

**NORTH ICELAND:**

***PRELIMINARY SOCIO-ECONOMIC  
STUDY FOR ALCOA ALUMINUM  
PLANT***

*Final Report*

*February 2006*

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University of Akureyri Research Institute**

**A report prepared for the Invest in Iceland Agency**

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## 1 INTRODUCTION

This report provides a pre-evaluation and a basic comparison of the socio-economic impact of an aluminum plant, with a capacity of 250.000 tons per year, to be located in North Iceland. It is assumed that the first phase of the aluminum plant can begin production in 2012 and the second phase in 2013-2014. The report is a part of a work carried out for the Ministry of Industry and Commerce.

The three locations compared are from the west to the east: Skagafjörður region, Eyjafjörður region and Húsavík region. The study builds on a baseline study of socio-economic conditions for an aluminum plant in Eyjafjörður, Húsavík and Skagafjörður, compiled by the University of Akureyri Research Institute.

The general purpose is to assess how the project will affect the various components of the baseline socio-economic environment in each region, given their current capacity and ability to respond to new demands.

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## 2 POPULATION

The aluminum plant project will affect the population development of the region where it will be located and of North Iceland as a whole. It will both lead to population growth and to changes in the various population characteristics.

In recent years North Iceland has experienced declining or stagnant population levels due to out-migration and lower birth rates (which is a national trend). The age pyramid has been skewed with lower cohorts of young adults and sexual imbalance as the number of men is higher than the number of women; this being due to higher out-migration of young women. In addition North Iceland has experienced the national trends of aging population and smaller family sizes. The population characteristics of Akureyri have more resembled the national trend while the description above applies more to other parts of North Iceland; hence the impact of the aluminum plant project on population characteristics will probably be greater if the plant is located in Skagafjörður and Húsavík than in Eyjafjörður. The impact of the project on population growth will be directly related to the employment multiplier effects of the plant described in chapter 3. As the multiplier will vary between the three regions population growth will also be different.

It is assumed in chapter 3 that for each job at the plant some additional 2-2.5 jobs will be created in Iceland. Provided that the number of jobs at the plant will be some 300 it will create nationally a total of 900-1,050 jobs. Since the labor force accounts for approximately 50% of the total population it can be assumed that the project will through direct, indirect and induced effects provide an economic base to support 1,800-2,100 persons. In addition there will be some short term population changes affected by the construction activity of all project components, i.e. power, plant, transmission lines, harbor, infrastructure and housing.

Based on previous studies in Iceland, it can be assumed that between 1/3 and 2/3 of the indirect and induced plant-related jobs will be located in North Iceland, varying somewhat between the three locations. The total increase in jobs there will hence be 550-700 and provide the economic base for 1,100-1,400 persons in North Iceland.

The expected demographic implications of the plant project will probably be as follows:

**Retention of existing residents.** At present many young people in their 20's, especially with higher education, leave North Iceland. This trend is more pronounced amongst women than men. The plant project will probably reduce considerably out-migration of young people.

**Sex ratio.** The number of men at working age (15-69 years old) is higher than the number of women, especially in the Skagafjörður and Húsavík regions. One of the most important objectives for the plant project should be to make jobs available and attractive to women, and this will have the incidental effect of reducing the gender imbalance in the Skagafjörður and Húsavík regions.

**In-migration.** The likely impacts of the Fjarðaal project in the East on in-migration have been surveyed. The surveys show considerable motivation for people from the East to move back if more and better employment opportunities are created. This position was age dependent as the young people were more motivated to move back to their former home region than the middle aged or older people. We can expect a similar motivation for the North.

**Age distribution.** There will be age structure changes as a result of the above noted demographic change. In addition it will initially increase the number of children. It will probably increase the number of people 20-39 year old as they are most likely to move back.

## 2.1 Eyjafjörður Region

About 23 thousand people live in the Eyjafjörður region, thereof ca. 16,500 in Akureyri, or 71%. The population of Akureyri has grown in recent years while the population in other parts of the region has remained stagnant or even declined. The total population within 45 minutes driving distance from the proposed site for the aluminum plant at Dysnes is around 21,500 at present. After a road tunnel to Siglufjörður will open in 2009 another 1,350 people will be added to the population within a commuter range of the plant site.



Photo: Árni Ólafsson

**Figure 1. Eyjafjörður and Akureyri a view to the north.**

As a result of the relative strength and diversity of the local economy in Eyjafjörður and its capability to provide the services and man-power needed for the project, it is expected that the local employer multiplier effects will be greater there than in the other two regions.

If the population growth of the region will continue until 2010, at the same rate as over the period 2000-2004, there will be about 24,500 persons living in the



region by then. However, if a decision is made to locate an aluminum plant in the region, this number will most likely be higher due to expectations and the construction activity preceding operations.

According to the assumptions above and in chapter 3 the project will generate some 600-700 new jobs in the region and provide the means of living for a population of 1,200-1,400 people.

## **2.2 Húsavík Region**

The population of the Húsavík region is close to 4 thousand, defined as living within the commuter range of 45 minutes driving distance from the proposed plant site at Bakki. The region has experienced a population decline during the past few years. If the plant will be located in the Húsavík region that would in all probability lead to similar number of derived jobs and population increase for North Iceland as if the plant was located in Eyjafjörður. However, the spin-off effects will probably be rather evenly spread between the Húsavík and the Eyjafjörður regions. More of the specialized derived jobs would probably be clustered in Akureyri. The proposed road and tunnel projects shortening the distance between Húsavík and Akureyri, will also make the passage safer and more comfortable.

If the population decline of the region will continue until 2010, at the same rate as over the period 2000-2004, there will be about 3,700 persons living in the region then. However, if a decision is made to locate an aluminum plant in the region this number will most likely be higher due to expectations and the construction activity preceding operations.



Photo: Gunnar Jóhannesson

**Figure 2. Húsavík and the Skjálfandi bay, seen to the west from the mountain Húsavíkurfjall.**

According to the assumptions above and in chapter 3 the project will generate some 300 new aluminum plant jobs in the region, and 150-200 indirect and induced jobs, resulting in a total of 450-500 new jobs. This will provide a new economic base supporting a population of 900-1,000 people. Due to uncertain impacts of the proposed tunnel through Vaðlaheiði it can not be categorically stated how the spin-off effects will be spread between the Húsavík region and the Eyjafjörður region. Although that is of concern to the local communities, community leaders and business people it should not be of a great concern for the plant owner. A healthy competition between two neighboring regions over population growth and spin-off effects will benefit the project.

### **2.3 Skagafjörður Region**

A total of 4,300-4,400 inhabitants live in the Skagafjörður region. All municipalities in Skagafjörður, except for one small farming community

(Akrahreppur, pop. 225), merged in 1998<sup>1</sup>. The total population within 45 driving distance from the site at Brimnes is some 4,300 inhabitants. The impact of the proposed aluminum plant being located in the region will probably reach beyond regional boundaries. The reason is that three towns, Blönduós, Siglufjörður and Skagaströnd are all located just outside the commuter range, in 70, 78 and 75 km distance respectively from the industrial site at Brimnes. Impacts from the industrial development would to some degree be observed in these towns. This enlarged region had a population of over 7 thousand people.



Photo: Mats Wibe Lund

**Figure 3. Sauðákrókur and Skagafjörður a view to the north.**

If the population decline of this enlarged region will carry on until 2010, at the same rate as over the period 2000-2004, there will be about 6,800 persons living in the region then. However, if a decision is made to locate an aluminum plant at Brimnes this number will most likely be higher due to expectations and the construction activity preceding operations.

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<sup>1</sup> Prior to 1998 there were 12 municipalities in the Skagafjörður region, the smallest with mere 45 inhabitants!

According to the assumptions above and in chapter 3 the project will generate some 300 new aluminum plant jobs in the region, and 150-200 indirect and induced jobs, resulting in a total of 450-500 new jobs. This will provide a new economic base supporting a population of 900-1,000 people. In this case one can expect the total number of derived jobs in North Iceland as a whole to be somewhat lower due to shorter distance to the Reykjavík capital area and less propensity to seek services in Akureyri than in the case of location in the Húsavík region.

Short term effects while building hydro power plants in the region would most strongly be observed in the region. However, effects will probably to some extent also be found in Eyjafjörður and the adjacent communities to the west.

## **2.4 Comparison**

The three locations will be somewhat differently affected by this industrial development in terms of changes in population level and characteristics.

If located in the Eyjafjörður region it is likely that the effects of the plant would to a large degree be observed within the region itself. Short and long term effects related to harnessing of the power resources in the Húsavík region would to some degree be observed there but also in the Eyjafjörður region. Almost all of the derived jobs would be located in the Eyjafjörður region and in the Reykjavík capital region.

If located in the Húsavík region, the effects of the plant would most likely be spread to a certain degree to the Eyjafjörður region as well as the Reykjavík capital region in terms of derived jobs and even some direct jobs at the plant. The reason is Akureyri's relatively large labor pool and its relative diversity as the largest town in northern Iceland. The total number of derived jobs in North

Iceland would be similar as in the case of Eyjafjörður, the difference is that in this case they would be observed in both regions. Short and long term effects related to the harnessing of the region's power resources for making electricity would to a large extent be observed in the region. During the construction phase of both the plant and the power stations much activity will obviously be concentrated in the region.

Location in Skagafjörður region would probably cause a little less increase in the number of derived jobs in North Iceland than the other two locations due to less distance to the capital area and less propensity to seek services in Akureyri compared to the Reykjavík capital region. The industrial development will probably spread to a little extent out of the Skagafjörður region itself, to three towns just outside the edge of reasonable commuting distance and probably to some extent to Akureyri.

The general positive effects of an aluminum plant in any of the three regions will be that migration to the respective region would take place, resulting in a more balanced age structure and the region would gain more educated persons, i.e. a "brain gain".

The complementary effects of the Húsavík location for both development in the region itself as in the Eyjafjörður region is an important aspect of the project and will cause less stress on neither of the regions, their inhabitants and economy. The preconditions for this are however the proposed road and tunnel projects between the two regions.

### 3 LOCAL ECONOMY

The impact of the project on the local economy will be felt at first during the construction phase and then operations of the aluminum plant.

#### 3.1 Construction

Construction will involve the power project, transmission lines, the plant itself, the harbor at the plant site, all necessary infrastructure and housing. A number of guest workers, both of domestic and foreign origin, will be expected in North Iceland during the construction. Some of them will probably bring their families and stay there for a long time, which will further increase activity in the region.

Many small local construction companies and their employees will find work on the plant project, or on project-related construction. Many business opportunities will be created for companies providing goods and services to the project itself or the construction labor force. Air passenger and freight movements through the local airport will increase greatly, and there will be new demands for trucking, shipping and courier services. There will also be a requirement for extra hotel space.

The impact on the local economy will be large and a few years boom will be expected, as there will be other project-related activity undertaken concurrently. The impact on construction companies, retail, services and transportation will be substantial. It can be expected that demand for housing will increase considerably and prices of houses will rise.

The size of activity during the construction period has the potential to result in wage and price inflation, although it is spread over a few years period. Labor shortages could have a negative effect on low-wage sectors (e.g. farming, tourism and services), new demand could result in house price inflation, etc., leading to



increases in the cost of living which may be particularly negative for those with low fixed income.

However, a number of factors suggest that such problems will be minor or non-existent after the construction period. The most important of these is the project timeframe, which allows quite adequate time to plan and prepare for all phases of activity. New demands for labor, housing, transportation infrastructure, etc. will be anticipated and plans can be put in place to respond as necessary. Secondly, and related to this, key informants interviewed as part of the report preparation were generally of the opinion that the local labor, housing and other markets, and existing systems of government, would be well able to respond to the new demands resulting from the plant project.

In general it would be easier for the Eyjafjörður region to absorb a project of this size than the other two regions. If the plant will be located in Eyjafjörður the cumulative effects during construction will be dispersed to other regions as well because the power plant construction will take place elsewhere. If the plant will be located in Húsavík the local impact during construction will be larger as the power project will be within the region as well. It will require careful planning like Alcoa Fjardaal has done in East Iceland to accommodate such a construction project there. Additional labor resources can be mobilized from Akureyri, other parts of Iceland and from abroad. If the plant will be located in Skagafjörður the local impact will be substantial as some of the power resources are located in the region. It will also require careful planning as mentioned above and additional labor will have to be brought in.

### **3.2 Operations**

There are a few different approaches to assessing the regional economic impact of an industrial project like the proposed aluminum plant in North Iceland. In a study in 1990 on the impact of power-intensive industries on population and employment, the Institute for Regional Development compared the effects of a new aluminum plant in three different locations: the Reykjavík area, Eyjafjörður

and Reyðarfjörður. Their conclusions were that the employment multiplier, using location quotient of exporting and non-exporting activities, was 2.3 for the Reykjavík area, 1.3 for the Akureyri area and 1.0 for the Reyðarfjörður area. Nationally the ratio of basic to non-basic industries, a classification that is subject to criticism, is 1 to 2.0-2.5 (depending on definition of basic/non-basic). Hence, were this ratio to be applicable to a plant project, each new "basic" job at an aluminum plant would create 2.0-2.5 derived "non-basic" jobs. If an aluminum plant is located in North Iceland, probably 40-60% of the nationally derived new jobs will emerge in the local area, according to the calculations of the Institute for Regional Development.

For this study it is assumed that the same policies of service contracting non-core activities to external service providers will be employed as at the Alcoa Fjardaral project. Therefore the employment multiplier for Iceland as a whole is assumed to be in the region of 3-3.5, i.e. each job in the aluminum plant will generate additional 2-2.5 jobs. This is based on the study by Nysir for Alcoa Fjardaral in 2005 on the impact of the aluminum plant in Reyðarfjörður. A more detailed calculation can not be carried out at this stage as more specific information and research will be required, which will only be available after the project has been planned in more detail.

It is furthermore assumed that each job in the aluminum plant will create ca. 1.0-1.3 additional jobs in North Iceland; the rest of the impact will be felt elsewhere in Iceland, mostly in the capital region. Total number of new jobs in north Iceland are therefore expected to be 550-700, depending to some degree on where in north Iceland the plant will be located. It is estimated that the plant will directly, indirectly and through induced effects create about 900-1,050 new jobs in Iceland

Of the three proposed locations the local employment impact will probably be greatest in Eyjafjörður; a plant in Eyjafjörður will generate fewer jobs in the North outside the local region. A plant in Eyjafjörður is expected to create 600-700 new jobs there in total but very few elsewhere in north Iceland. A plant in Húsavík will most likely generate substantial employment multiplier effects in



Eyjafjörður, both during construction and operation. If Húsavík is the preferred location it is expected that half the derived jobs will be in the Húsavík region and half in Eyjafjörður. This will bring about 450-500 new jobs in the Húsavík region and 150-200 in the Eyjafjörður region, or 600-700 for North Iceland..

A plant located in Skagafjörður will probably have similar local multiplier effects in the Skagafjörður region as a plant located in Húsavík within the Húsavík region. Due to closer proximity to Reykjavík than the other two locations it is expected that a plant in Skagafjörður will result in the regional employment multiplier for North Iceland being slightly lower than for the other two locations. A plant in Skagafjörður is expected to create a total of 450-500 new jobs in Skagafjörður and 100-150 in Eyjafjörður, or a total of 550-650 new jobs in North Iceland.

#### Estimated Cumulative Employment Multiplier Effects of an Aluminum Plant

Selected location	New jobs in local region, incl. plant	Additional new jobs in North Iceland	Additional new jobs elsewhere in Iceland	Total no. of new jobs in Iceland
Skagafjörður	450-500	100-150	350-500	900-1.050
Eyjafjörður	600-700	0	300-450	900-1.050
Húsavík	450-500	150-200	300-450	900-1.050

The assumptions made are based on studies in other locations and are at this stage only a rough estimate. It is anticipated that the multiplier effects will mainly be felt through “backward linkages” and “final demand linkages”. The former includes the plant’s purchases of various inputs and services through service contracting and latter of the impacts felt of the plant workers as consumers and tax payers. The assumptions may not hold after 5-10 years due to rapid changes in the Icelandic society and economy. It must also be stressed that the national government, local authorities in the North and the company will through their policies and service contracting influence the size of the ”induced“ or ”derived“ impact of the plant.

There is a shortage of well-paid jobs in North Iceland. The greatest economic impact of the plant will probably be to increase the number of well-paid year-around jobs in the North and raise the general standard of living.

### **3.3 Service Contracting**

Given the nature of current construction practices and the service contracting policies of new aluminum plants, service contracting will have a major impact on the local economy in the region of the selected plant location..

It is presupposed that some main contractors will be hired for the construction of the various project components (power project, transmission lines, plant, harbor and infrastructure) and that there will probably be a few sub-contractors for each main contractor. The main business opportunities for entrepreneurs in the North will be as sub-contractors. For the plant construction alone sub-contractors will be needed not only for the construction of the plant but also for the assembly of electrical and mechanical equipment, maintenance of electrical systems, machinery and equipments, transportation, operation of work camps and provision of materials, equipment, tools and food.

Examples of possible sub-contracting opportunities of the plant are as follows. In the pot room, cast house and rodding plant are various types of jobs related to the assembly of equipment and systems and preparation of production systems. There is a need to set up work camp for a few hundred workers. At the peak of activity there might be 1,000-1,500 construction workers engaged at the plant site.

Many sub-contracting opportunities will rise during the operating period. These include possible outsourcing of services such as accounting and auditing, computer and IT services, customer service functions, various engineering and technical services, human resource services, various maintenance tasks, janitorial

functions, cleaning, security, catering, gardening, transportation of workers and facilities management. It can also include manufacturing of components, fleet management, repair services and materials management. The last one involves the transport and storage functions, as well as auditing freight bills and freight brokering.

Firms able to provide the various services demanded by the plant are mainly based in Reykjavík and Akureyri, but to a much lesser extent in Sauðárkrókur and Húsavík. From the company's point of view this should not be a problem. The services demanded can be provided from companies in Akureyri in the case of the plant being located in Skagafjörður, Eyjafjörður or Húsavík. If the plant will be located in either Sauðárkrókur or Húsavík some services can be provided by local companies or local representatives of companies from away. In general the company can expect to be able to meet most, if not all, its outsourcing needs from companies in North Iceland. In the baseline study the range of services provided in North Iceland are highlighted.

## 4 LABOR MARKET

The aluminum plant project will have a great impact on the labor market in the region where the plant will be located, as well as on North Iceland as a whole, both during construction and operations.

It is estimated that the plant will provide total employment of about 300 person-years. The plant will utilize the best available technology in the world, both in respect to technical performance as well as pollution control. The advanced technology will introduce a high level of automation, eliminating most exposed and physical wearing jobs and will instead demand highly skilled employees for its operations. The number of women working in aluminum plants has been growing and they are now doing jobs that previously were considered jobs for men. Many aluminum plants use affirmative action programs to attract more women.

The plant will be in a strong position to compete with other industries for labor. Other aluminum plants in Iceland pay higher salaries than most other industries. They provide secure jobs and a shift work that is normally better paid than daytime work. Plant work is particularly attractive for many categories of workers. The distribution of employment, during construction and operations, will be dependent on such things as work schedules, the availability and location of work camps and other employer-provided accommodations, and commuting distances.

The following sections will discuss the degree to which, and ways in which, the local labor market in each region can meet the direct labor requirements of the plant and the indirect and induced requirements it will generate. It describes the availability of local labor, in the form of the existing labor force and likely new entrants (e.g. school leavers). In doing this, it considers the size of the project labor-shed; that is, the size of the region from which plant employees can reasonably be expected to commute to the industrial sites in the three regions.

The size of the area is related to both transportation systems and the work schedule.

Below the structure of the labor market in each region and the employment situation will be discussed. It will furthermore discuss and compare the total income per taxpayer and the level of skills and education in each region.

Statistics Iceland do not publish data on labor force activity for individual regions in Iceland. However this data is published for the capital region and other regions outside the capital area as a whole. According to the University of Akureyri Research Institute, activity rates in different regions of the country appears to be very similar, or 81% on average for both men and women of working age. However there is some difference between the participation of men and women in the Icelandic labor market with the activity rate for women being lower. In the Icelandic labor market men are 54% of all workers and women 46%, but of those who work full-time men are 64% and women 36%. Women are 79% of part-time workers and men 21%.

#### **4.1 Eyjafjörður Region**

The number of local residents and school leavers available for direct employment at the industrial site Dysnes in Eyjafjörður is constrained by the commuting distance of 45 minutes, or approximately 68 km radius from the proposed industrial site, provided the average speed is 90 km/h. By using the activity rate 81% it is possible to calculate the approximate potential size of the labor force in the Eyjafjörður region. In Eyjafjörður region the potential size of the labor force (16-74 years) is 13,271/12,487 (Siglufjörður included/ Siglufjörður excluded) provided the activity rate is 81%. The expected road tunnel between Siglufjörður and Ólafsfjörður will shorten the distance between Siglufjörður and Dysnes to 57 km and Siglufjörður will become within a commuting distance to the Dysnes industrial site. The road tunnel will thus enlarge the labor market in the Eyjafjörður region.

Each year about 380 new recruits enter the labor market in the region, while about 180 persons retire from it. If the effects of out-migration are excluded, the net increase is therefore about 200 persons a year. However, the real figure is lower because of a small net out-migration in the region.

An aluminum plant with a labor force of about 300 person-years is expected to create indirectly another 300-400 jobs (see chapter 3). That will result in a total increase of 600-700 new jobs in Eyjafjörður region.

The main changes that are apparent in the labor market in the Eyjafjörður region during 1998-2003 is the relative downsizing in manufacturing and increase in jobs in the tertiary sector, mainly in education and commerce. In 2003 11% of employed persons were in the primary sector, mainly in fishing, 32% in the secondary sector, mainly in manufacturing (fish processing included) and 57% in the tertiary sector, mainly in health services and social work, wholesale, retail trade and repairs and education and public administration (Statistics Iceland, 2005).

Plant work will be particularly attractive for many types of workers. The plant will be in a strong position to compete with other industries in the region for labor, because they provide secure jobs and salaries are higher than in all other industries, except fishing.

A number of people currently living within 45 minutes driving distance from the plant site will probably be interested and able to work at the plant. This will include some who are currently underemployed or on low salaries, but others will move to plant work from other forms of employment. This group includes farmers, their spouses, truck drivers, self-employed craftsmen, inshore fishermen, fish plant workers and people who work in tourism.

The average income in the Eyjafjörður region was 2,388,000 ISK for the income year 2004 or a little bit lower than for Iceland outside the Reykjavik capital region (2,420,000 ISK). The average income is quite lower than for Iceland as a whole where the average income is 2,716,000 ISK. The highest average income is in the Capital region or 2,901,000 ISK. Low salaries workers (farmers, workers in tourism, etc.) would be interested in a job at the plant if located at Dysnes.

The Directorate of Labor collects and publishes registered data of unemployment and this data is available for the eight regions in Iceland. Eyjafjörður and Húsavík regions belong to the Northeast region. The unemployment in the Northeast region in October 2005 is above the national level, both amongst women and men. The unemployment amongst women in the region is 3.4% but 1.9% for women in Iceland and 1.9% amongst men in the region but 1.1% for men in Iceland. It is clear that some of these people would be interested to work at the plant.

The Eyjafjörður region (especially in Akureyri and the larger towns) has many skilled craftsmen (mechanics, carpenters, metal & steel, plumbers, electricians and engineers). Some of these craftsmen will probably be interested in working at the plant because the plant can offer stable and well-paid jobs.

In the fishing communities (Dalvík, Ólafsfjörður, Siglufjörður etc.) there will be some workers interested in alternative employment. Many inshore fishermen that fish on their own boat face various restrictions such as limited access, quota and weather conditions. They can only work part of the year and would be interested in a more stable job, where they could perhaps fish during off-duty hours. To fishermen on larger fishing vessels who have long stays away from home, secure and highly paid jobs at shore are probably tempting. Similarly, most fish processing workers are rather low paid and to some of them plant related work would be interesting.

In the region there are schools on all levels from pre-schools to a university. It is easier access to a larger and generally well educated labor shed than for the other two regions.

## 4.2 Húsavík Region

In the Húsavík region the potential size of the labor force (16-74 years) is 2,222 given that the activity rate is 81%. The size of the available labor force is constrained by the driving distance of 45 minutes one way to the industrial site at Bakki north of Húsavík. A possible new road tunnel through the mountain of Vaðlaheiði east of Akureyri is being investigated. The Vaðlaheiði tunnel will shorten the distance between Akureyri and Húsavík by 16 km (from 91 km to 75 km). The labor market will consequently be larger and more diverse. The road tunnel is a key project if the plant will be located in Húsavík.

Each year about 60-70 new recruits enter the labor market, while about 30 persons retire from it. If the effects of out-migration are excluded, the net increase is therefore about 30-40 persons a year. However, the real figure is lower because of considerable net out-migration from the region. The Húsavík area has experienced a population decline during the past years (a decrease of just under 13%). The age pyramid for the region shows clear signs of net out-migration for a considerable period of time. This can be marked by lack of young adults (20-34 years and small children 0-4 years) in the region.

The proposed aluminum plant will probably lead to a total of 450-500 new jobs in the Húsavík region.

The main changes that are apparent in the labor market in Húsavík region during 1998-2003 is the relative decline in manufacturing and increase in jobs in various services, mainly in tourism. In 2003 18% of employed person were in the primary sector, mainly in agriculture and fishing, 32% in the secondary sector, mainly in manufacturing (fish processing included) and 50% in the tertiary sector, mainly in health services and social work and public administration (Statistics Iceland, 2005).



Plant work will be particularly attractive for many categories of workers. The plant will be in a strong position to compete with other industries in the region for labor, because they provide secure jobs and salaries are higher than in all other industries, except fishing.

A number of people currently living within 45 minutes driving distance will probably be interested and able to work at the plant at Bakki industrial site. This will include some who are currently underemployed or on low salaries, but others will move to plant work from other forms of employment. This group includes farmers, their spouses, truck drivers, self-employed craftsmen, inshore fishermen, fish plant workers and people who work in tourism.

The average income in the Húsavík region was 2,157,000 ISK for the income year 2004 or fairly lower than in the Eyjafjörður region. The average income is considerable lower than in whole Iceland where the average income is 2,716,000 ISK. The highest average income is in the Capital area or 2,901,000 ISK. Low salaries workers (farmers, workers in tourism, etc.) would be interested in a job at the plant if located at Bakki.

As was indicated above The Directorate of Labor collects and publishes registered data of unemployment and this data is available for the eight regions in Iceland. Húsavík region belong to the Northeast region. The unemployment in the Northeast region in October 2005 is above the national level, both amongst women and men. The unemployment amongst women in the region is 3.4% but 1.9 amongst women in Iceland and 1.9% amongst men in the region but 1.1% amongst men in Iceland. It is clear that part of this people would be interested to work at the plant.

In the Húsavík region (especially in Húsavík) are some skilled craftsmen (mechanics, carpenters, metal & steel, plumbers, electricians and engineers).

Some of these craftsmen would be interested in working at the plant because the plant can offer stable and well-paid jobs.

Fishing and fish processing is the main source of employment in Húsavík. Many inshore fishermen that fish on their own boats face various restrictions such as limited access, quota and weather conditions. They can only work part of the year and will probably be interested in a more stable job, where they can possibly fish during off-duty hours. To fishermen on larger fishing vessels who have long stays away from home, secure and highly paid jobs at shore are probably tempting. Similarly, most fish processing workers are rather low paid and to some of them plant related work would be interesting.

In the Húsavík region there are schools up to and including the upper secondary level but due to closeness to Akureyri, the University of Akureyri is accessible for the inhabitants in the Húsavík region. A tunnel through the Vaðlaheiði mountain will make this an acceptable commuting distance of around 45-50 minutes. In the region there is a small pool of well educated labor force at present, but it needs to be addressed if the plant will be located in the Húsavík region.

### **4.3 Skagafjörður Region**

In Skagafjörður region the potential size of the labor force (16-74 years) is 2,242 , based on an activity rate of 81% .

Each year about 90-100 new recruits enter the labor market, while about 40-50 persons retire from it. If the effects of out-migration are excluded, the net increase is therefore about 50 persons a year. However, the real figure is in reality lower because of a net out-migration in the region. The Skagafjörður region has experienced a negative population development during the past years (a decrease of 5%). The age pyramid for the region shows signs of net out-

migration with lack of young adults (women 20-39 years and men 25-34 years) and small children (0-4 years) in the region.

The proposed aluminum plant will probably lead to a total of 450-500 new jobs in the Skagafjörður region.

The changes observed in the employment market in Skagafjörður region during the period 1998-2003 are similar as in the Eyjafjörður region. There was a relative decline in agriculture, fishing and manufacturing but an increase in the service sector such as in public administration and education. In 2003 15% of employed person were in the primary sector, mainly in agriculture, 30% in the secondary sector, mainly in manufacturing (fish processing included) and construction and 55% in the tertiary sector, mainly in public administration, wholesale and retail trade and health services (Statistics Iceland, 2005).

Plant work will be particularly attractive for many categories of workers. The plant will be in a strong position to compete with other industries in the region for labor, because they provide secure jobs and salaries are higher than in all other industries, except fishing.

A number of people currently living within 45 minutes driving distance will probably be interested and able to work at the plant at Brimnes industrial site. This will include some who are currently underemployed or on low salaries, but others will move to plant work from other forms of employment. This group includes farmers, their spouses, truck drivers, self-employed craftsmen, inshore fishermen, fish plant workers and people who work in tourism.

The average income in the Skagafjörður region was 2,193,000 ISK for the income year 2004 or slightly higher than in the Húsavík region. The average income is considerable lower than in whole Iceland where the average income is 2,716,000 ISK. Low salaries workers (farmers, fish processing workers, workers

in tourism, etc.) will most likely be interested in a job at the plant if located at Brimnes.

As was indicated above The Directorate of Labor collects and publishes registered data of unemployment and this data is available for the eight regions in Iceland. Skagafjörður region belongs to the Northwest region. The unemployment in the Northwest region in October 2005 is under the national level, both amongst women and men. The unemployment amongst women in the region is 1.7% but 1.9% amongst women in Iceland and 0.4% amongst men in the region but 1.1% amongst men in Iceland. It is clear that part of this people would be interested to work at the plant.

In Skagafjörður region there are about 370-400 farms. Most of them are sheep farms, but about 40-50 are dairy farms, half of which are mixed sheep and dairy farms. Most farmers, especially those who live close to the towns, and many housewives, supplement their farm income. The farmers work e.g. as school bus and truck drivers, in construction and repair work, slaughtering, stevedoring, inshore fishing and fish processing. The housewives work in fish processing, health care, home help, school catering and cleaning, teaching, day-care for children, handicrafts and a few operate bread and breakfast on the farms. If more stable and highly paid jobs become available within a 45 minutes commuting range, many of the farmers and their spouses would probably be interested in work at the industrial site of Brimnes or related services.

In the Skagafjörður region (especially in Sauðárkrókur) are some skilled craftsmen (mechanics, carpenters, metal & steel, plumbers, electricians and engineers). Some of these craftsmen would be interested in working at the plant because the plant can offer stable and well-paid jobs.

In the Skagafjörður region there are schools on all levels from pre-schools to a special university. The Senior High School at Sauðárkrókur offers education for the industrial sector such as metal, electrical and carpentry. The Hólar University

College in Skagafjörður is a research-, development and educational institute run by the Ministry of Agriculture and is one of two schools of agriculture and land-based industries in Iceland. The university is servicing Iceland as a whole. In the region there is a small pool of well educated labor force at present, but it needs to be addressed.

Skagafjordur municipality is in cooperation with University of Iceland, starting up a high technology research and development center in the year 2006. The main research fields for this center will be educational research, design and production of prototypes for manufacturing in Iceland, design and building of control-boards for computerized products for the Icelandic industry and research in environmentally friendly high-tech industries such as production of carbon fibers, hydrogen power, solar and wind energy and hydrothermal energy.

#### **4.4 Comparison**

The labor market is much larger and more diversified in Eyjafjörður region than in the other two regions. It is easier, especially in Akureyri, for educated couples to both find work there than is the case in the Húsavík and Skagafjörður regions. In Eyjafjörður there is a lot of jobs in different service sectors, such as in health services, social work and wholesale and retail trade. In the Icelandic labor market 86% women work in service related sectors but just 55% of men. Alternatively, a plant location in Skagafjörður and Húsavík regions will have a positive impact on the local infrastructure and labor market.

If the plant will be located in Skagafjörður or Húsavík regions considerable in-migration will be needed, but less so in Eyjafjörður. These can be young people from the regions wanting to move back home as new interesting job opportunities rise. An in-migration from neighboring regions in the North can also be expected, or people from elsewhere in Iceland. The high number of job applicants at other aluminum plants, such as Nordural and Fjardaal shows that sourcing well qualified labor is not a problem at all; the number of job applicants by far exceeds the number of jobs available.

## 5 MUNICIPAL GOVERNMENT

Iceland has two government levels, the state and ca. 90 local authorities. The entire country is divided into local authorities that manage their own affairs and have independent tax sources. Their right to self-governance is defined in the Constitution. Elected local councils manage the affairs of the local authorities. They are e.g. responsible for education, social services, sports and recreation, cultural activities, infrastructure, planning, utilities, technical services, harbors and fire services.

The municipal structure in the three regions is relatively different from one region to the other. In Skagafjörður region all of the municipalities except one merged in 1998 (Grétar Þór Eyþórsson and Hjalti Jóhannesson, 2002). In Eyjafjörður however there is Akureyri with 71% of the inhabitants and eight other municipalities. However, a few mergers have taken place in the past few years, mostly among the smaller municipalities. In the Húsavík region there is a similar pattern as in Eyjafjörður.

Because of this municipal pattern where only the larger municipalities are able to provide all of the services expected from municipalities, the smaller municipalities need to negotiate for cooperation on several services. Such a system of inter-municipal cooperation is most advanced in Eyjafjörður and Húsavík regions.

### 5.1 Eyjafjörður Region

Eyjafjörður region has 9 municipalities within a commuting distance from the industrial site at Dysnes. The total population in the area on the 1 Dec. 2004 was 23,260, thereof 16,562 in the town of Akureyri or 71%.

There exists a formal regional plan in Eyjafjörður for the planning period 1998-2018. An area for a large industrial plant at Dysnes is designated in the plan.

The same goes for the master plan of the municipality Arnarneshreppur 1998-2018. It is a known fact that there are mixed opinions on the location of a large industrial plant in Eyjafjörður. Two recent opinion polls show different outcomes to this question. A survey from February 2005 shows that 52% of inhabitants in Akureyri and neighboring municipalities are in favor of an aluminum smelter in the region, 13% were neutral and 35% against it. However, in a survey from October 2004 63% were in favor of an aluminum plant in the region. If an aluminum plant is built in Eyjafjörður, a master plan of a few municipalities might have to be revised, especially the location of power lines. Thus, the fragmented municipal structure of Eyjafjörður can to some degree be an encumbrance, especially concerning planning issues. It is important that enough building sites are available for the development of residential housing and commercial and public buildings. These issues should easily be dealt with in Eyjafjörður even if the Arnarneshreppur municipality<sup>2</sup> is currently revising its master plan. Also, due to increased population in the countryside around Akureyri, objections to locations of power lines can be expected, depending on the location of necessary lines.

Service level is high among municipalities in the region and there is a capacity to accommodate more population or to expand services. This is the case, especially in Akureyri which has been growing in recent years. Akureyri can easily respond to new development opportunities and the municipality is of good financial standing.

There is a great diversity in services in the region, both private and public, much more so than could be expected of a region of this size. This is because Akureyri is the regional center of North Iceland. For education, Akureyri offers among the nation's best opportunities from pre-school to university level. There is a wide range of recreation in Eyjafjörður. The region has many golf courses, three skiing areas, indoor soccer field, skating rink, various sports halls and outdoor and indoor swimming pools, accommodation for equestrian sports, recreational boats and so on. The private services include a shopping mall in Akureyri, supermarkets, various specialty stores, two cinemas, various restaurants etc. This

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<sup>2</sup> The location of Dysnes is in Arnarneshreppur municipality.

wide range of services and recreation is important in making the Eyjafjörður region attractive region to live in and to do business.

The fragmented municipal structure causes concern, especially regarding planning issues and land use. It would be desirable to merge municipalities in the region into one or two, e.g. to make the planning process easier and land use more rational.

## **5.2 Húsavík Region**

The Húsavík region has a population of 3,906 and the town of Húsavík (pop. 2,272) is the only town in the region. There are a total six municipalities in the region as it is defined here, with the municipality Húsavík being the largest.

In Húsavík there exists a formal master plan for the planning period 1985-2005 which is being revised and work on that will finish by the end of 2005. In this master plan there will be designated an industrial site at Bakki. In other municipalities of the region it is not expected that planning issues will be problematic. It is important that enough building sites will be available for the development of private housing and various industries. The provision of various municipal services is furthermore important. These issues should be easily dealt with in the region. If a new harbor has to be built it will be the responsibility of the municipality and the state. There is an interest in the project in the region. According to a survey carried out in February 2005, 66% of inhabitants in the Húsavík region are in favor of an aluminum plant in the region, 12% were neutral and 22% were against it.

Downsides are e.g. that the region has a rather small population and therefore less services than in Eyjafjörður, but the experience from the industrial development in East Iceland does not indicate that this will be a problem. The



vicinity of Akureyri with a proposed road tunnel and a shorter road distance between the two regions, will make additional services accessible .

A further merger of municipalities in the region is desirable e.g. in order to ensure rational planning decisions and land use.

### **5.3 Skagafjörður Region**

The Skagafjörður region with its population of 4,335 inhabitants 1 Dec. 2004 is only divided into two municipalities. The town of Sauðárkrókur has the majority of the inhabitants of the municipality Skagafjörður or 2,602. The other municipality is rural and has just over 200 inhabitants.

According to a survey carried out in February 2005, 37% of inhabitants in the Skagafjörður region were in favor of an aluminum plant in the region, 17% were neutral and 46% were against it.

Formal master plans are available for individual towns and villages in the region but not for the municipality Skagafjörður as a whole. A master plan for the planning period 2006-2018 is being prepared and is expected in the first half of year 2006. An industrial site at Brimnes will be included in the plan. Until this plan has been confirmed, there remains some uncertainty on several issues. The most important factors will be the location of areas planned for housing, industry, services and various other land uses.

The Skagafjörður municipality has much to offer for a potential industrial plant such as vast areas to develop and one of them is the Brimnes site. However, its location is 26 km from the main town Sauðárkrókur which makes development and planning a more demanding task. Building a harbor will be costly but that part of the infrastructure will be provided by the municipality and the Icelandic state and run by the municipality. Services, both public and private, are relatively

diverse and possibilities for recreation are abundant in the region. With increased population this will develop further and infrastructure which has been eroding due to a combination of the small size of the market as well as the closeness to Reykjavík by road, i.e. air transportation might gather new strength.

#### **5.4 Comparison**

In general the municipal services in the three regions are good and to a large extent comparable. This applies e.g. to pre-schools, elementary and junior high schools. In Akureyri, where the population is about 6.5 times larger than in the other two regions, public services provided by the state and private services are more abundant and diverse. That applies to e.g. hospital services, high schools and university education.

Recreational and sports facilities are readily available in all three regions, although they are more diverse in Eyjafjörður than in the other two regions, e.g. indoor soccer field and a skating hall. Cultural activities are similar in the three regions but there is again more diversity in Eyjafjörður.

The budget of the municipalities is not comparable because of differences in population, area size, services and the structures of the local economies. This should however not be of concern since the government uses the Local Governments Equalization Fund to make transfer payments to municipalities. The transfer payments of the fund support municipalities with a low tax base and high cost structures. It also supports directly the municipal school costs.

The most important difference between the three regions, apart from their differences in population size concerns the state of physical planning, both the master plans (municipal plans) and the regional plans.

In Eyjafjörður there exists a formal regional plan. However, the number of municipalities involved, causes some uncertainty. This applies e.g. to the decision making regarding the location of power lines.

In the Húsavík region the planning factor is more easily solved. Of the three sites, the power source is closest to the industrial plant in Bakki and power lines would mostly cross uninhabited areas.

In the Skagafjörður region, the necessary plans have still not been carried out. There neither exists a regional plan for the region as a whole nor a master plan for the municipality of Skagafjörður as a whole. This clearly creates uncertainty for a possible aluminum plant until the necessary planning work has been carried out.

## 6 HOUSING

The project, both during construction and after operation starts, will cause immigration to the region selected for plant location. This will probably include some senior employees transferring from other aluminum plant operations, return and new migrants taking more junior positions at the plant, and people attracted to the area by indirect and induced employment and business opportunities. Increased employment and incomes may also result in new housing demands by the existing population, including some movement to higher-quality housing. It is expected that these impacts will be felt mainly within commuting range of the plant.

This chapter will discuss the need for new residential housing and its utilization. The demand for new commercial and public buildings in each region will also be discussed and evaluated.

### 6.1 *Demand for New Residential Housing*

New residential housing demand is calculated in each region as follows:

As was discussed in chapter 3 it is estimated that the aluminum plant will directly, indirectly and through induced effects create about 900-1,050 new jobs in Iceland, thereof 550-700 in North Iceland. If the plant will be located in Eyjafjörður nearly all those jobs will be felt there, but if located in Skagafjörður or Húsavík 450-500 new local jobs can be expected as a result of the plant. If the plant is located in Húsavík it is expected that probably half of the derived jobs will be felt in Akureyri and the Eyjafjörður region.

At present the average number of inhabitants per apartment in Eyjafjörður is 2.4. Provided the population increase will be 1,200-1,400 persons, there will be a need for 500-600 new apartments in the region. The present average number of

inhabitants per apartment in Húsavík is 2.5. This will result in a demand of 360-400 new apartments in the region but as was indicated above part of the in-migrants will possibly be living in the Eyjafjörður region. At present the average number of inhabitants per apartment in Skagafjörður is 2.3. If the aluminum plant will be located at Brimnes the estimated total demand for new apartments will be 360-400 in Skagafjörður.

The population of Iceland as a whole is aging as is common in western countries. People in general are having fewer children than before, they marry later and many decide to stay single. These developments result in smaller family sizes on average. As the operation of the plant begins many young in-migrants with families and young children will move into the region, resulting in larger families and higher number of inhabitants per apartment. Increased employment and incomes may also result in new housing demands by the existing population, including some movement to higher-quality housing.

In residential housing the average size of apartments per inhabitant is 49 m<sup>2</sup> in Eyjafjörður, 54 m<sup>2</sup> in Skagafjörður and 55 m<sup>2</sup> in Húsavík. Due to declining average family sizes, although somewhat counteracted by young families of in-migrants, and higher living standards it is estimated that the average size of apartments in North Iceland will rise up to 55m<sup>2</sup>.

New demand for residential housing resulting from the project will be around 66,000-77,000 m<sup>2</sup> in Eyjafjörður and 50,000-55,000 m<sup>2</sup> in Skagafjörður and the Húsavík region.

## **6.2 Demand for New Commercial and Public Buildings**

Our study has shown that there will be a need for new capacity in the local schools if the project is implemented in North Iceland. The project impact on health services is somewhat different and there does not appear to be any

imminent need for new hospital buildings or primary health care centers as a result of the project. These facilities have enough capacity to absorb new residents, although more staff and equipment might be needed.

With commercial buildings there is a need for new buildings that can meet the demands of modern businesses. Some of the excess capacity in commercial buildings at present in North Iceland is due to the buildings not being suitable for modern industries and businesses. Many of them were built and designed 30-50 years ago when the demands were different and some of them are not in suitable locations.

### **6.2.1 School Buildings**

After the operation of the aluminum plant begins the population in Eyjafjörður will increase by some 1,200-1,400 persons. It is estimated that 25% of the new population growth will be pupils attending nursery, primary and secondary schools. This is based on 18 year classes of the size 1.4-1.5% per year class. In projections for school buildings it is estimated that each additional child requires on average 10 m<sup>2</sup> of school buildings (nursery, primary and secondary), although it is known that this figure varies between school levels. A total of 300-350 new children will be expected in Eyjafjörður region as a result of the project, increasing the demand for school buildings by some 3,000-3,500 m<sup>2</sup> in the region. Some of the schools in the region have already excess capacity to absorb a few more pupils, especially one or two stream schools. This has to be considered when new demand is assessed. It is projected that 225-250 new children will be living in Skagafjörður or the Húsavík region if the plant is located in either region. If each additional child requires 10 m<sup>2</sup> of new school buildings the demand will be 2,250-2,500 m<sup>2</sup>. Just as in Eyjafjörður some of the schools in the two regions will probably have excess capacity and hence the demand will probably be somewhat lower.

### 6.2.2 Commercial Buildings

The demand for commercial buildings will be rather specialized. For commercial buildings the demand will mainly be for offices and service firms, but less for production and storage. There is already an excess capacity of some commercial buildings in the three regions. If the aluminum plant will be located in Eyjafjörður it is estimated that 300-400 new derived jobs will be generated in the region. If each new derived job needs 25 m<sup>2</sup> of commercial buildings the demand in Eyjafjörður will be 7,500-10,000 m<sup>2</sup> of new commercial buildings. If the plant will be located in Skagafjörður/Húsavík regions some 150-200 new derived jobs will be generated. If each new derived job needs 25 m<sup>2</sup> the new demand of commercial buildings is estimated at 4,000-5,000 m<sup>2</sup>.

## 7 SERVICES AND INFRASTRUCTURE

Infrastructure development, needed both for construction and operation of the aluminum plant is in some cases a municipal duty, in other cases a state responsibility and in a few instances a joint municipal-state task. It is assumed that for some infrastructure developments and related services, special agreements will be made between the owner of the plant and the public authorities. These are functions like water, sewer, roads and harbors.

The same principle applies to services to industry. They can be a municipal duty, a state function or a joint state-municipal task. These are functions like waste disposal, fire services, planning, building control, occupational health and safety and environmental health. These services are all available in the Eyjafjörður, Húsavík, and Skagafjörður regions.

In the same manner, services to the inhabitants within the field of education, social services, health services, sports, recreation and culture are all available and of a good standard in the three regions.

### 7.1 General Effects on Services and Infrastructure

#### *Education*

There will be an increase in the demand for education in response to population growth and starting immediately after project approval. Plant-related vocational training will also be required. A rapid response to the latter is needed so as to prepare local residents for plant-related economic opportunities.

Many of the pre-schools and elementary and junior-high schools in the regions have excess capacity to absorb a few more pupils. However, once the project takes off there is a need to expand the schools. If the municipalities are



expecting more local taxpayers as a result of the plant they will build the necessary facilities and hire the extra staff needed to provide the required services. The Local Government Equalization Fund will to a certain extent support the municipalities in operating schools.

### ***Health***

There will be an increased demand for health services and infrastructure as a result of any direct requirements of the plant for on-site and related services as well as plant-related population growth. In the former case, it is expected that there will be an on-site provision of first aid services and a health clinic, which would be provided in co-operation and perhaps collaboration with local health authorities. In the case of an accidental event during construction or operations, there could be a need to use hospital services. Population growth would place demands on the health care system, and could lead to requirements for additional staff, equipment and infrastructure.

The regional hospital in Akureyri (FSA) provides excellent hospital services in the case of emergencies, accidents and serious illnesses. All three regions have primary health care clinics as well as small hospitals. The health services in the area are well equipped to serve the needs of the aluminum plant project.

### ***Social services***

While the plant project will generate some increased demand for social services in response to population growth, increased income and employment may reduce other demands. It seems likely that there will be minimal changes in the demand for social work, poor relief and child welfare services. No significant impacts are expected on the demand for services to the elderly and the handicapped.

### ***Public safety***

In addition to any direct requirements of the plant for on-site and related public safety services and equipment (e.g. security, fire-fighting, ambulance and other

emergency response), there will be some increase in requirements for public safety services and equipment in response to demographic and economic growth. The site requirements will likely be met with a mix of direct provision (e.g. fire fighting equipment), contracted commercial services (e.g. site security) and co-operative arrangements with local authorities (e.g. additional fire fighting equipment and services). These arrangements will probably be reciprocal, with site services and equipment being available to assist in any local emergencies.

Demographic and economic growth could lead to an increased demand for public safety and emergency services. However, in all cases the total effect will likely be very modest and easily addressed through normal increases in the provision of equipment and services.

### ***Recreation***

In all of the regions there are ample recreational opportunities for future plant workers and their families. The growth in the economy will also see increases in the tax base and the ability of local residents to pay user fees.

### ***Water and sewer***

There is some surplus capacity in the water supply and sewer systems in most towns, although upgrading is needed in some communities because of more stringent regulatory requirements. The plant will have its own sewer system.

### ***Solid waste disposal***

Solid waste disposal is a service provided by municipalities usually for whole regions. How this is carried out is different between the three regions and will be described for each region separately.

### *Power*

The current electrical power supply is usually adequate for regional needs, although there may be a need to upgrade the service to individual communities depending on the distribution of plant-related population and economic growth.

### *Harbors*

The harbor at the selected industrial sites will probably be financed and built in cooperation between the Icelandic state and the respective municipality or an inter-municipal harbor board, such as in Eyjafjörður. It will be operated by the municipality or by their inter-municipal board.

### *Airport*

The current regional airport at Akureyri, and the local airports of Húsavík and Sauðárkrókur, have the capacity to absorb increases in traffic resulting from all phases of the plant and power plant projects. However, this traffic will result in increasing numbers of domestic, and probably the introduction of international, flights. This will clearly benefit all individuals and businesses in the region. If international flights will be introduced, there are already customs facilities at the Akureyri airport. The airports will also be of importance for emergency flights with sick and injured people when needed.

## **7.2 Eyjafjörður Region**

The education system in Eyjafjörður with two high schools and one university will be capable of educating the local population to meet new demands such as deriving from the aluminum plant project.

The primary health care services in Akureyri have excess capacity to meet new demands rising from the project. The same applies to the regional hospital which is the largest outside the capital region.

If quality requirements allow using surface water for industrial use, Arnarneshreppur municipality will be able to provide water from the nearby river Hörgá. The Akureyri municipal power and water company (Norðurorka) will also be able to provide water from its ground wells some 7-8 km south of Dysnes.

Eyjafjörður waste disposal is carried out as an inter-municipal cooperation (Sorpeyðing Eyjafjarðar) and is owned by all municipalities in the region. It is seeking a new waste disposal site since the existing site only has a license to operate until 2009. It has been difficult to find a new site even if there are suitable sites in the region. The municipalities, in which these sites are located, have not permitted this operation within their boundaries. There is available land to deal with increases in solid waste and recyclable waste, both from increasing number of inhabitants and from the plant itself, but politically this has proved to be a difficult task to solve within the region. This is one of the planning problems that can and will arise when there are many small municipalities in a region which have to deal with planning issues that go beyond their boundaries.

The present harbor facilities in the Eyjafjörður region (the inter-municipal cooperation Hafnasamlag Norðurlands [www.port.is](http://www.port.is)) are for the most part sufficient for the current and anticipated demand. There is a cargo port facility at Akureyri, the regional hub for Eimskip shipping company, that can handle most project related traffic, if needed. The quay is 80 m long with 9 m depth by harbor. Cargo facilities are also adequate at Dalvík.

Building a new harbor at Dysnes will probably commence in the same time period as the construction of the aluminum plant. The harbor will be built and

operated by the inter-municipal cooperation mentioned above. The Icelandic state will probably take part in financing the harbor construction.

It is expected that the road network in the Eyjafjörður region will change considerably over the next few years. In 2012 two new tunnels will most likely be in operation. One of them will connect Siglufjörður (pop. ca. 1,350) to the Eyjafjörður region. The other tunnel will pass through the mountain Vaðlaheiði just east of Akureyri and provide much better connection between the Eyjafjörður region and the Húsavík region. Shortening of distances will be 16 km and further shortenings of up to 4 km on the road are possible. These changes in the road network will e.g. enlarge the labor market of the two regions and they will to a greater extent overlap in the future.

There is a single lane road tunnel to the town Ólafsfjörður (this is also the road to Siglufjörður) and perhaps the need for this tunnel to be changed to two lanes will rise in the future. In the case of an aluminum plant in Eyjafjörður this need will rise even more.

There have been talks about a tunnel between Eyjafjörður and Skagafjörður regions shortening greatly distances between them. The industrial site at Brimnes would in that case almost be within a commuting distance from Akureyri (around 70 km).

### **7.3 Húsavík Region**

The junior college in Húsavík and the schools in Akureyri are jointly capable of educating the local population to meet new demands.

In Húsavík there is a good primary health care service and a hospital . With a short distance to Akureyri it is not likely that there will be a need to enlarge these facilities if the plant will be built in the region.

There is some surplus capacity in the water supply and sewer systems in Húsavík, although upgrading is needed in some communities because of more stringent regulatory requirements.

Recently a waste disposal inter-municipal cooperation of the municipalities in the region (Sorpeyðing Þingeyinga) built a waste incineration plant in Húsavík and there is also a waste disposal area to deal with increases in solid waste and recyclable waste, both from increasing number of inhabitants and from the plant itself.

The present harbor facilities in Húsavík are for the most part sufficient for the current and anticipated demand. There is a cargo port facility in Húsavík, which can handle most project related traffic, if needed. The quay is 150 m long with 8-12 m depth by harbor.

If a new harbor will be built it will most likely be an extension of the present harbor of Húsavík to the north. It will probably commence at the same time period as the construction of the plant. If so, it is possible that a work camp will be shared with plant construction workers. Otherwise it will be solved by Húsavík municipality which will build the harbor jointly with the Icelandic state.

At Húsavík airport scheduled flights could commence again if demand rises. The airport will also be of importance for emergency flights with sick and injured people when needed. Furthermore there is a short distance to the current regional airport at Akureyri which has the capacity to absorb increases in traffic resulting from all phases of the plant and hydro projects.

There will be some changes in the road system in the Húsavík region in next years. The single most important could be a road tunnel under the mountain Vaðlaheiði just east of Akureyri, mentioned earlier.

An old single lane bridge close to Húsavík with a capacity of 10 tons per axle needs to be replaced. Trucks weighing more than 10 tons per axle must take some detour. According to plans a renewal of the bridge shall take place 2011-2014. This project has to be put forward if a plant will be built in the region and it is important to take the opportunity to shorten the distance between Akureyri and Húsavík in the process by up to a maximum of four km in addition to the 16 km shortening of the Vaðlaheiði tunnel.

#### **7.4 Skagafjörður Region**

The junior college in Sauðárkrókur and the schools in Akureyri will jointly be capable of educating the local population to meet new demands. The Junior College for Northwest Iceland, located in Sauðárkrókur offers education for the industrial sector such as metal, electrical and carpentry.

In Sauðárkrókur there is a good primary health care service and a hospital. With a short distance to Akureyri it is not likely that there will be a need to enlarge these facilities if the plant will be built in the region.

There is no water supply at Brimnes and it will have to be built if the plant will be located there. The water in the area contains carbonic acid and its temperature fluctuates somewhat. As a drinking water it is not of good quality. Good drinking water is available in some 10-20 km distance in Hjaltadalur valley. There is a good source of water for industrial use in the nearby river Kolka. The plant will have its own sewer system.

The state of waste disposal in Skagafjörður leaves something to be desired. The present waste disposal site does not fulfill standards and a solution has to be found. However an inter-municipal co-operation of Skagafjörður, Blönduós and Skagafjörður for waste disposal is being prepared and is expected to start in the

first half of the year 2006. There is a good area for waste disposal close to Brimnes to deal with increases in solid waste and recyclable waste, both from increasing number of inhabitants and from the plant itself.

There is no harbor facility at Brimnes which will have to be built by the municipality and probably co-financed with the Icelandic state. There is a little cargo port facility at Sauðárkrókur, which can probably handle most project related traffic, if needed. The quay is 145 m long with 6 m depth by harbor.

At Sauðárkrókur airport scheduled flights can increase if market conditions change. The airport will also be of importance for emergency flights with sick and injured people when needed. Furthermore there is a relatively short distance to the regional airport at Akureyri which has the capacity to absorb increases in traffic resulting from all phases of the plant and hydro projects.

The three towns Siglufjörður, Blönduós and Skagaströnd are all ca. 70 km from the site at Brimnes. Some changes are planned in the road system in the Skagafjörður region over the next few years. The most important road improvement needed is between the town Sauðárkrókur and the aluminum plant. A long single lane bridge on the road needs to be replaced and upgraded into two lanes. The same goes for another single bridge between the site and highway 1.

Below is some discussion about the effects of possible road tunnels connecting Skagafjörður and the neighboring regions to the east and west. It has to be stressed that there are by no means specific plans to carry out these projects at the moment. Making long road tunnels is a way to shorten distances enough so that an enlargement of the labor market in the region could take place. A road tunnel of 4,5-5 km to the west of Siglufjörður would shorten the distance by some 12 km down to some 66 and therefore “moving” the town into a commuting distance from the plant as defined in this project. The most important change would occur if a long road tunnel of some 20 km from the



possible plant to the east, towards Akureyri. The distance between the site at Brimnes and Akureyri would be some 70 km, a good road just above sea level.

None of these tunnels have been planned by the government but the road tunnel from Skagafjörður to Eyjafjörður will be in the new master plan for Skagafjörður. These tunnels would be very expensive to make and the 20 km tunnel would probably be the second longest road tunnel in the world.

## **7.5 Comparison**

The supply of compulsory education is good and comparable in all three regions. The junior college education is also similar even if the diversity is greatest in the Eyjafjörður region. Despite the university college in Hólar, Akureyri has a clear advantage in offering a wide range of studies at the university level as well as various other educational opportunities.

Social services and public safety are very similar in all three regions but due to Akureyri's size this field is largest in that area, e.g. law enforcement and fire departments.

All regions offer various recreational opportunities, both man-made and natural. Each of the regions has its different character but in some aspects they are quite similar. Akureyri has the greatest diversity, e.g. special facilities like an indoor soccer hall and a skating hall, as well as excellent skiing facilities.

Water supply is different between the regions. In the Eyjafjörður region and in Húsavík there is good supply of drinking water but in the Skagafjörður this is a more difficult task to solve.

The state of waste disposal is different between the three regions. In the Húsavík region there is a new waste incineration plant in Húsavík. In Skagafjörður there is an old waste disposal site that does not meet with standards and a new site has to be found in the next years. A new waste disposal cooperation of the municipalities of Skagafjörður, Blönduós and Skagaströnd is being prepared and expected to start in the first half of the year 2006. In Eyjafjörður the license to operate the waste disposal site is valid until 2009. Even if there are good locations to be found in Eyjafjörður for waste disposal sites there is some uncertainty about the future. According to new geological studies they are not to be found within the limits of the Akureyri municipality and other municipal governments in the region have not been willing to allow this kind of activity within their boundaries and this has in fact turned into a planning problem.

The Húsavík location has an advantage when it comes to the supply of energy and how easily it can be transmitted to the proposed site. The power lines to the plant will pass through uninhabited area of land and visual effects will be minimal. Much of the power lines will be within the boundaries of Húsavík. In the Eyjafjörður this can prove most problematic to solve since the transmission lines would have to be routed through up to 4-5 municipalities, with each of them being responsible for planning issues within their boundaries. This of course depends on locations of the power lines. In the case of Skagafjörður power can possibly be used from the Skatastaðir hydro-power project and from the 150 MW Blanda hydro-power station as well. At present the power from Blanda is mainly transmitted to the southwest; consequently new power projects would have to be developed to serve the market there. One important aspect of the Eyjafjörður region is that the location offers the opportunity to draw on energy sources both from the west in Skagafjörður or to the east in Húsavík region. The former option is probably easier from a planning point of view.

There is no harbor at Dysnes but the site is suitable. The harbor in Húsavík has to be enlarged to the north as the possible harbor in Héðinsvík is too costly according to a study by Siglingastofnun (2005). Harbor at Brimnes would cost about twice that of harbor at Dysnes in Eyjafjörður.

In all three locations there are good airports but Akureyri has a clear advantage regarding much more service, capacity and the frequency of flights. For several years now the people in the Húsavík region have used Akureyri airport for all domestic flight or since this was discontinued in Húsavík.

New roads in the region will have many positive effects for the proposed aluminum plant. The most important effects will probably be enlarged labor markets. This will be especially important in the case of a road tunnel through the mountain Vaðlaheiði just east of Akureyri joining to a large extent the Eyjafjörður and Húsavík regions. Therefore it would be easy for a plant at the Bakki location to use services from Akureyri and to some extent draw from its labor pool. Another important tunnel is the one to Siglufjörður enlarging the Eyjafjörður region by 1,400 inhabitants. Ideas of a new tunnel between Eyjafjörður and Skagafjörður through the high mountains between the two regions would have a great effect in tying them together. In some ways the effects could be even greater since traditionally there has been less communication between Skagafjörður and Eyjafjörður than Eyjafjörður and the Húsavík region.

One of the greatest changes resulting from aluminum plant will be direct cargo routes into the area from abroad. If located either in Eyjafjörður or Húsavík regions this will have most effect since the market is largest in this area both for import and export. This is especially important since the shipping companies have discontinued all cargo shipping to these regions. Almost all goods are transported by trucks to and from the capital area and in a small degree to and from East Iceland where there is imported and exported from the harbors as a result of an aluminum plant in that region.

In general communications systems are of good quality in the regions and they are continuously improving. The distance to an optical fiber is shortest at Dysnes and Bakki. However, this will in any case not be any problem.

## 8 LAND AND RESOURCE USE

### 8.1 Eyjafjörður Region

#### 8.1.1 Land

Due to relatively favorable weather conditions the Eyjafjörður region is suitable for agriculture which has a stronghold in the region, especially dairy farming. Although it can be stated that minor effects from the plant would possibly be observed on farms close to it and not on farming in the region in general, this might change the image of the area close to the plant as a pure agricultural region. Opposition in all farming communities against a development of this kind can however be expected.

The plant would be visible from the road to Dalvík and Ólafsfjörður as well as from a part of the road to Reykjavík. Of course it would as well be visible from across the fjord and change the cultural landscape. However if, it would not be possible to lay the power lines as sub-marine cables across the fjord the power lines would have the strongest visual impact.

A 250.000 tons plant would need 3,500-4,000 GWh/year which would most likely come from both east and west to the region. The energy transfer will need two 220 kV power lines from the power sources to the plant. These lines will effect land use and have strong visual effects. Three different locations of these lines are the most likely ones:

- Through Ljósavatnsskarð and over Víkurskarð mountain pass and then under the fjord Eyjafjörður as a sub-marine cable and the directly to the plant.
- Through Ljósavatnsskarð and through a new road tunnel under Vaðlaheiði (the mountain east of Akureyri) and then a few km to the south of Akureyri and then just west of Akureyri in the direction of Dysnes.

- Same location as the present 132 kV line over a mountain pass just east of Akureyri and then just west of the town in the direction of Dysnes.

The location of these lines would most likely raise some debate, especially the most sensitive locations, i.e. in Ljósavatnsskarð and to the south and west of Akureyri.

Lines from west would probably be laid parallel with present power lines in Hörgárdalur and Öxnadalur.

### **8.1.2 Hydropower**

Eyjafjörður has very limited hydro-power and a possible plant will not have any effects on the possibility of harnessing hydro-power in the region.

### **8.1.3 Geothermal power**

Geothermal sources can be found in several locations in Eyjafjörður and in Fnjóskadalur to the east. There are sufficient geothermal sources for the future growth of Akureyri. One of the sources for geothermal water is in Hjalteyri close to Dysnes, so accessibility to geothermal water at the site is excellent.

### **8.1.4 Sea**

In the fjord small boat fishing is considerable. Fish farming is growing in importance in Eyjafjörður. There is a large halibut hatchery in Hjalteyri, using seawater from the fjord. On-growing of cod in sea cages is along the west coast of the fjord and large scale mussel production is planned in the fjord about 10-20 km north from the proposed plant location. The plant would probably not disturb this activity, but without further studies the effects on this activity can not be predicted.

Several years ago sub-marine hydrothermal chimneys (or vents) were discovered in Eyjafjörður fjord. These chimneys are unique in the world and there are hopes that they will attract sports divers from all over the world in the future. Some of these chimneys are only a few kilometers away from Dysnes and caution has to be taken in order not to damage them.

## **8.2 Húsavík Region**

### **8.2.1 Land**

Due to more favorable conditions in the southern part of the Húsavík region, agriculture is much stronger there than close to the industrial site at Bakki. The plant would probably not affect agriculture at all. But exactly how these effects will be is beyond the scope of this study.

The natural scenery in the Húsavík region is one of its major assets. Visual effects of a plant could have some effects on tourism.

It is likely that most or even all energy needed for the plant will originate in the Húsavík region. Two 220 kV lines will be needed and they will probably be for the most part located in uninhabited areas of the region not too far from the plant. Some visual effects will be observed but this will be minimal.

### **8.2.2 Power**

The Húsavík region is relatively rich in geothermal power and some hydro power can be found in the region as well.

### 8.2.3 Sea

In the Skjálfandaflói bay small boat fishing is quite active. Without further studies the effects on this activity can not be predicted with any certainty, but at this stage no effect can be foreseen.

Húsavík has in recent years taken the lead in whale watching in Iceland and is widely known for that. Visual effects will be observed from the sea, but it is uncertain if it will affect the tourist business.

## 8.3 Skagafjörður Region

### 8.3.1 Land

Agriculture has a strong position in Skagafjörður. Dairy farming has been increasing during the past few years and sheep farming is also important. Growing barley has increased in recent years as there are among the best conditions for this kind of crops in Iceland. Skagafjörður is also known for its tradition in horse farming. An aluminum plant in the regions does not appear to have substantial effects on agriculture. But exactly how these effects will be is beyond the scope of this study.

### 8.3.2 Hydropower

A 250.000 tons plant will need 3,500-4,000 GWh/year. It would be possible to harness some 2,200 GWh/year of hydropower in the Skagafjörður region taking into account, Blanda power plant and the possible power projects at Skatastadir and Villinganes. The remaining energy would have to originate in regions to the west or east. In both cases those power lines would have to be routed at least 30 km along the valley and effect land use close to them and the view on the landscape. If the energy needed for the plant in Skagafjörður would have to be transmitted from the east the same situation would arise as in the case of the Dysnes site when routing the power lines through the vicinity of Akureyri.



### 8.3.3 Geothermal power

Geothermal heat for heating residential houses, but not for power generation, can be found in many places in the Skagafjörður region. A source 16 km north of Hofsóss was recently found and drilling for hot water will soon be carried out just 3 km south of Brimnes.

### 8.3.4 Sea

Effects on fishing and fish farming are beyond the scope of this study but in the Skagafjörður fjord small boat fishing is carried to some extent. The plant would probably not disturb this activity, but without further studies the effects can not be predicted with any certainty. There is no fish farming in the fjord.

## 8.4 Comparison

Minor effects on agriculture will probably be observed in all regions and some visual effects will occur as well.

Accessing the necessary energy for the plant is an issue that really sets the three regions apart. Power lines will have relatively little effects in the case of the Húsavík location since they will for the most part be routed through uninhabited areas. These effects will be more important in the case of Eyjafjörður or Skagafjörður regions. In both cases the power lines will be routed through Akureyri's surroundings and in the case of the Skagafjörður region power lines will also be routed along that region. This concerns both land use as well as visual effects.

The Eyjafjörður location has an interesting option when it comes to providing energy for the plant, i.e. the possibility to obtain energy both from the Húsavík region to the east and from the Skagafjörður region to the west. However, the energy from Skagafjörður region alone will not suffice for a plant of 250,000 tons capacity. Routing power lines through a proposed road tunnel just east of Akureyri may be one of the options. It might become unnecessary to route the

lines through the vicinity of the town, if used in combination with a sub sea cable. Fragmented municipal structure in Eyjafjörður may complicate the planning process necessary in the case of power lines.

Enough geothermal water is available for increased population in all three regions.

## 9 CULTURE AND WAY OF LIFE

It is well known that during construction period of large plants there will be a tightness and tension in the local economy that will influence the culture and way of life, especially in the less populous regions of Húsavík and Skagafjörður. For that reason it is important to plan the influx of migrant workers and the work camps in such a way that possible negative influences will be kept at minimum. This can be solved in a similar manner as in Reyðarfjörður where first class facilities are provided in the work camp and it is located adjacent to the construction site.

Once operations begins and the construction activity is substantially completed the situation will change. Those who work at the plant will live with their families spread over a few communities in the region, depending on where the aluminum plant will be located. In-migration of new people and increased income levels will lead to a more diversified society and strengthen various social and cultural activities in the region.

The local culture is very strong and resilient in all of the three regions concerned. The cultural life and recreational opportunities are rather diverse in North Iceland. Sports and cultural activities are especially strong in Akureyri, with an extensive range of facilities, clubs and groups, but less so in the other two regions. However, both Húsavík and Sauðárkrókur have excellent outdoor recreational opportunities.

Through increased population and income as a result of the aluminum plant, new sports, recreational and cultural facilities can be developed. Activities in these fields can be increased and enriched. Musical groups, theatre, sports clubs should benefit from this, which will both strengthen the region concerned and North Iceland as a whole.

## 10 OVERALL CONCLUSIONS

An aluminum plant producing 250 thousand tons a year and employing ca. 300 persons can undoubtedly be located in any of three regions studied in this report. There are certain differences between the three locations in terms of population, local economy, labor markets, social services, education levels, culture and way of life, infrastructure, access, services and energy supplies, which the owner of the plant can compare and evaluate, based on this report.

The assessment is concerned with identifying the various impacts, reflecting the fact that the project can have a range of beneficial effects on each region and North Iceland as a whole, especially when allied to some innovative thinking about approaches, policies and practices.

North Iceland has rather resilient and broad economic bases, which are dependent on the fishing industry, farming, manufacturing, tourism and services. Economic growth there has been much slower than in the Reykjavik capital region. There are no signs that the existing economic bases are likely to be undermined or seriously damaged by the introduction of an aluminum plant and related activity into North Iceland. To the contrary many new business opportunities will emerge as a result of the plant and the local industries might use the opportunity to make their operations more efficient and less labor demanding.

The plant will generate significant direct, indirect and induced employment, income and business. It will both represent a new industrial sector and have benefits for a range of other sectors that will provide goods and services to the plant and its labor force. The project's direct, indirect and induced demand for skilled and professional personnel will help these people to remain in North Iceland and help address current age and sex structure imbalances.

The project time frame until 2012 allows plenty of time for local governments, industry, unions and the proponent to plan and engage in such collaborative initiatives, for instance in training and infrastructure development, prior to the start of project activity.

Direct employees will be drawn from the existing populations of, and new immigrants to, communities within commuting distance of the plant. Proposed or possible road tunnels can enlarge the labor market for an aluminum plant and related services in both Skagafjörður and Húsavík, but they matter less if the plant is to be located in Eyjafjörður. The plant and related activity will lead to improvements in transportation and a wide range of other infrastructure and services, to the benefit of all living in the particular region.

Economic and demographic growth will contribute to further enrichment of the strong local culture, sports and recreation, through increased spending and participation, as well as attendance to various activities.

The main conclusions for each of the three regions are as follows:

***Eyjafjörður Region:***

- There is currently an easier access to a larger and generally well educated labor shed in Eyjafjörður than for the other two regions due to larger population and higher level of education..
- Due to larger size it is easier for the local community in Eyjafjörður to accommodate a project of this size than for the other two regions.
- The local population has previously shown resistance to proposals of aluminum plants to be located at Dysnes. However there can be expected some resistance to a large projects like a 250.000 t/y aluminum smelter in all locations. According to a recent survey (February 2005) 52% of the inhabitants are in favor of an aluminum plant in the region and 13% are neutral.

- The proposed location is close to Akureyri airport and harbor and the road system in the region is generally of a good standing.
- The local multiplier effects will be greater than in other locations.
- Planning permission for power lines from the east might be difficult to get. This is an issue that needs to be addressed.
- Housing will be easily solved. This includes residential as well as commercial and public buildings.
- The small municipality of Arnarneshreppur causes some concern; an amalgamation into a larger unit would be preferred. The harbor is however the main project of the municipality. That project would be undertaken by the inter-municipal harbor board in the Eyjafjörður region (Hafnasamlag Norðurlands).
- Easy for service contracting; good access to construction workers and various subcontractors.
- Spousal employment is not a cause for concern.

### ***Húsavík Region:***

- The project is very large for the region. It will require considerable of effort and careful planning for the local authority to handle a project of this size. The project will, if implemented, become the single largest opportunity in recent times to transform the Húsavík region into a thriving and dynamic local economy.
- According to a recent survey (February 2005) there are some 66% of the inhabitants in favor of an aluminum plant in the region, i.e. about 14% stronger local interest in the project than in Eyjafjörður and 29% stronger than in Skagafjörður. 12% are neutral.
- Small pool of well educated labor force at present, but needs to be addressed. The project will bring about new job opportunities for educated people in the region.

- Good access to road network but a new road would have to be made to a nearby harbor in Húsavík if it would be used for the plant.
- Short distance to an airport but no regular airline service available.
- Municipal amalgamation between Húsavík and the small Tjörneshreppur municipality is preferred.
- Good access to adjacent energy resources in the region. No planning problems foreseen with transmission lines.
- Will require housing development, especially residential housing.
- Spousal employment will need to be addressed.
- A road tunnel through Vaðlaheiði to Akureyri can help solve some of the socio-economic concerns, such as access to a large educated labor force, spousal employment opportunities, housing and access to business services for outsourcing. The cost of the 7.2 km tunnel is moderate. It is not planned by the road authorities but a local initiative is being undertaken to propose a toll tunnel.
- The proposed road tunnel and road improvements that shorten the distance and make the passage safer and more comfortable will make the site easier to serve from Akureyri both during construction and operation periods.
- Employment multiplier will in all probability be lower in the local region than in the Eyjafjörður region, but the latter region will most likely also benefit from the project in terms of employment, income and business opportunities.

***Skagafjörður Region:***

- The project is very large for the local area. It will require a lot of effort and careful planning for the local authority to handle a project of this size. The project will, if implemented, give the Skagafjörður region a great opportunity to develop into a thriving and dynamic local economy.

- According to a recent survey (February 2005) 37% of the inhabitants in the Skagafjörður region are in favor of an aluminum plant in the region and 17% are neutral. Small pool of well educated labor force at present, but needs to be addressed.
- Small pool of well educated labor force at present, but needs to be addressed. The project will bring about new job opportunities for educated people in the region.
- The site is close to Sauðárkrókur harbor and airport, but there are rather limited air services to and from the airport.
- Road transportation from the site to Sauðárkrókur and to highway 1 needs to be improved, but roads in the region are otherwise in good condition.
- A road tunnel to Akureyri can help solve some of the socio-economic concerns, such as access to a large educated labor force, spousal employment opportunities, housing and access to business services for outsourcing. The ca. 20 km tunnel is not planned by the road authorities. It will be expensive and a toll could only recover a fragment of the cost.
- Previous merger of the small municipalities in the region will make it possible for the municipality of Skagafjörður to manage well and control all the necessary tasks for the project, such as planning, infrastructure and provision of services.
- Some energy sources for the project are in the region, but additional energy needs to be transmitted into the region. No major planning problems are foreseen with location of transmission lines within the region.
- Will require housing development, especially residential housing.
- Spousal employment will need to be addressed.
- Local multipliers will be low but the spin-off activities will be felt both in Reykjavik and Akureyri.



## REFERENCES

- Akureyrarbær (2005) The website: [www.akureyri.is](http://www.akureyri.is)
- Atvinnuþróunarfélag Þingeyinga (2005) The website: [www.atthing.is](http://www.atthing.is)
- Conway, R. S. (2000) *The Washington State Aluminium Industry. Economic Impact Study*. Prepared for the Pacific Northwest Aluminium Industry. Dick Conway & Associates.
- Directorate of Labour (2005) The website: [www.vinnumalastofnun.is](http://www.vinnumalastofnun.is)
- Grétar Þór Eypórssón and Hjalti Jóhannesson (2002) *Sameining sveitarfélaga, Aðbrif og afleiðingar, rannsókn á sjö sveitarfélögum*. Akureyri: Rannsóknastofnun Háskólans á Akureyri.
- Hjalti Jóhannesson (2002) *Byggð og atvinnulíf í Eyjafirði. Samantekt vegna byggðaaáætlunar Eyjafjarðar*. Akureyri: Bygðarannsóknastofnun Íslands.
- Hjalti Jóhannesson and Jón Þorvaldur Heiðarsson (2005) *Samanburður veltenginga á Vestfjörðum, Vestfjarðavegur og Djúpvegur – Samfélagsábrif og arðsemi*. Akureyri: Rannsóknastofnun Háskólans á Akureyri.
- Hjalti Jóhannesson and Kjartan Ólafsson (2004) *Samgöngubætur og félags- og efnahagsleg ábrif þeirra - þróun matsaðferða*. Akureyri: Rannsóknastofnun Háskólans á Akureyri.
- Hjalti Jóhannesson, Grétar Þór Eypórssón and Kjartan Ólafsson (2002) *Jarðgöng og Vegagerð á norðanverðum Tröllaskaga, Mat á samfélagsábrifum*. Akureyri: Rannsóknastofnun Háskólans á Akureyri.
- Hönnun (2002) *Samfélagsleg athugun vegna áforma um uppbyggingu á orkufrækum iðnaði á Húsavík*. Reykjavík: Fjárfestingastofan Orkusvið.
- Iceland Tourist Board (2005) The website: [www.ferdamalarad.is](http://www.ferdamalarad.is)
- Icelandic Road Administration (2005) The website: [www.vegagerdin.is](http://www.vegagerdin.is)
- Jón Þorvaldur Heiðarsson (2005) *Íbúaföldi og þörf á íbúðarhúsnæði á Austurlandi árið 2008*. Akureyri: Bygðarannsóknastofnun.
- Jón Þorvaldur Heiðarsson and Valtýr Sigurbjarnarson (2005) *Jarðgöng á Austurlandi. Mat á samfélagsábrifum og arðsemi*. Akureyri: Rannsóknastofnun Háskólans á Akureyri.
- Kjartan Ólafsson (2005) *Rannsókn á samfélagsábrifum álvers og virjunarframkvæmda á Austurlandi. Könnun meðal fólks á Austur- og Norðausturlandi haustið 2004*. Akureyri: Bygðarannsóknastofnun.
- Línuhönnun (2005) *Industrial site at Brimnes Skagafjörður Iceland*. Reykjavík: Investin Iceland Agency
- Nýsir Consulting Services (2005) *A study of the socio-economic impact of the proposed Alcoa aluminum plant in Reyðarfjörður, Iceland*. Reykjavík. Draft.
- Rannsóknastofnun Háskólans á Akureyri (2002) *Unpublished data from the survey "Samgöngur og ferðavenjur"*
- Siglingastofnun (2005) *Aluminium Plant North Iceland Site Comparison Study Harbor Study*. (November 2005, revised December 2005). Reykjavík: Ministry of Industry and Commerce & Alcoa.

Statistics Iceland (2005) The websites: [www.statice.is](http://www.statice.is) and [www.hagstofa.is](http://www.hagstofa.is)

Sveitarfélagið Skagafjörður (2005) The website: [www.skagafjordur.is](http://www.skagafjordur.is)

University of Akureyri (2005) unpublished data