Case No: 76531
Event No: 730132
Decision No: 37/15/COL

EFTA SURVEILLANCE AUTHORITY

EFTA SURVEILLANCE AUTHORITY DECISION

of 4 February 2015

not to raise objections to individual aid in favour of Hydro Aluminium AS for the construction of the Karmøy demonstration plant

(Norway)

The EFTA Surveillance Authority ("the Authority")

HAVING REGARD to the Agreement on the European Economic Area ("the EEA Agreement"), in particular to Articles 61(3)(c) and Protocol 26 thereof,

HAVING REGARD to the Agreement between the EFTA States on the Establishment of a Surveillance Authority and a Court of Justice ("the Surveillance and Court Agreement"), in particular to Article 24,

HAVING REGARD to Protocol 3 to the Surveillance and Court Agreement ("Protocol 3"), in particular to Article 1(3) of Part I and Article 4(3) of Part II,

Whereas:

I. FACTS

1 Procedure

(1) Following pre-notification contacts, the Norwegian authorities notified individual aid to Hydro Aluminium AS ("Hydro") pursuant to Article 1(3) of Part I of Protocol 3 by letter received and registered by the Authority on 8 December 2014 (Events No 732002,732004-732013).

2 Description of the notified measure

2.1 The notified measure

(2) The notification concerns an individual grant of MNOK 1 555 (equivalent in 2014 values to MNOK 1 486) to Hydro for the construction of a demonstration plant for novel, more efficient aluminium smelting cell technologies (HAL4e and HAL4e Ultra) in Karmøy municipality ("the notified measure").

(3) The aid will be distributed to Hydro in the period 2015-2017.

2.2 Enova's New Technology Programme

(4) The notified measure would be financed by the Energy Fund, which is managed by Enova SF ("Enova"), a state enterprise fully owned by the Norwegian State via the Ministry of Petroleum and Energy. Enova was established on 1 January 2002 with the purpose of managing the Energy Fund and to administer several Norwegian support programmes aimed at promoting the use of energy-efficient technologies. One of them is the New Technology Programme ("NTP"), which assists demonstration projects for innovative technologies in order to foster their market diffusion. By Decision No 248/11/COL, the Authority declared the Energy Fund scheme, including the NTP, compatible with the EEA Agreement.

(5) Enova grants aid through regular calls for applications, which are available on its website as well as published in major national and regional newspapers. Under the NTP, projects are evaluated in competition with each other based on their projected energy savings as well as the likely future environmental impact of the new technology to be verified.

(6) Under the NTP, Enova can grant state aid for demonstration projects that fulfil a number of conditions: (i) aid is only granted to projects that have limited market dissemination and have not already been tested in full-scale; (ii) an end-user has to be involved in the demonstration project; (iii) the demonstration project has to involve full-scale versions of the new technologies, which must be tested under typical industrial-like operating conditions; (iv) the demonstration project must have a minimum operational period of two years; (v) only projects that generate a measurable energy result in the form of energy production or energy efficiency are eligible for aid; (vi) projects need to generate a positive cash flow during the operational phase; and (vii) there must be sufficient market diffusion of the new technologies.

(7) The NTP as approved by the Authority in its Decision No 248/11/COL envisages that eligible costs will normally be calculated by reference to a counterfactual investment. However, it foresees that a "no investment" counterfactual may be a more realistic counterfactual alternative under certain circumstances.[1]

(8) Enova undertakes a net present value ("NPV") calculation of each project in order to ensure that projects only generate a normal return on capital. Projects with an estimated return on capital which equals or exceeds what is considered normal for the relevant projects and industry are ineligible for aid. Aid is only considered proportionate if the same result could not be achieved with less aid. In practice, Enova will evaluate the rate of return of each project and compare it to the rate generally applicable for the relevant activity.

(9) The NTP foresees a maximum aid intensity of 50% for large enterprises. According to Decision No 248/11/COL, an individual notification to the Authority of any aid measure above EUR 7.5 million is required.[2]

(10) In 2013, Enova received nine applications under the NTP. Hydro applied for the aid for the demonstration plant on 6 September 2013, and Enova's board of directors decided to grant the aid – conditional upon obtaining the Authority's approval – on 22 June 2014.

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[1] Decision No 248/11/COL of 18 July 2011 on the Norwegian Energy Fund scheme, para. 142.

[2] *Ibid*., para. 58, cross-referring to para. 160 of the Guidelines on State aid for environmental protection ("EAG"), published on 10 June 2010 (OJ L 144, 10.6.2010, p. 1 and EEA Supplement No 29, 10.6.2010, p. 1).

2.3 The beneficiary

(11) Hydro is a wholly-owned subsidiary of Norsk Hydro ASA ("Norsk Hydro"). Its activities are concentrated around the production and sales of aluminium from the production plants in Sunndal, Årdal, Husnes, Høyanger and Karmøy as well as the production and sales of energy from the power plants in Årdal and Luster, all situated in Norway. In addition the company is involved in trading activities. In 2013, Hydro had 2 306 employees.

(12) Hydro's mother company, Norsk Hydro, is a Norwegian aluminium and energy company with its headquarter in Oslo, Norway. Norsk Hydro is a public limited company organised under and with a governance structure based on the Norwegian corporate law. Primary listing is on the Oslo stock exchange and Norsk Hydro is subject to Norwegian security legislation and stock exchange regulations.

2.4 The markets on which Hydro is active

2.4.1 The market for primary aluminium

(13) Hydro's main activity is the production of primary aluminium. Primary aluminium metal is a commodity that is priced based on quotations from the London Metal Exchange. In 2013, Hydro produced 1 944 kilo (metric) tons ("KMT") of primary aluminium worldwide, whereof 1 005 KMT were produced within the EEA. The total production in 2013 amounted to 50 200 KMT worldwide, giving Hydro a global market share of 4%. Within the EEA, Hydro's market share for sales of primary aluminium cast-house products was [10-15]*%.

(14) Aluminium is delivered as liquid from the electrolysis to a cast-house for alloying and solidification. The customisation process of the metal for different end-uses starts at the cast-houses, the products from the cast-houses being Standard Ingot, Extrusion Ingots, Rolled Ingots, Foundry Ingots, Wire rods etc. Further quality differentiations result from a combination of alloying elements and thermomechanic processing. Main usage areas are extrusion (32%), rolling (30%), casting (24%) and cable (12%). These products are mainly used for transport (27%), construction (25%), packaging/foil stock (14%), electrical (14%) and machines/equipment (10%).[3]

2.4.2 The smelting cell technology market

(15) All larger aluminium producers are actively engaging in the research, development and innovation ("R&D&I") of aluminium smelting cell technology. The five major integrated[4] players, UC Rusal, Alcoa, Rio Tinto Alcan ("RTA"), Emirates and Hydro, are all conducting in-house technology development programmes.[5] There is no direct exchange of technology between the large players. However, the competitive nature of the aluminium technology market is an important driver for innovations. New technology by one market player drives all players in the market toward more efficient production processes. Furthermore, it is market practice for companies to present their technology development programs at international industrial seminars, as well as publishing literature on their R&D&I efforts.

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* Business secret.

[3] All metal to be produced at the demonstration plant will be in the form of liquid metal with a minimum aluminium content of 99.7%. Presently, the cast-houses at Karmøy can produce Extrusion Ingots, Rolled Products and Wire Rods.

[4] I.e. with interests in all aspects of the aluminium industry (bauxite mining, alumina refining, aluminium smelting, manufacturing and recycling as well as research and technology).

[5] These companies accounted for 27% of the global aluminium production in 2012.

(16) A further characteristic of the primary aluminium market is the spreading of technology through mergers and acquisitions[6] as well as joint ventures ("JV"), where companies cooperate in ownership and operation of plants. JVs are a common method to get access to smelting cell technology through involving one partner with proprietary technology.

(17) There are only two companies for which the sale of aluminium smelting cell technology currently forms an integral part of their business strategy: RTA and Chinalco. RTA is by far the dominant global technology provider outside China, whilst Chinalco is the dominant technology provider within China. Both are estimated to hold a share of the smelting cell technology market in their respective regions exceeding 80%.

(18) Companies that do not have their own proprietary smelting cell technology need to buy technology licenses for new plants or new potlines.[7] A license will always be related to a defined number of cells at a defined potline/plant.

(19) Hydro is not currently active in the market for smelting cell technology (with the exception of its JV activities).[8] However, once the technologies are sufficiently verified through the demonstration plant, Hydro will commercialise licenses for the HAL4e and HAL4e Ultra technologies to aluminium producers for investments in plants located within the EEA.

(20) In addition, a novel heat exchanger has been developed by Hydro and validated in cooperation with the French company Solios. […].[9] However, the heat exchanger does not form part of the aid application. In particular, any energy savings from its use are not included in the energy efficiency assessment carried out by Enova, which has evaluated only the effect of the new electrolysis technology in the smelting cell.

2.5 Hydro's smelting cell technology

(21) Hydro currently uses a smelting cell technology called HAL300, which is a state-of-the-art technology with relatively low energy consumption and high productivity. HAL300 is the result of decades of incremental improvement. However, according to Hydro, this technology has now reached its limits.

(22) For the past years, Hydro has therefore been developing a new smelting cell design, which allows for a significant further reduction in energy consumption and climate gas emissions. This new cell design (HAL4e) has been tested in a research pilot facility but not yet at a commercial scale. Hydro argues that full-scale testing is necessary before any commercial deployment can take place due to a number of technological risks, in particular the risk of electromagnetic interaction between cells, as well as the need to

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[6] Examples are Rio Tinto acquiring Alcan that earlier acquired Pechiney and Alusuisse, Hydro acquiring VAW, Rusal acquiring Sual, and the Emirates' merger between Dubal and Emal.

[7] Examples of companies purchasing technology are Alcoa, BHP Billiton, Nordural, AMAG, Trimet, Aluar, Aluminium Bahrain, Sohar Aluminium, Vedanta, Hindalco, Nalco, Egyptalum, Xinfa Aluminium & Power, Hongqiao Group, and China Power Investment.

[8] In the past, Hydro sold cell technology externally to companies such as […]. Of these, only the sales to […] covered full potline sales to independent third parties. In addition, during the last 10 years, Hydro has supplied technology to the entire plant at Qatalum, which it owns 50/50 with Qatar petroleum.

[9] The main potential for energy saving by installing a heat exchanger is found in the reduced energy consumption of the main fans in the gas treatment centre. The reduced energy consumption is a result of the reduced volume of the gas when the gas is cooled and the elimination of the need for a dilution of the hot gas to ensure efficient removal of fluoride from the gas and to protect the filter. The energy saving potentials for the demonstration plant is estimated at […]. There is also a large potential for reuse of energy from the aluminium industry for the heating of water and buildings.

verify the new technology's integration in the production handling processes and in light of the very high investment costs involved.

(23) The innovation of the HAL4e cell design consists of several elements not only of a new geometry, larger cell size and increased amperage, but also of a number of other elements. For instance, an important issue is to reduce the ohmic losses to a minimum. This is achieved by optimising the design of all connections, anodes, cathode and the general geometry of the interior of the cell. At the same time the heat balance of the cell needs to be controlled in order to maintain optimum operating conditions. The new design of the cathode increases the stability of the liquid aluminium and is developed to take into account higher magnetohydrodynamic ("MHD") forces. It further enables a reduction in the distance between the cathode and anode.

(24) Hydro's current state-of-the-art HAL300 technology platform is presently operating with an amperage of 310-315 kA and an energy consumption of approx. 13.5 kWh/kg Al. The cross section of the HAL4e production cell is […] larger and the cells operate at 45% higher amperage than the HAL300. The HAL4e cells are estimated to operate with an amperage of 450 kA and an energy consumption of 12.3 kWh/kg Al. The HAL4e Ultra cells – a different configuration of the standard HAL4e cells – are estimated to reach an amperage of 415 kA and an energy consumption as low as 11.5-11.8 kWh/kg Al.

2.6 The demonstration plant project

(25) The aim of the demonstration plant is to verify the HAL4e cell design prior to full-scale industrial use of the technology.

(26) A full smelter pot-line normally consists of four sections with a total of 370–440 cells. Ideally, a full section to verify realistic pseudo full-scale operation is 90-100 cells. To save costs for the demonstration plant, Hydro has found that this number can be reduced to 60 cells and still represent a sufficient statistical platform for cell performance verification. Furthermore, a size of 60 cells in total is the normal size for a shift of operators and is at a scale where investments in auxiliary equipment like cranes, pot tending machine, gas cleaning processes etc. per kg of aluminium is kept at a minimum.

(27) The demonstration plant would be fitted out with 48 HAL4e and 12 HAL4e Ultra cells.

2.6.1 The HAL4e cells

(28) The HAL4e technology represents a step-change in performance from the current HAL300 technology. This change has only become possible by the introduction of a new technology, most notably a novel […][10] and a […][11] concept. In addition to the […], improvements of the […] designs and improved […] technology (including […]) have been key contributors to the overall energy consumption results of HAL4e. In particular, the new concept of […][12] represents a technology step-change.

(29) The cells in a HAL4e production facility will be placed closer to each other and in another layout than for any other existing technology. The cells will operate at a higher amperage and high current density. These factors introduce a more challenging MHD environment. A prerequisite for a successful verification of the MHD behaviour is to run a sufficient number of cells in a demonstration plant.

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[10] Patent […].

[11] Patent […].

[12] Patent […].

(30) The increased size of the cell implies more and slightly […] and the […] must be increased. In addition, the size of the electrolytic bath introduces challenges connected to keeping a homogenous concentration in the bath.

2.6.2 The HAL4e Ultra cells

(31) The purpose of the HAL4e Ultra demonstration is to run enhanced cells based on the HAL4e platform at […] in a real production environment. This involves that the HAL4e Ultra cells are expected to be operated with an energy consumption as low as 11.5-11.8 kWh/kg Al, whilst the amperage will be 415 kA.

(32) This implies some improvements in elements of the cells but no changes in the basic design, since the HAL4e Ultra is based on the same platform as the HAL4e. Minor changes in some elements of the cells will be implemented in order to achieve further reduction of energy consumption. New materials will be used to attain additional reductions of ohmic losses, and an improved mathematical model for the correction of magnetic fields in addition to the […] will enable a further reduction of the interpolar distance. The lower energy consumption implies changes in the […] to ensure good operational conditions.

(33) Since most of the HAL4e Ultra cell design is identical to that of the HAL4e cells, it is not necessary to run more than 12 cells with the HAL4e Ultra technology in order to verify and document the technology. The 12 HAL4e Ultra cells will encompass the basic HAL4e cell functionalities, including all interfaces in the day-to-day pot-room operation. They will in this sense be an integral part of the HAL4e cell technology verification programme.

(34) The HAL4e Ultra technology does not represent a higher investment cost than the HAL4e technology, as there are only small design variations between the two cell concepts. The HAL4e Ultra technology therefore has only a minimal impact on the total investment costs and, hence, no appreciable impact on the financial support needed for the realisation of the demonstration plant.

(35) Whilst the HAL4e cells represent a disruptive innovation by changing technology platform, the HAL4e Ultra merely represents an optimisation of the HAL4e technology.

2.6.3 Technological risk of the HAL4e technology platform

(36) The demonstration plant is intended to verify the HAL4e technology against the background of a number of technological risks identified in the earlier R&D&I phases.

(37) Cathode design and behaviour: The cathode performance is essential for optimal operational performance of the cells. Improved design solutions compared to the test cells at Årdal will be implemented in the demonstration plant. The main risk factors are a reduced lifetime of the cathode (which is a major cost factor), a reduced aluminium production and an increased energy consumption.

(38) MHD behaviour: Controlling the MHD behaviour is essential for the operational stability and energy consumption of the HAL4e cells. The main risk factors are a reduced production and an increased energy consumption

(39) Maintenance needs: An operational adaptation or exchange of components or equipment may turn out to be necessary in order to ensure proper maintenance of the HAL4e cells. The main risk factor is an increase in operational costs.

(40) Interface between cells and rest of facility: The interface between the cells and various kinds of facilities and equipment represent further risk factors that may also lead to increased costs in the early operation phase.

(41) New operational procedures: Successful adaptation of the operational philosophy and standard operating procedures of the new cell concept in the operational organisation is furthermore a risk factor that could lead to increased operational costs.

2.6.4 Expected environmental impact of the HAL4e technology

(42) The HAL4e technology is expected to result in a reduction of both indirect emissions from the better energy efficiency compared to the current HAL300 technology and direct greenhouse gas ("GHG") emissions from the smelting process.

(43) Regarding the demonstration plant and assuming an energy consumption for HAL4e cells of 12.3 kWh/kg Al and 11.8 kWh/kg Al for the HAL4e Ultra cells, the energy saving compared to an equivalent production based on the HAL300 technology will be 96 GWh/year. The reduction of GHG-emissions compared to the emissions of the HAL300 plants will be 0.1 ton CO_2-equivalent/ton Al, which is a substantial reduction.

(44) Once the HAL4e technology has been successfully verified, Hydro is likely to roll it out in existing brownfield sites. Potential projects include enlarging the demonstration plant (Karmøy Phase II) as well as the introduction of the technology on other existing sites in […]. The energy reduction in relation to these brownfield sites is expected to be up to approx. […] TWh/year in a short to medium term.

(45) In the long term, Hydro is likely to convert all its production lines to the HAL4e technology. Assuming an energy consumption of [11.8-12.3] kWh/kg Al as an average energy consumption for the HAL4e production capacity (taking into account some future incremental changes), 13.5 kWh/kg Al as the average consumption for the alternative HAL300 platform smelters and 14.1 kWh/kg Al for the older smelters using less efficient technologies, the energy effect of the HAL4e technology will in total represent a reduction in energy consumption of approx. […] TWh/year globally from 2035.

(46) In addition to the above, there would be a substantial reduction of direct GHG-emissions from the smelting process itself, as well as further potential environmental benefits arising from the possible adoption of the HAL4e technology by other aluminium producers under the technology licensing programme.

2.6.5 Costs and benefits of the demonstration plant

(47) The investment costs for the proposed demonstration plant are composed as follows:

Budget post	**MNOK**
Site Preparation, Utilities & Infrastructure	[…]
Power Supply	[…]
Anode Service Area	[…]
Potline Area, *of which*:	[…]
- *Potroom building & workshops*	*[…]*
- *Rectifiers and transformers*	*[…]*
- *Pots and busbars*	*[…]*
- *Potline equipment and vehicles*	*[…]*
- *Fume Treatment Plant*	*[…]*
- *Potroom control system & utilities*	*[…]*

Budget post	MNOK
Other (freight, spares, first fill, insurance, testing)	[…]
Engineering & Project Management	[…]
Total investment cost	**3 845.1**

(48) The Norwegian authorities have clarified that MNOK 19 of the investment costs are costs related to a possible expansion of the demonstration plant (i.e. Karmøy Phase II). Hence, the eligible investment costs for the demonstration plant are reduced to MNOK 3 826 (in 2014 values).

(49) In accordance with Decision No 248/11/COL, the eligible costs are calculated net of any operating benefits and operating costs during the first five years.[13]

(50) The demonstration plant's annual production capacity is 74 200 tons. It is scheduled to start its production in 2017 with a total volume of [50 000 – 57 000] tons. The initial phase of the plant is expected to be two years. In 2018, the production volume is expected to reach [70 000 – 74 000] tons. The long run production level is expected to be [73 500 – 74 100] tons, which is below the theoretical maximum capacity due to maintenance breaks for the cells. Annual revenues from the demonstration plant during the first five years of operation are thus expected to increase over the years. Based on Hydro's projections, the discounted operational revenues during the first five years of operation amount to MNOK […].

(51) The annual operation and maintenance costs vary from year to year. The major cost drivers are the prices of electricity, alumina and anodes. Based on Hydro's projections, the demonstration plant's discounted operational costs during the first five years of operation amount to MNOK […].

3 Comments by the Norwegian authorities

(52) According to the Norwegian authorities, the notified measure should be assessed in line with Decision No 248/11/COL as aid granted under the NTP of the Energy Fund scheme, which the Authority declared compatible with the functioning of the EEA Agreement on the basis of Article 61(3)(c) of the EEA Agreement.

3.1 Eligibility of the project under the NTP

(53) The Norwegian authorities explain that all applications under the NTP are subject to detailed scrutiny by Enova. In order to ensure that there is no overcompensation in relation to eligible projects, all applications are subject to the following procedure.

(54) First, Enova carries out an individual assessment of the information provided by the applicant on the technical potential of the project and the relevant costs and benefits.

(55) Secondly, Enova undertakes a financial analysis of the project in order to determine the aid required to ensure a normal return on capital, taking into account operating benefits and costs. Projects with an estimated return on capital which exceeds what is considered normal for the relevant industry are not eligible for aid.

(56) Thirdly, Enova carries out a comparison of the aid required to ensure a normal return on capital within the applicable maximum aid intensities.

[13] Decision No 248/11/COL, para. 32.

(57) Finally, Enova gives priority to projects according to the level of aid needed (per KWh saved), as well as the likely future environmental impact of the new technology to be verified, until the annual budget is allocated. Thus, projects which qualify under steps one to three of its assessment might in the end not be awarded aid due to budgetary limits and competition from other, more efficient projects.

(58) According to Decision No 248/11/COL, demonstration projects have to fulfil a number of criteria in order to be eligible for aid under the NTP. The fulfilment of these criteria are supervised by Enova.

3.1.1 Limited market dissemination and no prior full-scale testing

(59) Since 2004, Hydro has been working on the development of the HAL4e platform at its research centre in Årdal. The HAL4e technology represents a novel cell design based on a number of innovations and patents. It is a change in the technological platform, and not a mere incremental development of an existing technology. This technology is not used by any other aluminium producer.

(60) Hydro had started some small-scale testing since 2004, and six test cells were started up in its research centre in 2008. However, the technology has not yet been tested in a full-scale demonstration plant, let alone been used in commercial aluminium production. The technology thus has not yet been introduced to the market.

(61) On this basis, the Norwegian authorities consider that in line with Decision No 248/11/COL there has been no market dissemination of the HAL4e technology nor any prior full-scale testing.[14]

3.1.2 End-user participation

(62) Hydro intends to put the HAL4e technology to commercial use in its aluminium production if the demonstration plant proves a success and market conditions allow capacity expansions.

(63) The Norwegian authorities thus consider that the project involves an end-user in line with Decision No 248/11/COL.[15]

3.1.3 Full-scale testing under typical operating conditions

(64) The demonstration plant involves 48 full-scale versions of the HAL4e cells and 12 full-scale versions of the HAL4e Ultra cells. A demonstration plant with 60 cells represents the minimum scale acceptable in order to create a sufficient statistical basis for the verification of the HAL4e and HAL4e Ultra technologies. In addition, the size of the demonstration plant is optimal from an operational cost perspective. Furthermore, the technology will be tested under the same industrial operating conditions as Hydro's planned future full-scale plants.

(65) On this basis, the Norwegian authorities consider that the demonstration plant represents a full-scale version of the new technology, which will be tested under typical industrial-like operating conditions in line with Decision No 248/11/COL.[16]

[14] *Ibid.*, para. 111.

[15] *Ibid*., para. 112.

[16] *Ibid*., paras 113 and 114.

3.1.4 Minimum two years operational period

(66) The demonstration plant is expected to be completed by 2017. The operation of the new HAL4e production cells at the plant will at a minimum last for two years, from 2017 to 2019.

(67) The Norwegian authorities thus consider that the minimum operational period requirement set out in Decision No 248/11/COL is met.[17]

3.1.5 Measurable energy result

(68) If successful, the HAL4e demonstration plant will generate a measurable energy result in the form of energy savings of approx. 96 GWh per year. In addition, the likely future use of the technology once verified in Hydro's brownfield sites is expected to lead to a reduction in energy consumption of up to approx. […] TWh per year in a short to medium term perspective. In the long term, the energy effect for the HAL4e technology introduction will in total represent a reduction in energy consumption of approx. […] TWh per year.

(69) The Norwegian authorities therefore consider that the requirement for a measurable energy result as set out in Decision No 248/11/COL is met.[18]

3.1.6 Generating of a positive cash flow during the operating phase

(70) According to the projections of Hydro, the demonstration plant is expected to generate a positive cash flow in its operating phase, i.e. the revenue generated from its aluminium production is expected to exceed operating cost.

(71) The Norwegian authorities therefore consider that the requirement for a positive cash flow during the operating phase as also set out in Decision No 248/11/COL is met.[19]

3.1.7 Sufficient market diffusion of the new technology

(72) It follows from Decision No 248/11/COL that the long term aim of the NTP is to contribute to environmental protection by the diffusion of new and more efficient energy technologies.[20] Sufficient market diffusion of the new technology – once verified in the demonstration plant – is therefore a necessary condition for a project to be eligible for aid under the NTP.

(73) The Norwegian authorities explain that the market diffusion of the HAL4e and HAL4e Ultra cells will take several forms.

(74) First, the demonstration plant will lead to market diffusion through the likely full-scale deployments of the HAL4e technology at Hydro's own sites as well as its JV projects.

(75) Secondly, Hydro is actively disseminating results of the HAL4e programme at industrial seminars. This has attracted vast attention and is expected to continue to do so. Considering the competitive nature of the aluminium market, Hydro's results are expected to drive other market players towards further development of more efficient proprietary production processes. The energy efficiency aspect of the HAL4e could be a driver

[17] *Ibid*., para. 115.

[18] *Ibid*., para. 116.

[19] *Ibid.*

[20] *Ibid*., para. 11.

towards a shift in R&D&I focus to energy efficiency, as opposed to productivity, which has been the main research focus of Hydro's competitors so far.

(76) Finally, Hydro will, once verification in the demonstration plant has been completed, sell technology licenses for the HAL4e and HAL4e Ultra technologies[21] to aluminium producers requesting such license for investments in plants located within the EEA[22] on commercial terms. Licenses will be available at least up to 1 January 2030.[23]

(77) On this basis, the Norwegian authorities consider that the requirement for market diffusion as set out in Decision No 248/11/COL is fulfilled.

3.2 Incentive effect

(78) As stated above, the NTP foresees that for a demonstration plant, the assessment may be undertaken based on a "no investment" counterfactual. The Norwegian authorities argue that such a "no investment" counterfactual approach is particularly appropriate in the case of the proposed demonstration plant for the following reasons.

(79) First, Hydro has not considered a counterfactual in the form of an alternative reference investment. The principal aim of the demonstration plant is not to produce aluminium, but to reduce the risk of investing in the new HAL4e technology in future full-scale commercial plants. This aim cannot be achieved in an alternative plant using the existing, less energy efficient HAL300 technology.

(80) Secondly, Hydro does not lack production capacity, satisfactory technology or equipment in relation to the volume currently demanded by the market. Hydro can thus continue producing its needed production volume using existing facilities.

(81) Finally, if Hydro were to invest in new production capacity, it would only invest in the most energy efficient technology available to the company. This is currently the HAL4e technology platform, as the HAL300 platform has reached its technological limits. However, the HAL4e technology has not yet been sufficiently tested and verified to justify a roll-out on a commercial scale.

(82) As set out in Decision No 248/11/COL, in case of a "no investment" counterfactual the following elements need to be assessed in order to determine whether the aid has an incentive effect: (i) whether any relevant EU or national standards will be introduced in the foreseeable future; (ii) whether the investment in the relevant project represents normal market behaviour; (iii) the level of risk connected to the project and whether the investment, without the aid, would generate an appropriate profit; (iv) the project's level

[21] For the avoidance of doubt, the licensing will not necessarily include any future additional elements or modifications of the technologies that may be developed by Hydro outside the scope of the measures covered by the aid subject to the present notification.

[22] Hydro might not be prepared to sell its technology outside the EEA due to commercial, legal as well as political risks. For instance, there may be a risk that in some countries, intellectual property rights are not always protected or respected in the same way as in the EEA.

[23] According to Hydro, the novelty of, and thus the commercial interest for, the technology will per se be limited to a certain amount of time until other and potentially better technologies have been developed and made available for the industry. Furthermore, Hydro will have to maintain the technology and uphold and retain the competence related to it and the necessary resources to be able to carry out the sales procedure until the end of 2029.

of increased environmental protection; and (v) the extent of the production advantages obtained by the aid recipient.[24]

3.2.1 Relevant EU or national standards

(83) To the Norwegian authorities' knowledge, there are no on-going negotiations on EU or national level to introduce new or higher mandatory standards for the energy consumption of aluminium smelters.

3.2.2 Normal market behaviour

(84) The Norwegian authorities argue that building a demonstration plant as the one planned by Hydro without any state aid does not represent normal market behaviour.

(85) Most technology development in the primary aluminium market is pursued through incremental changes, which do not require full-scale testing in a demonstration plant. These changes are routinely financed and implemented by producers without any state support (with the exception of potential aid for R&D&I).

(86) This is different for a real step-change development such as the switch to a completely new cell design platform (e.g. HAL4e), which requires full-scale testing to mitigate the technology risks. These situations are very rare – the development of the HAL300 cells for instance dates back to 1978 – and do not represent normal market behaviour. According to Hydro, so far there have been only two comparable demonstration plants established by competitors outside the EEA, by RTA and Emirates, for the purpose of full-scale testing. As far as Hydro is aware, at least one of them involved important amounts of state support.[25]

(87) Finally, the Norwegian authorities recall that the construction of the proposed demonstration plant is highly unprofitable (see 3.2.3 below) and would not take place without the aid.

3.2.3 Level of risk and profitability

(88) Regarding the level of risk, the Norwegian authorities argue that the technological risks as set out in section 2.6.3 above would prevent Hydro from investing in the demonstration plant in the absence of aid.

(89) In addition, the Norwegian authorities highlight a number of other risk factors that may affect the profitability analysis of the project, in particular the sales price of aluminium, electricity prices, the cost of anodes, the exchange rates as well as the development of the actual investment costs.[26]

(90) The Norwegian authorities thus consider that the project carries a substantial level of risk, both in relation to the technology to be verified as well as to the development of key drivers of profitability. They also underline that the projections for the energy efficiency of the HAL4e technology used in the assessment of the project (including the profitability analysis in form of a NPV calculation) are based on a best case scenario; any negative deviation would have a corresponding negative impact on the financial projections.

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[24] Decision No 248/11/COL, para. 142.

[25] For the AP60 demonstration plant with an investment cost of about US$ 1.1bn, RTA was granted financial support through R&D tax incentives in addition to a 30-year loan from the Government of Quebec. Furthermore, it benefits from a 24-year extension of the company's lease of hydro-electric power plants below the normal power price for large industrial customers in Quebec.

[26] These risk factors have been assessed by Enova in the framework of its NPV analysis.

(91) Regarding the profitability of the demonstration plant, the Norwegian authorities have presented a NPV calculation on the basis of 50 years of operation. Even though the testing and verification of the HAL4e technology in the demonstration plant is expected to last for only two years, the production cells are expected to have a total lifetime of 50 years. This total lifetime provides a better basis for determining how much aid is necessary to trigger the project.

(92) As a part of the NPV calculation, the Norwegian authorities have analysed the rate of return required by Hydro for the demonstration plant project. Hydro has submitted internal corporate policy guidelines, which are applied by Hydro to all its investment projects. The guidelines normally require a […]% real rate of return on investments after tax in decisions of capital allocation. For the Karmøy demonstration plant project, this corresponds to a rate of return of […]% before tax.

(93) However, the same corporate policy guidelines state that the CEO of Hydro can accept projects that do not reach this minimum requirement in case of large projects with particular strategic relevance for the company. Large projects with strategic relevance are described as projects of vast financial scope that target the core of Hydro's activities. The guidelines do not fix any absolute minimum requirement in that case, as the rate of return requirement for such projects will necessarily vary according to the project at hand, its strategic opportunities and the risks involved.

(94) In its application for aid to Enova, Hydro stated that it would be willing to accept an internal rate of return on the project – including the state aid – of […]% after tax, corresponding to […]% before tax. Enova has set the maximum aid amount for the project on the basis of these values. Updated investment costs now show an increase in costs compared to the estimate used in the application for aid. The actual internal rate of return of the project will thus be lower and only reach […]% after tax, corresponding to […]% before tax. This is well below the normal rate of return requirement of Hydro. It also does not exceed the estimated weighted average cost of capital ("WACC") for Hydro of around […]% and thus would not generate any net return.

(95) According to the NPV calculation, without state aid the demonstration plant would generate a negative NPV of MNOK […] over its assumed lifetime of 50 years, based on a real rate of return requirement of […]% before tax. The internal rate of return without the aid is […]% before tax. The proposed aid amount of MNOK 1 486 (2014 value) will bring the rate of return before tax up to […]%.[27]

(96) In light of these calculations, the Norwegian authorities consider that the project suffers from a funding gap and that the notified measure would not result in overcompensation for Hydro, given that the aid would not increase the internal rate of return of the project beyond the normal rate of return requirement of Hydro nor exceed its estimated WACC.

3.2.4 Level of increased environmental protection

(97) The Norwegian authorities note that the likely environmental impact of the HAL4e technology as set out in section 2.6.4 is substantial.

3.2.5 Extent of production advantages

(98) The Norwegian authorities consider that the aid concerns an investment in the verification of a new aluminium production technology that aims to save energy. If verified, the

[27] Even with the aid, NPV of the project would still be negative at MNOK […] based on a real rate of return requirement of […]%.

HAL4e will be more cost efficient than conventional technology. Thus, it is unavoidable that the aid will lead to some production advantages.

(99) However, the Norwegian authorities also point out that the eligible costs are calculated net of any operating benefits (see section 2.6.5 above). Furthermore, the demonstration plant itself will have only a negligible annual production capacity of 74 200 tons. This will increase Hydro's share of the global production by merely 0.12% (in 2017). In addition, based on Hydro's normal rate of return requirement for investments, the NPV of the project will be negative even with the aid.

(100) Finally, primary aluminium is a commodity that is sold on the market based on fixed prices without any form of labelling with regards to environmental matters. A more environmentally friendly production process such as HAL4e is therefore unlikely to have an impact on customer demand and general market conditions for Hydro's products.

3.3 Proportionality

(101) Enova intends to grant MNOK 1 555 (equivalent to MNOK 1 486 in real 2014 values) to Hydro for the construction of the demonstration plant. The aid will be distributed to Hydro in the period 2015-2017.

(102) In summary, the eligible costs (as set out in section 2.6.5 above) and aid intensity calculations are as follows:

Hydro demonstration plant	**MNOK (in 2014 values)**
Eligible investment costs	3 826
Operating revenues (five years)	-[…]
Operating costs (five years)	[…]
Total eligible costs	**3 621**
Proposed aid amount	1 486
Aid intensity: 41%	

(103) Consequently, applying the calculation method set out in Decision No 248/11/COL, the proposed aid amount of MNOK 1 486 results in an aid intensity of 41% of eligible costs. The Norwegian authorities highlight that the aid intensity is thus well below the maximum aid intensity of 50% for large enterprises under the NTP.

(104) In addition, the Norwegian authorities argue that the result of the NPV calculation – as described in section 3.2.3 above – shows that the project suffers from a funding gap. The aid amount does not exceed this funding gap and is therefore limited to the minimum necessary to trigger the investment.

(105) Finally, Enova will apply the rules for disbursements of aid under the Energy Fund scheme as explained in section I.7 of Decision No 248/11/COL. Following these provisions, the aid amount will be reduced in case the incurred investment costs are lower than budgeted. In case of realised savings, the aid amount will be proportionately reduced. Furthermore, Hydro is not free to redistribute costs between budget posts; any changes are subject to Enova's approval. The adjustment of the aid is facilitated by the fact that Enova holds back the last 20% of the aid until the project is completed and will only disburse the remaining aid when it has approved an audited final project report with audited final project accounts.

(106) To reduce the risk of overcompensation, Enova will also re-assess the profitability of the project based on the final production capacity as well as the projections for the sales price

of aluminium, the exchange rate NOK/USD and the electricity price at the time Hydro takes the final decision to initiate the project.

(107) The amount of MNOK 1 555 (nominal value, corresponding to MNOK 1 486 in 2014 value) therefore represents the maximum amount of aid, which may be revised downwards using the adjustment mechanisms described above.

3.4 Effect on trade and competition

(108) The Norwegian authorities consider that the notified measure could have an effect on trade and competition in both the market for primary aluminium and the market for smelter cell technology, in which Hydro will become active once the HAL4e technology platform has been successfully verified.

(109) The Norwegian authorities argue that any negative impact on these markets will be limited given that the aid is proportionate. In particular, the aid intensity of 41% is well below the maximum aid intensity under the NTP, the aid is granted net of any operating benefits and the NPV calculation shows that Hydro will not generate any profit even with the aid. Furthermore, the production capacity of the demonstration plant is very low in comparison to the size of the global market for primary aluminium (see section 3.2.5 above) and will not lead to any appreciable effect on the market.

(110) The Norwegian authorities concede that the measure will lead to Hydro obtaining a first-mover advantage once the new technology has been verified in the demonstration plant. However, they argue that conferring a certain first-mover advantage is inherent in funding a demonstration project for new technology, and will be outweighed by the positive effects of the measure. Furthermore, any such first-mover advantage will be limited in time, given the market diffusion of the new technology, e.g. through licensing, and the incentive for competitors in turn to improve their technologies (see section 3.1.7 above). The Norwegian authorities highlight the important exit barriers for innovation in the industry, given the high upfront investment costs and long-term development programs of all major aluminium producers. It is therefore unlikely that the aid measure will result in Hydro's competitors reducing their technology development activities.

(111) In addition, the Norwegian authorities state that although the market for primary aluminium suffers from a degree of over-capacity at the moment, there is a stable demand for aluminium that is likely to grow, and idle capacity is usually based on less efficient and less environmentally friendly smelting technology. Furthermore, Hydro is not an inefficient firm that will be kept afloat by the aid. The Norwegian authorities also argue that the aid will not have any effect on trade and location, as Hydro – as well as any other producer using the new technology – will evaluate the location of future investments purely on the basis of an individual cost-benefit analysis. The location of the demonstration plant will not have any major impact on that choice.

(112) Regarding potential exclusionary behaviour due to the aid, the Norwegian authorities argue that Hydro has a share of only about 4% of the global market for primary aluminium, and about [10-15]% in Europe. The production capacity of the demonstration plant will increase this market share to 4.1% globally and about [10-15]% in Europe. Furthermore, the global market is highly fragmented, with no player accounting for more than 8% of global production in 2013. Given the low market shares and the structure of the market, Hydro is unlikely to be able to exercise market power due to the aid measure.

(113) Concerning the market for smelting cell technology, the Norwegian authorities argue that Hydro is a very small player, even when taking into account its JV activities.[28] It will face strong competition from the established players, RTA and Chinalco, which hold a share of the smelting cell technology market in their respective regions exceeding 80%. Finally, there is strong countervailing buyer power from aluminium producers.

II. ASSESSEMENT

4 Presence of state aid

(114) Article 61(1) of the EEA Agreement provides that: "*Save as otherwise provided in this Agreement, any aid granted by EC Member States, EFTA States or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Contracting Parties, be incompatible with the functioning of this Agreement*."

(115) In its Decision No 248/11/COL approving the Energy Fund (including the NTP), the Authority concluded that disbursements to undertakings under the Energy Fund constitute state aid within the meaning of Article 61(1) of the EEA Agreement.[29] There is nothing in the current notification to alter that conclusion.

(116) Hydro will be awarded aid by Enova under the Energy Fund, the funding of which comes from various sources controlled by the State and therefore constitutes state resources.

(117) An individual financial grant will be awarded to Hydro, which will thus receive an economic advantage it would not have received in the normal course of business. Given that the aid is granted to a single undertaking, it is clearly selective.

(118) At the moment, Hydro is mainly active in the market for primary aluminium production, which is subject to competition and trade within the EEA. The economic advantage conferred on Hydro by the notified measure is therefore liable to distort competition and affect trade between the Contracting Parties to the EEA Agreement.

(119) For these reasons, the notified measure constitutes state aid within the meaning of Article 61(1) of the EEA Agreement.

5 Procedural requirements

(120) Pursuant to Article 1(3) of Part I of Protocol 3, "*the EFTA Surveillance Authority shall be informed, in sufficient time to enable it to submit its comments, of any plans to grant or alter aid (…). The State concerned shall not put its proposed measures into effect until the procedure has resulted in a final decision*".

[28] Hydro has not supplied technology licences for full pot lines to independent third parties during the last 10 years. If technology sales to JV are counted, the sale of Hydro technology to the Qatalum plant in Qatar accounts for [10-15]% of the smelting cell technology market globally (except China) in terms of capacity, and [5-10]% in terms of the number of licensed projects. However, Hydro itself owns 50% of the plant. If China is included, Hydro's share of the global smelting cell technology market is even lower.

[29] Decision No 248/11/COL, para. 54.

(121) The notified measure is based on the NTP under the Energy Fund scheme as authorised by Decision No 248/11/COL. That decision foresees the obligation to notify individual aid grants over EUR 7.5 million to the Authority for a detailed assessment.[30]

(122) The Authority notes that under the Energy Fund, the award of aid above this threshold is conditional upon the Authority's approval.[31] Accordingly, the Norwegian authorities have not yet implemented the individual aid measure in favour of Hydro. Furthermore, by submitting the notification received and registered by the Authority on 8 December 2014, the Norwegian authorities have complied with the notification requirement.

(123) The Authority can therefore conclude that the Norwegian authorities have respected their obligations pursuant to Article 1(3) of Part I of Protocol 3 and Decision No 248/11/COL.

6 Compatibility of the aid

6.1 Legal framework

(124) The Norwegian authorities have conducted their assessment to grant aid to Hydro according to the procedures approved by the Authority for the NTP in its Decision No 248/11/COL. They submit that the aid is compatible with Article 61(3)(c) of the EEA Agreement.

(125) Pursuant to Article 61(3)(c) of the EEA Agreement, aid to facilitate the development of certain economic activities or of certain economic areas may be considered compatible with the functioning of the EEA Agreement where such aid does not adversely affect trading conditions to an extent contrary to the common interest.

(126) Decision No 248/11/COL states that in order for aid to be compatible on this legal basis, it must, first, pursue an objective of common interest. Secondly, it must be well designed to deliver that objective and in that context: be an appropriate instrument, have an incentive effect and be proportionate. Finally, the distortions on competition and effect on trade of the aid must be limited so that the overall balance is positive. In that regard, the following questions must be assessed (the "balancing test"):[32]

1. Is the aid measure aimed at a well-defined objective of common interest?

2. Is the aid well designed to deliver the objective of common interest? In particular:

   - Is the aid measure an appropriate instrument, *i.e.* are there other, better-placed instruments?

   - Is there an incentive effect, *i.e.* does the aid change the behaviour of the beneficiary?

   - Is the aid measure proportional, *i.e.* could the same change in behaviour be obtained with less aid?

3. Are the distortions of competition and effects on trade limited, so that the overall balance is positive?

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[30] *Ibid*., para. 58, cross-referring to para. 160 EAG.

[31] *Ibid*., para. 57.

[32] *Ibid*., para. 139, cross-referring to para. 87.

6.2 Detailed assessment of the notified measure

(127) In assessing whether the notified measure can be deemed compatible under Article 61(3)(c) of the EEA Agreement, the Authority will apply the balancing test set out above in conjunction with the requirements set out in Decision No 248/11/COL. In applying the balancing test, the Authority will carry out a detailed assessment of the notified measure, proportionate to the distortion potential of the measure.[33]

6.2.1 Objective of common interest

(128) An objective of common interest is an objective that has been recognised as being in the common interest of the EEA States.

(129) The Authority notes that the EEA institutions have recognised that the protection of the environment and the reduction of CO_2 emissions are in the common interest of the Contracting Parties to the EEA Agreement. Both the EU Member States and the EFTA States have made a commitment to achieve at least a 20% reduction in greenhouse gas emissions compared to 1990 and at least a 20% saving in energy consumption compared to the projections for 2020.[34]

(130) Furthermore, as recognised by the Authority in its Decision No 248/11/COL, the primary objective of state aid under the NTP is to introduce new energy technologies to the market. The substantial environmental benefit pursued is the future large scale deployment of new and more effective energy production and saving technologies. The NTP attempts to favour the market diffusion of such technologies and to address a market failure in the sense that the long term positive externalities such as knowledge spill-overs stemming from the testing and deployment of new technologies are not sufficiently taken into account when profit seeking undertakings make investment decisions. Due to the perceived unattractive rates of return from a commercial perspective, the number of investments in this field risk being sub-optimal from a community perspective.[35]

(131) The notified measure is aimed at addressing this market failure. The purpose of the demonstration plant is to verify a new and more effective energy saving technology, which will be made available to the market once the verification has been successful.

(132) Based on the above, the Authority concludes that the aid measure is aimed at a well-defined objective of common interest.

6.2.2 Appropriate instrument

(133) In its Decision No 248/11/COL, the Authority found that state aid represents an appropriate instrument to achieve the objective of common interest identified above, namely to verify a new and more effective energy saving technology.

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[33] The Authority notes that in the assessment of the NTP, Decision No 248/11/COL refers to a number of provisions of the EAG, including the threshold for individual notification in para. 160 EAG. The Authority also notes that para. 164 of the EAG states that the detailed assessment following such an individual notification has to be proportionate and depends on the distortion potential of the notified measure.

[34] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, incorporated into point 41 of Annex 4 to the EEA Agreement by Joint Committee Decision No 162/2011 (OJ L 76, 15.3.2012, p. 49 and EEA Supplement No 15, 15.3.2012, p. 56.

[35] Decision No 248/11/COL, para. 140.

(134) This finding was based on the information provided by the Norwegian authorities that there are no other, less distortive instruments to achieve the same results, and that the goals of the NTP could not be attained through regulation.[36]

(135) Regarding the notified measure, the Authority notes in particular that the Norwegian legislation does not require undertakings, e.g. producers of primary aluminium such as Hydro, to construct plants using new innovative technologies (e.g. HAL4e) instead of conventional production facilities or state-of-the-art technologies (i.e. HAL300). Provided that they respect applicable standards (i.a. with regard to pollution or building codes), conventional production facilities or buildings using conventional technologies known to the market may thus be authorised and built.

(136) The Norwegian authorities have also demonstrated that a less distortive aid instrument, e.g. a loan or a guarantee, would not be suitable to trigger investment in the new technology. They have explained in particular that other instruments would have a limited impact on the NPV calculation and would therefore be less suitable to address the funding gap compared to an aid grant.[37]

(137) The Authority therefore concludes that the notified measure is an appropriate instrument to verify a new and more effective energy saving technology.

6.2.3 Incentive effect

(138) As set out in Decision No 248/11/COL, aid generally does not present an incentive effect for the beneficiary in cases where the project has already started prior to the aid application by the beneficiary to Enova.[38] The Authority notes that Hydro's application for aid to Enova was submitted before the start of the project.

(139) State aid for environmental protection must result in the recipient of the aid changing its behaviour so that the level of environmental protection will be higher than if the aid had not been granted. The Authority thus needs to verify that Hydro would not, without the aid, build the planned demonstration plant, e.g. because of its intrinsic benefits.

(140) The NTP of the Energy Fund scheme as approved by the Authority in its Decision No 248/11/COL foresees that the incentive effect will normally be assessed by reference to a counterfactual investment. However, the decision recognises that in some cases, aid applicants may not have considered an alternative investment. For many investors, the key element for a demonstration project is to reduce the perceived risk of investing in the innovation on a larger scale, and to increase the user acceptance of a new alternative technology or solution. A demonstration project is a risk mitigation measure related to future investment decisions. Alternative investments may be further research, technology monitoring or to wait until others have made the investment necessary to demonstrate the technology.[39]

(141) As set out in section 3.2 above, the Norwegian authorities submit that Hydro has not considered a counterfactual in the form of an alternative reference investment. The purpose of the notified project is to demonstrate the HAL4e technology in a full-scale production line. This objective cannot be attained by building a conventional production plant based on the existing HAL300 technology.

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[36] *Ibid*., para. 141.

[37] This issue was notably discussed in a video conference on 11 June 2014.

[38] Decision No 248/11/COL, para. 142.

[39] *Ibid.*

(142) As also set out in section 3.2 above, the Norwegian authorities have used an NPV calculation to examine whether the aid has an incentive effect. The NPV calculation determines how much aid is needed in order to trigger an investment. A project is triggered when it reaches an NPV of zero with a reasonable rate of return.

(143) The data submitted by the Norwegian authorities indicate that, without the aid, the demonstration project would have a negative NPV of MNOK […] based on a real rate of return of […]% before tax, which is the normal rate of return applied by Hydro to investments. With the aid, the project will have an NPV of NOK 0 at an internal rate of return before tax of approximately […]%.[40] The Norwegian authorities have explained – as set out in section 3.2.3 above – that Hydro can exceptionally authorise such a low rate of return in case of projects with particular strategic relevance. Furthermore, the estimated rate of return does not exceed the estimated WACC of Hydro.

(144) The Authority considers that the NPV calculation demonstrates that the project is not viable without the aid. In addition, the rate of return is within the scope of what can be considered reasonable, on the basis of the information provided by the Norwegian authorities.

(145) As set out in Decision No 248/11/COL, in case of a "no investment" counterfactual the following further elements need to be assessed in order to determine whether the aid has an incentive effect: (i) whether any relevant EU or national standards will be introduced in the foreseeable future; (ii) whether the investment in the relevant project represents normal market behaviour; (iii) the level of risk connected to the project and whether the investment, without the aid, would generate an appropriate profit; (iv) the project's level of increased environmental protection; and (v) the extent of the production advantages obtained by the aid recipient.[41]

(146) As stated in section 3.2 above, the Norwegian authorities have confirmed that there are no ongoing negotiations at EU or national level to introduce new or higher mandatory standards in respect of which the aid would result in any advantages to Hydro. Furthermore, the Norwegian authorities have explained that the construction of demonstration plants without state support to verify a completely new smelting technology platform does not represent normal market behaviour.[42] This is mainly due to the risks involved and the highly unprofitable nature of the investment. As regards the levels of risk and profitability, as well as the extent of production advantages, Enova's financial analysis of the project using an NPV calculation takes account of all production advantages, as well as the levels of risk and profitability, over the lifetime of the production equipment. These factors therefore do not affect the finding of the NPV calculation that the investment is not viable without the aid. Finally, as regards the likely level of environmental protection resulting from the aid, the Authority notes the estimate of the environmental impact of the HAL4e technology provided by the Norwegian authorities as set out in section 2.6.4 above.

(147) Having assessed these factors, the Authority concludes that Hydro, with the aid, will change its behaviour so that the level of environmental protection will be higher than if the aid had not been granted. Thus, the notified measure fulfils the conditions regarding the incentive effect.

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[40] Event No 732005, page 68.

[41] Decision No 248/11/COL, para. 142.

[42] Event No 732005, page 65.

6.2.4 Proportionality

(148) A state aid measure is proportionate if the measure is designed in such a way that the aid is kept to the minimum necessary.

(149) The Authority notes that Enova carries out a competition for aid under the NTP. The competitive contributes to promoting an efficient use of state resources and limiting the risk of overcompensation. However, given the influence of qualitative elements (e.g. the potential of a new technology to create future energy savings) in the selection process, the existence of a competition for aid does not by itself ensure that the notified measure is proportionate.

(150) The eligible costs calculation presented by the Norwegian authorities (see section 3.3 above) shows that the aid intensity of the notified measure is about 41%. This is below the maximum aid intensity of 50% for large enterprises under the NTP.

(151) As explained in Decision No 248/11/COL, Enova furthermore carries out an NPV calculation to ensure that the aid amount is limited to the amount necessary to trigger the project. When assessing projects with a shorter lifespan than the lifetime of the equipment, Enova bases the NPV calculation on the hypothetical full lifetime of the equipment. The result of the NPV calculation – as described in section 3.2.3 above – demonstrates the extent of the funding gap for the project and that the aid amount does not exceed this funding gap.

(152) Finally, the rules for disbursements of aid under the Energy Fund Scheme, as explained in section 3.3 above, ensure that there is no overcompensation in case the investment costs or the main profitability drivers change between the date of this decision and the implementation of the project.

(153) On the basis of the above, the Authority concludes that the aid measure is proportionate.

6.2.5 Actual distortion of competition and effect on intra-EEA trade

(154) The Authority has examined the potential for distortions of competition and an effect on trade in the light of the foreseeable impact of the aid on competition and trade between undertakings in the relevant markets.

(155) The notified measure is liable to affect two different relevant markets, namely the market for primary aluminium and the market for smelting cell technology.

(156) The market for primary aluminium has regularly been assessed by the Authority as a distinct product market with a global dimension.[43]

(157) The European Commission has found a distinct market for smelting cell technology of a global dimension (excluding China) in its decision-making practice in the field of merger control.[44] It concluded that: *"[...] the product market includes the following package:*

[43] See e.g. Decision No 344/09/COL of 23 July 2009 on the Helguvík Aluminium Smelter; Decision No. 187/05/COL of 20 July 2005 in respect of tax and fee concessions in favour of the aluminium smelter, NORÐURÁL HF. at Grundartangi; Decision No 127/05/COL of 1 June 2005 proposing appropriate measures in respect of tax and fee concessions in favour of the aluminium smelter, NORÐURÁL HF. at Grundartangi; and Decision No 40/03/COL of 14 March 2003 on proposed financing and tax measures concerning the construction of an aluminium plant in the township of Fjarðabyggð.

[44] See e.g. the Commission decisions in Case No COMP/M.3225, *Alcan/Pechiney*, para. 31; and Case No COMP/M.4827, *Rio Tinto/Alcan*, paras 89 and 91.

patents, and know-how (technical information, including the potlines and potline services, operating procedures and choice of materials) and smelter process; engineering package (flow sheets, specifications, drawings and operating procedures); a nonexclusive, non-transferable licence to construct the smelter and operate the technology to produce aluminium. In particular, the product market does not include the provision of equipment used to build or operate the smelter."[45] The Authority has not been presented with any reasons for departing from this market definition.

(158) The Authority notes that, as a general rule, if the aid is proportionate, its negative impact on trade and competition is likely to be limited. As set out above in section 6.2.4, the Authority has concluded that the aid is proportionate. The Authority considers therefore that any negative effects on competition and trade are likely to be limited.

(159) The Authority further notes that the investment in the demonstration project is technologically strategic and may confer a first-mover advantage on Hydro in both the market for primary aluminium and the market for smelting cell technology. However, this sort of first-mover advantage represents an inherent part of funding demonstrations of new technologies.[46] Its effect will moreover be mitigated by the positive spill-over effects of the project. The purpose of the project is to demonstrate the merits of the HAL4e technology platform. The know-how resulting from the project will not only be used as a basis for Hydro to make its future investment decisions, but also to help convince other market players to acquire technology licenses. The results of the demonstration plant as well as the technology itself (through the licensing process) will accordingly be available to all market players, and they will be in a position to deploy the technology in full-scale production plants.

(160) The Authority also notes that primary aluminium is sold on the market based on fixed prices without any form of labelling with regard to environmental matters. The more environmentally friendly production process is therefore unlikely to have an impact on customer demand and general market conditions for Hydro's products.

(161) Furthermore, the Authority notes the arguments of the Norwegian authorities that any such first-mover advantage will be limited in time, given the incentive for competitors to improve their own technologies and the important exit barriers for innovation in the industry.

(162) The Authority does not consider that the aid will keep an inefficient firm afloat, nor that it will have an effect on trade and location. The Norwegian authorities have shown that Hydro is not an inefficient producer, and that the project is not affected by the current overcapacities in the market. Furthermore, the Authority notes that Hydro – as well as any other producer using the new technology – will evaluate the location of future investment projects on the basis of an individual commercial assessment, and not based on the location of the demonstration plant. The Authority also notes in this respect that the part of the investment costs benefitting the potential extension of the demonstration plant (Karmøy Phase II) was deducted from the eligible investment costs.

(163) The Authority further notes that Enova has carried out an open and transparent competitive process to select Hydro as an aid recipient, in line with the requirements of Decision No 248/11/COL. Such a process further reduces the distortions of competition,

[45] *Rio Tinto/Alcan*, para. 89.

[46] See e.g. Decision No 249/11/COL of 18 July 2011 on the aid to Sway Turbine AS, para. 116.

as any undertaking can potentially apply to receive support for eligible projects under the NTP.

(164) Finally, the Authority has also considered the respective market shares of Hydro on the relevant markets as well as the structure of these markets (see section 3.4 above), and concludes that Hydro is unlikely to be able to exercise market power due to the aid measure.

6.2.6 Balancing and conclusion

(165) Based on the detailed assessment set out above, the Authority has balanced the positive and negative effects of the notified measure. The Authority concludes that the distortions resulting from the notified measure do not adversely affect trading conditions to an extent contrary to the common interest.

7 Conclusion

(166) On the basis of the foregoing assessment, the Authority considers the notified aid to Hydro to be compatible with the functioning of the EEA Agreement.

HAS ADOPTED THIS DECISION:

Article 1

The individual aid to Hydro Aluminium AS notified by the Norwegian authorities on 8 December 2014 is compatible with the functioning of the EEA Agreement.

Article 2

The implementation of the notified measure is authorised accordingly.

Article 3

This Decision is addressed to the Kingdom of Norway.

Article 4

Only the English language version of this decision is authentic.

Done at Brussels, 4 February 2015.

For the EFTA Surveillance Authority

Oda Helen Sletnes
President

Frank Büchel
College member