

Case No: 78956
Document No: 793780
Decision No: 124/16/COL

EFTA SURVEILLANCE AUTHORITY DECISION
of 25 May 2016

not to raise objections to individual aid in favour of Alcoa Norway ANS for the
construction of a 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 Article 61(3)(c) and Protocol 26,

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) The Norwegian authorities notified an individual aid measure in favour of Alcoa Norway ANS (hereinafter “Alcoa”) pursuant to Article 1(3) of Part I of Protocol 3 by letter received and registered by the Authority on 8 April 2016.¹

2. Description of the notified measure

2.1. The notified aid measure

- (2) The notification concerns individual state aid in the form of a non-reimbursable grant of NOK 280 448 695 in nominal value (around EUR 29 million) to Alcoa for a full-scale demonstration project in Lista or Mosjøen, Norway (“the notified measure”). The objective of the aid is to demonstrate and verify the novel zero-emission Advanced Smelting Technology (“AST”) for aluminium production.
- (3) The aid will be distributed to Alcoa in the period 2016-2017.

¹ Document No 799775. The letter enclosed a notification form (Document No 799780), an explanatory document (Document No 799781) and 8 annexes (Documents No 799776 to 799779 and 799783 to 799785).

2.2. Enova's New Energy Technology Programme

- (4) The notified measure will be financed from 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 administering several Norwegian support programmes aimed at promoting the use of energy-efficient technologies. One is the New Energy Technology Programme ("NETP"), which assists demonstration projects for innovative technologies in order to foster their market diffusion. By Decision No 248/11/COL,² the Authority declared the Energy Fund scheme, including the NETP, compatible with the EEA Agreement.
- (5) The NETP 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.³ The notified aid exceeds this notification threshold.
- (6) Enova awarded the aid for Alcoa's demonstration project in a decision adopted by the board of directors on 6 May 2015 (Annex 8 to the notification).⁴ The aid is conditional upon the Authority's approval.

2.3. The beneficiary

- (7) The beneficiary, Alcoa, is wholly owned by Alcoa Inc. The latter manufactures and engineers lightweight materials, such as aluminium, around the world and owns two smelters in Norway, in Lista and in Mosjøen.
- (8) The facility in Lista was established in 1970 and was originally owned by Alcoa Inc. (50%) and Elkem AS (50%). In 2009, Alcoa became the sole owner.
- (9) The smelter in Mosjøen started production in 1958. It was then owned by Elektrokjemisk AS (Elkem Aluminium) and AluSwiss. In 1963, Alcoa Inc. became part owner in the venture, taking 50% ownership of the facility. Elkem Aluminium remained the operating partner until 2009, when Alcoa Inc. acquired the remaining ownership shares and consequently established the Alcoa Norway entity, which also comprises the Alcoa Lista smelter.
- (10) The beneficiary does not have any pending recovery order and it is not an undertaking in difficulties; the company has sound financial accounts. Alcoa is a large company.

2.4. The market on which Alcoa is active

- (11) Alcoa produces lightweight materials such as aluminium. The product produced in the demonstration plant will be primary aluminium.

² Decision No 248/11/COL of 18 July 2011 on the Norwegian Energy Fund scheme (OJ C 314, 27.10.2011, p.4). The full text is available at the Authority's website: <http://www.eftasurv.int/media/decisions/248-10-COL.pdf>

³ *Ibid.*, para. 58, cross-referring to point (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).

⁴ Document No 799782.

- (12) Primary aluminium metal from the aluminium production cells is a commodity that is priced based on quotations from the London Metal Exchange (“LME”).
- (13) The aluminium produced by Alcoa enters the total global market for aluminium. The recorded global production in 2014 was 53 127 in thousand metric tons (“kt”).
- (14) Presently, the EEA is a net importer of primary aluminium, with imports covering about 40% of the primary metal demand. The import comes mainly from Russia, the Middle East (UAE, Bahrain and Qatar) and South America (Brazil, Argentina and Venezuela).
- (15) The ten largest producers of primary aluminium in 2015 are listed in Table 1:

Table 1. The ten largest producers of primary aluminium in 2015.⁵

	Production (kt)	Market share (%)
1. Hongqiao Group (China)	5 088	8.8
2. UC Rusal (Russia)	3 692	6.4
3. Chalco (China)	3 256	5.6
4. RTA (Canada)	3 254	5.6
5. Alcoa Inc. (USA)	2 693	5.1
6. Shandong Xinfu (China)	2 716	4.7
7. Emirates Global (UAE)	2 373	4.1
8. CPI (China)	2 204	3.8
9. Hydro (Norway)	1 899	3.3
10. East Hope Group	1 821	3.2

- (16) According to CRU Market Analysis the total demand for aluminium semi-fabricated products (semis) will grow by 4.9% per year from 2013 to 2023, and by 3.6% for primary aluminium during the same period. This means an estimated growth in demand to 61 500 kt by 2017 and further to 76 500 kt by 2023. The figures show that whilst a part of the growth will be covered by an increasing share of re-melted aluminium scrap, there will still be a significant need for new primary aluminium production capacity.
- (17) Due to production in excess of demand, stocks of aluminium have increased from 2008 to 2013 but have decreased steadily since the beginning of 2014. Globally, an estimated 9.8 million tons were stored by September 2015.⁶ This high level of stocks is reflected in the current price. However, prices are expected to increase as stocks diminish.
- (18) According to the Norwegian authorities, due to the demonstration plant’s marginal share of global production, as well as the LME pricing, the effect of the increased production on the global aluminium price will be negligible.

2.5. Current technology and technology diffusion

- (19) The only commercial process today for producing primary aluminium is based on the Hall-Héroult technology. Alternative processes [...] * have been researched, but have so far not been commercially used.

⁵ CRU Q3 2015 Quarterly Review, based on 57,721 kt.

⁶ Alcoa 3rd Quarter 2015 Earnings Conference, October 8, 2015. 57.4 Mt demand @ 62 days of inventory.

* Removed to protect business secrets.

- (20) The Hall-Héroult process is more than 100 years old, and most primary aluminium technology development has been done gradually since its invention.
- (21) 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 players, UC Rusal, Alcoa, Rio Tinto Alcan (“RTA”), Emirates and Hydro, are all conducting in-house technology development programmes.⁷ 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 towards 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.
- (22) A further characteristic of the primary aluminium market is the spreading of technology through mergers and acquisitions⁸ as well as joint ventures (“JV”), where companies cooperate in ownership and operation of plants.
- (23) 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%.
- (24) Companies that do not have their own proprietary smelting cell technology need to buy technology licenses for new plants or new potlines.⁹ A license will always be related to a defined number of cells at a defined potline/plant.

2.6. The demonstration project

- (25) The project refers to a full-scale demonstration project for aluminium production using a new, innovative, green technology. The project will have 2 years of construction and 4 years of operation. Therefore, the Norwegian authorities consider that the lifetime of the project is 6 years.

2.6.1. The AST technology

- (26) The AST is [...] different from the Hall-Héroult process. Most notably, [...].¹⁰ The AST demonstration project has the objective to produce aluminium more competitively by reducing the production costs and the negative environmental effects.
- (27) The new technology has been tested under R&D&I programs but not at a commercial scale.

⁷ These companies accounted for 25% of the global aluminium production in 2015.

⁸ 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.

⁹ Examples of companies purchasing technology are Alcoa, BHP Billiton, Nordural, AMAG, Trimet, Aluar, Aluminium Bahrain, Sohar Aluminium, Vedanta, Hindalco, Nalco, Egyptalum, Xinha Aluminium & Power, Hongqiao Group, and China Power Investment.

¹⁰ [...]

- (28) Alcoa has developed a technology commercialisation strategy within a stage gate framework for program execution. The strategy for the AST program details a two-phased approach for commercial demonstration to minimise technical and financial risks inherent in such scale-up endeavours. However, only Phase I is supported by state aid, i.e. the notified aid measure only refers to Phase I of the project.
- (29) Phase I will demonstrate the successful operation of the Alcoa AST for five full-scale pots at 240 kA. A five-pot installation is the minimum accepted configuration required to adequately demonstrate the magnetic impacts of cells on adjacent cells. The minimum has been chosen at this point to reduce the investment required for this phase. Furthermore, 35% of the current global smelting plants are using ≤ 240 kA potlines. Therefore, there is a market for licensees to invest in AST ≤ 240 kA to replace the current Hall-Héroult ≤ 240 kA potlines.¹¹
- (30) The Norwegian authorities have explained that commercial green field operation of AST is planned at [...] kA. Before passing to commercial operation at high voltage, Alcoa foresees a Phase II of the project. In Phase II, the AST will be tested at a higher amperage (minimum [...] kA).
- (31) Alcoa sees Norway as an ideal location to further develop and demonstrate the AST because of the availability of a technically competent workforce, which has the skills required for the operations, and the availability of clean hydroelectric power to further highlight the environmental benefits of the AST.
- (32) Alcoa has two operational sites in Norway, in Lista and in Mosjøen. Alcoa's current proposal is to establish the AST demonstration project in Lista. However, a strategic evaluation is ongoing and a final decision between Lista and Mosjøen will be made at a later stage, but prior to initiating the detailed engineering. The investment costs and operational costs are independent of site selection since the project is based on a brownfield demonstration facility in Norway.
- (33) The novel design of the cell will yield at least a [...] % increase in productivity based on the footprint of the cell and, depending on the operating point chosen, could yield as much as a [...] % increase in productivity. The capital cost per ton will therefore be [...] lower than for the conventional Hall-Héroult technology. These productivity benefits will be achieved at an improved energy efficiency and reduced emissions.
- (34) The combination of [...] improved productivity and improved energy efficiency will make the AST attractive to the global smelting industry. Once the technology is demonstrated, there will be a financial incentive, a regulatory “push”, and a social “pull” to drive implementation of the technology.

2.6.2. *Expected environmental impact of the demonstration project*

- (35) Alcoa's AST will produce aluminium through an energy efficient novel smelting process with high cell productivity and a low environmental footprint.
- (36) **Table 2** shows a comparison of key performance indicators (“KPIs”) of the AST at the proposed demonstration program phases against the Alcoa Lista site, typical Hall-Héroult

¹¹ According to the Norwegian authorities “[t]he EEA addressable market with AST 240 kA could be up to 70% of the installed production capacity”.

technology operating at 240 kA, and the current typical performance of an industry benchmark licensed technology: [...].

Table 2. Summary Comparison of Smelting Key Performance Indicators

Smelting KPI	Units	Reference/Basis			Advanced Smelting Technology			
		[...]	[...]	[...]	[...]	Phase I [...]	Phase II	Commercial
Cell current	kA	[...]	[...]	[...]	[...]	240	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]			
[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]	[...]
[...]	[...]	[...]	[...]	[...]	[...]			
[...]	[...]	[...]	[...]	[...]	[...]			
[...]	[...]	[...]	[...]	[...]	[...]			
[...]	[...]	[...]			[...]			

Notes:

[...]
[...]
[...]

- (37) With a slightly smaller ([...])% pot footprint (represented by the reduction of GHG direct emissions) versus a Lista pot, the AST Phase I facility is expected to operate [...])% more efficiently (lower energy consumption) and with [...])% higher productivity (per footprint). Compared to the Lista facility, the AST Phase II and Commercial phases are expected to operate [...])% and [...])% more efficiently, and with [...])% and [...])% higher productivity, respectively.

2.6.3. Costs and benefits of the demonstration plant

- (38) The relevant exchange rate has fluctuated significantly. Alcoa has based its calculations on forward curves from Reuters for NOK/USD that start at 6.73 NOK/USD in 2016 and ends at 6.64 NOK/USD in 2021. The NOK/USD exchange rate is of particular relevance to the project as prices for primary aluminium are quoted in USD.
- (39) The **accepted total investment costs** for the demonstration project are NOK [...] in nominal value (NOK [...] million in real terms).
- (40) **Operating costs** comprise several elements: cost of raw materials, energy prices, maintenance costs, etc. There is a steady relation between consumption of raw material from the different factors and the final product. In the calculations, the prices for raw materials are based on the prices at the application date and a minor increase over the lifetime of the project. The energy prices are based on long-term contracts. The electricity price is estimated to vary from [...] to [...] USD/MWh during the operating period.
- (41) In a long-term perspective, Alcoa estimates that operating costs will be [...])% lower than for today's Hall-Héroult technology. The operating costs for four years are estimated at NOK [...] million in nominal value and NOK [...] million in real terms.

- (42) **Operating benefits** of the project come from the production of primary aluminium. The income is dependent on the production volume and sales price. The assumptions used in the calculations are based on information available at the application date. Alcoa has estimated that prices will increase from [...] USD/ton in 2014 to [...] USD/ton in 2021 (nominal values). When the facility is in normal operation, total yearly income is expected to be around NOK [...] million (2014 values). This estimation confirms a positive cash flow in the project.
- (43) The operating benefits are estimated at NOK [...] million for four years in nominal value and NOK [...] million in real terms.

2.6.4. Extra cost calculation

- (44) Points 117 and 118 of Decision 248/11/COL establish that the eligible costs under the NETP are determined to be the extra investment costs established by comparing the aided investment with the counterfactual situation in the absence of state aid.
- (45) The Norwegian authorities consider that the counterfactual scenario is no investment.¹² Therefore the eligible costs of the demonstration project are calculated on the basis of the entire investment costs of the project, which amount to NOK [...] in nominal value (NOK [...] million in real terms). Once the operating costs and benefits have been taken into account, the eligible extra costs are NOK [...] million in nominal value and NOK [...] million in real terms. See **Table 3** below.

Table 3. Eligible extra costs calculation

	Demonstration plant (MNOK). Nominal value	Counterfactual MNOK
Investment costs	[...]	0
Operating costs (four years)	+ [...]	0
Operating benefits (four years)	- [...]	0
Eligible extra costs	[...]	

- (46) The proposed aid amount of NOK 280 448 695 in nominal value (NOK 261.3 million in real terms) results in an aid intensity of [$<45\%$] of the eligible extra costs, as described in **Table 4**.

Table 4. Aid calculations

	Aid in Nominal value MNOK
Investment costs	[...]
Eligible costs	[...]
Aid intensity according to Decision No 248/11/COL	50%

¹² The NETP 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 (Decision No 248/11/COL, para. 142).

Maximum aid amount according to Decision No 248/11/COL	[...]
Aid to Alcoa	280.4
Aid intensity	[<45%]%

(47) Thus, the aid intensity is below the maximum aid intensity under the NETP.

3. Comments by the Norwegian authorities

3.1. Legal framework for the assessment of the measure

- (48) According to the Norwegian authorities, the notified measure should be assessed in line with Decision No 248/11/COL as aid granted under the NETP 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.¹³
- (49) Since the measure has an environmental objective, the Norwegian authorities use the guidelines for environmental protection adopted in 2010 (hereinafter “the EAG”¹⁴) and the guidelines on state aid for environmental protection and energy 2014–2020 (hereinafter “the EEAG”¹⁵) as general insights into relevant principles for their compatibility assessment.
- (50) In their assessment, the Norwegian authorities have firstly assessed whether the project is eligible for aid under the NETP. Secondly, they have appraised the compatibility of the measure in line with the conditions laid down in Decision No 248/11/COL. In that regard, Norway has verified that: (i) the aid is aimed at a well-defined objective of common interest, (ii) there is a need for State intervention, (iii) the aid measure is an appropriate instrument to achieve the foreseen objective, (iv) there is an incentive effect, (v) the aid measure is proportionate, and (vi) the distortions of competition and effects on trade are limited.
- (51) The Norwegian authorities have also confirmed that the transparency obligation will be complied with for all aid granted from July 2016, in line with the transparency requirements laid down in Section 3.2.7 of the EEAG.

3.2. Eligibility of the project under the NETP

- (52) The Norwegian authorities explain that all applications under the NETP are subject to the following procedure.
- (53) 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.
- (54) 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

¹³ With reference to Commission Decision N 521/2008, *Alpha Ventus*, the Authority concluded that the programme fell within a gap between the scope of the EAG and the R&D&I Guidelines. See Decision No 248/11/COL, paras. 132-137. State aid guidelines for environmental protection (“EAG”), OJ L 144, 10.6.2010, p. 1 and EEA Supplement No 29, 10.6.2010, p. 1. Decision No 248/11/COL refers to the former R&D&I state aid guidelines (“R&D&I Guidelines”), OJ L 305, 19.11.09, p.1 and EEA Supplement No 60, 19.11.09.

¹⁴ State aid guidelines for environmental protection (“EAG”). See footnote 13.

¹⁵ Guidelines on state aid for environmental protection and energy 2014-2020 (“EEAG”). OJ L 131, 28.5.2015, p. 1 and EEA supplement to the OJ No 30, 28.5.2015, p.1.

costs. Projects with an estimated return on capital which exceeds what is considered normal for the relevant industry are not eligible for aid.

- (55) Thirdly, Enova compares the aid required to ensure a normal return on capital with the applicable maximum aid intensities.
- (56) 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 the assessment might in the end not be awarded aid due to budgetary limits and competition from other, more efficient projects.
- (57) 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 NETP. The fulfilment of these criteria are supervised by Enova. The criteria are:

3.2.1. Limited market dissemination and no prior full-scale testing¹⁶

- (58) Alcoa has developed the AST technology for decades. However, the demonstration project proposed by Alcoa is the first implementation at a commercial demonstration scale of the AST. The technology has not yet been tested in a full-scale demonstration plant, and therefore not used in production. The technology thus has not yet been introduced into the market.

3.2.2. End-user participation¹⁷

- (59) Alcoa intends to put the AST technology to commercial use in its aluminium production if the demonstration plant proves to be successful and if the market conditions allow capacity expansions. Consequently, the project involves an end-user participation in line with Decision No 248/11/COL.

3.2.3. Full scale testing under typical operating conditions¹⁸

- (60) The demonstration plant involves five full-scale versions of the AST pots, which is seen as the minimum number acceptable in order to create a sufficient statistical basis for the verification of the AST technology under typical operating conditions, and is optimal from an operational cost perspective. The technology will be tested under the same industrial operating conditions as a possible future full scale plant at one of Alcoa's metal plants in Norway. Furthermore, the Norwegian authorities submit that 240 kA cells plants are frequently used in the market today (around 35% of global production is produced in smelters running at 240 kA or less).

3.2.4. Minimum two-year operational period¹⁹

- (61) The Phase I demonstration project is expected to run from 2018 until the end of 2021 (after which it may be followed by a Phase II). The requirement for a minimum two-year operational period is thus fulfilled.

¹⁶ Decision No 248/11/COL, para. 111.

¹⁷ *Ibid.*, para. 112.

¹⁸ *Ibid.*, paras. 113 and 114.

¹⁹ *Ibid.*, para. 115.

3.2.5. Measurable energy result and positive cash flow²⁰

- (62) If successful, the project allows for a reduction of energy consumption by 9.7 GWh per year. In addition, the project will also result in a reduction of greenhouse gas (“GHG”) emissions by [...] kilotons per year.
- (63) According to Alcoa’s projections, the demonstration plant is expected to generate a positive cash flow in its operating phase, i.e. the revenue generated by the production of the plant is expected to exceed operating costs.
- (64) The Norwegian authorities therefore consider that the requirement for a measurable energy result and a positive cash flow during the operating phase as set out in Decision No 248/11/COL is met.

3.2.6. Sufficient market diffusion of the new technology²¹

- (65) It follows from Decision No 248/11/COL that the long-term aim of the NETP is to contribute to environmental protection by promoting the diffusion of new and more energy efficient technologies. 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 NETP.
- (66) Alcoa has committed to ensure market diffusion of the AST under certain conditions. Annex 6 to the notification²² includes a Licensing Commitment memo signed by Alcoa according to which licenses will be granted to other aluminium smelting companies for investments in plants located within the EEA under the following conditions: (i) the demonstration of the AST in the Phase I project is successful, (ii) the license is limited to the technology scope of the demonstration project, (iii) the delivery of the technology will not exceed 10 years after the successful demonstration of the AST in the Phase I project. Outside the EEA, licenses will also be available, but with the following exclusions: (i) geographic regions where export controls are prohibitive, (ii) geographic regions where political or commercial investment risk are high, (iii) geographic regions where intellectual property risk are high.
- (67) Alcoa will also invite potential customers to the demonstration plant and will provide empirical evidence of the performance, stability and operability of the technology, both on-site and in the relevant industrial fora.
- (68) The Norwegian authorities consider that the requirement for market diffusion as set out in Decision No 248/11/COL is fulfilled.

3.3. Contribution to an objective of common interest

- (69) The Norwegian authorities argue that the project responds to an objective of common interest, namely environmental protection. The Norwegian authorities also recall that promoting research and development and innovation is in itself an important EEA objective laid down in Article 1(2)(f) and 78 of the EEA Agreement.

²⁰ *Ibid.*, para. 116.

²¹ *Ibid.*, para. 11.

²² Document No 799784.

3.4. The need for the State intervention

- (70) The Norwegian authorities recall that the most common market failure in the field of environmental protection is related to negative externalities. Undertakings acting on their own have no interest in taking into account the negative externalities arising from production.
- (71) Without the aid, Alcoa will have no incentive to increase environmental protection in its production process. As a consequence, the state aid intends to correct a market failure that leads to a sub-optimal level of environmental protection.

3.5. Aid as an appropriate instrument

- (72) The Norwegian authorities argue that state aid represents an appropriate instrument to achieve the environmental objective of the aid.
- (73) The Norwegian legislation does not impose upon the industry to construct plants using new innovative technologies (such as the AST) instead of more conventional production facilities/state of the art technologies (such as older technology based on the Hall-Hérault process). Provided that they respect the standards applicable (notably as regards air pollution or building codes), conventional production facilities/buildings using conventional technologies known to the market may be authorised and built.²³
- (74) According to the Norwegian authorities, less distortive aid instruments, e.g. a loan or a guarantee, would not be suitable to trigger investment in the AST. They submit that the investment in the AST demonstration plant is highly unprofitable. The cash flow is so low that a loan or guarantee would in any case have to imply a substantial element of subsidy. Furthermore, the project contains technological risks and uncertainties. The Norwegian authorities conclude that aid instruments other than a grant would have a limited impact on the net present value (“NPV”) calculation and would therefore be less suitable to address the funding gap compared to an aid grant.²⁴

3.6. Incentive effect of the state aid

- (75) As already stated, the NETP 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.
- (76) Alcoa has not considered a counterfactual in the form of an alternative reference investment. The purpose of the AST demonstration plant project is to demonstrate the AST in a fully operational production line. This will not be possible at a conventional production plant. The increased production that may occur as a result of introducing this technology will be a consequence of the project, but not the purpose of the investment.
- (77) 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

²³ See para. (135) of Decision No 37/15/COL 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, para. 141 (OJ C 193, 11.6.2015, p. 6), (“*Hydro decision*”).

²⁴ *Ibid.* para. (136).

foreseeable future; (ii) whether the investment in the relevant project represents normal market behaviour; (iii) the level of risk connected to the project; (iv) whether the investment, without the aid, would generate an appropriate profit; (v) the project's level of increased environmental protection; and (vi) the extent of the production advantages obtained by the aid recipient.²⁵

(i) Relevant EU or national standards

- (78) The Norwegian authorities submit that to their knowledge, there are no on-going negotiations on EU or national level to introduce new or higher mandatory standards which the investment aid in favour of Alcoa would help the company to achieve faster than its competitors or gain any other advantages from.

(ii) Normal market behaviour

- (79) Innovation in the aluminium market is frequent but at the time being, innovation is related to improvements of the Hall-Héroult technology. The investment in a commercial-scale demonstration plant in order to verify a new energy efficient, highly productive and zero-emission production technology is not considered normal market behaviour. [...] The Norwegian authorities submit that as such, the AST is ground-breaking²⁶ and may push the industry towards an improved environmental record, especially with regards to the elimination of direct GHG emissions.
- (80) Primary aluminium is sold on the market without any form of environmental labelling. In light of this, a more environmentally friendly production process is unlikely to have an impact on customer demand and general market conditions for Alcoa's products. Product image considerations are therefore unlikely to incentivise Alcoa to invest in environmental protection.

(iii) Level of risk and the extent of the production advantages

- (81) The aid concerns an investment in the verification of a new aluminium production technology that aims to eliminate GHG emissions and save energy. If verified, the AST will be more cost-efficient than conventional smelting technology. Thus, the aid will lead to production advantages. However, the Norwegian authorities argue that the project does not imply production advantages that could negatively affect the incentive effect.
- (82) The Norwegian authorities submit that the aid is granted net of any operating benefits. The NPV of the demonstration plant, based on the duration of the Phase I project, is negative even with the aid. In addition, Enova has carried out a sensitivity analysis which shows that overcompensation will not be possible during the life time of the demonstration plant. The demonstration plant gives an expected NPV of NOK [<0] million, which is NOK 30 million lower than with static NPV analysis. Furthermore, there is less than 1% probability for the demonstration plant's NPV being positive. Because of the risk profile of the investment, the project will not take place without the aid.

(iv) Profitability of the project

²⁵ Decision No 248/11/COL, para. 142.

²⁶ The Norwegian authorities have provided, as Annex 2 (Document No 799778) to the notification, a report from [...] confirming that the project is highly innovative and ground breaking. The same authorities have also provided with comments from international experts confirming the innovative value of the project. Annex 3, report from [...] (Document No 799777) and Annex 4 [...] (Document No 799776).

- (83) According to the Norwegian authorities, due to the risk profile and the unprofitability of the investment, Alcoa will not undertake the investment without aid.
- (84) The Norwegian authorities refer to the EEAG²⁷ as well as the Hydro and Sway²⁸ cases, in which the Authority stated that the unprofitability of the project can serve to demonstrate the incentive effect of the aid.
- (85) The Norwegian authorities have submitted a NPV calculation of the AST demonstration plant on the basis of six years of construction and operation (2016–2021). This represents the lifetime of the investment. The NPV analysis shows that Alcoa’s demonstration plant will be unprofitable, even with the aid. Hence, the project suffers from a funding gap.
- (86) Alcoa normally requires a rate of return (“RR”) after tax of [...] % for investments. The RR requirement is composed of a WACC base rate of [...] % (October 2013 to September 2015), a completion risk of [...] % and risk premiums for the country and industry which totals [...] %. In real terms, the required RR is [...] %. The Norwegian authorities consider the RR required by Alcoa for the demonstration plant project to be reasonable and not exceeding what is considered normally required by the beneficiary.²⁹
- (87) The financial calculations show that with a proposed aid of NOK 280 448 695 the project will have a NPV of NOK [<0] million (based on a RR of [...] % and six-year lifetime for the investment). Without aid, the NPV will be NOK [<0] million. Alcoa is normally not comfortable with negative NPV projects, but is willing to accept it as long as the project has a sufficient strategic relevance for the company.³⁰
- (88) The Norwegian authorities have calculated the NPV of the AST demonstration plant on the basis of a total of six years of construction and operation (2016–2021), including two years of construction and four years of operation. [...] the demonstration purpose of the cells will have fulfilled after the four-year operational period, hence the reinvestments and further operation of the cells have not been included in the investment analysis.
- (89) The Norwegian authorities have nevertheless provided the Authority with data to demonstrate that even when taking into account a longer lifetime of the project, the NPV remains negative and therefore the project suffers from a funding gap in all scenarios and in line with point (57) of the EEAG.
- (90) According to the Norwegian authorities, if the lifetime of the project were not six years but 20, 30 or 50 years, with or without any reinvestment, the NPV remains negative as illustrated in **Table 5** below.

Table 5. NPV with different economic life with support from Enova. Reinvestments in the years 2022, 2032, 2042, 2025 and 2062

Economic life	0 MNOK	10 MNOK	50 MNOK
6 yr	[<0]	[<0]	[<0]

²⁷ See point (57) of the EEAG.

²⁸ Decision No 249/11/COL of 18 July 2011 on the aid to Sway Turbine AS (OJ C 314, 27.10.2011, p. 3).

²⁹ See para. (157) of Decision 248/11/COL.

³⁰ The demonstration of the AST will allow Alcoa to produce primary aluminium with lower energy consumption and a lower environmental footprint. It will also allow the company to enter the aluminium smelting technology market.

20 yr	[<0]	[<0]	[<0]
30 yr	[<0]	[<0]	[<0]
50 yr	[<0]	[<0]	[<0]

(v) *Level of environmental protection*

- (91) The notified project will increase the level of environmental protection as compared to the counterfactual scenario. The Alcoa demonstration plant is expected to generate annual energy savings of 9.7 GWh per year compared to business as usual (traditional Hall-Héroult technology). Moreover, GHG-emissions will be reduced to zero, resulting in a reduction of climate gas emissions compared to conventional production of [...] kt CO₂ equivalent/year. Further environmental benefits will result from the possible Phase II demonstration plant, as well as possible future full scale roll-outs and the sale of licenses.

(vi) *The extent of the production advantages*

- (92) The new technology will make it possible to increase the production for Alcoa, but to a very limited extent (only [<5 000] tonnes/year) that will not have any significant influence on the world market for primary aluminium. The mere scale of the project will naturally limit the production levels. There is also a possibility that the production will not increase by as much as expected. If this happens, the NPV will be reduced further. Consequently, the Norwegian authorities submit that the incentive effect is not lower due to production advantages.³¹

3.7. Proportionality of the state aid

3.7.1. *The aid is limited to the minimum necessary*

- (93) The Norwegian authorities acknowledge that according to points (78) and (79) of the EEAG, for individual aid, compliance with the maximum aid intensities is not sufficient to ensure proportionality. As a general rule, individually notifiable aid will be considered to be limited to the minimum if the aid amount corresponds to the net extra costs of the aided investment, compared to the counterfactual scenario in the absence of aid.
- (94) The calculation of eligible costs of the project at hand is based on Section II.7 of Decision 248/11/COL, as well as point (68) of the EEAG, i.e. they correspond to the extra costs necessary to meet the environmental objectives.³² As the NPV analysis demonstrates, operational benefits have been subtracted from the additional investment costs. The extra costs as calculated for Alcoa's project are thus net of all operational benefits.
- (95) The Norwegian authorities have provided a NPV calculation to demonstrate that the aid does not exceed the project's lack of profitability, based on a rate of return significantly below what is normally required for investments by Alcoa. Even with the aid, and including six years of operation with a positive cash flow, the project will never reach a positive NPV. The same conclusion applies if the lifetime of the project were considered to be longer. In light of this, the Norwegian authorities submit that the aid amount does not exceed the expected lack of profitability (including a normal rate of return) over the time horizon by which the investment is fully depreciated.

³¹ See also paragraphs (33) and (64) of the *Salzgitter* case (Commission decision of 14 April 2010. State aid case N 451/2009 – Germany Energy saving by direct strip casting technology for light steels – aid to Salzgitter Flachstahl GmbH. (OJ C 154, 12.6.2010, p. 1).

³² This concept implies that, in order to establish how much aid can be granted, all the economic benefits accrued by the investment have been subtracted from the additional investment costs.

- (96) When applying the NPV method, due account has been taken of the individual risk involved in the demonstration project when setting the rate of return. The method for arriving at the correct discount rates is set out based on best practice financial methodologies, i.e. CAPM (capital assets pricing model) and WACC (weighted average cost of capital). Enova has made its own calculations of Alcoa's required RR, supporting Alcoa's own analysis.
- (97) The start-up investment of the demonstration project is high with limited revenues from the increased production during the years of test-operation of the demonstration plant compared to the high specific investment cost per ton.
- (98) Finally, the Norwegian authorities highlight that Enova's competitive selection process among eligible investment projects leads to the selection of beneficiaries that can address the environmental objective using the least amount of aid or in the most cost-effective way. The selection process as described above (paragraphs (52) to (56)) is conducted in a non-discriminatory, transparent and open manner without excluding any undertakings that may compete with projects addressing the same environmental objective falling within the ambit of the respective aid program.
- (99) Under the programme for NETP, Enova gives priority to projects which could lead to energy change in the long term, and where the demonstration result is fit to enhance the competence and reduce the barriers for new installations. In sum, the level of subsidy is determined by a technical and financial evaluation of each project. Priority is given to those projects where the technology being tested has the potential of saving or producing the highest amount of kWh per subsidised NOK. This leads to a competition between projects for the receipt of public funds with the aim being to grant aid to the potentially most efficient projects.
- (100) The AST project has a significant potential for triggering energy saving and GHG emission reductions. This indicates a substantial contribution to strengthening the energy change in the long term. In light of Alcoa's market diffusion plan, Enova has furthermore assessed the project as fit to enhance competence and reduce barriers for new installations.

3.7.2. Aid intensity

- (101) The aid amount of NOK 280 448 695 in nominal value is equivalent to an aid intensity of [$<45\%$], which is below the relevant maximum aid intensity of 50% as prescribed by the NETP. The Norwegian authorities consider that reducing the aid intensity contributes to ensuring the proportionality of the aid.

3.7.3. Adjustment of the aid amount

- (102) The Norwegian authorities note that Alcoa is not automatically entitled to the full aid amount. The amount of NOK 280.5 million (nominal value) effectively represents the maximum aid amount. In accordance with the rules for disbursements of aid under the Energy Fund Scheme, as explained in chapter I.7 of Decision 248/11/COL, 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, Alcoa is not free to redistribute costs between budget posts. Changes are subject to Enova's approval. The adjustment of the aid is facilitated by the fact that Enova withholds 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.

(103) Furthermore, the assessment of profitability and appropriate aid level is based on available data/estimates updated at the time of Enova's board decision to grant the aid to Alcoa, in May 2015. The basis for the estimates could change further before Alcoa takes the decision to initiate the project, which will happen when the Authority has approved the aid from Enova. In case such changes result in the NPV calculation showing a positive result, the aid amount will be reduced.

3.8. Limited distortion of competition and trade

3.8.1. The relevant markets

(104) Alcoa is mainly a producer of primary aluminium. However, in the case at hand, the company will also licence out the AST, if verified, to third parties. Hence, the notified measure is liable to affect two different relevant markets, namely the market for primary aluminium and the market for smelting cell technology.

3.8.2. The lack of distortive effects

(105) The Norwegian authorities note that *“if the aid is proportional, notably if the calculation of the extra investment or operating costs has taken into account all advantages to the undertaking; the negative impact of the aid is likely to be limited.”*³³

(106) The extra cost approach is based on (1) a credible counterfactual (no investment) and (2) the investment aid is granted net of any operating benefits. Moreover, the aid intensity in the demonstration plant project is [<45]%, which is below the applicable maximum aid intensity of 50%. Enova has further submitted a NPV analysis showing that the project will be unprofitable even with the aid. Consequently, the Norwegian authorities consider that the effect on competition is limited and outweighed by the positive effects on the environment.

(107) Primary aluminium is a globally traded commodity, the price of which is based on international quotations. The demonstration project will produce an insignificant amount of aluminium that cannot be expected to have any impact on price.

(108) Furthermore, the AST will not result in a new or higher quality product.³⁴ Moreover, as explained above, Alcoa is not likely to benefit from tangible advantages in terms of an improved product image, because aluminium is sold in the market without any form of environmental labelling.

(109) Alcoa has been chosen as eligible in a non-discriminatory, open and transparent selection process, without excluding any undertakings that may compete with projects addressing the same environmental objective falling within the ambit of the respective aid programme.³⁵

(110) Furthermore, the sales revenues are based on estimated market prices and volumes. They are taken into account and subtracted in the NPV analysis, and thus not eligible for aid.

(111) As the AST aims at reducing energy consumption, it is furthermore worth noting that production advantages are to a certain degree inherent in energy efficiency measures. In

³³ Points (176) of the EAG and (93) of the EEAG.

³⁴ See point (95)(b) of the EEAG.

³⁵ As emphasised at point (94) of the EEAG.

addition, the AST eliminates direct GHG emissions. The market diffusion of the technology will ensure that the demonstration project will contribute to making the economy greener.

3.8.3. *Dynamic incentives/crowding out*

- (112) The Norwegian authorities acknowledge that the investment undertaken by Alcoa is innovative and as such technologically strategic. Thus, if verified, the new technology may possibly provide Alcoa with a first mover advantage.
- (113) After the successful demonstration, Alcoa will license the AST to other companies in the aluminium smelting industry throughout the EEA and worldwide with the limitations described in paragraphs (66) and (67) above and detailed in Annex 6 to the notification.
- (114) The Norwegian authorities consider that the testing and possible market introduction of the AST will be a driver towards further innovation and development amongst other market players that develop production technology for proprietary use and/or licencing.
- (115) Furthermore, as the aided project concerns an innovation activity, the existence of exit barriers in the relevant market is of particular relevance.³⁶ The barriers to exit from the primary aluminium and smelter cell technology markets are very high. Development of aluminium production methods is capital intensive, requiring high upfront investments into technology development and highly specialised engineering plants and machinery, as well as specialised engineering know-how that cannot easily be applied to other products or sold to other industries.
- (116) Alcoa's biggest competitors are all conducting long-term in-house development programs. These require considerable innovation organisations and investment costs. Proprietary technology development is considered important in order not to become a vulnerable market player. The aid is therefore unlikely to lead to a reduction in R&D&I spending by competitors.

3.8.4. *Maintaining inefficient firms afloat*

- (117) The Norwegian authorities believe that Alcoa is an efficient undertaking with sound financial accounts. Consequently, the Norwegian authorities are of the opinion that the aid granted is not used to maintain an inefficient firm afloat.

3.8.5. *Market power/exclusionary behaviour*

- (118) The Norwegian authorities do not consider that the aid will create or enhance market power, neither in the primary aluminium market nor in the smelter cell technology market. Consequently, neither the market structure as such nor Alcoa's behaviour will be altered as an effect of the aid.
- (119) Concerning the smelter cell technology market, there are only two companies which have the supply of aluminium production technology as part of their business strategy today; RTA and Chinalco. RTA is the main technology provider in the world excluding China, and Chinalco the main provider in China. Both have market shares of more than 80% of the open market in their respective regions.³⁷

³⁶ See points (86) and (87) of the EEAG, as well as para. (161) of the *Hydro* case.

³⁷ According to information submitted by Hydro in the framework of the *Hydro* case.

- (120) Alcoa has neither supplied technology licences for full pot lines to independent third parties nor to JVs during the last ten years. If the demonstration project is successful, Alcoa has committed to licensing out the AST.
- (121) Hence, the aid is not likely to prevent competitors' expansion or new entry on the smelter cell technology market since the beneficiary is not yet present on the market.
- (122) Concerning the market for primary aluminium, the aid amount is fairly limited as compared to Alcoa's aluminium production and global market demand. The demonstration project would involve the production of [$<5\ 000$] tons of aluminium, compared to Alcoa's 2014 global primary aluminium production of approximately 3 125 kt. It will make up merely 0.0[...]% of the forecasted global demand in 2017.³⁸ Even if there is a certain degree of overcapacity in the primary aluminium market, demand is expected to grow by 3.6% per year from 2013 to 2023, which vastly exceeds the expected increase in Alcoa's production due to the demonstration plant.
- (123) Furthermore, the aid amount of NOK 280.5 million (in 2014 values) is low compared to the global primary aluminium market turnover of NOK 630 billion in 2013. *Prima facie*, the demonstration plant is therefore not likely to dissuade any aluminium producers to invest in innovation.³⁹ In addition, the primary aluminium market is forecasted to grow, driving up the aluminium price and production capacity.
- (124) The Norwegian authorities conclude that the aid will not have as an effect that the beneficiary can strengthen or maintain market power in the market.

3.8.6. Effects on trade and location

- (125) If the AST is sufficiently verified at the demonstration plant it will, in case of sufficiently favourable market conditions, be used for all new Alcoa projects. Regarding expansions in Norway, it is likely that a Phase II demonstration plant will also be located at Lista or Mosjøen (but not as a physical expansion of the Phase I demonstration plant). However, the choice of location will be based on a total evaluation of cost, conditions and market possibilities, which historically has shown to vary significantly over time, especially with regard to power prices and currency rates.
- (126) Moreover, the location of the demonstration plant will not result in the Lista or Mosjøen area benefiting from more favourable production conditions in general, neither in terms of comparatively lower production costs nor higher production standards. The aid is only granted to one beneficiary. As explained, primary aluminium is sold on a global market and is priced based on quotations from the LME. Hence, the Norwegian authorities argue that it is unlikely that the aid will attract more investments in the region where the demonstration plant is located. Therefore, the aid will not have a significant effect on trade and location.⁴⁰

3.9. Cumulation

³⁸ 62.3 megatonnes in 2017, <http://www.statista.com/statistics/241004/base-metal-production-by-type/>

³⁹ For a similar line of reasoning see para. (130) – (131) of the *Rekkof* case (Commission decision of 17.12.2010, State aid N 144/2010. The Netherlands. “Rekkof”).

⁴⁰ See point (84), (88), (96)(d) and (98) of the EEAG, as well as Decisions 491/10/COL on the aid to Norsk Miljø Energi AS for the Lista wind park, p. 14 and Decision 110/11/COL on the aid to Midtfjellet Vindkraft AS for the Midtfjellet wind park pp. 15–16.

(127) Alcoa has previously received aid from Enova to develop energy efficient production, which does not overlap with the aid for the demonstration plant. The Norwegian authorities have confirmed that Alcoa has not received other aid for this project, neither from Enova nor from other public authorities. It has also been confirmed that Alcoa has not received aid from Norway for earlier stages of the technological development of the AST.

II. ASSESSMENT

1. The presence of state aid

- (128) Article 61(1) of the EEA Agreement states that a measure constitutes state aid within the meaning of Article 61(1) of the EEA Agreement if the following conditions are cumulatively fulfilled: the measure: (i) is granted by the State or through state resources; (ii) confers an economic advantage on the beneficiary; (iii) is selective; and (iv) is liable to distort competition and to affect trade between Contracting Parties.
- (129) In Decision No 248/11/COL approving the Energy Fund (including the NETP), 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.⁴¹ There is nothing in the current notification to alter that conclusion.
- (130) Alcoa 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.
- (131) An individual financial grant will be awarded to Alcoa, 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 selective.
- (132) Alcoa produces lightweight materials such as aluminium. The product produced in the demonstration plant will be primary aluminium. All those products are subject to competition and trade within the EEA. The economic advantage conferred on Alcoa by the notified measure is therefore liable to distort competition and affect trade between the Contracting Parties to the EEA Agreement.
- (133) For these reasons, the Authority concludes that the notified measure constitutes state aid within the meaning of Article 61(1) of the EEA Agreement.

2. Procedural requirements

- (134) 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*”.
- (135) The notified measure is based on the NETP 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.⁴²
- (136) The Authority notes that under the Energy Fund, the award of aid above this threshold is conditional upon the Authority’s approval.⁴³ Accordingly, the Norwegian authorities have not yet implemented the individual aid measure in favour of Alcoa. Furthermore, by submitting the notification received and registered by the Authority on 8 April 2016, the Norwegian authorities have complied with the notification requirement.

⁴¹ Decision No 248/11/COL, para. 54.

⁴² *Ibid.*, para. 58, cross-referring to point (160) EAG.

⁴³ *Ibid.*, para. 57.

(137) The Authority therefore concludes 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.

3. Compatibility of the state aid

3.1. Legal framework

(138) The Norwegian authorities have conducted their assessment to grant aid to Alcoa according to the procedures approved by the Authority for the NETP in its Decision No 248/11/COL (see paragraph (48) above). For the reasons provided by the Norwegian authorities (see paragraphs (52) to (68)), the Authority finds that the notified aid is eligible for aid under the NETP. The Authority refers, in particular, to the license commitment from Alcoa. The Authority considers that its terms and limitations are able to ensure the market diffusion of the supported AST technology within the EEA and worldwide.

(139) The NETP was assessed directly on the basis of Article 61(3)(c) of the EEA Agreement.⁴⁴ The Authority considers that this is the correct legal framework for the compatibility assessment of the aid to Alcoa. However, since the aid to Alcoa has an environmental objective, the Authority finds that the EAG and the EEAG can be used for general insight into relevant principles for this assessment.⁴⁵

(140) 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.

(141) In order to confirm that this is the case regarding the notified measure, and in line with Decision No 248/11/COL, a detailed assessment of the measure must be carried out. In order to do so, the following issues have been assessed:⁴⁶

1. contribution of the measure to a well-defined objective of common interest;
2. need for the State intervention;
3. appropriateness of the state aid;
4. existence of incentive effect;
5. proportionality of the aid amount (aid limited to the minimum necessary); and
6. avoidance of undue negative effects on competition and trade.

3.2. Detailed assessment of the notified measure

3.2.1. Contribution to a well-defined objective of common interest

⁴⁴ The Authority concluded that the NETP fell outside the scope of the R&D&I Guidelines. It also concluded that many of the projects to be supported by the NETP will not, due to their inherent characteristics as demonstration projects, follow the economic logic of the EAG. Therefore, the NETP was assessed directly under the EEA Agreement. See also footnote 13.

⁴⁵ See Decision No 476/15/COL of 11 November 2015 not to raise objections to individual aid in favour of Tizir Titanium & Iron AS for the construction of a demonstration plant in Tyssedal (OJ C 73, 25.2.2016, p. 8) (“*Tizir decision*”), para. 171.

⁴⁶ Decision No 248/11/COL, para. 139, cross-referring to para. 87.

- (142) An objective of common interest is an objective that has been recognised as being in the common interest of the EEA States. The Authority acknowledges that the protection of the environment is an objective of common interest.
- (143) The determination to protect the environment is already established in the EEA Agreement, when the Contracting Parties defined themselves as “*determined to preserve, protect and improve the quality of the environment*”. This determination is reflected in Chapter 3 of Part V of the EEA Agreement, entitled “Environment” (Articles 73 to 75). In particular, Article 73(1) of the EEA Agreement states that “*action by the Contracting Parties relating to the environment shall have the following objectives: (a) to preserve, protect and improve the quality of the environment*”.
- (144) Furthermore, the Authority has already recognised that the protection of the environment by means of the reduction of CO₂ emissions are in the common interest of the Contracting Parties to the EEA Agreement.⁴⁷ 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 2020.⁴⁸
- (145) The notified project has positive environmental effects. As already described in paragraph (36) above and in **Table 2**, if successful, the project will result in a reduced energy consumption of 9.7 GWh and reduction of GHG emission by [...] kilotons per year.
- (146) The project also contributes to developing a new, more efficient production technology. Therefore, the project promotes innovation within the EEA. The Authority notes that research and innovation is covered by Protocol 31 to the EEA Agreement. The promotion of innovation falls under the scope of the EEA Agreement. Research and innovation is, in particular, one of the core objectives of the Europe 2020 Strategy for smart, sustainable and inclusive growth.⁴⁹ Norway is an associated country of the Horizon 2020 programme.⁵⁰
- (147) Based on the above, the Authority concludes that the aid measure is aimed at well-defined objectives of common interest, i.e. the promotion of environmental protection and innovation.

3.2.2. Need for the state intervention

- (148) As a general consideration, the Authority considers that state aid should be targeted towards situations where it can bring about a material improvement that the market cannot deliver itself.

⁴⁷ See the Authority’s Decision No 150/15/COL of 21 April 2015 on the state aid measures in favour of electric vehicles (OJ C 231, 16.7.2015, p. 13.), *Hydro* decision and *Tizir* decision.

Full text of those decision is available at the Authority’s website: <http://www.eftasurv.int/media/decisions/150-15-COL.pdf> and <http://www.eftasurv.int/media/state-aid/-aid-to-Hydro-Aluminium-AS-final.pdf>

⁴⁸ 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 IV 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).

⁴⁹ Further information regarding the 2020 Strategy is available at: http://ec.europa.eu/europe2020/index_en.htm

⁵⁰ Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe’s global competitiveness. More information is available at: <http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020> See further: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cp/h2020-hi-list-ac_en.pdf

- (149) As recognised by the Authority in Decision No 248/11/COL, the primary objective of state aid under the NETP is to introduce new energy technologies to the market.⁵¹ The substantial environmental benefits pursued by the project are more effective energy production and saving technologies. The NETP 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 are sub-optimal from a community perspective.⁵²
- (150) 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. Without the aid, the project would not materialise.
- (151) The Authority concludes therefore that state aid is needed to address the defined market failure.

3.2.3. *Appropriate instrument*

- (152) 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.
- (153) 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 NETP could not be attained through regulation.⁵³
- (154) Regarding the notified measure, the Authority notes in particular that the Norwegian legislation does not require undertakings to construct plants using new innovative technologies (see paragraph (73) above).
- (155) In the present case, the Authority also notes, as the Commission did in the *Salzgitter* case,⁵⁴ that it is not possible to use a regulatory instrument to achieve the same result in terms of environmental protection as with the aid. The Authority considers that the Norwegian authorities could set certain standards but could not impose a specific technology upon the industry. However, standards may provide a less efficient incentive for improving a technology than granting state aid. Therefore, in the current situation the Authority concludes that investment aid constitutes an appropriate instrument to pursue the objective of environmental protection, given that less distortive instruments will not achieve the immediate objective of the aid, i.e. the implementation of the project.
- (156) 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 (see paragraph (74) above).
- (157) The Authority concludes therefore that the notified measure is an appropriate instrument.

⁵¹ Decision No 248/11/COL, para. 106.

⁵² *Ibid.*, para. 140.

⁵³ *Ibid.*, para. 141.

⁵⁴ See the *Salzgitter* case.

3.2.4. Incentive effect

- (158) As set out in Decision No 248/11/COL, state aid generally does not present an incentive effect for the beneficiary in cases where the project has already started prior to the aid application to Enova.⁵⁵ Alcoa's application for aid to Enova was submitted before the start of the project.
- (159) 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 has verified that Alcoa would not, without the aid, build the demonstration plant because of its intrinsic benefits.
- (160) The NETP foresees that the incentive effect will normally be assessed by reference to a counterfactual investment.⁵⁶ However, as the Norwegian authorities correctly point out, Decision No 248/11/COL recognises that in some cases, aid applicants may not have considered an alternative investment.⁵⁷ 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.⁵⁸
- (161) As set out in paragraph (76) above, Alcoa has not considered a counterfactual in the form of an alternative reference investment. The purpose of the notified project is to demonstrate the AST technology in a full-scale production line. This objective of the project is not to increase Alcoa's production, but rather to verify technology enabling the reduction of environmental footprint. The Authority notes that this objective cannot be attained by building a conventional production plant using the Hall-Hérault technology.
- (162) The Authority accepts therefore that the business as usual scenario would be a credible counterfactual scenario in the present case. The Authority notes that Alcoa has steady and economically sustainable operations as it is today. Consequently, the notified project is not necessary for further operations. If no aid would be granted, it does not seem realistic to assume that other investments would be considered. The Authority has reached similar conclusions in previous cases,⁵⁹ as has the Commission.⁶⁰ Consequently, the Authority accepts that the counterfactual is a no-investment decision and that the alternative investment costs are thus zero.
- (163) As also set out in section 3.6 of Part I above, NPV calculations have been used to examine whether the aid has an incentive effect. NPV calculations determine how much aid is needed

⁵⁵ Decision No 248/11/COL, para. 142.

⁵⁶ *Ibid.*, para. 142.

⁵⁷ Annex 2 to the EEAG contains a list of relevant counterfactual scenarios for various kinds of environmental measures. The list does not contain a counterfactual scenario for situations of aid to energy efficiency. The project at hand is an integrated project, i.e. it is a technological project but ensures some energy efficiency.

⁵⁸ Decision No 248/11/COL, para. 142.

⁵⁹ See the *Hydro* decision, para. 141 and the *Tizir* decision para. 194.

⁶⁰ In the AMEH case, the Commission approved aid from Germany to Arcelor Mittal Eisenhuettenstadt GmbH for the deployment of a Top Gas Recycling (TGR) demonstration project at a steel production plant. The Commission found that in absence of aid AMEH would not invest in TGR, but would follow the business as usual scenario. State aid case – Germany – N 450/2009 Top Gas Recycling (TGR). Project - Aid to ArcelorMittal Eisenhüttenstadt GmbH. (OJ C 94, 14.4.2010, p. 9.)

in order to trigger an investment. A project is triggered when it reaches an NPV of zero with a reasonable rate of return.

- (164) The data submitted by the Norwegian authorities indicate that, without the aid, the demonstration project would have a negative NPV of NOK [<0] million (see paragraph (87) above). With the aid, the project will have an NPV of NOK [<0] million⁶¹ (based on a RR of [...] % and a six-year lifetime of the investment).
- (165) The Authority is not convinced that the operational lifetime of the project can be reduced to four years (after two years of construction) as proposed by the Norwegian authorities. In the Authority's opinion, even if a certain re-investment in the cells would be necessary, the production plant using the AST could continue its production for a longer period. However, the Authority notes that the Norwegian authorities have been able to demonstrate that in all scenarios and irrespectively of the lifetime of the project, there is a funding gap (see paragraph (90) and table 5 above).
- (166) The Authority also notes that Alcoa normally requires a RR after taxes of [...] % for investments. In real terms the required RR is [...] % (see paragraph (86) above). Using this RR within the calculation, the project will not have a positive NPV even with the aid and therefore in principle will not be triggered (see paragraph (163) above). The Norwegian authorities have explained that Alcoa can exceptionally accept a negative NPV for projects with particular strategic relevance. As explained before (see footnote 30 above), the notified project has a strategic value for Alcoa, since if successful it will allow it to demonstrate a new alternative to the Hall-Héroult technology and allow Alcoa to enter the aluminium smelting technology market. The Authority notes that according to a report drafted by Menon,⁶² an independent consultant, the estimated normal RR before tax for the energy-intensive industries in Norway is 6.6%. Using this RR (6.6%) in the calculations – instead of the Alcoa's RR – the NPV will still be negative even with the aid (NOK [<0] million⁶³). Consequently, the project continues to have a funding gap disregarding the RR use in the calculations.
- (167) Based on the above premises, the Authority concludes that the NPV calculation demonstrates that the project is not viable without the aid.
- (168) 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.⁶⁴
- (169) As stated in section 3.6 (i) of Part I 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 Alcoa.

⁶¹ In real terms, equivalent to NOK [...] million in nominal value.

⁶² See Rapport nr. 2/2013. “Vurdering av normalavkastningskrav for utvalgte næringer i Norge”. Table 1 at page 3. Document NO 801413. The report was joined to the e-mail sent by Enova on 20 April 2016, Document No 801411.

⁶³ Information sent by Enova by mail dated 20 April 2016. Document No 801363.

⁶⁴ Decision No 248/11/COL, para. 142.

Furthermore, the Norwegian authorities have explained that the construction of demonstration plants without state support to verify a completely new aluminium production technology does not represent normal market behaviour. This is mainly due to the risks involved and the highly unprofitable nature of the investment.

- (170) 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 has taken into account all production advantages, as well as the levels of risk and profitability over the lifetime of the project (see section 3.7.1 of Part I above). These factors do not affect the findings of the NPV calculation that the investment is not viable without the aid.
- (171) Finally, as regards the likely level of environmental protection resulting from the aid, the Authority refers to the estimate of the environmental impact of the AST technology provided by the Norwegian authorities as set out in **Table 2** above (see paragraph (36) above).
- (172) Having assessed these factors, the Authority concludes that Alcoa, with the aid and if the AST technology is successfully verified, 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.

3.2.5. Proportionality

- (173) A state aid measure is proportionate if the measure is designed in such a way that the aid is kept to the minimum necessary.
- (174) Enova carries out a competition for aid under the NETP. The competition 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, competition for aid does not by itself ensure that the notified measure is proportionate. An *ad hoc* assessment of this criterion is required.
- (175) The calculations presented by the Norwegian authorities (see **Table 4** – paragraph (46) above) show that the aid intensity of the notified measure is [<45]%. This is below the maximum aid intensity of 50% for large enterprises under the NETP.
- (176) As explained in Decision No 248/11/COL, Enova also carries out an NPV calculation to ensure that the aid amount is limited to the amount necessary to trigger the project. The result of the NPV calculation – as described in paragraphs (87) to (90) above – demonstrates the extent of the funding gap for the project and that the aid amount does not exceed this funding gap.
- (177) Finally, the rules for disbursements of aid under the Energy Fund Scheme, as explained in paragraphs (102) and (103) 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.
- (178) The Authority also notes that the aid will not be cumulated with other aid for the same project as described in paragraph (127) above.
- (179) On the basis of the above, the Authority concludes that the aid measure is proportionate.

3.2.6. Avoidance of undue negative effects on competition and trade

- (180) Based on the information provided by the Norwegian authorities and summarised in paragraphs (105) to (126) above, 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, i.e. the aluminium production market and the market for smelting cell technology.
- (181) 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.⁶⁵ As set out above in section 3.2.5 of Part II, the Authority has concluded that the aid is proportionate.
- (182) Furthermore, the Authority has received detailed information from Norway (summarised in paragraphs (105) to (126) above) showing that the effects of the measure in the affected markets would be limited and outweighed by the positive effects in terms of contribution to the objective of common interest.
- (183) Regarding the primary aluminium market, the Authority notes that the project will not significantly increase Alcoa's production of primary aluminium. The production capacity of the demonstration plant is also negligible compared to global production and does not exceed the foreseen increase in demand. Consequently, the increase in Alcoa's production will not have an appreciable effect on market dynamics. The market shares of Alcoa show that the company is not in a dominant position and the project will not change its situation. The project will neither allow Alcoa to produce a higher quality product nor, in the absence of environmental labelling for the time being, reap any other product-related advantages. Moreover, it is unlikely that the project will have an impact on primary aluminium prices, given the size of the global market and that prices are based on international quotations (LME). Finally, there are important exit barriers in the market, and consequently it is unlikely that competitors will stop their own R&D&I efforts due to this project.
- (184) The Authority believes that if the results of the new technology are positive, Alcoa will have a first mover advantage. However, Alcoa will grant licenses to the new technology demonstrated in Phase I. The Authority underlines the importance of the license commitment described in paragraphs (66) and (67) to ensure that the supported technology will be spread to the industry in order to outweigh the negative effects on competition and trade linked to the measure. Alcoa will have a first mover advantage but only to a limited extent.
- (185) Regarding the market for smelting cell technology, Alcoa will be a new-comer, competing with RTA and Chinalco, both of which hold strong positions in their geographic markets (see paragraph (23) above). The demonstration project will therefore not have an appreciable negative impact on this product market.
- (186) For these reasons, the Authority concludes that the aid measure has limited effects on competition and intra-EEA trade.

3.2.7. Transparency

⁶⁵ For instance the former EAG stated that: “if the aid is proportional, notably if the calculation of the extra investment or operating costs has taken into account all advantages to the undertaking; the negative impact of the aid is likely to be limited”. The EEAG similarly indicate that “if the aid is proportionate and limited to the extra investment costs, the negative impact of the aid is in principle softened” (point (93)).

(187) The Authority finally notes the Norwegian authorities' commitment to meet the transparency obligation laid down in Section 3.2.7 of the EEAG from July 2016.

3.2.8. Conclusion on the compatibility assessment

(188) 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.

4. Conclusion

(189) On the basis of the foregoing assessment, the Authority concludes that the notified individual aid to Alcoa is compatible with the functioning of the EEA Agreement pursuant to Article 61(3)(c) thereof.

HAS ADOPTED THIS DECISION:

Article 1

The individual state aid to Alcoa Norway ANS, notified by the Norwegian authorities on 8 April 2016, for the construction of a demonstration plant in Lista or in Mosjøen is compatible with the functioning of the EEA Agreement pursuant to Article 61(3)(c) thereof.

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 in Brussels, on 25 May 2016

For the EFTA Surveillance Authority

Sven Erik Svedman
President

Frank Büchel
College Member

[Status]