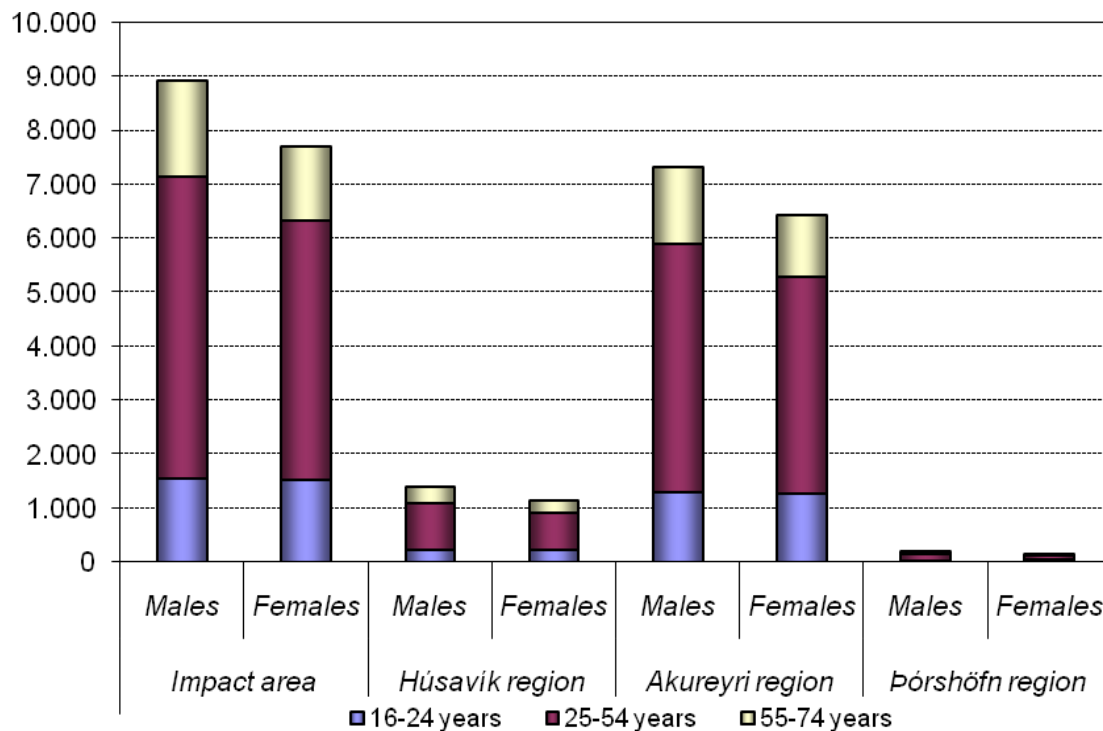
The discussion on the labor market is also based primarily on data from Statistics Iceland, but, in an equal measure, on information from surveys conducted by RHA in the impact area and which contain various characteristics of the labor market. As has been mentioned before, the region is divided into three, where the impact of the aluminum plant would have the most effect, the Húsavík, Akureyri and Þórshöfn regions. It is thought likely, that of this impact area, two locations will, first and foremost, see the greatest increase in employment possibilities due to the construction

of an aluminum plant, these being Akureyri and Húsavík. According to an assessment proposal, the number of jobs connected to the plant itself would be in the region of 300 – 450, but there would also be much resulting work to be had in Húsavík itself e.g. in the port activities. Akureyri has great superiority in the provision of services, compared to other settlements within the impact. Therefore, it may be said that there is a likelihood of many related service jobs being created in the wake of a new aluminum plant at Bakki. In this connection, we could look for comparison to the experience gained in Reyðarfjörður as it appears that the Alcoa plant strengthened the services network in Egilsstaðir more than it did in Reyðarfjörður. This can be deduced from the fact that in the period from 1 December 2002 until 1 December 2007 the population figure rose by 700 in Egilsstaðir and Fellibær but by only 400 in Reyðarfjörður. This happened in spite of the fact that more people working in the plant live in Reyðarfjörður than in Egilsstaðir and Fellibær. It may, therefore, be assumed that the new jobs in Egilsstaðir, which explain a greater population rise there than in Reyðarfjörður, are first and foremost in the service sector.

4.2.1 Size of labor market

The number of inhabitants in the impact area was 28,821 on 1 January 2008. The employment market in this area is, therefore, large by Icelandic standards. The labor market is taken to be that part of the population who are either working or looking for work. The employment participation rate depends on how large a proportion of people of working age (16-74 years) are in the employment market. Data on regional employment participation does not exist at Statistics Iceland but an analysis of this in the Reykjavík area and outside is available. There is little difference to be seen from this regional analysis. On the other hand, over the country as a whole, there is a considerable difference in employment participation according to gender and age. Therefore, it is possible to estimate the size of the labor market in the impact area from the point of view of gender and age linked population figures, as well as making the assumption that employment participation rate based on age and gender will be

the same for the impact area as it is for the country as a whole. In the next figure, we can see the estimated size of the labor market in the impact area on 1 January 2008.¹



Source: Based on data from Statistics Iceland

Figure 8. Estimated size of the labor market by regions and age groups

Over the impact area as a whole, we can assume that on labor market (age 16-74) there is a total of around 16,650; just over 8,900 men and just over 7,700 women. The employment market, therefore, comprises about 58% of the total population. In the Húsavík region, the labor market is estimated at about 2,550 persons, about 1,400 men and just under 1,150 women. The Akureyri region has by far the largest employment market, or around 13,750 persons. The bulk of the Akureyri region's labor market i.e. Akureyri itself and the build-up areas around the town, is, on the other hand, just outside the daily commuting limits from the aluminum plant.² As mentioned in chapter 3 on the impact area, borderlines between the regions are flexible in the case of some of the impact factors. Thus, it may be assumed that the

¹ Based on population figures, 1 January 2008 and the age and gender indexed employment participation rate, according to data from statistics Iceland on employment participation over the whole of Iceland, 2006.

² Assuming the average speed to be 90 km/h, the commuting distance limit for a traveling time of 45 minutes, would lie at up to 67 km from the destination. Due to improved communications, the distance between Akureyri and Húsavík will be reduced to just over 70 km.

large employment market of the Akureyri area will be accessible to the aluminum plant. In the Þórshöfn area, on the other hand, the employment market comprises about 350 persons. Currently, Þórshöfn lies about 212 km from Húsavík, based on whole-year travel but this distance will be reduced to around 159 km during the next few years. However, this distance is well outside the limits for daily commuting, as defined in this report. In reality, the same applies to the easternmost part of the municipality of Norðurþing, i.e. Kópasker, Raufarhöfn and its immediate neighborhood. These are, however, sparsely populated areas and are counted as belonging to the Húsavík region, chiefly because this facilitates the collection of data and because they are in the same municipality as Húsavík.

It must be kept in mind that many elements may influence people's decisions on how far they are willing to commute on a daily basis. Driving conditions are probably the most important deciding factor i.e. quality of roads, weather conditions and traffic safety. Salaries and working hours can also have a great influence on whether people are willing to travel long distances to work. Finally, it is important to consider what other choices of employment are available on the home ground. This last factor could mean that the employment area would reach further east than do the distance figures outlined in this report as a basis for commuting.

4.2.2 Size of labor market from project site

As mentioned above, it is estimated that the labor market is around 58% of the population. With this figure in mind, as well as demographic figures, it is possible to work out an estimation of how far from the aluminum plant at Bakki the employment market reaches. The next figure shows the extent of the labor market radius with Bakki as the center point. From this we can, for example, read how large this market is within a 30 km traveling distance from Bakki. Also, it is possible to see how big the labor market is within a maximum daily commuting distance from Bakki of 45 minutes. As regards the traveling time, this is based on the assumption that people travel at the maximum permitted speed limit. It is, however, unrealistic to assume that drivers can, in every case, maintain that as their average traveling speed. The figure is compiled, assuming that the Vaðlaheiði Tunnel will, at that time, be open and in use, as well as the new bridge over Skjálafandafljót River in Út-Kinn which will shorten the commuting distance.

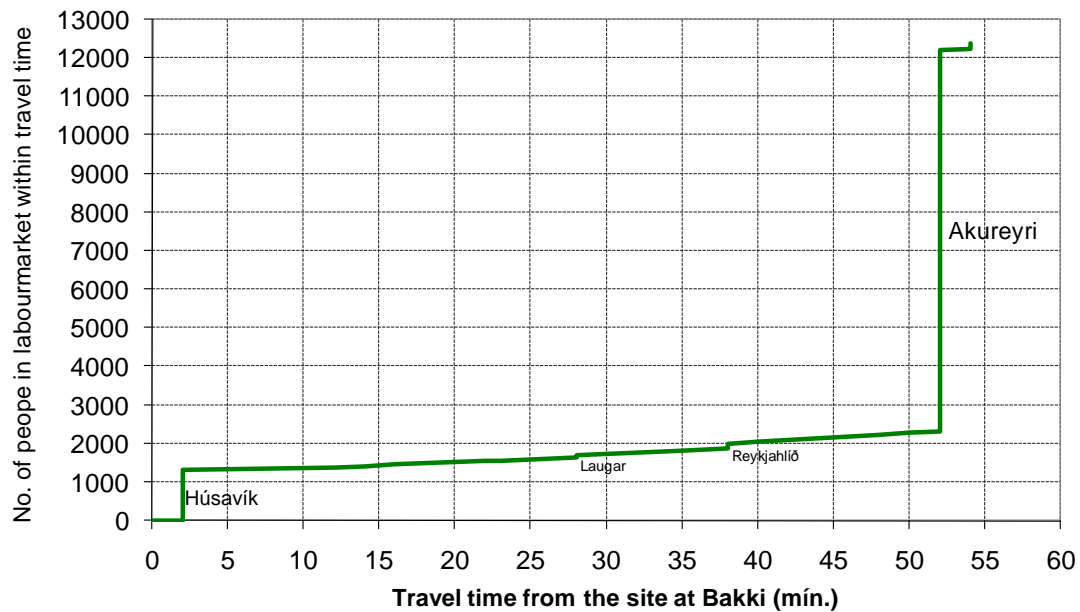


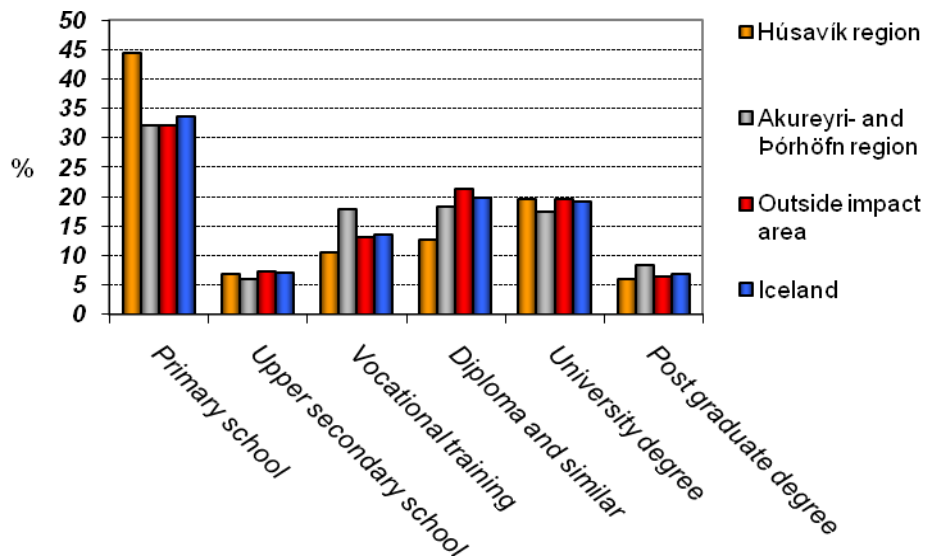
Figure 9. Estimated size of the labor market from the project site, Bakki

From this figure, we can see that on the employment market are around 2,200 persons within a traveling distance of 45 minutes from Bakki. Just outside this limit, is Akureyri, with a traveling distance of 52 km and an employment market of just under 10,000 persons – based on the assumption that necessary improvements to the road system will be carried out.

4.2.3 Education levels

Data on the educational qualifications of the inhabitants is not available from official sources. Details on education can, however, often to be found in background information collected in surveys. RHA carried out one such survey in the spring of 2007. This was in connection with research into the social effect of the construction of the aluminum plant and power plants in the east of the country³. The figure below shows the level of education both inside the impact area and outside, according to this survey. It was decided to group Akureyri and Þórshöfn regions together in this analysis as there were so few respondents in the latter. In spite of the fact that the percentage of replies to this survey was not high, there were no indications of a systematic deviation as regards gender, age or residence.

³ This is a postal survey which was carried out from the end of February until the beginning of May 2007. The final sample comprised 3,134 people from all over Iceland living there 1 January 2007, born 1942-1989 (age 18-65). Answers received numbered 1,219 i.e. 38.9% of those targeted.



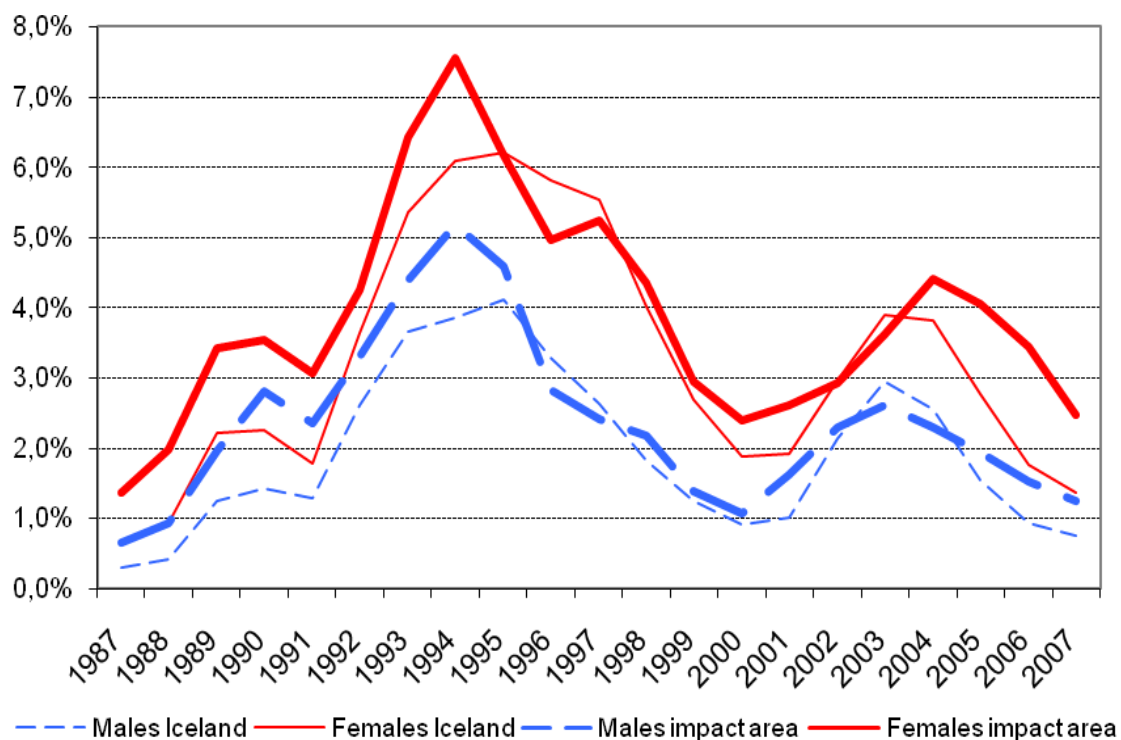
(Source: RHA, unpublished data)

Figure 10. Education levels of the impact area compared to other regions (highest education obtained background data from a survey in 2007)

According to this analysis, there is some difference in educational levels between the areas. In the interpretation of this data, a certain amount of caution must be exercised as we are dealing with a sample comprised of 133 respondents in the Húsavík area and 202 in the Akureyri/Þórshöfn area. In the former, it is obvious that there are more people who have only completed an elementary education and fewer who have a short further education record. Respondents with an education relating to industrial trades were proportionately more in the Akureyri and Þórshöfn regions, which is perhaps not unexpected, considering Akureyri's long history and tradition of industry. There was little difference in the percentage of those with a university education. The composition of age groups in the areas must be kept in mind as this may be used to explain some aspects of the findings. In the Húsavík area, there are proportionally more older people, while the younger adults with, generally, a higher level of education have decreased in number. RHA has conducted some surveys where similar information appears as background parameters. Generally speaking, the trend over the past years seems to be for the number of those who have only an elementary education to fall by about 1-2 percentage points a year, while the figure for those with a university education rises by about 0.5 percentage points per year. (Jón Þorvaldur Heiðarsson et al., 2007).

4.2.4 Unemployment

Icelanders have not, for the most part, suffered greatly from high unemployment figures over the past decades, although there have been periods in between e.g. the beginning of the nineties when unemployment has been considerable. At those times, certain districts or built-up areas were very badly hit, when the main sources of employment suffered a blow. This applies to, among other places, the impact area. Akureyri was, for example, dependent on industries which experienced a severe downswing in the nineties. The Icelandic labor market has, however, always been thought of as flexible, a fact which is seen in the way the inhabitants migrate from one place to another, depending on where there is work to be had, and also in the way they switch from one type of job to another.



Source: Based on data from Directorate of labor

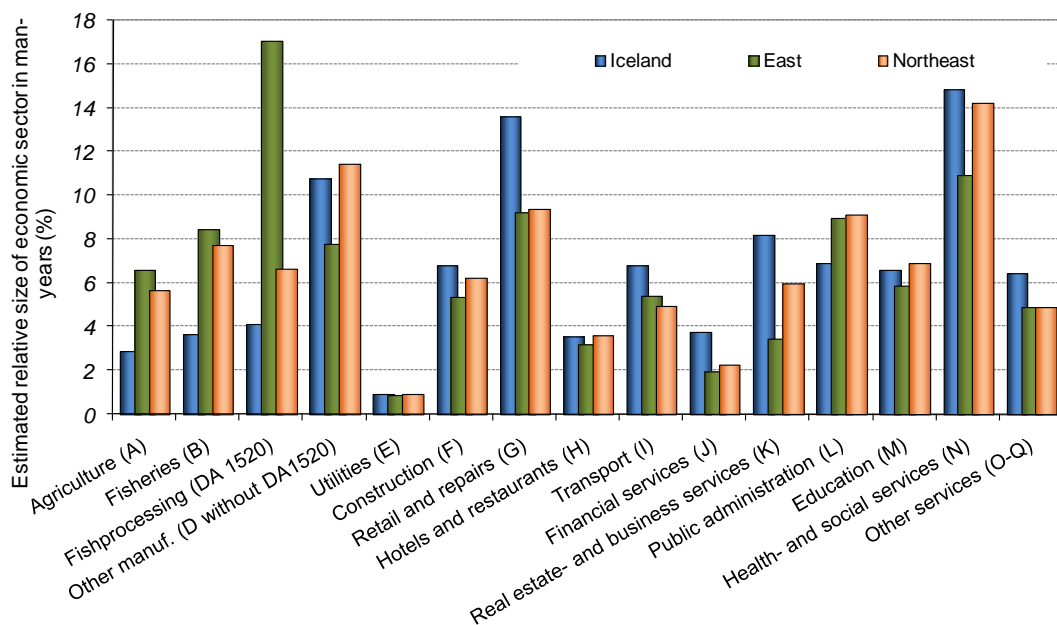
Figure 11. Unemployment 1987-2007, annual averages

Figure 11 shows that registered unemployment has, on the average, been rather more in the impact area than in Iceland as a whole, although it has swung more or less in time with the general trend for the country. It is a long time since seriously high unemployment has been seen, by Icelandic standards. During the last 20 years, registered unemployment for the impact area was highest in 1994 when it reached 7.6% for women and 5.2% for men. In recent years, there has been little

unemployment, although it reached 4.4% for women in 2004 when this was the highest figure in the country.

4.2.5 Wages and the structure of the economy

Alcoa has already gained vast experience in the setting up of an aluminum plant in the provinces areas, and here of course we mean the plant at Reyðarfjörður. It is, therefore, interesting to see how the analysis of employment types in the impact area, (the north east) compares with that of the east of the country. To do this, there is no other way than to examine the situation before heavy industry projects commenced in the east of Iceland⁴ and here, therefore, is a comparison of assessed employment classes⁵ in the year 2002 for these areas and for Iceland as a whole.



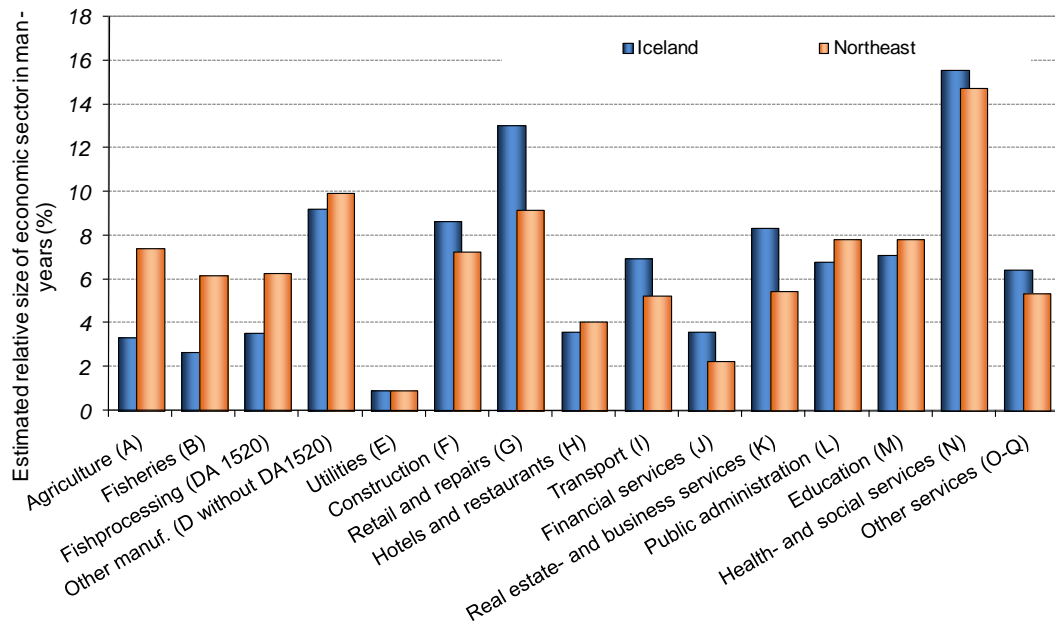
Source: Based on data from Statistics Iceland

Figure 12. Estimated division of the economy into industry sectors in man-years, 2002

From the figure, it can be seen that the north east is nearer to the national average than is the east, in most employment types. The same kind of employment division for 2005 can be seen in the next figure but now East Iceland has been omitted as the presence of heavy industry development would skew the employment grouping there.

⁴ Heavy industry projects in the east of Iceland in the year 2003.

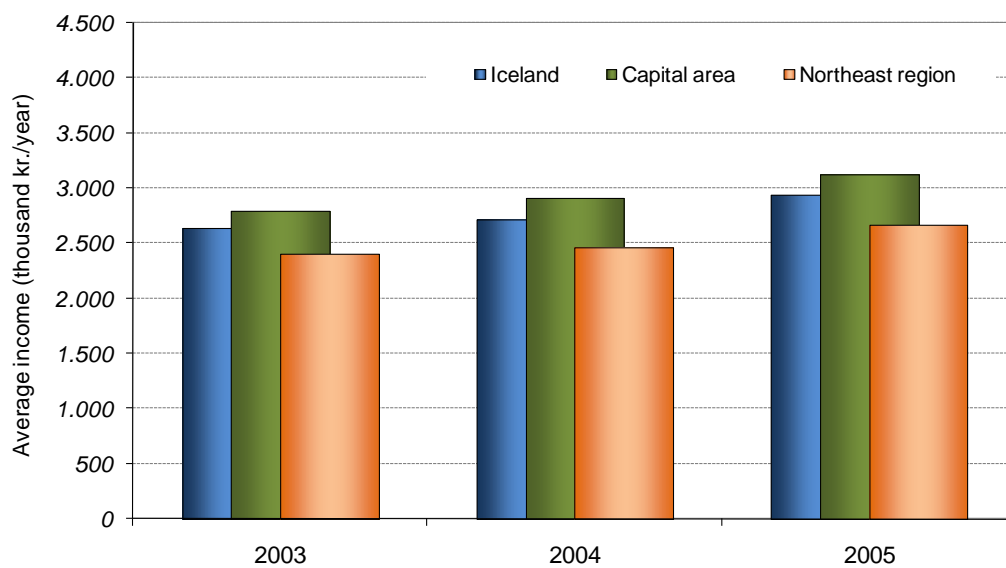
⁵ The assessment is made by dividing total salaries in each employment type by the average salaries in primary occupation for each employment type. The resulting value is not the number of man-years, but the ratio should nevertheless be similar.



Source: Based on data from Statistics Iceland

Figure 13. Estimated division of the economy into industry sectors in man-years 2005

Both 2002 and 2005 show that incidences of other industries are rather more in the north east than in the country as a whole. This should come as no surprise considering the strong tradition for industry in that area, especially Akureyri. In Iceland, salaries are higher in the area of the capital than elsewhere in the country. In the next figure is seen the average salary in primary occupation over three years 2003-2005 in North East Iceland as well as in the area of the capital and the country as a whole.



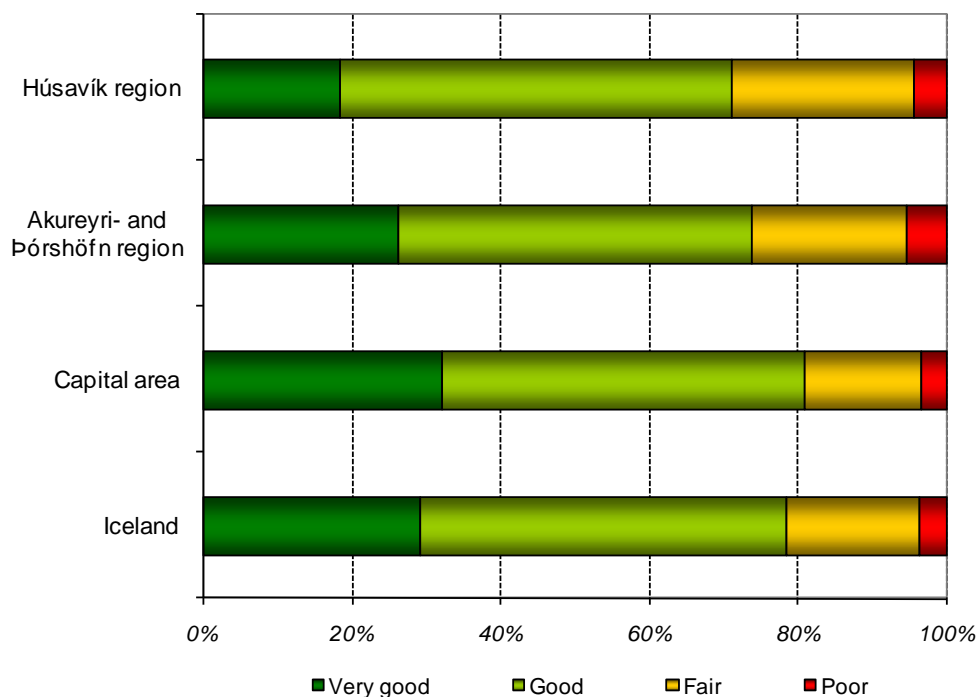
Source: Based on data from Statistics Iceland

Figure 14. Average income by primary occupation in the impact area

The salaries in the impact area (the north east) are close to 15% lower than in the area of the capital during this period.

4.2.6 Health

In 2007, a comprehensive survey into the health of the Icelandic people was carried out by the Public Health Institute of Iceland. The institute was asked for an analysis of data that would give an indication of the health of people living in the area that this research covers. According to this analysis there is little difference seem between separate areas. Because of the sparse population in the Þórshöfn region, it proved impossible to analyze that area separately, so this was grouped with the Akureyri region on the joint decision of RHA and the Public Health Institute of Iceland.

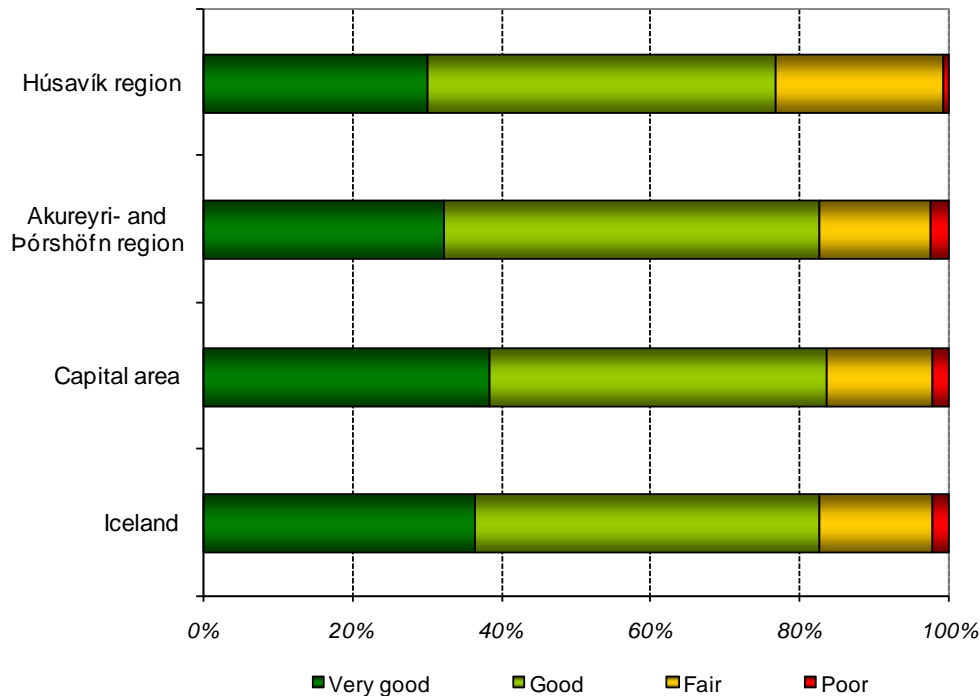


Source: Jón Óskar Guðlaugsson and Stefán Hrafn Jónsson (2008)

Figure 15. Question in Public Health Survey 2007 (all age groups 18-79 years): How do you generally estimate your physical health?

Between the capital area and the rest of Iceland e.g. the Húsavík region, there appears to be a considerable difference, where the health of those living in the Reykjavík area is somewhat better. In the Húsavík region, 71% consider their health either good or very good as opposed to over 80% in the Reykjavík area. When separate age groups were examined, e.g. 18-40 years old and 41-60 a regional difference again became apparent. The percentage of older people, however, is proportionally high in many

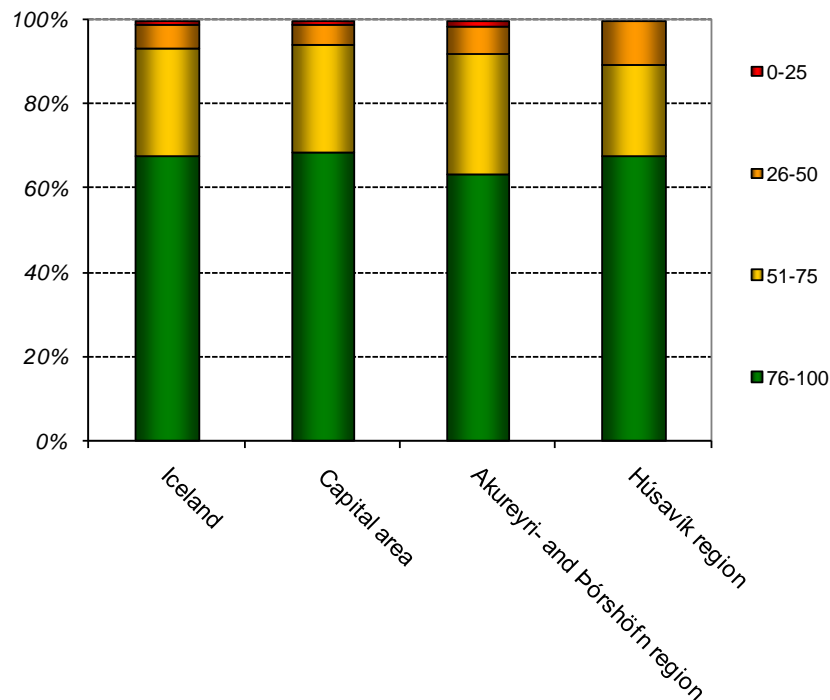
districts and their worse health condition weighs more heavily in results for a combined age group. So that, in the country as a whole the percentage of people over 55 is 21.6%, while in the Húsavík area this is 26.7%.



Source: Jón Óskar Guðlaugsson and Stefán Hrafn Jónsson (2008)

Figure 16. Question in Public Health Survey 2007 (all age groups 18-79 years): How do you generally estimate your mental health?

A similar result was found under the section on mental health, where about 77% in the Húsavík area considered themselves either in good mental health or very good, while this figure was 84% in the capital area for a comparable state of mental health. The inhabitants of the Akureyri/Þórshöfn region estimated their mental health in a similar way to the people of Reykjavík.



Source: Jón Óskar Guðlaugsson and Stefán Hrafn Jónsson (2008)

Figure 17. Question in Public Health Survey 2007 (all age groups 18-79 years): Respondents' perception of their own health from worst possible health (0) to best possible health (100)

In the survey, people were asked to assess their health on a scale of 0-100. The figure above shows that about 2/3 of respondents thought their health was in the region of 76-100 based on that scale. There is no great difference between the areas.

4.3 Municipalities

There are two administrative levels in Iceland, the state and the municipalities. The right of the municipalities to administer of certain matters is incorporated into the constitution of the republic and set forth in further detail in various Acts of Parliament and Regulations. Municipal administrations are responsible for a large number of policy areas, e.g. preschools, elementary education, various social services, cultural matters and also technical issues, area planning, road building, drainage systems, the running of fire brigades and of ports where applicable.

The number of municipalities in Iceland has varied significantly, being highest, or 229, in 1950. Now the entire country comprises a total of 78 municipalities.

The average population of municipalities was 3,800 in spring 2006 and their mean geographical area just over 1,300 km². Averages, however, only tell half the story and

the municipalities vary considerably both with regard to size and number of inhabitants. The largest municipality covers an area of nearly 9,000 km² and the smallest is a mere 2 km² in approximate size. The current population of the capital, Reykjavík, is about 118,000, which comprises roughly 38% of the nation. However, about 62% of the population of Iceland live within the total area of the capital. In this district, and within a 45 minute commuting distance from Reykjavík, reside ¾ of all the people living in Iceland. Only four municipalities, apart from Reykjavík, have more than 10 thousand inhabitants and five have a population exceeding 5 thousand. Approximately 8% of the nation live in 45 municipalities with fewer than 1,000 inhabitants.

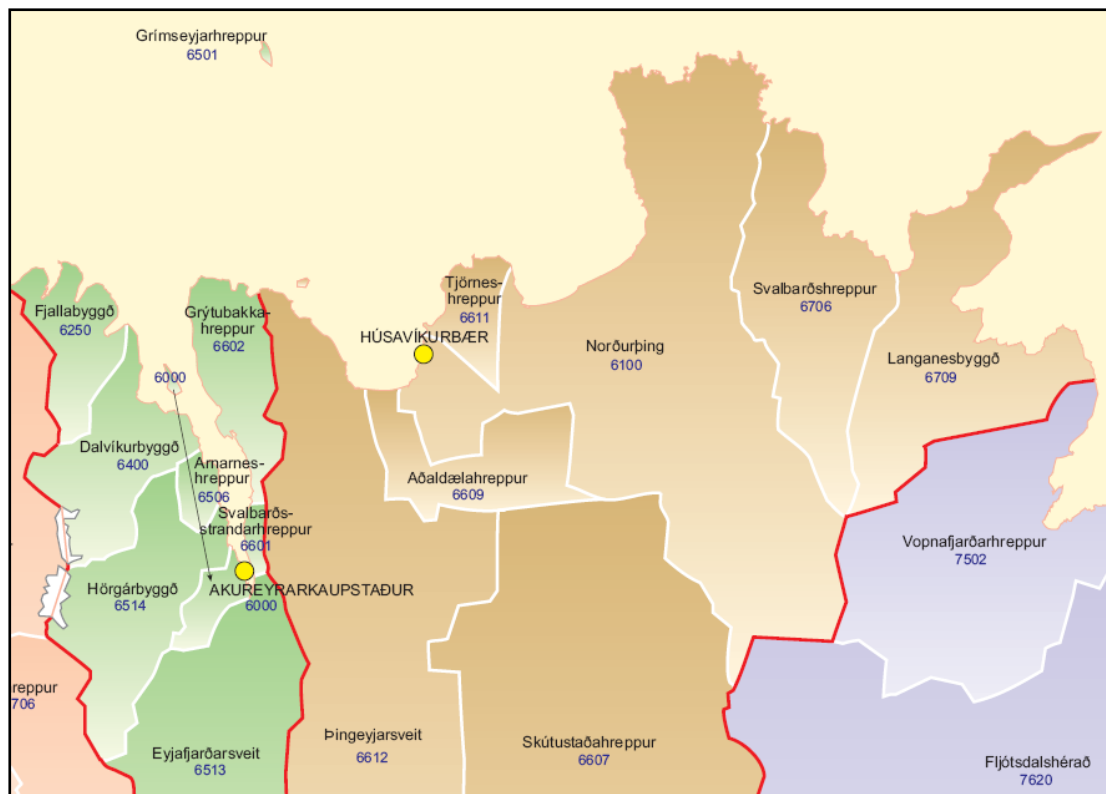
4.3.1 Municipal structure

The municipal boundaries were drawn in other times and under circumstances totally different from those which currently apply in communications, commerce and services. Although the merging of municipalities has marked the road towards reasonably large service units, some of them still have too few inhabitants to be able to support the level of services required in our times. The impact area, North East Iceland, has 15 municipalities shown in the table below in a geographical sequence from west to east, together with a number of facts relating to them:

Table 3. Municipalities in the impact area, area and amalgamations

Name of municipality	Pop. January 1 2008	Area km ²	Information on amalgamations and more
Fjallabyggð	2,188	364	Two urban centers, Ólafsfjörður (pop. 881) and Siglufjörður (pop. 1,307). Amalgamated from two municipalities in 2006.
Dalvíkurbyggð	1,948	598	Largest centre Dalvík (pop. 1,410). Amalgamated 1998 from three municipalities.
Arnarneshreppur	171	88	Mostly rural.
Hörgárbyggð	417	805	Mostly rural. Amalgamated 2004 from three municipalities.
Akureyrarbær	17,278	132	Population primarily in Akureyri (pop. 17097) Hrísey island (pop. 180) Amalgamated with Akureyri in 2004.
Eyjafjarðarsveit	1,007	1,775	One of the largest rural municipalities in Iceland. Amalgamated in 1991 from three municipalities.
Svalbarðsstrandarhreppur	389	55	Mix of urban and rural.
Grýtubakkahreppur	353	432	Mix of urban and rural.
Grímseyjarhreppur	103	5	Island 40 km off the coast.
Píngeyjarsveit	940	5.988	Merged 2008 from two municipalities.
Skútustaðahreppur	399	6.036	One of the geographically largest municipalities in Iceland.
Norðurþing	2,973	3,729	Amalgamated in 2006 from Húsavíkurbær, Kelduneshreppur, Öxarfjarðarhreppur and Raufarhafnarhreppur.
Tjörneshreppur	60	119	The third smallest municipality of the country.
Svalbarðshreppur	115	1.155	Rural.
Langanesbyggð	480	1.332	Amalgamated in 2006 from two municipalities, Þórshöfn and Skeggjastaðahreppur.

As the table shows, the municipalities vary significantly in size and composition. The amalgamation of municipalities has served the purpose of creating more populous entities. Nevertheless, a number of municipalities with tiny populations have not merged with others and, consequently, lack the potential to provide adequate services. In many cases, however, they have joined forces with more heavily populated units with regard to certain service sectors. Akureyri is the most densely populated municipality, although among the smallest in geographical area. Built-up localities which are developing in the adjacent municipalities should really be regarded as suburbanization.



Source: Iceland Geodetic Survey (2008)

Figure 18. Municipalities in the impact area

The map above shows the boundaries of the municipalities, together with the so-called municipal identification number which is used in statistical processing.

4.3.2 Finances of municipalities

The most important municipal source of revenue in Iceland is income tax to local government. Local tax was about 73% of total municipal income in Iceland in 2006, property tax about 14%, contributions from the Municipal Compensation Fund approx. 12% and other taxes about 1%. In addition to tax revenue, the municipalities collect various service charges, e.g. for preschools and sports facilities, public utilities and ports. Income other than tax revenue averages 20% of total revenue, but varies widely from one municipality to another.

The Municipalities Compensation Fund operates in accordance with Chapter III of The Municipal Revenue Act No. 4/1995 with subsequent amendments. The purpose of the Fund is to ensure the ability of municipalities to fulfill their role as laid down by law by contributions intended to equalize their varying income potential and expense requirements. The largest single item in the Fund's contributions relates to elementary education. There are significant divergences in contributions from the Compensation Fund as a proportion of the total revenue of individual municipalities,

(Table 4) although it may be stated as a general trend that the larger municipalities receive a lower ratio of their income from the fund, as may be gathered by comparing Akureyri to the other municipalities.

Table 4. Division of municipal tax revenue 2006, ISK in millions and percentages

Municipality	Municipal tax	Property taxes	Income equalization fund	Other taxes	Total
The country as a whole	80,349	15,619	12,880	1,716	110,564
	73%	14%	12%	2%	100%
Akureyri	3,973	575	855	159	5,562
	72%	10%	15%	3%	100%
Norðurþing	654	92	424	22	1,192
	55%	8%	36%	2%	100%
Tjörneshreppur	12	1	9	0	22
	55%	5%	41%	0%	100%
Pingeyjarsveit	179	36	211	0	426
	42%	8%	50%	0%	100%
Skútustaðahreppur	89	27	77	1	194
	46%	14%	40%	1%	100%

Source: Árbók sveitarfélaga (Yearbook of Icelandic municipalities) 2007

In addition to the above-mentioned sources of revenue, municipal treasuries had other income (income, policy areas etc.) amounting to ISK 28,427 million. Thus the total revenue came to ISK 138,991 million in 2006.

Municipal expenses may, in the main, be divided in two; operational expenses and investments. In 2006 the operational expenses of municipalities in all of Iceland were approximately ISK 135 billion. The costliest items were education, social services and matters relating to youth and sports. Those three items comprised 71% of expenses, (49% + 11% + 11%). There are, however, significant differences between the expenses of the municipalities dealt with here, (Table 5).

Table 5. Expenditure on the three costliest policy areas of municipal operations 2006, ISK per capita

Municipality	Social services	Education	Youth and sports
Akureyri	86,853	210,416	61,734
Norðurþing	27,057	202,594	44,304
Tjörneshreppur	29,483	167,283	233
Þingeyjarsveit	24,970	317,311	20,890
Skútustaðahreppur	42,015	264,107	75,334

Source: Árbók sveitarfélaga (Yearbook of Icelandic municipalities) 2007

Tjörneshreppur presents a somewhat unique pattern, since very few children live in the municipality. This is reflected in practically non-existent contributions to youth and sports and the lowest contributions per person to education, which is, however usually more expensive in the countryside than in densely populated areas due to smaller classes and more school busing. On the other hand, social services are usually more extensive and varied in larger population centers, cf. Table 5 which shows that the contributions of Akureyri Municipality are more than double those of the next-ranking municipality and over eight times higher than the lowest contributions among the municipalities in question. It should be noted in this comparison that Akureyri Municipality runs various social services which the others do not offer and obtains state contributions in return. Hence, the divergence between Akureyri's contributions to social services and those of other municipalities is smaller than the figures show.

4.4 Public services

Varied services are on offer under the auspices of the state and municipalities; separate categories being described below. Education is the highest item on municipal budgets as indicated in chapter 4.3.3 (Table 5) and social services and matters relating to youth and sports are also significant aspects of the services maintained by the municipalities dealt with in this report. Health is the highest item of expenditure on the state budget.

4.4.1 Education

The method adopted here is to confine the report to elementary schools and preschools in the immediate neighborhood of the aluminum plant. The reasoning behind this is that these are more in the nature of close radius services than upper levels of education and within easy traveling distance from Húsavík, making it

possible for such schools to accept, at least temporarily, increased numbers of pupils concomitant with the construction and operation of an aluminum plant. This provides leeway to assess the need for school facilities in the long term when a balanced situation has been achieved after the construction phase, i.e. during the operational period of the aluminum plant, since it only then becomes apparent where and to what extent the municipalities in question need to react to heightened demand for services.

Preschools. This level of education is typical of the close radius services that municipalities are obliged to provide, the service area being narrower than is the case with other types of schools because of the very young children involved. Consequently, only Húsavík, which has one preschool, will be seen as relevant in this regard. The school has six classes, two for each year, and a total of about 130 pupils. The youngest children accepted by the school are one year old. There has been a reasonable balance between demand for places and the school's intake capacity, although currently a few children in the youngest age group are waiting for admission.

Elementary schools. The situation with elementary schools differs from the preschool level to a certain extent since school busing is organized and there may be significantly longer distances between home and school. Children from Tjörneshreppur, for instance, have, through the years, been transported by bus to Hafralækjarskóli – involving a distance of 44 km. between the school and the northernmost farm, Máná. The following four elementary schools are within a driving distance of 45 minutes from the site of the anticipated aluminum plant.

Table 6. Schools within ca. 45 min. driving distance from the project site

School	Distance from Húsavík	No. of students 2007-2008	No. of classes	Remarks
Borgarhólsskóli	-	327	1.-10.	Owned by Norðurþing
Hafralækjarskóli	22	65	1.-10.	Owned jointly by Norðurþing and Þingeyjarsveit
Litlulaugaskóli	39	42	1.-10.	Owned by Þingeyjarsveit
Stórutjarnaskóli	52	42	1.-10.	Owned by Þingeyjarsveit

Source: Statistics Iceland

In 1896 a special building was erected in Húsavík for the purpose of children's education. The first level of secondary education, or "adolescent school" began about 1906. The Húsavík School of Practical Secondary Education (Gagnfræðaskóli Húsavíkur) was launched in 1945, replacing the adolescent school. In 1960 a new school building was completed which accommodated both elementary and secondary levels of education. In 1992 the Húsavík Primary School was renamed

Borgarhólsskóli which gradually developed into a full-fledged elementary educational institution offering schooling from year 1 through year 10. The first pupils from year 10 graduated from Borgarhólsskóli in spring 1994 (Retrieved from the Internet 07.08.08. www.borgarholsskoli.is)

In 2007 the total number of pupils in Borgarhólsskóli, year 1-10, was 327 the largest number in year 8 or 42, and the lowest in year 1, or 23. Most grades had ca. 30 pupils. As shown by the figures indicating pupil numbers in each grade, the school can add a significant number of pupils without any special adjustments to speak of. Based on two classes for each year and a reasonably even distribution, an increase of about 60-80 pupils would allow the school to reach its optimal economy of size. Thus it would appear that a significant population increase in relation to an aluminum plant at Bakki would cause no difficulties at the level of elementary education. It should also be kept in mind that Hafralækjarskóli, which has a substantial potential for increased intake, is only a short distance away. This possibility could be used to bridge a temporary peak in elementary education during the construction period of the plant, since the distance between Húsavík and Hafralækjarskóli is only 22 km.

Hafralækjarskóli in Aðaldalur began its operation in 1972 with a dormitory for children from Tjörnnes until the mid-nineties, when daily busing for children was adopted after a trial period which began in 1992 (Hjálmar Bogi Hafliðason, 2005). The school buildings are spacious and easily accommodated the approximately 100 pupils that were enrolled there in earlier times. In recent years, however, the number of pupils has fallen significantly and in 2007 there were only 65 in seven grades, with no pupils in the first year. A substantial increase could be handled here without difficulty.

An elementary school, Litlulaugaskóli, is operated at Laugar in Reykjadalur. The closeness to Laugar Upper Secondary School offers a great many opportunities, e.g. the joint use of a well-equipped gymnasium and swimming pool. The Laugar school community is rather special, offering all three educational levels in a sparsely populated district. The distance between the schools Litlulaugaskóli and Hafralækjarskóli is 20 km.

The school Stórutjarnaskóli, began operation in autumn 1971 under the auspices of the then existing municipalities Ljósavatnshreppur, Hálshreppur, Bárðdælahreppur (now Þingeyjarsveit) and Grýtubakkahreppur. Attendance has fallen steeply in recent

years and the premises are now oversized with regard to the current number of pupils; only 42 in four grades in 2007. A preschool is also operated in the wintertime in what used to be pupil dormitories. This school, however, is closed in summer due to the operation of a summer hotel. In addition, Stórutjarnaskóli accommodates a music school. These premises, just like Haftralækur and Laugar, have significant capacity for additional pupils.

Upper secondary schools. The secondary level of education is run by the state. The Húsavík Upper Secondary School was established 1 April 1987 and commenced operation 15 September that year. The school has approximately 150 students, with 15-30 graduating each year with the matriculation examination (stúdentspróf) or a final examination from other study programs. The school is located at Stórigarður 10, where the School of Practical Secondary Education used to be. The building accommodates 11 classrooms, a library, the school office and facilities for administrators, teachers and other staff members. (Retrieved from the Internet 08.08.08. www.fsh.is/page.asp?Id=555)

The Laugar Upper Secondary School is a boarding school of a somewhat special type. It offers four study programs, social science and natural history lines leading to the matriculation examination and vocational studies in gymnastics and sports-related subjects as well as a general program of study. The student population is approximately 100, coming from various parts of the country. (Retrieved from the Internet 08.08.08. www.laugar.is/vefur/?p=skolinn).

Two large upper secondary schools are operated in Akureyri, i.e. Akureyri Junior College (MA) and Akureyri Comprehensive Junior College (VMA). In 1930 MA became a fully independent school entitled to graduate students with the matriculation examination (stúdentspróf) at which juncture it adopted its current name. The school premises have been significantly enlarged since that time with corresponding growth in student numbers. The student population is now about 800, with 150 graduating with the matriculation examination every year.

VMA is the largest school at upper secondary level outside the area of the capital. It was opened in 1984 and has been constantly expanding since that time. The size and organization of the school allow flexibility in study arrangements and course offerings. The school has high-grade amenities, e.g. well equipped technical workshops, excellent facilities for teaching nutritional and culinary subjects, new and

well-equipped classrooms for art tuition as well as first-rate provisions for all theoretical and academic instruction. There are about 1,200 daytime students enrolled in the school and a total student population of approximately 2,000 when evening classes and distance education programs are included.

University. The University of Akureyri was established in 1987 and has grown rapidly during its years of operation, with a student body of about 1,500 and a staff of almost 200. There are three faculties at the university: Faculty of Health Sciences, Faculty of Arts and Social Sciences and Faculty of Business and Science.

During the academic year 2008-2009 there are courses on offer in 15 academic disciplines: Media Studies, Primary and Lower Secondary Education, Nursing, Occupational Therapy, Pre-school Education, Biotechnology, Law, Modern Studies, Social and Economic Development, Social Studies, Psychology, Fisheries Science and Aquaculture, Computer Sciences, Natural Resource Sciences and Business Administration. A large proportion of the student population are enrolled in the university's distance education program and, indeed, the University of Akureyri has played a leading role in this form of study. A research centre, where the university has conducted part of its operation since 2004, accommodates various academic and research institutions. Experience has shown that such an arrangement is of mutual benefit to all parties involved.

Specialty schools. There are several specialized schools in the impact area; for example the Akureyri School of Visual Arts and Design which offers a program of preparatory studies, a department of aesthetic arts which provides professional training in free visual arts and a department of art design where students are trained in the profession of graphic design. There are also a number of music schools in the region, in Akureyri and Húsavík and also in more sparsely populated areas. The largest of those is The Akureyri Music School which operates in five different departments and provides instruction in most musical instruments. The school has a staff of 35 professionally trained teachers who serve about 1,200 elementary school pupils and well as providing a musical education for approximately 500 students specializing in a variety of musical instruments.

4.4.2 Social services

Municipalities are under a legal obligation to provide social services for individuals and families, cf. Act No. 40/1991. The aim of such services “*is to ensure financial and social security and support welfare based on communal assistance*” as stated, for example in the first Article of this Act. The tasks involved may comprise social counseling, financial assistance, social services in the home, matters relating to children and youths, services for people with handicaps, senior citizens, preventive measures relating to alcohol and drug problems, unemployment registration and the operation of employment exchange agencies, to mention the main categories of such services. The municipalities dealt with here all have formally organized social service committees and generally operate sophisticated social services in a successful manner with the aid and participation of professionally trained staff.

4.4.3 Recreation

The municipalities in question are all involved in ambitious programs with regard to sports and recreation for which various facilities are available, e.g. excellent sports stadiums and swimming pools, both in Húsavík and at Laugar. The same applies to Akureyri where further options are on offer, such as an 18 hole golf course, an indoor skating rink, an indoor football pitch and excellent ski slopes where snow can be produced from water by means of specialized machinery. There are also fine ski slopes in the immediate vicinity of Húsavík, as well as terrain particularly well suited for cross-country skiing. The impact area also has much to offer with regard to enjoying the natural environment, e.g. mountain trekking and angling, to name but few examples. Thus there is varied potential for outdoor recreation. The impact area offers a rich selection of cultural and artistic events with regard to drama and music. For instance, a professional theatre operates in Akureyri which is also the home town of the North Iceland Symphony Orchestra and an energetic drama society is active in Húsavík.

4.4.4 Civil protection, police and safety

In accordance with the Civil Defense Act No. 82/2008 civil defense committees are appointed by local government for the purpose of strategy formation and the organization of civil protection activities within their districts. The civil defense committees prepare risk assessments and emergency response plans in cooperation

with the National Commissioner of Police. Municipal councils appoint the staff of civil defense committees and pay their work-related expenses.

The official jurisdiction of the Húsavík Police Commissioner and Chief of Police extends from Vaðlaheiði in the west to Bakkaflói in the east and Vatnajökull in the south, a geographical area of approximately 15 thousand km² with a population of ca. 5,500. The office of Chief of Police in Húsavík operates 3 police stations, in Húsavík, Raufarhöfn and Þórshöfn.

The official jurisdiction of the Akureyri Police Commissioner comprises Eyjafjarðarsýsla and the two westernmost country municipalities in South Píngeyjarsýsla, Svalbarðsstrandarhreppur and Grýtubakkahreppur. In addition, the Akureyri Police Commissioner has the role of Chief of Police in his own area as well as that of the Police Commissioner in Fjallabyggð. The size of the police jurisdiction is just under 4,300 km² and it has approximately 24 thousand inhabitants. The largest population centers are Akureyri, Siglufjörður, Ólafsfjörður and Dalvík, each of which has its own police station.

There are fully equipped fire brigades in the impact area, especially those in Akureyri and Húsavík, but also elsewhere. The main function of the Akureyri fire brigade is fire prevention and medical transport service. The emergency wardens in 112 receive notifications and service requests for the fire brigade, provide assistance during emergency calls etc. The fire brigade takes care of medical transport in the service area of Akureyri Health Centre, for which purpose they use four ambulances owned and operated by the Icelandic Red Cross. The vehicles are of a high standard and fitted with the latest technical equipment. The same applies in Húsavík where two ambulances are located, and one in each of the following settlements: Kópasker, Raufarhöfn and Þórshöfn. Medical transport service in the operational area of The Health Center of Thingeyjarsýslur is the responsibility of that institution and part of its operation. Highly organized, well-equipped rescue teams with a large number of reservists to draw upon are also located within the impact area. Rescue services in Iceland are based on volunteers who have been specially trained to tackle difficult and demanding conditions. The services are mainly financed by the sale of fireworks and lottery tickets.

4.4.5 Hospitals and health care

There are two hospitals and two health centers in the impact area of a potential aluminum plant at Bakki, all of which are of particular importance in connection with the availability of necessary health care facilities with regard to anticipated construction work. Akureyri Hospital (FSA) operates in accordance with the Health Service Act No. 40/2007 with subsequent amendments and is under the authority of the Ministry of Health and Social Security. FSA is a high-technology hospital and the second largest in Iceland, offering services in all the main disciplines of medical science. There are, among other facilities, fully-equipped operating theatres, an intensive care unit and an A&E department which responds to emergencies and accidents. There is a helicopter deck adjacent to Akureyri Hospital, since this institution is defined as the country's main reserve hospital outside the capital area. The centre for air ambulance services in North and East Iceland is located at Akureyri Airport, cf. chapter 4.6.3. Akureyri Hospital (FSA), generally has a staff of approximately 650 in about 490 full-time positions, including about 50 physicians. There are about 180 registered hospital beds at FSA and the total area of the main hospital building is approx. 25 thousand square meters.

The aim of Akureyri Health Centre, as applies to other such institutions, is to contribute to the strengthening, improvement and maintenance of good health which adds to the well-being and welfare of the inhabitants of the center's service area. Akureyri Health Centre is in charge of medical treatment, health care and nursing extrinsic to hospitals in Akureyri and the vicinity. It has a staff of about 70 in approximately 50 full positions, thereof 12 physicians.

The operation of the Health Center of Thingeyjarsýslur falls into two main categories. On the one hand there is the Húsavík Hospital and, on the other, health centers. The hospital runs the conventional services of such an institution – as does the health care – which are mainly divided into reception and on-call duties by primary health care physicians, home nursing, nursing services, infant care, maternal health protection and school health care.

4.5 Business services

This chapter briefly describes the main aspects of services to industry in the impact area. In addition to what is outlined here, a wide range of service providers are

situated in Reykjavík, which, and in many instances also have branches in Akureyri and Húsavík

4.5.1 Bookkeeping and accountancy

Several companies in this field operate in Akureyri and Húsavík. Some are part of multinational concerns, e.g. Deloitte, KPMG and PricewaterHouse-Coopers; others are independent businesses, as, for example, Grófargil in Akureyri. In addition to those already mentioned, there is a large number of individuals and smaller companies engaged in bookkeeping and auditing.

4.5.2 Computer services

Services in this field have been increasing and the companies have grown through the merging of smaller units. The largest companies are Skýrr, www.skyrr.is and Þekking www.thekking.is which among other things, offer extensive computer services and hosting. Software services are also available, both under the auspices of the companies named above and others, e.g. TM Software, www.tmssoftware.is and Hugur www.hugur.is. In addition, numerous specialized stores offer computers and software.

4.5.3 Architecture and engineering services

There are several architecture and engineering service enterprises in Akureyri, some being offshoots of larger businesses, mostly in Reykjavík. Among Akureyri companies are Raftákn, www.raftakn.is and Verkfræðistofa Norðurlands, www.vn.is as well as Mannvit Engineering www.mannvit.is and Verkís www.verkis.is, large companies, which, after the merger of several smaller units, operate in many different parts of the country. A large number of experts work for these companies, especially engineers. Architectural offices are generally smaller enterprises with fewer staff.

4.5.4 Diverse services and education

A number of companies in the area are involved in personnel placement and supply services, opinion surveys and education. The largest of those is Capacent, www.capacent.is. As examples of establishments focusing on retraining and education, we could mention Símei, www.simey.is, and Húsavík Academic Center, www.hac.is. Both these institutions offer courses in a variety of subjects. Diverse research activities are also conducted at the Academic Center in Húsavík where the

North East Iceland Nature Center is also located, a research institution in the field of natural sciences and one of seven such centers in Iceland www.nna.is.

4.5.5 Building management

Two companies in Akureyri and Húsavík dominate most of this market sector, ISS Iceland, www.issworld.com and www.iss.is, and Securitas, www.securitas.is. Those enterprises, however, are not local concerns, but operate all over Iceland. A number of smaller parties undertake similar services.

4.5.6 Industry

Several companies operate in local building and metalwork industries. Akureyri has fostered a long shipbuilding tradition with a large shipyard which undertakes newbuilding and repairs, and is also home to smaller metallurgic and tinplate workshops and companies. A large number of construction companies of varying types and sizes are located in Akureyri as well, and several similar undertakings operate in Húsavík.

4.5.7 Transportation

There are several transport companies in the area. Most of these do not confine their activities to local needs, but form parts of more substantial concerns which operate all over the country and also run freight shipping and logistics services between Iceland and other countries. Among those are Iceland's two largest transport companies, Eimskip, www.eimskip.is and Landflutningar Samskip, www.landflutningar.is and www.samskip.is. Both these companies have substantial capacity to operate a wide range of transportation activities, both by land and sea. Other important enterprises in the field of transport and logistics are Air Iceland, www.flugfelag.is, Iceland's largest domestic airline and SBA-Norðurléið, www.sba.is, which operates extensive bus and coach charter services. Fjallasyn Runars Oskarssonar is a sizeable company that specializes in coach and charter services in the Húsavík area. www.fjallasyn.is

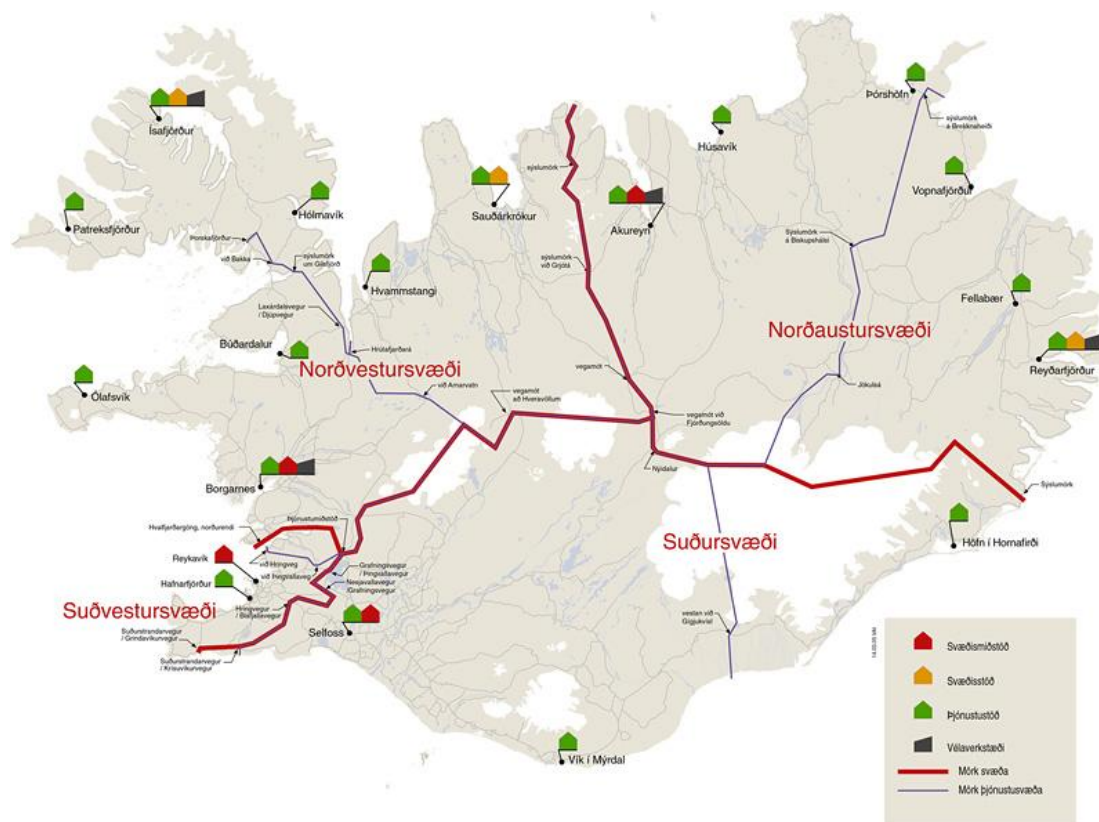
4.6 Infrastructure

The infrastructure of the impact area is variously owned by the state, the municipalities or by private parties. The mode of operation of such structures is dealt with in this chapter, although generally the coverage of these items focuses on types of infrastructure, not ownership or operational aspects.

4.6.1 Roads

The Minister of Communications is in charge of matters relating to road transport issues. The Icelandic Road Administration is in charge of the highway system in accordance with the Highway Act No. 80/2007, comprising the administration of public roads or road sections, including road construction, maintenance and related services. The function of the Road Administration is to develop and take charge of the entire system of public roads in the most economical way giving priority to the requirements of society, the safety of road users and environmental matters. This involves making sure that communications are ensured all year round, at minimum cost and maximum convenience for road users, with a special emphasis on communications within service areas. During road construction and maintenance priority shall be given to minimizing potential accidents to road users.

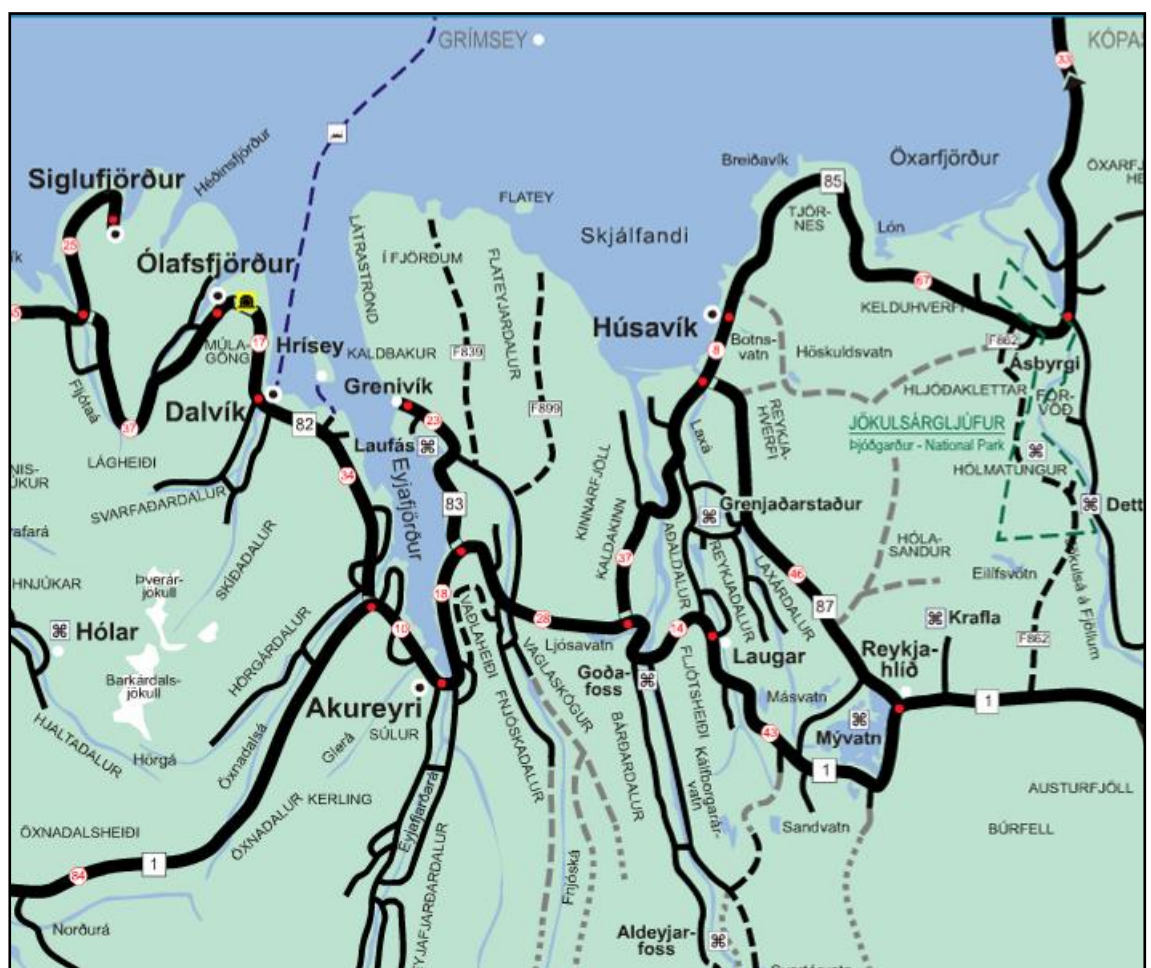
The Road Administration is divided into the Center and four administrative regions. The Center is the venue of strategy formation and the highest level of administration. The regional districts are the South, the South-west, the North-west and the North-east. (Fig. 20).



Source: The Icelandic Roads Administration, www.vegagerdin.is

Figure 19. Division of the Icelandic Road Administration into administrative regions

The ring road traverses part of the area and is connected to regional population centers, such as Húsavík, for example, by means of arterial roads (Fig. 21). Plans are under way for a tunnel through Vaðlaheiði which will shorten the distance between Akureyri and Húsavík by 16 km. Other possible shortenings of this route make up a total of 5 km, e.g. when a new bridge has been built over Skjálfafljót which will replace the current old bridge of single lane width, and restricted axle weight. When this work has been completed the distance between those two population centers will be just over 70 km - a figure which is highly relevant with regard to the construction of an aluminum plant at Bakki, since Akureyri will then have reached the distance limit calculated for daily commuting to work. Roads are also being improved between Húsavík, Kópasker, Raufarhöfn and Þórshöfn.



Source: The Icelandic Road Administration, www.vegagerdin.is

Figure 20. Public roads around Akureyri and Húsavík. (Retrieved from source November 2008)

4.6.2 Harbors

Húsavík Port, which is operated by the municipality Norðurþing, has recently been enlarged. The total length of piers is 770 meters with greatest depth at Bökugarður pier, 12 meters for a distance of 150 meters. Since improvements have been made, the port can handle vessels 150 meters in length with a maximum draft of 10 meters.

The general land use plan for Húsavík Municipality for the period 2005-2025 presents a site plan for the port, which has now been implemented in part, and from which a new road connection to Bakki will be built when aluminum plant construction begins.

Currently the general land use plan for the entire municipality of Norðurþing is being reviewed after merging of municipalities in the region. The Húsavík port area will be among the focus points of this review, with further extension in mind in order to enable the port to tackle all services with the anticipated aluminum plant, both during the phase of construction and operation.

The ports in Akureyri and the vicinity are operated by a co-operative municipal enterprise, Hafnasamlag Norðurlands, www.port.is. Akureyri Port, with its large operational area and spacious warehouses, has extensive cargo capacity. The main pier is approximately 140 meters in extent, with a depth of about 9 meters. There are also other piers in Akureyri, both for serving the needs of the fishing fleet and for industry, e.g. Akureyri Shipyard which also operates a floating dock.

4.6.3 Airports

Akureyri airport serves both domestic and international flights. It is the center of air ambulance services for North and East Iceland. Akureyri Airport comes second to Reykjavik with regard to frequency of domestic air traffic, with 5-10 flights a day connecting those two locations. There are also regular flights between Akureyri, on the one hand, and Grímsey, Þórshöfn and Vopnafjörður, on the other. During part of the year regular international flights are operated from Akureyri Airport to Copenhagen and there are also occasional flights to London and several other cities.

The current runway in Akureyri is 1,940 meters long. It is now being extended by 460 meters, resulting in a total length of 2,400 meters. Safety areas will also be enlarged to cover 150 meters at each end of the runway. Thus, the total length of the runway, including safety areas will be 2,700 meters. This enhancement significantly improves the role of Akureyri as an alternate international aerodrome to Keflavík

Airport. In addition to the lengthening of the runway, navigation and landing aids have been improved in order to ensure acceptable minimum safe altitude for instrument approach procedures. This work is expected to be completed in autumn 2009.

The airport terminal which was opened in 1961 has been enlarged and renovated so that it can now accommodate approximately 400 visitors at the same time. The passenger area is 550 m² and may be divided into 3 sections when required for the handling of international flights. A new catering facility with a reasonably spacious restaurant area is attached to the waiting hall which also offers the services of an automatic cash dispenser and a duty free store for international flights.

There is an airport in Aðaldalshraun, about 10 km south of Húsavík which used to handle scheduled flights, but this service was terminated a few years ago. It is now defined as a landing strip only since it does not deal with regular, scheduled air traffic. Yet conditions for landing are excellent, with a 1,600 meter tarmac runway, adjacent to which is a reasonably spacious, newish air terminal. There is also a landing strip for smaller aircraft in the Mývatn District.

4.6.4 Waste management

The private limited company Flokkun Eyjafjörður ehf. was established 24 May 2007 jointly by all municipalities in Eyjafjörður. The company has set itself the aim of supporting increased recycling and the improved handling of waste materials. To ensure the implementation of this aim, Flokkun has formulated its own strategies in matters regarding quality, the environment and safety. Molta is a subsidiary of Flokkun and other companies in the area, and under its auspices a highly-developed biomass plant is currently under construction for the purpose of processing useful products from biological waste. This will significantly reduce landfill volume.

4.6.5 Utilities

The utilities dealt with here relate to the distribution of heating, electricity and water. In recent years, many utilities have been merged into comprehensive power companies which provide versatile services in this field. This has been the case both in Húsavík and Akureyri. Orkuveita Húsavíkur ehf. (Húsavík Energy) was established 11 February 2005 in accordance with authorization by Act of Parliament No. 13/2005. The Act authorized Húsavík Municipality (now Norðurþing), the owner of the utility,

to establish a private limited company with regard to Orkuveita Húsavíkur, www.oh.is, from and including 1 January 2005. According to this Act, Orkuveita Húsavíkur took over the exclusive right of Húsavík Municipality and Orkuveita Húsavíkur to operate a heating, electricity and water utility in Húsavík.

On 1 August 2000, Rafveita Akureyrar, Hitaveita Akureyrar and Vatnsveita Akureyrar (Akureyri Electricity, heating and water utilities) were merged into one power company, resulting in a strong public utility, Norðurorka, www.nordurorka.is. This will, on its own, cooperatively, or even by merging with other power companies, take charge of the transportation and sale of energy and water in Akureyri and other areas where buyers are to be found. Akureyri Municipality is the owner of this company.

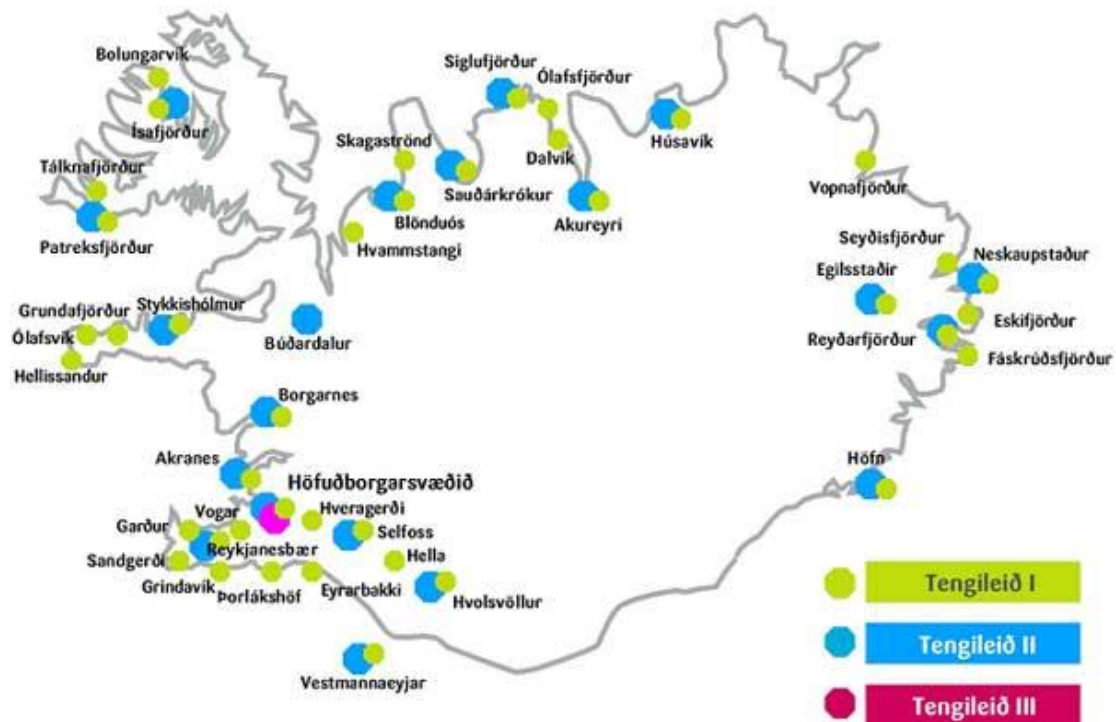
Peistareykir ehf., a company owned by Orkuveita Húsavíkur, Norðurorka, Landsvirkjun and Þingeyjarsveit, is engaged in research with regard to the procuring of energy in the geothermal high-temperature area in Peistareykir with power plant construction in mind.

4.6.6 Communications

There are two kinds of long-distance cables, the traditional telephone cables and the new optical-fiber cables which can be divided into landlines and submarine cables. Two submarine cables link Iceland to other countries. CANTAT3 connects Western Europe to North America, extending right across the Atlantic between Iceland and the Faeroes. The Farice cable links Iceland to Europe with connections to the Faeroes and Scotland. This is a rough outline of Iceland's telecommunications with the rest of the world.

Different regions of Iceland are connected by means of high-technology optical-fiber cables and this system is currently undergoing rapid development and enhancement. The vicinity of Bakki near Húsavík is linked by a telecommunications network comprising radio, TV and telephone. With regard to sparsely populated areas, the picture is rather different. In these parts, much remains to be done, e.g. with regard to high-speed Internet connections. In the light of an altered economic environment and the privatization of baseline telecommunications systems there is growing uncertainty as to whether improvements will be made, and if so, of what kind.

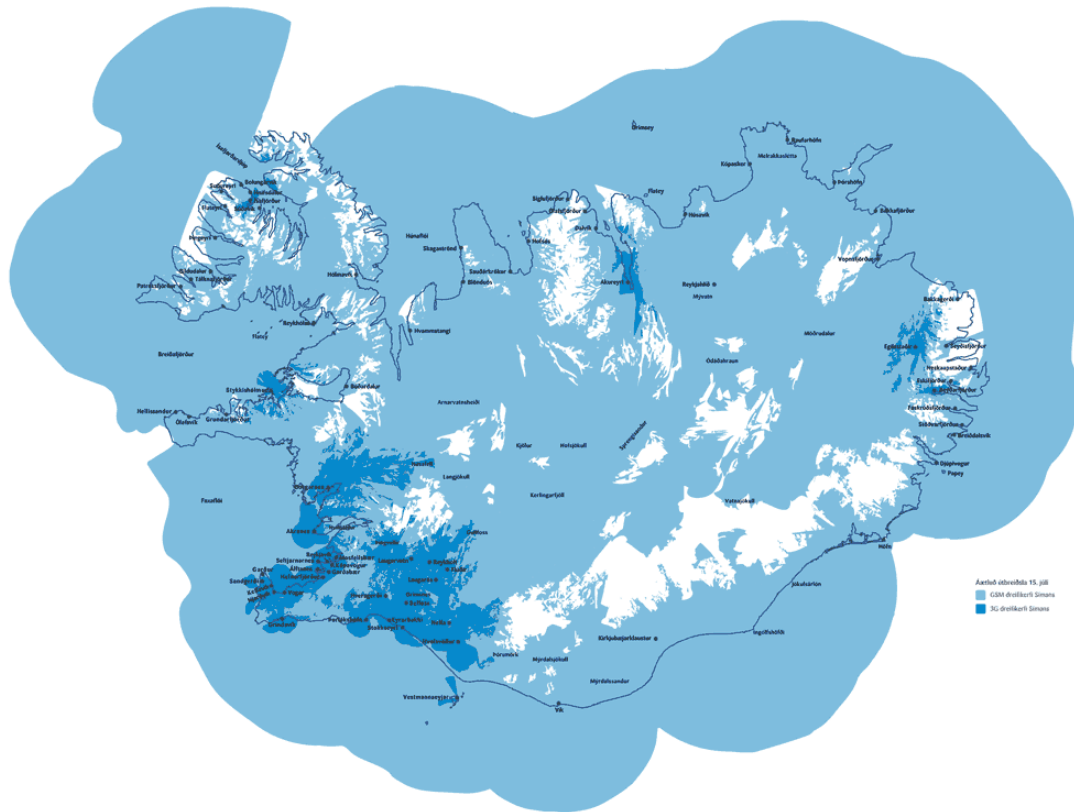
The Síminn IP-based network is available in all the main urban centers in Iceland. It is also possible to link locations where Síminn does not have IP connection points to the network by utilizing other methods of access to private company networks. (Fig. 22)



Source: Síminn, www.siminn.is

Figure 21. IP network of Síminn, August 2008

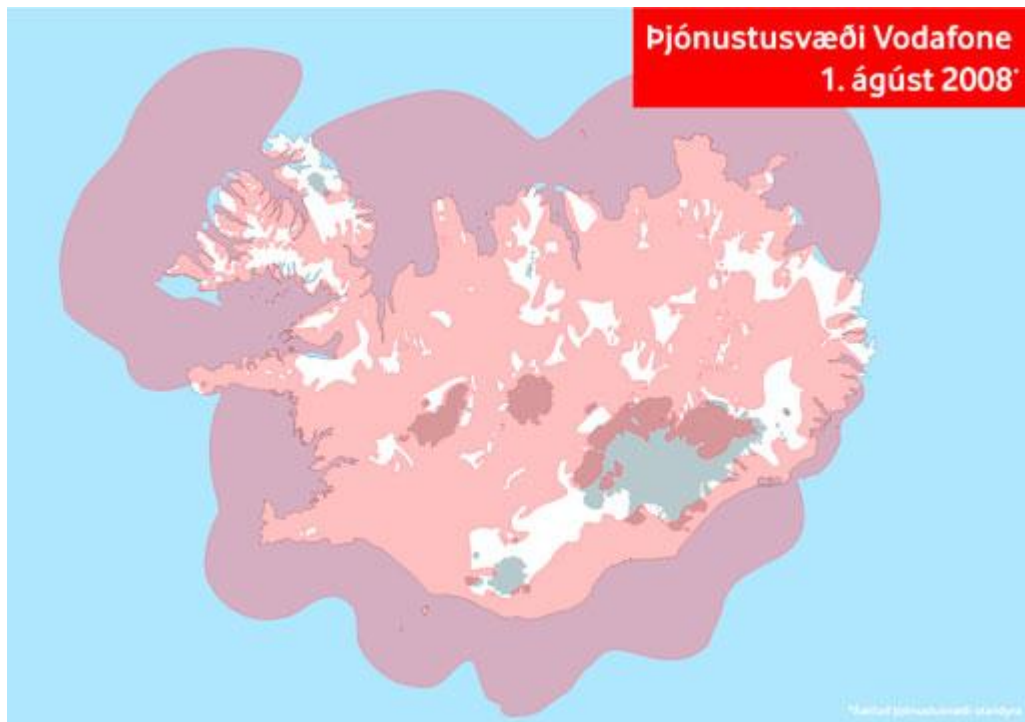
At present the two companies Síminn and Vodafone have completed the installation of long-range GSM transmitters all over the country, which greatly extends the area of mobile phone coverage. Concurrent with the development of the long-range GSM system, long-distance 3G is being built up, leading to a significant improvement in general mobile phone services. By means of the 3G system, for example, seafarers, rescue teams and tourists are able to access a high-speed network link via computer and telephone virtually anywhere in Iceland and obtain a telephone connection in a larger area than is now possible, as may be gathered from the following figures. Fig. 23 shows the planned extent of the long-distance 3G system in 2010.



Source: Síminn, www.siminn.is

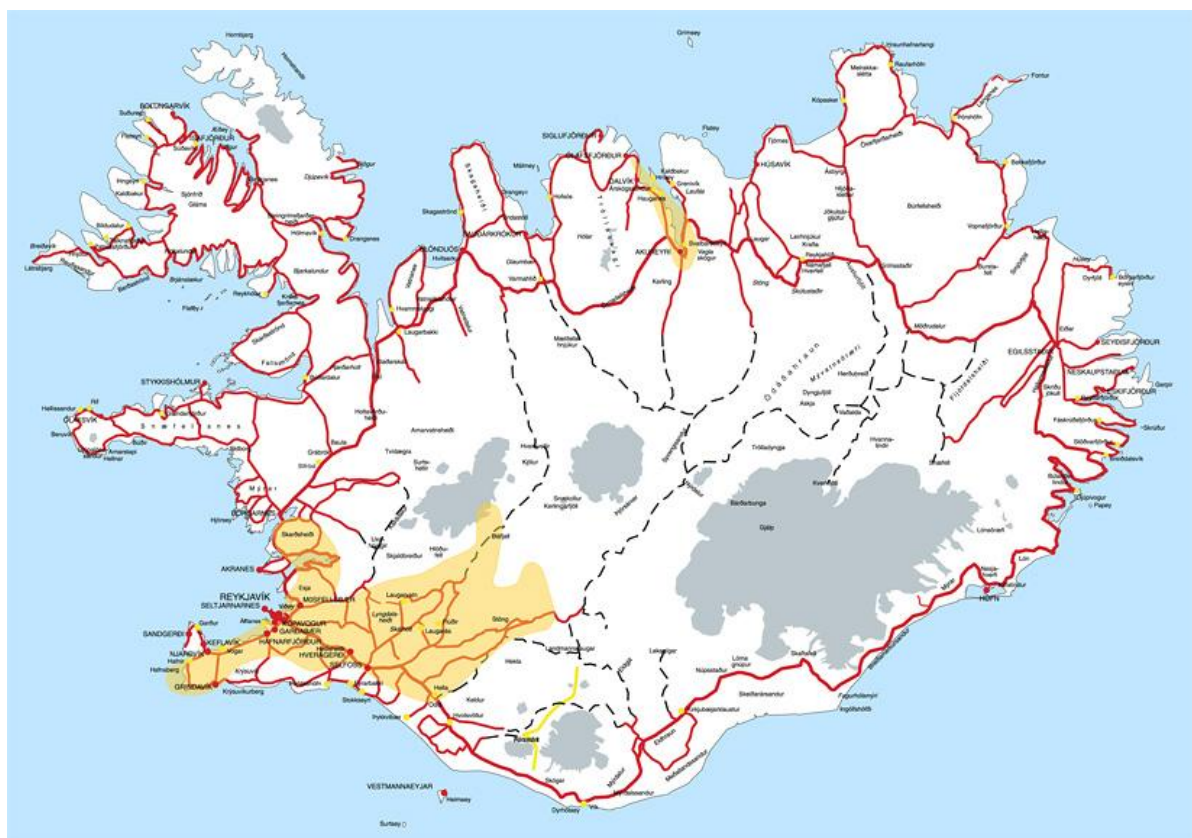
Figure 22. GSM and G3 network of Síminn, August 2008

The telecommunications company Vodafone has developed a sophisticated IP ADSL system which ensures high-speed data transfer. Fig. 24 shows the coverage of Vodafone's GSM service in August 2008 and fig. 25 illustrates the extent of the company's G3 network.



Source: Vodafone, www.vodafone.is

Figure 23. Vodafone’s GSM network, August 2008



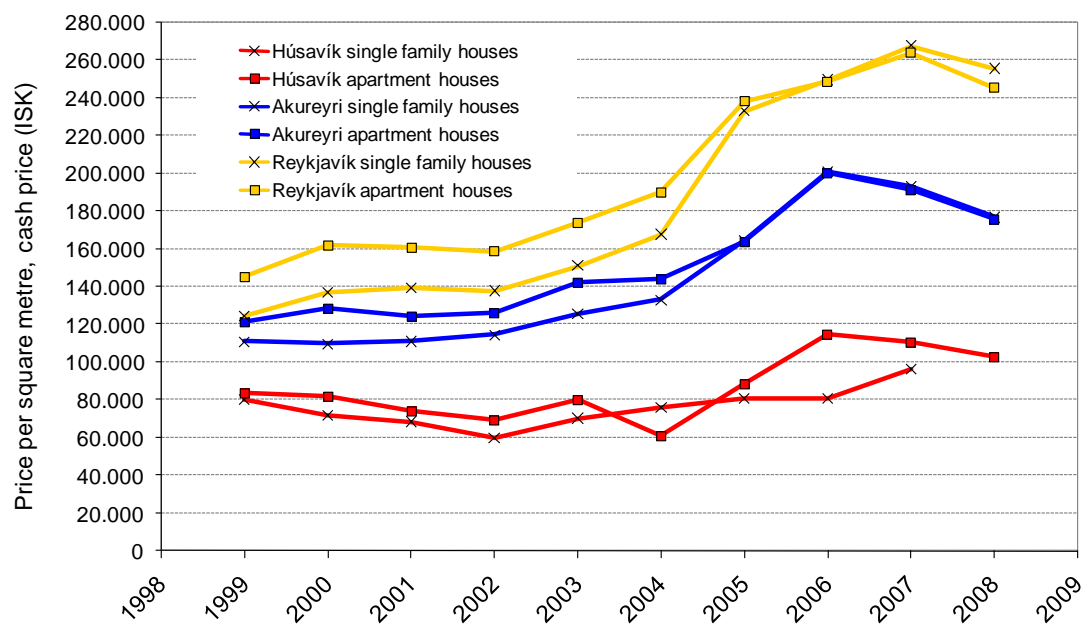
Source: Vodafone, www.vodafone.is

Figure 24. Vodafone’s G3 network, August 2008

4.7 Housing market

4.7.1 House prices

The real estate price index compiled by the Land Registry of Iceland provides a guideline to the development of house prices in Iceland's largest population centers. The index includes three locations within the impact area; Akureyri, Húsavík and Dalvík. Price trends in Húsavík and Akureyri are our main concern, with regard to the construction of an aluminum plant at Bakki. The next figure shows house prices per square meter in Húsavík and Akureyri, with corresponding data for Reykjavík included for comparison. The figure shows actual prices adjusted to the price level for July 2008, the value of which is calculated on the basis of average prices during the first 9 months of that year. Only housing built 1951 and later is included in the data, since the prices of older houses sometimes follow other principles.



Source: Land Registry of Iceland, *verðsjá fasteigna*

Figure 25. Price of residential housing built 1951 and later, adjusted to the price level in July 2008

The figure clearly shows the wide gap between house prices in Húsavík and Akureyri. And yet house prices are significantly lower in Akureyri than in Reykjavík, or approximately 70% of those in Reykjavík and the Húsavík prices make up about 40% of the Reykjavík norm.

4.7.2 Size of housing

The table below shows the size of residential housing in the Húsavík region as well as in the whole of Iceland.

Table 7. Size of residential housing in the Húsavík region at the end of 2007

	Size of residential housing Dec 31 2007 (m ²)	Population Jan 1 08	Residential housing per capita (m ²)
Húsavík	128,755	2,256	57.1
Raufarhöfn	18,932	224	84.5
Norðurþing less Húsavík and Raufarhöfn	38,554	493	78.2
Tjörneshreppur	4,422	60	73.7
Aðaldælahreppur	21,240	259	82.0
Þingeyjarsveit	56,775	681	83.4
Skútustaðahreppur	28,858	399	72.3
Iceland as a whole	17,274,079	313,376	55.1

Source: Land Registry of Iceland

The average size of residential housing per capita is approximately 55 m² in the country as a whole. If the size per capita of residential housing in urban districts is significantly above the national average, this should probably be regarded as underutilization. The table indicates that residential housing is significantly underutilized in municipalities in the Húsavík region. This, however, appears not to be the case in Húsavík, and even less so in Akureyri where the figure is below the national average. Underutilization is obvious in Raufarhöfn, but this is not particularly relevant because of the distance between Raufarhöfn and the aluminum plant. In the countryside it is harder to determine whether housing is underutilized since houses tend to be larger there than in urban centers. Nevertheless, it is likely to be a case of underutilization if residential housing there exceeds 70-80 m² per capita. This applies to Aðaldælahreppur⁶ and Þingeyjarsveit.

The next table shows the size of industrial housing in the Húsavík and Akureyri regions as well as nationwide.

⁶ Now part of Þingeyjarsveit.

Table 8. Size of industrial housing in the Húsavík region

	Shops and offices (m ²)	Manufacturing	Warehouses	Specialized property (m ²)	Industrial housing total	Industrial housing per capita
Húsavík	17,680	29,421	4,469	26,359	77,929	35
Raufarhöfn	2,569	8,718	6,116	6,998	24,400	109
Norðurþing less Húsavík and Raufarhöfn	3,568	11,105	5,935	12,691	33,299	68
Tjörneshreppur			143		143	2
Aðaldælahreppur	2,009	981		1,330	4,321	17
Þingeyjarsveit	2,494	6,362	510	10,972	20,338	30
Skútustaðahreppur	7,588	3,198	4,410	9,814	25,000	63
Iceland as a whole	2,730,834	3,247,374	805,576	4,415,829	11,199,613	35.7

Source: Land Registry of Iceland

The table indicates that there is but little excess industrial housing in the Húsavík region. The size of industrial housing in Húsavík per capita closely reflects the figure for the country as a whole. The same applies to Akureyri where industrial housing appears to be well utilized. But in Raufarhöfn, industrial housing is at a relatively high level, although this does not matter much, since Raufarhöfn is at a considerable distance from the proposed aluminum plant. It is mainly in Skútustaðahreppur and Norðurþing, outside Húsavík, that one may find underutilized industrial housing.

4.8 Community and lifestyle

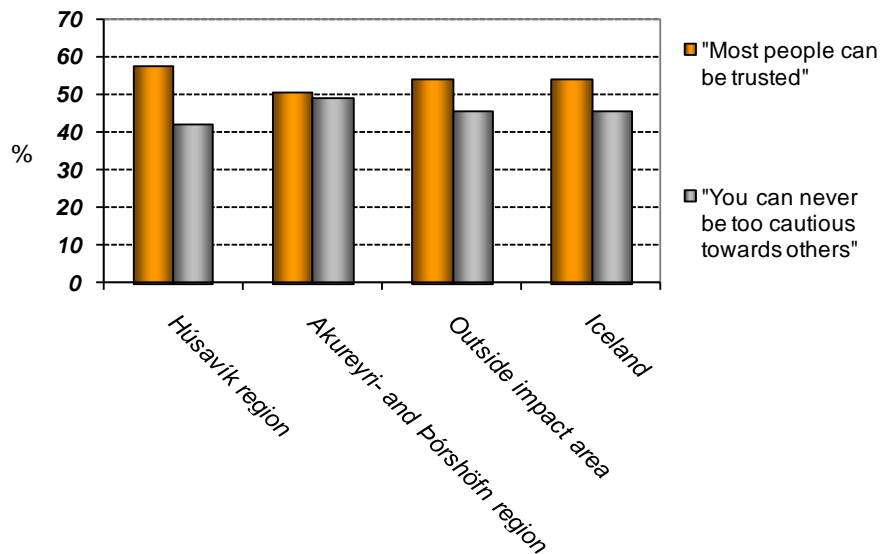
A strong industrial tradition is a dominant characteristic of the impact area, or, as one interviewee expressed it: “*We are industrially-oriented people*”. In the area as a whole, this industrial basis is linked to food processing, both with regard to agricultural and fish products. The Akureyri region has a solid background in industrial production with a long history of robust textile, shipbuilding and chemical industries as well as a sophisticated culinary sector, etc. During the past 25 years or thereabouts, especially after 1990, this industrial base has yielded significantly to increased employment in the service sector, especially in education. Thus, Akureyri has developed into a service and knowledge-based community. Similar changes, albeit on a smaller scale, have taken place in the Húsavík region which has, for example, had to go through the termination of the production of diatomite for export and the closing of various foodstuffs production enterprises, such as the shrimp processing plant, Gefla, in Kópasker which closed in 2003 after a steep decline in production in 2002. There have been some instances of fishing quotas being sold away from the region resulting in fisheries and fish processing activities being

transferred to outside ownership. The countryside and the smallest villages in the impact area have been faced with adverse circumstances in many respects with a recession and declining incomes in agriculture. Out-migration from the area is a particular concern, as well as the gender ratio and changes in the age composition of the population. This has wide-ranging consequences for the operation of social services e.g. when schools lose pupils, making their operation harder to maintain.

Another interesting aspect of the area is a long tradition in the operation of co-operative societies, which may be traced to the fact that Iceland's first co-operative, Kaupfélag Þingeyinga, was founded in the Húsavík region in 1882 which may thus be regarded as the cradle of the co-operative movement in Iceland. This co-operative has now merged with its sister company in the Akureyri region, KEA, www.kea.is, whose structure has undergone profound changes since its period of greatest prosperity about the middle of the 20th century, when it was a dominant force in the local economy, and industrial activity in Akureyri was to a significant extent operated under the auspices of the co-operative movement.

In a postal survey which RHA carried out in Iceland in 2007, as part of research into the social impact of the construction of an aluminum plant and power plant in East Iceland, a question was included which was intended as a measurement of mutual trust in society⁷.

⁷ This survey is described in further detail in chapter 4.2.3 which deals with levels of education in the impact area.

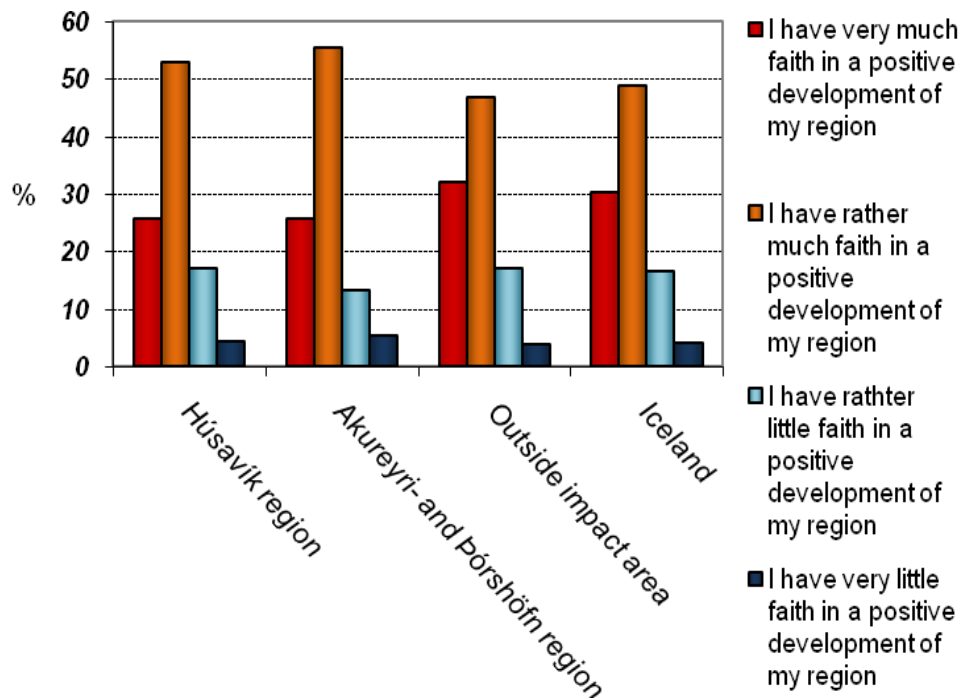


Source: RHA, unpublished data

Figure 26. Survey 2007: What would be more true, in your opinion, that most people can be trusted or that you can never be too cautious towards others?

Both the Húsavík and Akureyri regions diverge from the national average with respect to people's attitudes to the point raised in the question. Apparently, people in Húsavík demonstrate more trust towards their fellow citizens than is the norm in Akureyri. How far this should be interpreted is hard to say, although the difference may well have something to do with the size of Akureyri as an urban centre.

With regard to the inhabitants' vision of the future of their region over the next few years, as elicited in the survey referred to above, there is but little difference to be noted between other parts of Iceland and the regions which are the subject of this research. In the Akureyri and Þórshöfn regions, a slightly higher proportion of respondents, (about 81%) stated that they believed in a positive development, as compared to 78-79% of respondents in the Húsavík region and the country as a whole,



Source: RHA, unpublished data

Figure 27. Survey 2007: Do you have much or little faith in a positive development of your region in the next years?

This is only a small divergence, however, and it can be stated, broadly speaking, that the morale the community as shown in these answers is not significantly different from the norm for the country as a whole.

The fact that Akureyri is located in the impact area causes its community to differ from other regions outside the capital. Because of Akureyri's presence, the impact area possesses a reasonably large labor market as well as a domestic market for various goods and services, resulting in greater diversity than elsewhere in Iceland outside the area of the capital. Thus, the region is to some extent less dependent on the capital which probably makes its mark on the inhabitants and their lifestyle.

Obviously, the potential advent of heavy industry to the area has given rise to high expectations, as was clearly indicated at a focus group meeting with a number of inhabitants in the Húsavík region, which was held in November 2008. Among aspects of the situation emphasized by those present was the enhanced variety in the local economy resulting from such a development, both jobs in the aluminum plant itself and derived forms of employment. It was anticipated that the young people would be more likely to remain in their home district and that some of those who had moved away would return.

5 IMPACT ASSESSMENT

The assessment of the probable social impact of an aluminum plant in Húsavík is based on the analysis of data and interviews with experts and inhabitants. Account is also taken of the effect experienced by communities in East Iceland in relation to the building of the Alcoa Fjarðaál aluminum plant and its operation. Furthermore, consideration is given to what has been learnt from the operation of aluminum plants in the west of Iceland.

5.1 Population

5.1.1 Zero option

The zero option means that the project under investigation never reaches the stage of implementation, in this case an aluminum plant at Bakki. Source: Based on data Source: Based on data from Statistics Iceland

Figure 2, chapter 4.1.1 shows the demographic development within the impact area in recent years. In the event that no aluminum plant is built at Bakki, it is most likely that the curves shown in the figure will continue in the same direction. A slow population increase will continue in Akureyri and a significant decrease go on in the Húsavík region. The greatest loss of inhabitants will still occur in the Þórshöfn region. Apart from opportunities arising in the Þórshöfn area, should oil be found in Drekasvæði or its surroundings, the utilization of geothermal energy would be the main option for halting this negative trend in the years to come. This energy would probably be used to produce electricity for some industry other than aluminum smelting. Energy is precious and will in all probability become increasingly valuable as time goes by and the earth's fossil fuels gradually dwindle. So it is most likely that in the future someone is going to want to buy the energy on offer in the impact area, for the purpose of industrial development. How long the wait would be, however, cannot be predicted. Besides, it is almost certain that some parties might be interested in harnessing the energy that exists in the area and transport it to another location, e.g. to aluminum plants in Iceland's south-west corner. There is no doubt that the inhabitants of the Þingeyjarsýslur region are strongly opposed to any such scenario and would be likely to use political pressure against any plans of this kind with the support of other residents of North Iceland. Conceivably, they might also use their

authority with regard to land use planning and the granting of an operational license to block any such schemes.

5.1.2 Construction phase

It is estimated that 3,000 to 4,000 man-years will be created by the construction of an aluminum plant at Bakki. Temporary work, however, of this kind is not likely to have a lasting effect on demographic development, although it may well have a strong impact in the short term. The construction work could, for example, bridge a certain gap in the local economy of the impact area. In other words, it could be superimposed on an economic recession. This might hinder out-migration from the impact area to other regions of Iceland or abroad. If such an out-migration takes place it is not certain to be completely reversed, except perhaps in a long period of time despite a recovery of the local economy. The construction work could also temporarily halt an exodus from areas which have suffered a lasting out-migration, such as the Húsavík and Þórshöfn regions. The construction project will also have some crowding-out effect, unless the economy is in a very poor condition when it is implemented.

In the event that the economy is in reasonable shape during the period of construction of the aluminum plant, it is highly important that the public sector and private companies should arrange their operations in such a way that other construction work will be at a minimum at the same time. This sharply curtails the crowding-out effect, lessening the likelihood of the construction work ousting viable enterprises. The risk of a severe crowding-out effect arising from the construction project is thus reduced, for the simple reason that a favorable labor market in the impact area during the construction period will bring in more foreign employees. Their number is to some extent reflected in demographic figures during the construction period, but in the long term their impact on population growth is probably none whatsoever.

At this time, however, the economic outlook is very bleak, and we are faced with the prospect of the greatly diminished operation of both the private and public sectors in years to come. Based on the premise that construction of the aluminum plant is begun in 2010, an environment of economic decline is a virtual certainty and the crowding-out effect of such a project therefore negligible. The project, on the other hand, may have a significant positive impact on a large number of people as well as the economy in its entirety. It can provide work for thousands who would otherwise be unemployed. If construction begins in 2012, the economic situation is less certain. It

is, however, overwhelmingly likely that a significant economic recession is still in evidence and that the building of an aluminum plant at that time will have little crowding-out effect, but much rather prove to be a welcome boost to the country's gloomy economic situation.

5.1.3 Operation phase

Here an attempt will be made to forecast the demographic effect of an aluminum plant at Bakki on the impact area by using, on the one hand, an economic base model and, on the other, an input-output analysis. Further to this, an attempt will be made to identify likely points of population growth within the impact area and, among other things, account will be taken of experience from East Iceland in this respect.

Economic base model. In an economic base model an attempt is made to divide occupational activity into two categories. One category comprises industrial activity which sells its products, goods or services, mostly outside the area in question. This, then, is an activity which is not based on local consumption and is only to a small degree affected by a growing or declining population, provided enough manpower can be obtained to keep the operation going. Examples of such activities are fish processing and power-intensive industry. Jobs in this type of operation are referred to here as independent jobs. The other category consists of industrial activity which is based on local consumption. A growing population improves the foundation for such operations, for example food stores and hairdressing salons. Jobs involving this type of activity are referred to as population-dependent jobs. The fundamental concept here, is that when an area is entered by an operation which produces goods or services sold on a larger market than the domestic one, this operation will attract people who, in turn, cause the domestic market to grow, so that local enterprises will also be strengthened. An attempt is made to estimate the ratio between those two categories. This ratio is then used to forecast the total number of jobs on the basis of the figure for independent jobs.

To be able to use the economic base model, it is necessary to estimate the number of jobs in different sectors of the economy within the area in question, i.e. how many individuals on the labor market are engaged in the activity concerned, based on full-time occupation. Thus, the first task is to estimate the number of jobs in the impact area, North East Iceland. Statistics Iceland has not compiled the relevant data, so an estimate has to be used. The Bureau of Statistics publishes, on the one hand, a table

showing average income in main employment (average income in main employment by region, type of occupation and gender 1998-2005) and, on the other, a table of total income from employment (total income by type of occupation and region 1998-2005) which shows total wages and salaries paid, classified according to region and type of occupation.

Unfortunately, no information is available for the period after 2005. Dividing the latter table by the former yields a number. This number, or unit, may be named “number of average incomes from employment”. It must be made absolutely clear that this is not the number of jobs in the occupation in question. The picture is confused by the fact that not everyone is in full time employment, although the job is classified as the main occupation of the person concerned. Statistics Iceland also publishes the number of working people nationwide (table 3.10 in the Statistical Yearbook of Iceland (Landshagir) as well as the working hours of those in full-time and part-time employment (table 3.15 in the Statistical Yearbook of Iceland).

The number of employed persons in North East Iceland may be estimated by the nationwide ratio between the number of incomes from employment and the number of persons employed. The number of jobs may be estimated by calculating how many part-time jobs correspond to a given number of full-time jobs based on a 40-hour working week, and this figure may, in turn, be added to the number of persons in full-time employment. In this manner, it is possible to estimate the total number of jobs in North East Iceland and then use the same ratios between types of occupation as displayed in the number of average occupation incomes. A comparison between the estimated number of jobs and the total population indicates that the total population is just over double the number of jobs.

The estimate for the years 1999 and 2004 is shown in the following table. The value for 1999 is the average of the years 1998-2000 and the value for 2004 is the average of the years 2003-2005.

Table 9. Estimated number of jobs in the impact area (the North East) 1999 and 2004

Estimated number of jobs	1999	2004
Agriculture	790	780
Fisheries	1,040	870
Fish processing	1,070	890
Other manufacturing	1,710	1,420
Utilities	125	125
Construction	790	900
Retail and repairs	1,340	1,230
Hotels and restaurants	480	520
Transportation	680	660
Financial services	280	300
Real estate and financial services	680	710
Public administration	1,150	1,130
Education	800	990
Health and social services	1,720	1,860
Other services and n.s.	570	740
Estimated number of jobs total	13,225	13,125
Population of the impact area	26,492	26,835

The estimate of the number of jobs in agriculture is probably the most doubtful one. It was decided, therefore, to use mainly the average of all the years 1998-2005 for both of the years in question.

The next step is to divide the estimated jobs into two categories. *Economic activity which is not based on local consumption* is placed in one category. Such enterprises sell their products nationwide or abroad and are therefore relatively unaffected by demographic fluctuations. Agriculture, fishing and fish processing are placed in this category as well as two other types of economic activity, in part. How large this part should be is a matter of opinion. It is assumed that approximately half the jobs in other types of industry are independent, i.e. produce goods and services for the national market. It is assumed, furthermore, that the same applies to the economic activity which relates to hotels and catering, half of this activity may be regarded as exported services to incoming tourists. In the second category should be placed economic activity which is based on local consumption. The number of local people is, therefore, a vital element in activity of this kind. This category includes one half of employment activities relating to other industries, one half of public utilities, the building and construction industry, commerce and repair services, half of the hotel and catering industry, transport and communications, financial services, estate and business services, public administration, education, health and social services, other

services and unspecified activities. Those economic activities are hereinafter referred to as *population dependent* activities

When the estimated number of jobs in each group is investigated, it will be seen that there are more population dependent activities than those in the independent category. In 1999 ratio between population dependent and independent jobs was 2.31, based on the premises outlined above. In 2004 this ratio was 2.62. Thus, the ratio has grown with the passing of time, which is no surprise since service activities are known to have expanded all over the Western world, while primary industries have declined with regard to number of jobs. The ratio grew by an average of 0.086 per annum in North East Iceland during the period 1999-2004 and this growth is expected to continue at the same rate year by year.

The next task is to forecast the number of jobs in independent activities after 2005. To this, in turn, jobs in the aluminum plant itself must be added, those being of the independent type. The forecast regarding the number of independent jobs is based on the following premises:

- It is the opinion of those in the know that jobs in agriculture are, to some extent, declining; the assumption here is 1% per annum.
- Jobs in fishing will continue to decline by 3.6% per annum as was the case during the years 1998-2005. Jobs in fish processing will go on declining by 3.8% per year, displaying the same trend as during 1998-2005.
- Jobs in other industries (those which were estimated as independent) will not go on decreasing, but should remain similar to the figure for 2005, e.g. because the development of an aluminum foil plant at Krossanes.
- Jobs in hotel and catering services (that half of this operation which is estimated as independent) will grow by 4% a year. This should be realistic, since tourist arrivals from abroad have increased significantly and with a lower exchange rate of the króna, this trend is likely to continue.
- Independent jobs in an aluminum plant are all entered for the year 2013 and the impact examined.
- All independent forms of employment in North East Iceland will be exposed to a crowding-out effect as a result of the operation of the aluminum plant.

The multiplier of this effect is estimated at -0.30 which means that jobs in the independent industries will fall by $0.3 \times 300 = 90$ with the advent of 300 jobs in an aluminum plant. All the crowding-out effect is focused on 2013, although this will in reality span a longer period.

It is rather hard to estimate the degree of the crowding-out effect created by jobs in an aluminum plant. In a forecast by RHA regarding population growth in East Iceland, the multiplier of the crowding-out effect was gauged at -0.2 (Jón Þorvaldur Heiðarsson, 2005). It would appear that demographic growth in East Iceland is unlikely to reach the level of the forecast. Consequently, a higher crowding-out effect is anticipated here, or -0.3.

The next table shows a forecast of the number of jobs in independent industries until 2013. It is assumed that the aluminum plant will commence production during the period 2012-2014 and reach full capacity in 2015. The objective here is to examine the impact of the aluminum plant on population figures. For the purpose of simplification, all events are centered on the year 2013, i.e. it is assumed that all the jobs in the aluminum plant will be created in that year and accompanied by the consequent crowding-out effect. The fact that jobs in the plant will increase gradually over a longer period, and most recruitment will take place in some other year than 2013, is of no substantial significance with regard to the population figure. The table also projects the growth of population-dependent man-years as a proportion of independent ones. As already stated, the ratio between those two was 2.31 in 1999 and is expected to increase by 0.086 per annum, reaching 3.51 in 2013. The second lowest row of figures in the table presents a projection of the total number of jobs in the impact area (North East Iceland), and the bottom row forecasts the population figure, based on the premise that inhabitants will be twice as many as the jobs available.

Table 10. Projected number of jobs and inhabitants in the impact area (the North East) until 2013 with a plant of 300 workers

Projected number of jobs	2010	2011	2012	2013
Agriculture	740	733	726	697
Fisheries	698	672	648	606
Fish processing	700	673	647	604
Other manufacturing (independent part)	711	711	711	690
Hotels and restaurants (independent part)	331	345	358	362
Aluminum plant				300
Total independent jobs	3,180	3,134	3,090	3,259
Ratio between independent and local market serving jobs	3.25	3.34	3.42	3.51
Total local market serving jobs	10,341	10,461	10,581	11,440
Total all jobs	13,521	13,595	13,672	14,699
Population of the impact area if double the number of jobs	27,043	27,190	27,344	29,399

When interpreting the table, a number of considerations should be kept in mind. Firstly, that the primary objective here is to examine the demographic impact of the aluminum plant. The population forecast may strike the reader as odd, especially when taking into account that in 2008 the population of North East Iceland had reached 27,400, or a considerably higher figure than suggested here for the year 2010. The demographic forecast, however, is not the main point here, but the difference between an aluminum plant and no aluminum plant. In the event that no aluminum plant is entered for the year 2013, the population forecast for that year is 27,505. If, on the other hand, a 300 man-year aluminum plant is entered into the model, the projection becomes 29,399, or a difference of 1,894 inhabitants. In other words, 1,900 more inhabitants are forecast with a 300 man-year aluminum plant than without it. In the event of a 450 man-year plant, the population difference rises to 2,850. In other words, 2,850 more inhabitants are predicted with a 450 man-year aluminum plant than without it.

Secondly, it must be borne in mind that an aluminum plant cannot be operated without energy production; if such production is to take place in the impact area, this will also create independent jobs, particularly in the case of geothermal electricity which is more labor-intensive than electricity generated by hydropower. Thus, these jobs should be added, increasing the population growth even further.

In the third place, it has to be taken into account that this is a plan based on the most acceptable premises available, which, however, when all is said and done, may turn

out to be wrong. Furthermore, this is a long-term projection which unavoidably adds to the uncertainty, as is the case with all forecasts.

Input-output analysis. In the input-output analysis an attempt is made to trace the funds paid out by a new aluminum plant and assess the number of jobs they create during their progression through the economy. Four factors are assessed in an input-output analysis: consumption linkages, backward linkages, forward linkages and crowding-out effect (horizontal linkages).

Consumption linkages. This factor involves studying the allocation of funds to payroll expenses in a new aluminum plant, based on price levels, taxation and wages and salaries in 2008. It is anticipated that paid wages and salaries of 300 aluminum plant employees amount to approximately ISK 1,720 million, and labor-related expenses ISK 474 million. This makes up an average monthly pay of about ISK 449,000 assuming that the inclusion of additional temporary employees in the summer will result in a total of 319 man-years being performed in the plant. Out of this amount of ISK 1,720 million it is assumed that 13.03% goes on municipal tax, or ISK 224 million, 15.2%, or ISK 261 million on national income tax and 1%, or ISK 17 million on union fees. Pension fund contributions are regarded as saved income which at some period will be returned to the employee.

Thus, 70.8% of the total pay, or ISK 1,217 million remains unaccounted for, which is regarded as the disposable income of the employees of the plant. It is estimated that a third of labor-related expenses, is retained within the impact area, as well as half the amount of income tax and union fees and approximately 80% of the employees' personal spending. Thus, out of payroll costs and related expenses totaling ISK 2,194 million, it is estimated that ISK 1,494 million is spent in the impact area. It is estimated that 30% of this amount goes on wages and salaries of those who provide services relating to the spending of this amount, i.e. ISK 1,494 million. This makes a total of ISK 448 million. Those who earn this amount (ISK 448 million) also spend it in certain proportions, thus creating jobs for others and so on and so forth. To make a long story short, it is anticipated that this will result in wages and salaries totaling ISK 567 million to individuals in the impact area. Based on the assumption that service providers earn an annual income of ISK 3.6 million, 157 jobs would be created in this manner. In short, it is estimated that 319 man-years in an aluminum plant will also give rise to 157 other jobs in the impact area. Thus, the multiplier of consumption linkages is expected to be 0.49.

Backward linkages. With regard to backward linkages, special attention is paid to how many jobs are generated by the purchasing of supplies by the aluminum plant. This refers to supplies other than electricity and the main raw materials, such as alumina and anodes. Included in the purchase of supplies, is all buying of services and payments to subcontractors. It is assumed that the purchase of supplies by an aluminum plant with 300 employees would be approximately ISK 5,600 million and that about two thirds of this amount would comprise purchases within the impact area, or ISK 3,750 million. It is estimated that 20% of this amount comprises wages and salaries to vendors of goods and services who subsequently spend their income etc. According to estimates, total wages and salaries in the area will amount to ISK 947 million and about 263 jobs are expected to be created. Thus, the multiplier of backward linkages is 0.83.

Forward linkages. In this context, the focus is placed on how the products of the aluminum plant progress through the economy and generate jobs. Briefly speaking, it is assumed that all the products will be transferred directly to the port from where they are going to be shipped abroad, in which case the multiplier of forward linkages is simply 0.

Crowding-out effect. (horizontal linkages). When new jobs come into being in a basic industry, others are likely to cease to exist since they are no longer efficient in the competition for labor. Thus, it may be said that the labor market passes its judgment on the jobs on offer, rejecting those that are least attractive. It is probable, therefore, that some current jobs will disappear when an aluminum plant begins its operation. It was assumed that the multiplier of crowding-out effect in East Iceland would be -0.2. In other words, that for every 10 jobs that are created in an aluminum plant, another 2 would cease to exist. Since the demographic increase in Central East Iceland has been somewhat lower than projected by RHA in 2005 (Jón Þorvaldur Heiðarsson, 2005), a higher crowding-out effect is anticipated here, or -0.3.

Total effects. The total multiplier, then, is estimated to be 1.02 (i.e. $0.49+0.83+0-0.3$) which means that 319 man-years created in the aluminum plant itself, will generate 325 derived jobs. Thus, an aluminum plant with a workforce of 300 will result in a total of 644 new jobs coming into existence. The population growth resulting from the plant may be expected to reach double this figure or about 1,288.

In the event of an aluminum plant with a workforce of 450, the multiplier is the same, with 964 jobs being generated which results in a population increase of 1,928.

Summary on population growth. The two methods do not yield the same results. This may be shown by a small table:

Table 11. Projected increase of population with economic base model and input-output analysis

Estimated increase in population in the impact area of a plant in Bakki	300 man-year plant, 250 thousand tons/annually	450 man-year plant, 350 thousand tons/annually
Economic base model	1,894	2,850
Input-output analysis	1,288	1,928
Both methods	1,200-1,900	1,900-2,900

Taking into account the results from both these methods, it is to be expected that, were a new 300 man-year aluminum plant to be built at Bakki, the resulting population growth in the impact area would be **1,200 to 1,900** solely for that reason. A 450 man-year aluminum plant would engender a population increase of **1,900 to 2,900**.

As already mentioned this projected population increase relates to the aluminum plant on its own. If it commences operation, however, geothermal power stations will already have been built to ensure the provision of electricity. Those power stations will provide a significant number of jobs and thus it is likely that the total growth rate resulting from the project as a whole would be even higher.

5.2 The location of workers and size of labor shed.

Above, discussion focused on the increased number of jobs and population growth in the wake of a prospective aluminum plant at Bakki; various sizes of plant were examined. The next stage is to consider where the employees of the plant are likely to reside. Will they live almost exclusively in the Húsavík region or will some of them reside in Akureyri, although this town lies just outside the 45 minute commuting distance⁸ defined earlier in this research?

To try to illustrate this further, experience already existing in Iceland should be examined. In this regard, the knowledge gleaned from Alcoa Fjarðaál's aluminum

⁸ Please note that here it is assumed that necessary road improvements have been completed on the route between Akureyri and Húsavík.

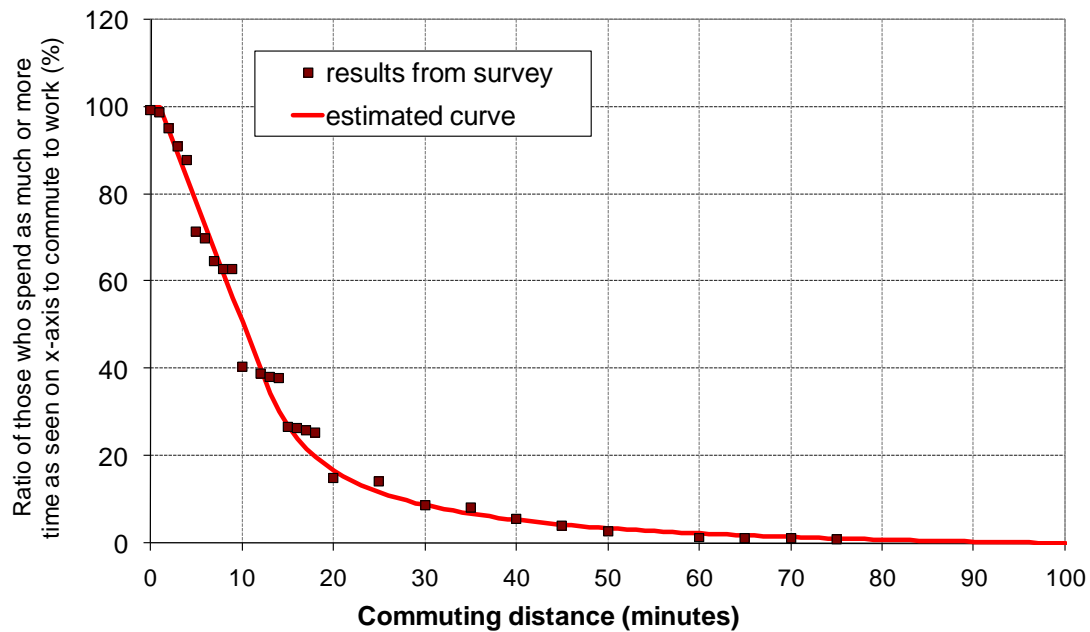
plant in Reyðarfjörður is most immediately relevant. It should be kept in mind, however, when drawing conclusions here that the plant's operation has not yet been formalized to the full.

Currently, it has a workforce of about 470, a fifth of whom live north of Fagradalur (mostly in Egilsstaðir and a very small number in Seyðisfjörður). The distance from the aluminum plant to Egilsstaðir is about 40 km. Approximately four fifths of the workforce live in Fjarðabyggð, a proportion which is also reflected among the plant's administrators and specialists. (Alcoa Fjarðaál, unpublished data, November 2008).

The experience from power-intensive industry at Grundartangi is of special interest here. The ferro-alloy plant at Grundartangi, now named Elkem Iceland ehf., was at a distance of 100 km from the centre of Reykjavík before the Hvalfjörður tunnel was constructed in 1998. Thus the road lay around the fjord Hvalfjörður, a slow and, in some respects, unsafe route characterized by sharp turns and steep hills. Despite such obstacles, there were always several employees of the Grundartangi plant who lived in Reykjavík. Some even drove this distance every day, although this mainly applied to plant administrators and specialists. After the Hvalfjörður tunnel was completed, the distance was cut to 50 km. As a result, a number of administrators and specialists moved to Reykjavík, and commuted daily through the new tunnel. When this is written, about 2/3 of Elkem Iceland's administrators and specialists live south of the Hvalfjörður tunnel, i.e. within the area of the capital. In the case of general employees, the proportion is reversed 2/3 live north of the tunnel.

It seems natural to look towards the experience from Grundartangi since this was a case of heavy industry which was, on the one hand, at a distance of 100 km from a large labor market and, on the other, 50 km away from the same market after significant road improvements. The aluminum plant at Bakki will be situated in between those distances, 76 km away from Akureyri, a large labor market. Conditions in Central East Iceland are not, however, fully comparable with Central North Iceland, for, although Egilsstaðir and Fellabær combined makes up the largest population centre in East Iceland, this location does not hold the same sway over other settlements in the region as do Akureyri and Reykjavík, with regard to their respective surroundings.

In 2002 RHA carried out a survey of people's traveling habits (Kjartan Ólafsson 2005). The result of this study may be seen as individual points in the following figure.



Source: unpublished data from RHA

Figure 28. The time it took Icelanders to access their workplaces in 2002

The figure also displays an estimated curve through the points. Let us assume that the labor market in the impact area behaves roughly according to what the figure shows; that half the people on the labor market, for instance, commute for a distance of 10 minutes or more, while approximately 10% travel for a distance of 30 minutes or more etc. The curve indicates that about 95% will go to work at a distance of 2 minutes or more (the distance between Bakki and Húsavík) while approximately 3% will undertake a journey of 52 minutes or more (the distance between Bakki and Akureyri). The labor market available to the plant at Bakki then constitutes a total of about 1,700 individuals, 1,240 in Húsavík, 300 in Akureyri and 160 in the vicinity of Húsavík.

Based on these proportions, it could be anticipated that 73% of the workforce of an aluminum plant at Bakki would live in Húsavík, 18% in Akureyri and 9% in the neighborhood of Húsavík. These figures could serve as an indication, but must not be taken too literally.

It is to be concluded from all this, that probably some of the specialists and administrators of the aluminum plant at Bakki will live in Akureyri. It is also virtually certain that the same will apply to several of the general employees of the plant. *In toto* it could be a question of a few dozen individuals who commuted to work from Akureyri to Bakki. Some employees will live in the vicinity of Húsavík, e.g. Tjörnes,

Aðaldalur, Kelduhverfi, Laugar in Reykjadalur, the Mývatn District and the area close to the road between Akureyri and Húsavík. The route passes through countryside dotted with farms and living along this route is quite likely to become even more sought after with the advent of the Vaðlaheiði tunnel and the aluminum plant at Bakki. A married couple, for example, will be able to seek work in both directions if they reside between those two population centers. It is also probable that some people will seek work in the aluminum plant from further afield, even from Kópasker. The distance to the plant from Kópasker is 94 km which is a long way to commute, but since housing in Kópasker is inexpensive and few local job opportunities, the possibility cannot be excluded that some will seek work in the aluminum plant as an attractive option. After all, the commuting distance is no more than that between Grundartangi and Reykjavík before the Hvalfjörður tunnel was built.

It should be emphasized that, here, all discussion on the residence of aluminum plant employees is based on the premise that the Vaðlaheiði tunnel will be completed when the plant begins its operation. It is assumed, furthermore, that the distance to Út-Kinn has decreased because of a new bridge across the river Skjálfandafljót (road 85). Improvements are also scheduled for road 87 between Húsavík and Reykjahlíð which will facilitate commuting from the Mývatn District.

5.2.1 Location of jobs in the impact area of the plant

As mentioned in the previous chapter, a few dozen employees of the aluminum plant at Bakki are expected to live in Akureyri. Other employees will probably live in Píngeyjarsýsla, mainly in Húsavík where 70-80% of the workforce could be presumed to reside. Húsavík is, therefore, most likely to benefit from the bulk of the population increase resulting from the aluminum plant at Bakki; in second place comes the vicinity of Húsavík and Akureyri.

As for the derived jobs, which will probably be more numerous than those in the aluminum plant itself, it may be anticipated that Akureyri will exert a strong pull in this context, a stronger pull, in fact, than that which shifted derived jobs to Egilsstaðir in the case of the Reyðarfjörður aluminum plant. Naturally, some of the derived jobs will be tied to the main location of the workforce, i.e. Húsavík. This applies to close radius services, for example in retail trade, preschools and elementary schools. Apart from occupations of this kind, the bulk of derived jobs is most likely to be sited in Akureyri. This would apply, more or less, to all specialized services, and the more

specialized they are, the more likely they are to be located in Akureyri rather than anywhere else in the impact area. The location of derived occupations in general retail trade will, among other things, depend on whether a cut-price supermarket opens in Húsavík. This is a likely development in the wake of an aluminum plant and the town planning authorities in Húsavík say that a potential site for such a store has already attracted interest, in the event that an aluminum plant is constructed.

It would appear to be clear, in other words, that the jobs created by the construction of an aluminum plant at Bakki will, in the main, focus on two points, Bakki and Húsavík, on the one hand, and Akureyri, on the other. Thus, the demographic growth will, for the most part, occur in those two population centers and also, to some extent, in their vicinity. The area around Akureyri will, therefore, be affected to a certain degree by an aluminum plant at Bakki, although this effect will probably not be highly visible. The population of the Þórshöfn region is unlikely to be significantly affected by the advent of an aluminum plant.

With all this in mind, it is thought likely that the division of population growth between the Húsavík and Akureyri regions could be around 60/40; i.e. 60% of the increase would take place in Húsavík and 40% in Akureyri and the neighborhood. Proportions approximating 70/30 or 50/50 are, however, by no means out of the question.

In this connection it could be mentioned that from 1 December 2002 to 1 December 2007 the population of Egilsstaðir and Fellabær grew at a similar rate to that of Reyðarfjörður, Eskifjörður, Neskaupstaður and Fáskrúðsfjörður combined. If the proportion is 60/40 and a 300 man-year aluminum plant is built at Bakki, the population of Húsavík and the vicinity may be expected to grow by 700-1,200 and that of Akureyri and vicinity by 500-800. In the event of a 450 man-year plant and the same proportion applies, it may be assumed that the population of Húsavík and vicinity will grow by 1,100-1,800 and that of Akureyri and vicinity by 700-1,200. Those figures appear in the next table.

Table 12. Estimated population growth in the impact area divided between Húsavík region and Akureyri region⁹

Estimated population increase in the impact area	300 man-year plant, 250 thousand tons/annually	450 man-year plant, 350 thousand tons/annually
Húsavík region	700-1,200	1,100-1,800
Akureyri region	500-800	700-1,200
Impact area total	1,200-1,900	1,900-2,900

It should be reiterated that these plans are based on the assumption that the Vaðlaheiðargöng tunnel has been completed when the aluminum plant commences operation. The population of Húsavík was largest in 1983 and 1996, or 2,514 in both years. On 1 January 2008 the inhabitants were 2,256. The town is most likely, therefore to grow larger than ever before if an aluminum plant at Bakki becomes a reality.

5.2.2 Location and origin of construction workers of the plant

It is unclear when construction work at Bakki would begin. The current estimate is that production would start during the period 2012 to 2014. Thus, the construction of the plant could be expected to commence during 2010-2012.

The composition of the workforce during the construction period will to a large extent be determined by the economic situation in Iceland as well as in other parts of the world. The worse the economic conditions are in the impact area when construction begins, the more likely it is that local people will seek work on the project. With regard to temporary work of this kind distance probably matters less than in the case of long-term jobs. It is anticipated, therefore, that both skilled and unskilled workers from the entire area will seek work in Húsavík in a situation where jobs are hard to come by. This is of course based on the premise that the project management wishes to employ skilled and unskilled Icelandic workers, which cannot be taken for granted. The Akureyri region is the most influential factor in this context. It is expected to take 3,000-4,000 man-years to build an aluminum plant. Thus probably 1,000-2,000

⁹ The population of the two regions is set on a slightly wider range than applies to the impact area as a whole. Therefore, the sum on the outer boundaries of these ranges is not equal to that of the outer boundaries for the impact area as a whole.

workers will be engaged in the construction project for 2-3 years, more in summer than in winter.

After the collapse of the banking system in October 2008 it is clear that Iceland will pass through a severe period of austerity lasting for a number of years entailing higher levels of unemployment than have been seen in Iceland for decades. There is every indication, furthermore, that the real exchange rate of the króna will remain low in years to come. Unemployment is likely to remain high in 2010 and for the next few years to come. A more long-term forecast is hard to develop with any confidence. A low exchange rate of the króna means that working in Iceland will be less attractive to people from abroad, since wages and salaries are probably going to be paid in Icelandic króna in accordance with Icelandic employment contracts. A growing number of Icelandic employees have gained experience at all levels in the construction of aluminum plants during the past few years. The closeness of Akureyri with its large number of skilled workers is also of critical importance with regard to the provision of manpower during the construction period.

If construction begins in summer 2010, there is every likelihood that the local population will play an important role in the building of the aluminum plant. Since nationwide unemployment is a probable scenario, available jobs will almost certainly be sought after from all regions of the country, especially other parts of North and East Iceland. Therefore, if construction work is set in motion in summer 2010, there is a high probability that all relevant manpower requirements will be satisfied from within Iceland, even seeing the majority of employees coming from the impact area. This would represent a huge boost to a society sorely in need of economic activity.

In the event that construction work is begun later, e.g. in 2012 it is harder to estimate the exchange rate level and the general economic situation. The most probable scenario, however, is an ongoing economic recession. The better the economic situation in the impact area and nationwide, the larger is likely to be the part played by foreign manpower during the construction period.

During the next 5-10 years, however, there is no likelihood of a similar overheating of the economy and such a high real exchange rate as was the case during the construction of the Alcoa Fjarðaál aluminum plant in Reyðarfjörður.

It is to be anticipated, therefore, that Icelanders will certainly play a larger role in the development of an aluminum plant in Húsavík than in Reyðarfjörður, whether construction commences in 2010 or 2012. How important the function of Icelandic workers is going to be is hard to tell at this stage, but they could play a major part if the economic environment remains bleak during the construction period.

5.3 Income

Total wage and salary payments at the Alcoa Fjarðaál aluminum plant are expected to amount to ISK 2,830 million in 2009. There are approx. 470 employees at the plant and thus estimated average pay in the plant will be in the region of ISK 6 million per annum, or about ISK 500,000 per month. This is high average pay and is to be explained in terms of a significant level of shift work in the operation of the plant. Employee remuneration in the aluminum plant at Bakki is expected to be along similar lines as in the Reyðarfjörður plant. Data is not available with regard to average pay in the impact area, although chapter 4.2.5 presented average income in main occupation during the period 2003-2005. This amounted to approx. ISK 2.7 million per year. Average pay is higher than average income in main occupation, as some people are engaged in two or even more jobs. It would be incautious, however, to estimate average pay in the impact area at more than 120% of average income from main occupation, or approx. ISK 3.3 million per annum. Although wages and salaries have increased significantly since 2005, it is clear, nevertheless, that ISK 6 million per year is well above average pay in the impact area.

5.4 Education levels

Based on experience from the construction of the Alcoa Fjarðaál aluminum plant in East Iceland, the level of education in the impact area can be expected to rise. This, however, applies mainly to the Húsavík area, whose level of education is somewhat below that in other parts of the impact area and the country as a whole. In Central East Iceland, surveys conducted by RHA showed a significant rise in education level between 2004 and 2007. There was a decrease in the proportion of people with basic education only, and the group with a university degree showed the most conspicuous increase (Hjalti Jóhannesson et al., 2007). A comparable trend is to be expected in the Húsavík region. This relates to the demographic composition as discussed in chapter

4.1.3 where in-migration, connected with new jobs, raises the percentage of younger and better educated people.

5.5 Health

The project is unlikely to significantly affect general health in the impact area which is roughly comparable to other parts of Iceland, cf. chapter 4.2.6. It would appear, however, that the state of general health is slightly better in urban centers, cf. a survey done by The Public Health Institute of Iceland. This may relate to the fact that in those areas, the age composition of the population is more beneficial as shown by the population pyramid (age and gender structure) in chapter 4.1.3. With a more advantageous pattern of migration in the wake of an aluminum plant, the age composition could be expected to change with a proportional increase in younger people, since resettlement is generally most frequent among people aged 20-35.

5.6 Municipalities

As indicated in chapter 4.3 and 4.3.1, the number of municipalities in Iceland has changed significantly during the past few years, with consequent adjustments of their boundaries which at the time were made under circumstances completely different from the present situation, e.g. with regard to communications, commerce and services. Probably their number has yet to decrease, as some of them have an insufficient population to support the services required in our times. This is the situation in many parts of the country, although here the focus is on the impact area of the aluminum plant at Bakki, Húsavík.

The Minister in charge of Municipal Affairs has announced a prospective change in legislation to the effect that the minimum number of inhabitants in a municipality will be raised from 50 to 1,000. As a result of this measure, nine municipalities in the impact area would have to merge with one or more other municipalities. This, however, does not relate to the construction project at Bakki, but is a consequence of the transfer of tasks and obligations from the state to municipalities.

5.6.1 Municipal structure

It has been mentioned already, that the part of the country defined here as the impact area of an aluminum plant at Bakki has 15 municipalities. During the past 15 years a number of elections have been conducted with regard to the amalgamation of municipalities within this area. Some proposals have been rejected, whereas others

have been successful. In discussions on this matter, suggestions have been aired in favor of determining by law a higher figure than now applies as the minimum number of inhabitants of a municipality and the Minister has made known that this will be done. Significant changes have occurred in Þingeyjarsýslur in the past few years leading to the amalgamation of five municipalities into one, i.e. Norðurþing and another five merged into the current Þingeyjarsveit. Thus, the number of municipalities in this area, the close radius of the aluminum plant, was reduced by eight, from twelve to four.

Experience from elections on the subject of municipal amalgamation shows that the inhabitants of the most sparsely populated municipalities are often reluctant to merge with others which have a larger population. Recent examples of this trend are Tjörneshreppur and Svalbarðshreppur. It cannot be said for sure that ideas relating to the building of an aluminum plant in Húsavík in Norðurþing, close to the boundary of Tjörneshreppur, have influenced that decision by the inhabitants of that particular municipality to reject a merger so far. Tjörneshreppur is one of Iceland's smallest municipalities, and when looking at a map showing municipal boundaries, it would appear logical that it should merge with Norðurþing since it has become an island within that particular municipality. But there are no special signs that the prospective aluminum plant at Bakki is going to encourage a merger, although, in the light of experience, Norðurþing and Tjörneshreppur are likely to become one and the same municipality at some point in time. The same can be said of Svalbarðshreppur, since administrative units of that size are gradually disappearing. It is not likely, though, that a power-intensive industry in Húsavík is going to determine whether or when Svalbarðshreppur is united with one or more municipalities.

On two occasions, voters in the Akureyri region have been asked to decide on the amalgamation of all municipalities in the area, but proposals in that direction have failed to gain sufficient support. Previously smaller mergers have been outlined, cf. chapter 4.3.1. However, there appears to be only limited interest in further mergers among municipal councilors. But whatever happens, the course of events is unlikely to be influenced by the development of power-intensive industry in Húsavík.

5.7 Public services

It depends on the policy area in question, what changes are to be anticipated, what adjustments need to be made, and which services have to be added as a result of

increased activity in the communities of the impact area of the aluminum plant at Bakki. The main foreseeable modifications will be outlined below.

5.7.1 Education

Generally speaking, the educational issues are well taken care of in the impact area, providing a solid foundation which can be built on as required. A decision to build an aluminum plant at Bakki will create a heightened demand for educational services because of the anticipated population increase and new job opportunities. Each service sector will be outlined here, in a similar fashion to the coverage in chapter 4.

Preschools. As outlined in chapter 4, the preschool in Húsavík is already operating at full capacity and unable to receive additional pupils, unless the premises are enlarged by means of an extension or a new school is built. There are no other preschools within a realistic driving distance from Bakki and it is clear, therefore, that preschool accommodation and facilities will have to be added, if there is a significant increase in demand for new places.

Elementary schools. The situation with regard to elementary schools differs in some respects from that of the preschool level, since in the former case, there is organized school busing and significantly greater distances are involved, between home and school. Last year (2007) there were 327 pupils in all, in Borgarhólsskóli, grade 1-10, the largest number in grade 8, or 42, but fewest in grade 1, or 23. In most grades there were 30 pupils. As already indicated, the school enjoys the benefit of excellent accommodation, part of which is newly built.

As the figures for each grade clearly show, the school can handle significantly more pupils without major adjustments, i.e. based on two classes in each grade and a fairly even distribution between years, the number of pupils could be increased by 60-80 to obtain the most economical scale of operation. It seems clear, therefore, that although there was a significant population increase due to an aluminum plant at Bakki, as may be expected, this development could be easily managed as far as the elementary school is concerned.

It should also be kept in mind that it is only 22 km to Hafralækjarskóli where there is considerable scope for adding pupils in a spacious school building which easily accommodated the 100 pupils that used to attend the school. This option could be used to overcome a temporary peak in educational demand during the construction

period of the aluminum plant. During the past few years, there has been a steep decline in pupil numbers at Hafralækjarskóli and in 2007 there were only 65 pupils at the school in seven grades with no students in the first year. It is obvious, therefore, that the school's intake could be significantly increased from the current level. The same applies to Stórutjarnaskóli which can accommodate a sizeable addition to its existing number of pupils, and, as discussed in chapter 5 on employees' domicile, some employees of the aluminum plant may want to live near the route between Akureyri and Húsavík.

Upper secondary schools. There are four upper secondary schools within the impact area, offering a variety of educational programs. It has been decided to build a new upper secondary school in Ólafsfjörður, thus adding to the facilities and study options on offer. This will provide some relief to such schools in Akureyri which are now fully utilized. Thus, there should be no reason to believe that the upper secondary schools in the area are going to have problems handling the increase in student numbers resulting from an aluminum plant at Bakki. With a view to the economic situation, rising interest in upper secondary education is to be expected, for example various programs of adult education. Conversely, it should be kept in mind that the age composition of the population in the area in question, is such that there will be a fairly steep fall in the age groups which reach secondary school age during the next 10 years, so that the total number attending upper secondary education is not likely to change significantly within the next few years

5.7.2 Social services

As gathered from experience obtained in Central East Iceland, the employees of Norðurþing Social Service are likely to be exposed to increased strain, especially during the construction period of the proposed aluminum plant. At this stage, however, it is not anticipated that special measures will be required, e.g. with regard to accommodation. It is likely, nevertheless, that the Social Service will need to recruit additional staff during the peak period of construction activities, since some short-term social problems are likely to occur in the context of an operation of such a large dimension. But the Municipal Social Service, which is of a high grade, as already indicated, should be able to deal with such matters. According to information supplied by the staff of the Social Service in Fjarðabyggð and spokesmen of the

church, certain problems have occurred in connection with 12-hour shifts, especially with regard to parents of young children.

5.7.3 Recreation

The immediate neighborhood of Bakki offers good facilities for sports and recreation, both in Húsavík and Laugar. The same applies to Akureyri where there are more varied options. It is important during the construction period to be able to offer a varied selection of leisure activities for the benefit of the workforce. Here, as in other respects, lessons can be learnt from East Iceland. The region already provides excellent opportunities for outdoor activities, and the available facilities offer good prospects for taking on additional tasks.

5.7.4 Civil protection, police and safety

The area in question has organized civil protection and a police force, besides well-equipped fire brigades, especially in Akureyri and Húsavík. Reserve emergency support is also available in the form of well-trained and fully-equipped rescue teams.

Special requirements for security services with regard to a proposed aluminum plant are to be expected. These will probably be dealt with by agreements with the parties concerned, i.e. the state, Norðurþing municipality and private enterprises which specialize in these fields. Increased activity in the impact area may also necessitate additional measures for civil protection and emergency services. As already outlined, however, the community is ready to meet such requirements as well as placing additional emphasis on various preventive measures.

5.7.5 Hospitals and health care

Heightened demand for health services is to be expected in connection with proposed construction work at Bakki, both with regard to population growth in the area and due to the nature of the work itself, which may call for specialized support, such as well-equipped emergency aid in case of accidents. Primary service of this kind already exists in Húsavík with a strong backing from the hospital in Akureyri. The management of institutions in this field do not anticipate difficulties in dealing with an extra workload.

5.8 Business services

This chapter discusses the primary aspects of business services within the impact area and what changes can be expected as a result of the proposed aluminum plant at Bakki in Húsavík.

5.8.1 Bookkeeping and accountancy

There are well established bookkeeping and accountancy firms in Akureyri and Húsavík. No major changes are anticipated to their operations as a consequence of the building of an aluminum plant at Bakki.

5.8.2 Computer services

Several companies in Akureyri and Húsavík operate in this sector. No major changes are anticipated to their operations as a consequence of the building of an aluminum plant at Bakki.

5.8.3 Architecture and engineering services

There are major companies operating in this field in Akureyri and Húsavík. They include Raftákn, www.raftakn.is and Verkfræðistofa Norðurlands, www.vn.is. Furthermore, the engineering services Mannvit, www.mannvit.is and Verkís, www.verkis.is, are located in both these towns. These enterprises are large engineering corporations, following several mergers, with operations across the country, and employ a large number of specialists, primarily engineers. Increased operations are predicted for businesses in this sector but it is not likely that staff numbers will have to be increased due to the general downturn currently affecting the construction industry.

5.8.4 Diverse services and education

A number of companies in the impact area specialize in recruitment, conducting surveys and training programs. The largest of those is Capacent, www.capacent.is. Símeý in Akureyri and Húsavík Academic Centre, www.simey.is are examples of organizations specializing in retraining and education and offering a wide variety of courses. Húsavík Academic Centre, which organizes various research projects, could well see an expansion in its activities and these companies combined should be in a good position to manage an upturn in demand.

5.8.5 Building management

Two companies in Akureyri and Húsavík dominate the market in this sector: ISS Iceland, www.issworld.com and www.iss.is, and Securitas, www.securitas.is; their operations are national rather than regional. A few smaller entities in the area will also offer comparable services. These companies are well equipped to cope with any increase in demand resulting from an aluminum plant at Bakki.

5.8.6 Industrial firms, services

Several firms conduct their activities locally in the construction and aluminum industry. Akureyri has a long history of shipbuilding and is home to a large company that undertakes newbuilding and maintenance, as well as other smaller entities engaged in metallurgic and tinsplate work. Several construction companies, large and small, are also based in Akureyri. Other firms in this sector are located in Húsavík. Due to the current decline, most of these companies can cope with increased activity, and do in fact require a rise in demand. During construction, it is expected that international labor markets will be utilized, as was the case in Reyðarfjörður, but as the current employment situation is different, it is anticipated that Icelanders will play a larger part in this construction.

5.8.7 Transportation

A few logistics companies operate in the area, although most of them are not locally based, but are rather divisions of larger national entities operating throughout the country, as well as handling consignments to and from Iceland. Among them are the two largest logistics companies, Eimskip, www.eimskip.is and Landflutningar Samskip, www.landflutningar.is and www.samskip.is, both of which boast significant capabilities in all areas of transportation and logistics on land and at sea. There is every indication that they will be able to deal with all logistical issues relating to the proposed aluminum plant at Bakki.

5.9 Infrastructure

Given the changes that have taken place in East Iceland since the emergence of Fjarðarál's aluminum plant, it is evident that the development of society's infrastructure correlates to both construction and operation.

5.9.1 Roads

Certain improvements to the road network will be necessary to accommodate the proposed aluminum plant's development. Most important are two projects on the route between Akureyri and Húsavík; A tunnel through Vaðlaheiði (part of highway 1) and the rebuilding of a single lane bridge at Út-Kinn (road 85). The reasons are twofold. One is a considerable reduction in the distance between the proposed plant and the large labor market in the area around Akureyri, which will make commuting and access to services in Akureyri easier. The other is that the weight limit of the single lane bridge restricts movement of heavy loads¹⁰ and consequently creates a certain bottleneck on the route between Akureyri and Húsavík. Upgrading the road network will benefit the whole of the community and facilitate communications between these two regions as well as improving road safety.

It will not be possible to construct a bypass for heavy goods vehicles around the town of Húsavík. Plans are under way to improve the primary route through the town as well as the surrounding area in order to reduce traffic speed, improve safety standards and minimize disturbance in the town centre. It is worth mentioning, that Norðurþing will emphasize that the transportation of supplies to the aluminum plant should be primarily by sea. To reduce the volume of traffic through the town center, a new road link between the harbor and the plant will be utilized.

5.9.2 Harbors

Among the largest infrastructure changes taking place in the area, and in fact throughout the whole transport system of North Iceland, is the emergence of the Bakki aluminum plant's new harbor. In 2004, domestic coastal sailings ended, resulting in most goods being transported around the country by road. Therefore, the majority of goods for import and export need to be hauled by heavy trucks to and from the capital or, in some instances, Reyðarfjörður. This transformation will be beneficial to those exporting and importing in North Iceland and is likely to shift jobs and business from the capital to the region around Húsavík.

¹⁰ According to annex II Regulation no. 155:2007 on size and weight of vehicles, the weight limit for the bridge over Skjálfafljót by Ófeigsstaðir is 40 tons. (e-mail from Einar Hafliðason, Icelandic Road Administration, 14th January 2009). According to the Icelandic Road Administration's bridge register, the bridge was built in 1935 and its listed weight limit is 400 kg/m².

It should be pointed out that according to an interview with Norðurþing's land-use planning representative, it is anticipated that supplies to the aluminum plant will be primarily transported by sea. This policy enjoys support, as such an arrangement will reduce the movement of heavy goods vehicles through the town. A high volume of heavy goods traffic through Egilsstaðir and Reyðarfjörður was one of the issues that caused strain on the communities during the construction of an aluminum plant and power station in East Iceland. In fact, it turned out to be possible to construct a bypass around Reyðarfjörður to the harbor, for the bulk of heavy goods traffic, but this option is not available in Húsavík.

5.9.3 Airports

In 2009, when the runway at Akureyri airport has been extended, conditions for international flights in the impact area will have improved, with an ensuing positive effect, for example on travel by foreign workers to and from the construction site. The frequent domestic flights to and from Akureyri could help meet the requirements of the aluminum plant, both during the period of construction and operation. With regard to flights to and from Húsavík airport, all the facilities are at hand, so should an operator see a business opportunity in running a domestic service, such a program could easily be launched, although the frequency of scheduled flights will most likely be lower than at Akureyri airport .

5.9.4 Utilities

No specific measures are expected to be required in relation to utilities due to the projected aluminum plant. New projects will be undertaken as and when the need arises and the population grows. It is apparent, according to an interview with Norðurþing's land-use planning representative, that the municipal council will maintain strict control over residential housing developments to ensure that existing sites are fully utilized in order to maximize return on investments in infrastructure e.g. utilities and road networks. Plans have been drawn up to begin work on Húsavík's effluent in order to meet relevant European (EEC) standards.

5.9.5 Telecommunications

The telecommunications network is governed by market forces, so its development will reflect the demand expected in the area as a result of the proposed projects. In

East Iceland the network expanded very much in step with demand and the same is expected to apply to this project.

5.9.6 Waste management

According to information from Norðurþing, special measures will be taken to deal with the increase in waste products expected during the construction period. Landfill sites can only cope with a certain portion of the waste, which is now mostly burnt in refuse incinerators. More landfill sites need to be identified to receive additional waste during the period of construction. There may be possible sites in the Kópasker area, but discussions have also taken place to step up cooperation between Eyjafjörður and Þingeyjarsveit in these matters.

5.10 The Housing market

5.10.1 Supply and demand

Information obtained from Norðurþing's land-use planning representative suggests that the municipality has closely followed developments relating to the construction of Alcoa Fjarðarál's aluminum plant in East Iceland, where house building has overshot demand, resulting in somewhat less contiguous residential areas than is considered desirable. Learning from this experience, residential housing development in Húsavík will be more centrally controlled. Therefore, entire zones or precincts, will not be allocated to contractors, but only individual plots. The current land use plan is expected to cope with the additional demand for housing due to the aluminum plant.

5.10.2 House prices

House prices in the Húsavík region are anticipated to rise, in particular in Húsavík itself and surrounding areas as well as the region closest to Akureyri. Two factors are at play in this context. The Vaðlaheiði tunnel will bring the Húsavík region closer to Akureyri as well as making the route more accessible. This will bring house prices in the vicinity of Akureyri closer to the price level inside the town itself, and its close radius. It is likely that this price rise, purely a result of the Vaðlaheiði tunnel, will extend to Húsavík, although the effect there will not be as noticeable. This development should also cause a fall in prices inside Akureyri, but owing to the size of the town the change is likely to be insignificant. A new aluminum plant will

dramatically increase demand for housing in Húsavík and drive up prices. Currently, house prices in Húsavík are only 50 – 60% of prices in Akureyri. It is likely that the difference will become less marked following the construction of the Vaðlaheiði tunnel and the aluminum plant, but it will not disappear completely. It is not unreasonable to assume that house prices in Húsavík will reach 60 – 80% of those in Akureyri. If a rise from 55% to 70% of Akureyri prices is assumed, with prices in Akureyri remaining unchanged, the real term price rise in Húsavík is close to 30%. An aluminum plant at Bakki will also boost demand for housing in Akureyri and its vicinity, clearly raising local house prices. This increased demand, however, will be smaller relative to the upswing in the Húsavík region so prices are not expected to rise as dramatically in Akureyri. House prices in Akureyri have, in recent years, remained at roughly two thirds of prices in Reykjavík, although this ratio used to be somewhat higher. An aluminum plant at Bakki notwithstanding, prices in Akureyri will in all likelihood reflect those in the region around the capital, by far the largest housing market in the country, and remain below price levels there. Nevertheless, an aluminum plant at Bakki will clearly nudge house prices in Akureyri closer to those in the capital area than otherwise would have been the case.

5.10.3 Need for new housing

As stated in chapters 5.1 and 5.2, a considerable population increase is expected in the impact area in the event that an aluminum plant is constructed at Bakki. Also mentioned was the anticipated ratio of 60/40, between the Húsavík and Akureyri regions, with regard to expected growth. New inhabitants require housing. The question then arises; how much of this increase can be covered by existing housing and how much new housing will be required. The trend over the past years has been for Icelanders to opt for ever larger houses. At year end 2002, residential housing was approximately 45m² per capita, but by year end 2007 this had risen to 55m². This period was characterized by substantial overheating of the economy and an upswing in living standards. Now that the bubble has burst, it is likely that the population will require smaller housing to a greater extent than the market is able to offer. In other words; there is significant surplus housing in Iceland. It would therefore be unrealistic to estimate a housing requirement of 55m² per capita. We would suggest that an estimate of 50m² per capita might be appropriate for the next few years. As previously mentioned, residential housing in rural areas tends to be larger than in

densely populated areas. Here it is assumed that an appropriate estimate for house sizes in rural areas should be around 70m². Based on this assumption, there is likely to be some surplus housing in the Húsavík region and in Akureyri. This surplus can be seen in the table below.

Table 133. Estimated excess housing in Húsavík region and Akureyri

	Size of residential housing Dec 31 2007 (m²)	Population Jan 1 2008	Estimated suitable residential housing (m²)	Estimated excess housing (m²)
Húsavík	128,755	2,256	112,800	15,955
Raufarhöfn	18,932	224	11,200	7,732
Norðurþing less Húsavík and Raufarhöfn	38,554	493	34,510	4,044
Tjörneshreppur	4,422	60	4,200	222
Aðaldælahreppur	21,240	259	18,130	3,110
Þingeyjarsveit	56,775	681	47,670	9,105
Skútustaðahreppur	28,858	399	27,930	928
Akureyri (less Hrísey)	901,384	17,097	854,850	46,534
Iceland as a whole	17,274,079	313,376		

The estimated quantity of surplus housing in the area around Húsavík, excluding Raufarhöfn, is approximately 33,400m². This should accommodate around 670 inhabitants. The likely population rise expected in the Húsavík region, as a result of a 300 man-year aluminum plant, is 700-1,200. This estimate shows that 0-27,000m² of additional housing will be needed in the Húsavík region. The next table shows comparable figures for Akureyri and the possibility of a 450 man-year aluminum plant.

Table 14. Estimate of need for new residential housing.

Estimated need for new residential housing (thousand m²)	300 man-year plant, 250 thousand tons/annually	450 man-year plant, 350 thousand tons/annually
Húsavík region	1 - 27	21-57
Akureyri region	0	0 - 14
Impact area, total	1 - 27	21 - 71

The table indicates that little residential housing will need to be built in Akureyri as a consequence of the aluminum plant. A significantly larger construction program will be required in the Húsavík region, with the greatest demand for housing without doubt concentrating on the town of Húsavík where it is likely that by far the largest number of new houses will be built in the impact area.

5.11 Community and lifestyle

Major changes are to be expected in the community, primarily in Húsavík, as a consequence of a large workplace, such as a 300-500 man-year aluminum plant being established together with derived occupations. Despite there being a tradition of industrial production both in the Húsavík region and particularly in the Eyjafjörður region, this workplace will nevertheless make a huge impact. Among the issues that need careful consideration are shift work patterns. As the labor market in Húsavík is not large, it should be carefully considered which is more appropriate, an 8 or 12 hour shift pattern. A decisive factor will be the level of single parent families and/or both parents working at the plant. According to information from East Iceland, 8 hour shifts are more suitable for those individuals and their families. It is likely that competition for labor will exist between traditional industries and the aluminum plant. Experience in East Iceland demonstrates the importance of performance in traditional industries. Movement of labor between sectors will be greater during a recession. It is clear that earnings are low in many rural areas, and some people are likely to see opportunities in the construction of the aluminum plant, although not necessarily in terms of actual work at the plant or during its construction, but also regarding potential increase in agricultural production, in line with a rise in the population and generally enhanced economic opportunities.

The experience of the co-existence of local and migrant workers in East Iceland during the construction process was, according to interviews with municipal councilors and local inhabitants, generally very satisfactory with few conflicts. In those matters, emphasis is placed on Húsavík using, as far as possible, a similar approach. Thus, workers' camps would be at a separate location, in so far as possible, recreation would be made available for staff, foreign workers would have access to facilities for religious worship etc. If Alcoa Fjarðaál builds on its encouraging experience in East Iceland, these issues are unlikely to pose any significant problems with regard to the Húsavík project.

6 COMPARISON ON THE FUTURE OF THE IMPACT AREA WITH AND WITHOUT THE PROJECT

In the sections above, we have examined how the impact area is likely to develop should the project go ahead (chapter 5). If, however, the project is abandoned, how will the area develop?

6.1 *Impact on regional development*

A large part of the impact area, i.e. both the Húsavík and Þórshöfn regions as well as Fjallabyggð near Akureyri, fall into the category that the Institute of Regional Development calls “districts with a permanently declining population” (Sigríður K. Þorgrímsdóttir and Halldór V. Kristjánsson, 2008). The Institute for Regional Development defines this as “areas where the population has declined by 15% or more in the period 1996-2006”. The main exception from this trend is Akureyri and its neighboring municipalities where the population has grown, as per table 2.

It is possible to demonstrate two scenarios, in the event that the aluminum plant project does not proceed: a) that the development of the community and industries will continue as it has done for the past years and decades, or b) that an industry other than the Alcoa aluminum plant will exploit the area’s energy resources that lie deep beneath the ground.

a) If industrial development continues as it has done for the past years, with a decline in primary processing and in various smaller industries, a continued fall in population can be expected in rural areas and smaller settlements. As mentioned in chapter 4.1, however, it is the larger communities that manage to hold back this trend, as illustrated by growth in various service and information sectors that are primarily based in urban areas. It is likely, therefore, that considering the whole impact area, it is mainly Akureyri which will continue to prosper. The progress of projects such as the Vaðlaheiði tunnel will determine to what extent population growth in Akureyri will spill over into the Húsavík region. The area around Húsavík, particularly the North East, as well as the Þórshöfn region, will experience a continuing demographic decline. In Húsavík itself, however, population numbers are expected to remain stable, in line with previous years. Due to improvements in the transport network, the labor markets in Akureyri and Húsavík are expected to merge up to a certain point, as dealt with in chapters 4.2 and 5.2.

b) Despite the above statements concerning the development of the impact area, one might deduce that this pattern is unlikely to persist for a long time, if industrial trends continue as in recent years. This is because the energy situation in the Húsavík region is clearly enviable. If the project being considered here falls through, others will see opportunities in exploiting the green energy in the future. It is likely that the value of the energy will increase further and various other industries, perhaps in a position to pay a higher price, might see benefits in utilizing it. However, this would mean a delay in the development of the community and the industries in the region. Furthermore, this would obviously lead to uncertainty as regards the type of industry that might make use of the energy and the way it would affect the community. People in the area have in fact had to live with this uncertainty for the past years, but as time passes and the natural resources become more valuable this uncertainty will be reduced. Where the energy will be exploited is another uncertain aspect of the situation. It is possible to transport it to other parts of the country but there is growing pressure to utilize energy to build up employment in the region where it originates. There is no guarantee, however, that this will be the case.

6.2 Consistency with government policy

The primary issue, when considering industrial development, such as the project being scrutinized here, is to ensure that it is in line with the Icelandic Parliament's (Alþingi) regional development plan. The current plan was passed in 2006 and will remain in force during the period 2006 – 2009. In it, Alþingi makes clear its policy regarding regional development, in particular for rural areas. In the plan (parliamentary resolution on a policy-forming regional development plan for 2006-2009 no. 24/132) provisions can be found that are relevant to the kind of industrial development that is being examined here. The following three objectives form the basis for the policy.

- a) Regional cores should be strengthened but concurrently solutions should be sought to encourage settlement in those regions that have suffered from a persistent decline in population.
- b) The various regions should be able to adapt to rapid community development and changes in industry.

- c) Industry, education, culture and social equality should be supported in rural areas.

It would appear clear that the proposed project is in line with item a) above.

Emphasis is also placed on strengthening the three regional cores, including Akureyri, as well as other important employment and service centers in rural areas. Presumably Húsavík falls into that category.

Policy formation with regard to transport and communications is highly relevant to the proposed project. Among the criteria presented in this research for impact area demarcation and labor market size, is the tunnel under Vaðlaheiði and the rebuilding of the bridge across Skjálfandaflljót in Út-Kinn (road no. 85), as well as the shortening of roads along that particular route. Every four years, the Icelandic Parliament (Alþingi) passes a resolution on transport and communications planning, according to laws relating to its communications policy for a 12 year period. Then, every two years, a special resolution is passed comprising a more detailed version of the first four years of the transport and communications plan. The passed parliamentary resolution on transport and communications planning for the years 2007-2010 is now available. However, the long-term plan for the years 2007-2018 is only available in the form of a parliamentary bill.

Included in the four year transport and communications plan for 2007-2010 is an extension of the runway at Akureyri airport which will facilitate international operations. This project is already under way and will not be delayed despite the economic difficulties. The four-year plan contained a provision, furthermore for beginning construction work on the Vaðlaheiði tunnel; a project which is expected to be in part privately funded.

In an appendix to the four-year transport and communications plan passed in spring 2008, it was decided to increase funding for the tunnel during the period and start work in spring 2009 (Ministry of Communications 2008). However, given the huge changes that occurred in the Icelandic economy in October 2008, as a result of the depreciation of the króna and the collapse of the banking system, the Budget for 2009 suggests that only minimal funds be allocated to projects that have already been tendered and where a contract has been entered into.

In the parliamentary resolution for long-term transport communications planning 2007-2018, the building of a new bridge and road link in Út-Kinn was proposed for the second and third phases of the plan (2011-2014 and 2015 – 2018). Due to the changed economic circumstances, however, those plans are likely to be postponed. Furthermore, the completion of a road across Hólaheiði in the eastern part of the impact area had been included in the parliamentary resolution. This project is already under way so it is likely that fewer changes will be made to its schedule than in cases where projects are still at the planning stage.

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- Þingsályktun um stefnumótandi byggðaáætlun fyrir árin 2006–2009, mál nr. 24/132. (A parliamentary bill on a policy-forming regional development plan for the years 2006-2009, case no. 24/132).

Register of interviewees:

- Aðalsteinn Baldursson, chairman, Framsýn trade union, 11 November 2008.
- Ágúst Óskarsson, counsellor at Þingeyjarsýslur Social Services, 11 November 2008.
- Bergur Elías Ágústsson, Norðurþing municipal commissioner, 11 November 2008.
- Erla Sigurðardóttir, curator of the Húsavík Whale Museum, 11 November 2008.
- Gaukur Hjartarson, Norðurþing land-use planning and construction representative, 11 November 2008.
- Guðrún Halldóra Jóhannsdóttir, principal of Grænuvellir pre-school, 11 November 2008
- Huld Aðalbjarnardóttir, director of Norðurþing culture and education department, 11 November 2008.
- Jón Helgi Björnsson, managing director of the Health Center of Thingeyjarsýslur, 11 November 2008.
- Kristján Þ. Halldórsson, project manager of social issues, Alcoa Húsavík, 5 December 2008.
- Reinhard Reynisson, managing director of Þingeyjarsýslur Industrial Development Association, 11 November 2008.

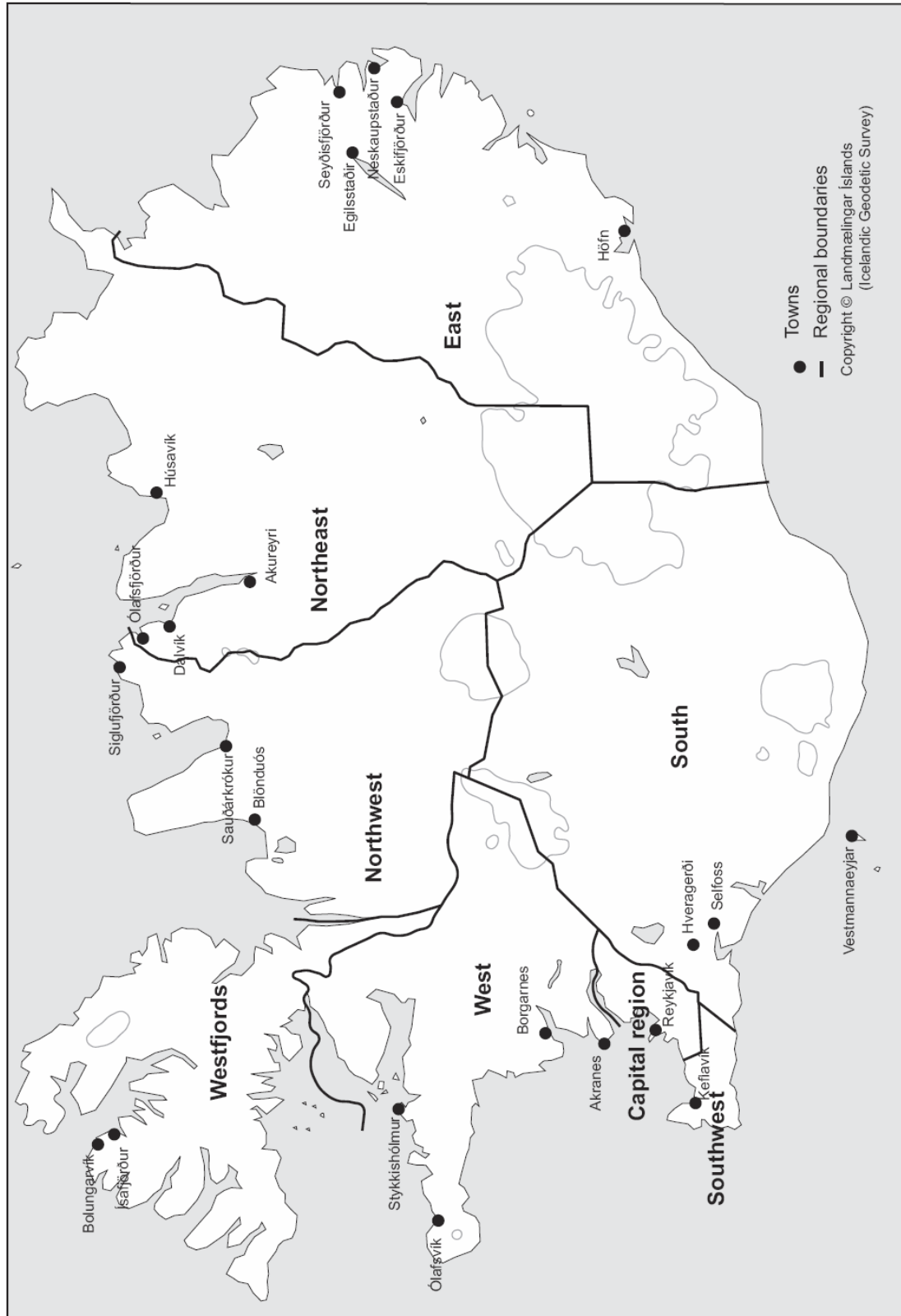
Tryggvi Finnsson, Þingeyjarsýslur Industrial Development Association, 11 November 2008.

Tryggvi Jóhannsson, director, Norðurþing executive and service department, 11 November 2008.

Group interviews:

Focus group of five inhabitants of the Húsavík region, convened in Húsavík 13 November 2008.

Appendix 1. Division of Iceland into statistical regions at Statistics Iceland, 2002



Appendix 2. Division of Iceland into Municipalities, 2007