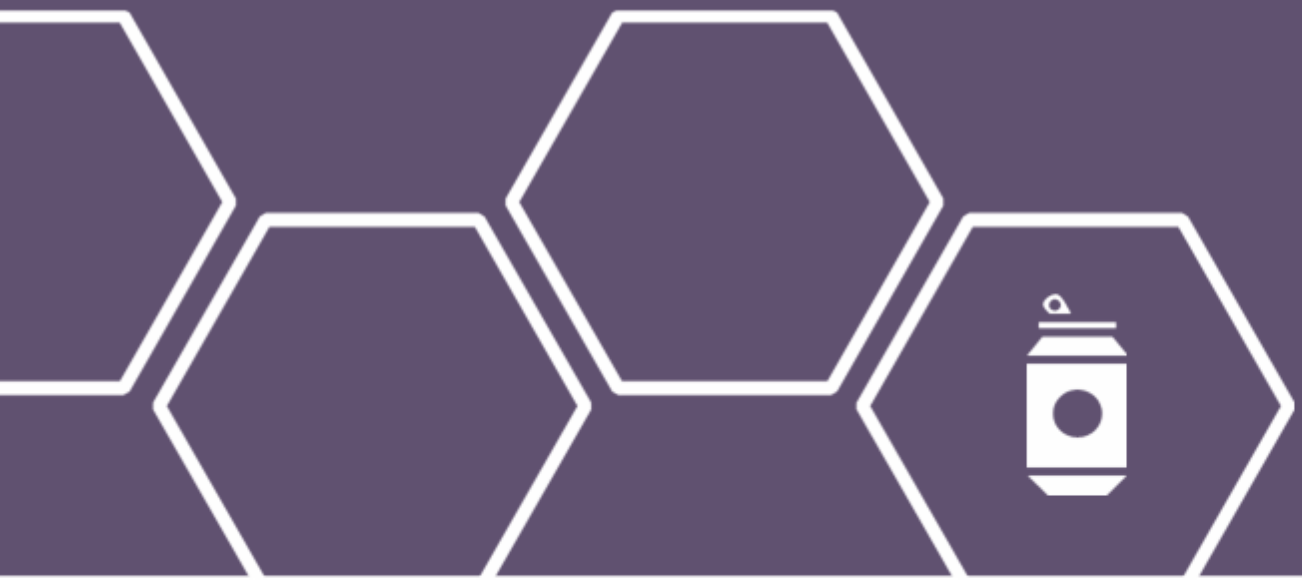
ACT

ROADTEST REPORT

Assessing low-Carbon Transition

Aluminium



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- the voluntary companies involved in the road test for their valuable contribution to the methodology improvement
- CRU Group, for providing access to their Emissions Analysis Tool[1]

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[1] More information on the CRU Emissions Analysis tool: https://www2.crugroup.com/EmissionsAnalysisTool

Background and purpose of this document

This document is part of the Assessing low-Carbon Transition (ACT) initiative and provides the main details of the ACT Aluminium road test. As part of the development of a new ACT sector methodology, this road test is conducted to improve the existing methodology and adjust the tools and inputs used to assess companies in this sector.

This report aims to provide the key findings of the assessment and an overview of results for the sector. Additional materials prepared during the assessment process, including detailed company data and feedback, informed the results summarised in this report but remain confidential.

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1.1. CONTEXT OF THE ROAD TEST

ALUMINIUM SECTOR

Aluminium is the second most-used metal in the world in terms of metric tonnes produced after iron, hence the most-used non-ferrous metal worldwide. According to the Aluminium International Institute (IAI)[2], in 2018, **the aluminium industry was responsible for 2% of global GHG emissions** and generated about 1.1 billion tonnes of CO_2e. More than 90% of this footprint is from primary production processes, while primary aluminium made up around 70% of the metal demand in 2018. Primary aluminium production is highly energy-intensive, with electricity making up a large share of the energy consumed.

Aluminium is a key metal, especially in the context of the energy transition, thanks to its qualities (lightness, strength, durability, electrical and thermal conductivity, formability and recyclability). Aluminium can be used for lightweight vehicles, solar energy (solar energy systems use aluminium for various components, including for mounting and framing solar PV panels and for reflectors in concentrating solar power systems) and in the electricity grid and electrical cables along with copper. According to IAI, rapid population and economic growth over the coming decades means **global demand for aluminium is set to increase by up to 80% (to 170 Mt of aluminium) by 2050**. To be aligned with the International Energy Authority's (IEA) Beyond 2°C scenario (B2DS), IAI calculated that **the average emissions intensity of primary aluminium would need to be reduced to about 2.5 t CO_2e/t (the current global average being about 16 t CO_2e/t in 2018[2]).** Reaching this target assumes a 100% reduction of electricity-related emissions over the next 30 years, as well as a 50% reduction in direct (process and thermal energy) emissions and those embedded in raw materials and ancillary processes. This constitutes a significant challenge for all actors along the aluminium value chain.

The ACT initiative assesses and evaluates companies' sustainability strategies to determine whether their proposed actions align with a below 2°C scenario. In the context of this road test, 10 companies were analysed and scored according to the most recent version of the ACT Aluminium Methodology (version 1.1, dated September 2021). The results of the road test are detailed in this report.

CONTRIBUTING TO ACT: NEW SECTOR DEVELOPMENT

For the past seven years, ADEME and CDP have been working together on developing the 'Assessing low-Carbon Transition' (ACT) initiative, a mechanism for assessing companies that have set climate commitments and want to take climate action in line with the Paris Agreement. The ACT methodologies use a holistic approach to assess a company's climate strategy and determine its readiness to transition to a low-carbon economy. The ultimate goal is to drive action by companies and encourage them to set their business on a well-below 2°C-compatible pathway.

[2] International_Aluminium_Institute, *Aluminium sector greenhouse gas pathways to 2050, September* 2021.

ACT's ambition is to prioritise the most emissions-intensive sectors. This approach means that tools and methodologies have to be adapted for each new sectoral development process in order to accurately reflect their impact on climate change. So far, the methodologies for the Auto, Electric Utilities, Retail, Construction, Real Estate and Property Developer, Cement, Transport, Oil & Gas and Iron & Steel sectors have been released. The Agriculture & Agrifood sector methodology is in the final stage of refinement before publication. As of June of 2022, road tests for the Chemicals, Pulp & Paper, Aluminium and Glass Methodologies methodologies are all in their final stages, with these sector methodologies due to be published in summer 2022. The stages of methodology development are as follows:

- Stage 1: Methodology development (including a one month-public consultation);
- Stage 2: Methodology experimentation (road test);
- Stage 3: Methodology refinements & release.

GOALS OF THE ROAD TEST

The project's objectives were:

- to test the draft ACT Aluminium Methodology and accompanying tools;
- to provide recommendations to refine the methodology in order to ensure that it is relevant and robust for the sector;
- to engage companies and other stakeholders in the low-carbon transition.

The road test for the ACT Aluminium Methodology was carried out, on behalf of ACT, by Solinnen and I Care & Consult.

ASSESSED COMPANIES

The ACT Aluminium Methodology is designed to assess a company's climate impacts across its value chain.

Figure 1 presents the aluminium value chain in a simplified way and highlights the types of players covered by the methodology.

All companies involved in producing aluminium or alumina will be covered by the ACT Aluminium Methodology. The only companies within the aluminium value chain that will not be covered by the methodology are:

- pure player bauxite miners,
- pure player anode producers,
- pure manufacturers of finished products.

The rationale is that these players do not account for a substantial part of the CO2e emissions within the aluminium value chain.

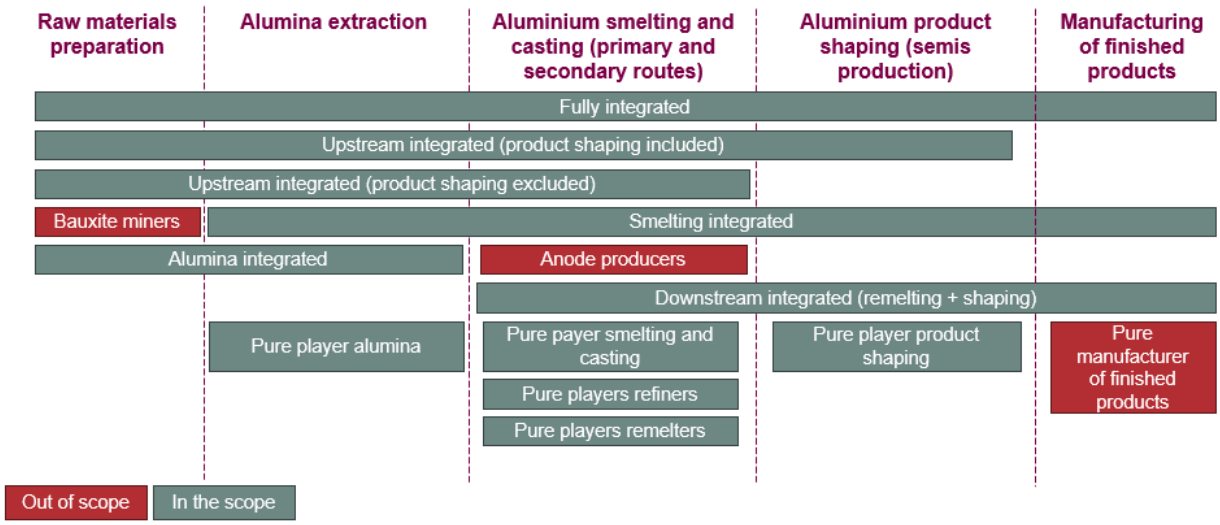

FIGURE 1: COMPANIES THAT CAN BE ASSESSED BY THE ACT ALUMINIUM METHODOLOGY

At the beginning of an ACT assessment, each company is asked about which step of the value chain they operate (or plan to operate). This enables assessing all kinds of aluminium companies that are present at different steps of the value chain, capturing the fact that not all aluminium companies focus their business activities at the same steps of the value chain.

For this road test, 10 companies were assessed, 5 voluntary companies and 5 companies assessed based on publicly available data.

Here is the list of volunteer companies:

The participating companies were active in the following segments:

Company	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
Aluminium Dunkerque			X	X	X			X
Constellium						X	X	X
EGA			X	X	X			
Jupiter Aluminium						X		
Real Alloy						X		

Number of companies per segment	0	0	2	2	2	3	1	2

To get a bigger sample of companies, five assessments based on public data have been performed. The name of the companies is kept confidential, as the score obtained for public data assessment reflects only the aspects of the companies' low-carbon strategy which are available publicly. Those companies were active in the following segments:

Company	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
Public company A	X	X	X	X	X			
Public company B	X		X	X	X	X	X	
Public company C	X	X	X	X	X	X	X	
Public company D	X	X		X	X			
Public company E	X	X		X	X		X	
Number of companies per segment	**5**	**4**	**3**	**5**	**5**	**2**	**3**	**0**

ASSESSMENT RESOURCES

The main inputs for undertaking the assessment were provided to Solinnen and I Care by way of four complementary resources:

- **The ACT Aluminium Methodology, version 1.1**. This document contains the scoring criteria for each of the indicators and lists how the scores are calculated and weighted. The methodology also provides relevant context for each of the indicators and an overview of the main goals of each module.
- **The ACT questionnaire.** This is an Excel document which was designed to collect data required to assess the performance score of ACT Aluminium. Companies were asked to directly fill out their response to the ACT questionnaire, with the assistance of the assessor. Once completed, analysts reviewed the responses. This document was a tool for discussion with participating companies.
- **The ACT assessment tool.** This is a browser-based tool developed by ADEME. Analysts could input data collected with the ACT questionnaire into the ACT assessment tool to calculate the company's performance score, applying specific company weighting. In previous road tests, calculations were performed using an Excel-based tool. Having one calculation tool per company made it difficult to maintain and update when issues were reported, or methodological updates were decided. Having a single online tool made it easier in that regard. Moreover, data and scores could be exported to defined file format (.json file), to help further processing of this data in a standard format for all companies.
- **The trend scoring tool.** This is an Excel-based tool which includes assessment guidance based on the scoring of some indicators of the ACT questionnaire.

In addition, analysts used the ACT Framework and Analyst Guide to ensure consistency with ACT methodologies for other sectors.

Regarding assessments based on public data, analysts relied on the following resources\:

- CSR reports as well as other public documents published by companies;
- CDP questionnaires, when available publicly ;
- CRU Emissions Analysis Tool[3], providing data about process-level emissions across assets and regions.

ROAD TEST PROCESS

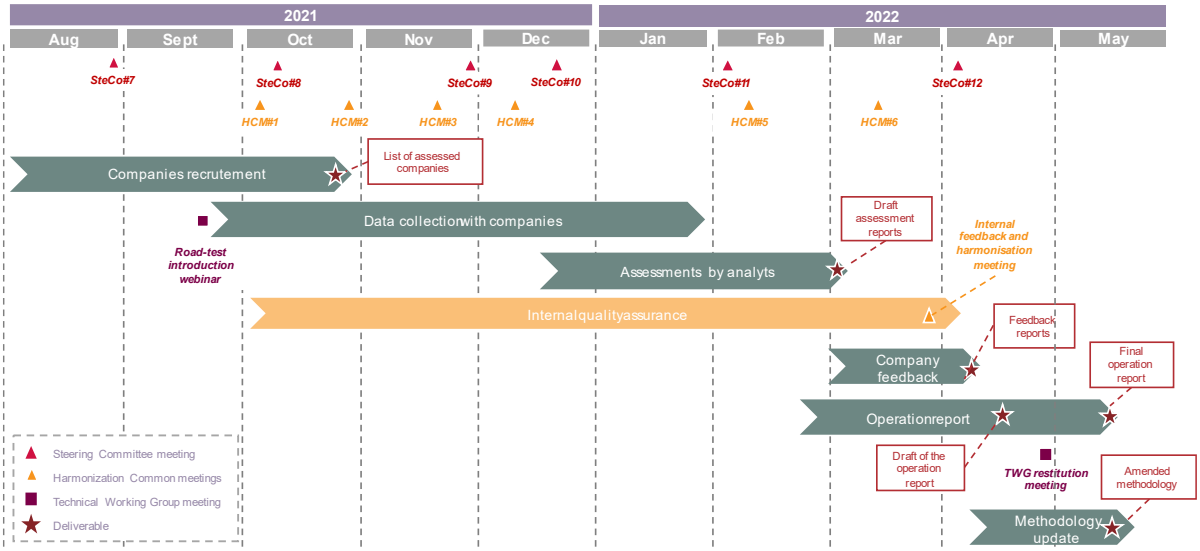

FIGURE 2: ACT ALUMINIUM ROAD TEST PROCESS

The road test process is presented in Figure 2. It has been conducted as follows:

Recruitment of companies

Recruitment of companies was conducted from August 2021. Several companies were directly contacted and invited to join the road test. A webinar was organised together with the International Aluminium Institute (IAI) to present and promote the road test. A maximum of 15 companies were planned to participate to this road test. Discussions were initiated with 13 companies. Several companies approached declined joining the road test, mainly due to a lack of availability to provide the required data. The deadline for the recruitment phase was extended to October 2021, in order to leave enough time for signing the required administrative documents (Terms of Reference and Non-Disclosure Agreements) with participating companies, and to identifying relevant companies for performing assessments based on public data.

Data collection with companies

Data collection started in September 2021. An opening webinar was organised to provide initial guidance and explanations to participating companies, by introducing them to the tools and the key methodological aspects of the ACT Aluminium Methodology. Data collection with each company was started with an initial call between the companies and an analyst from Solinnen, I Care or Novasirhe. During the one-hour call, the

[3] More information on the CRU Emissions Analysis tool: https://www2.crugroup.com/EmissionsAnalysisTool

companies' teams were given a brief reminder of the ACT initiative, the expected timeframes and deadlines, a general description of the relevant inputs, and an overview of the ACT questionnaire. Companies were subsequently sent the ACT questionnaire and the methodology documents and were encouraged to send questions via e-mail or through follow-up calls. Regular checkpoint meetings were organised between each company and their analyst to track the progress of the data collection process. These meetings allowed the companies to share their feedback and challenges regarding the data collection, the tool and some methodological aspects. Once companies submitted the completed ACT questionnaire with their inputs, analysts reviewed the responses and began the scoring process.

Assessments by analysts

Assessments were performed using the ACT assessment tool developed by ADEME in parallel to the road test. The first test version of the tool was sent to the ACT Aluminium team at the end of November 2021. Several revisions of the tool were made by ADEME to make it fully useable by analysts and conformant with the ACT methodology. More than 70 issues were reported by the ACT Aluminium team on ADEME's issue tracker, between December 15th 2021 and March 22th 2021. Assessments could only be completed after the first stable version of the tool was released.

Quality assurance

An internal quality assurance process was conducted all along the data collection and assessment phases. A logbook gathering all questions raised by analysts or companies was set up. Weekly progress meetings with all analysts were held, in order to discuss questions which were specific to ACT Aluminium, and ensure that similar interpretations of the methodology were applied.

An external quality assurance process has been conducted by the Methodology Harmonisation and Quality Assurance team (Eco2 Initiative and Climate Check). Six Harmonisation Common Meetings were organised by the Methodology Harmonisation and Quality Assurance team between October 2021 and March 2022. These meetings also involved the teams of the three road tests being conducted in parallel to ACT Aluminium (Chemicals, Glass and Pulp & Paper). Issues which were applicable to all four methodologies were discussed during these meetings. Logbook files were very useful to centralise questions from analysts and track the need for clarification in the ACT Aluminium Methodology that would need to be addressed at the end of the road test.

Once every analyst completed a first version of all of their assessments, a 3-hour internal feedback and harmonisation meeting was organised. During this meeting, selected assessments were reviewed by the team: each analyst went through the questionnaire and assessment tool and other analysts could comment or ask questions on topics where they had a different interpretation of the methodology or the tool behaviour. This meeting was very useful in harmonising the assessments and identifying clarifications to be made to the methodology and the tool. This also helped provide a larger picture of the lessons learned during the road test and general feedback on the methodology.

Company feedback

Once all assessments had been completed, analysts drafted a feedback report, and scheduled a feedback meeting with each company. In these reports and meetings, analysts shared the companies' ACT results, and provided detailed explanations on the strengths and areas for improvement in their climate strategy and score.

These meetings also allowed analysts to collect relevant and transparent feedback from companies on their ACT assessment experience (data collection, expectations regarding the methodology, how ACT will be used

in the future, etc.), and to identify areas of improvement for the update of the methodology at the end of the road test.

Final phase

During this final phase, Solinnen prepared the analysis of the road test assessments presented in the present report. A Technical Working Group meeting was organised to present a summary of the road test results, provide company testimonies, present challenges encountered during the road test and discuss modifications to be made to the methodology.

A final version of the ACT Aluminium Methodology was drafted, marking the end of the road test.

1.2. THE ACT ALUMINIUM METHODOLOGY

GENERAL APPROACH

While each ACT methodology is sector-specific, they are all based on the ACT Framework and as such there are fundamental commonalities among all of them. The assessment's main goal is to evaluate past, present and (anticipated) future company performance to determine the company's maturity level with respect to its transition to a low-carbon economy. The ACT initiative focuses on five guiding questions to determine company performance:

1. **Commitment**: What is the company planning to do?
2. **Transition plan**: How is the company planning to get there?
3. **Present**: What is the company doing at present?
4. **Legacy**: What has the company done in the recent past?
5. **Consistency**: How do all these plans and actions fit together?

These guiding questions are assessed through a series of modules composed of key performance indicators and sub-indicators, many of which are specifically designed for each sector. For the aluminium sector, there are a total of 29 indicators organised into nine modules. Figure 3 shows an indicator-level map illustrating how these indicators assess company performance at different points in time.

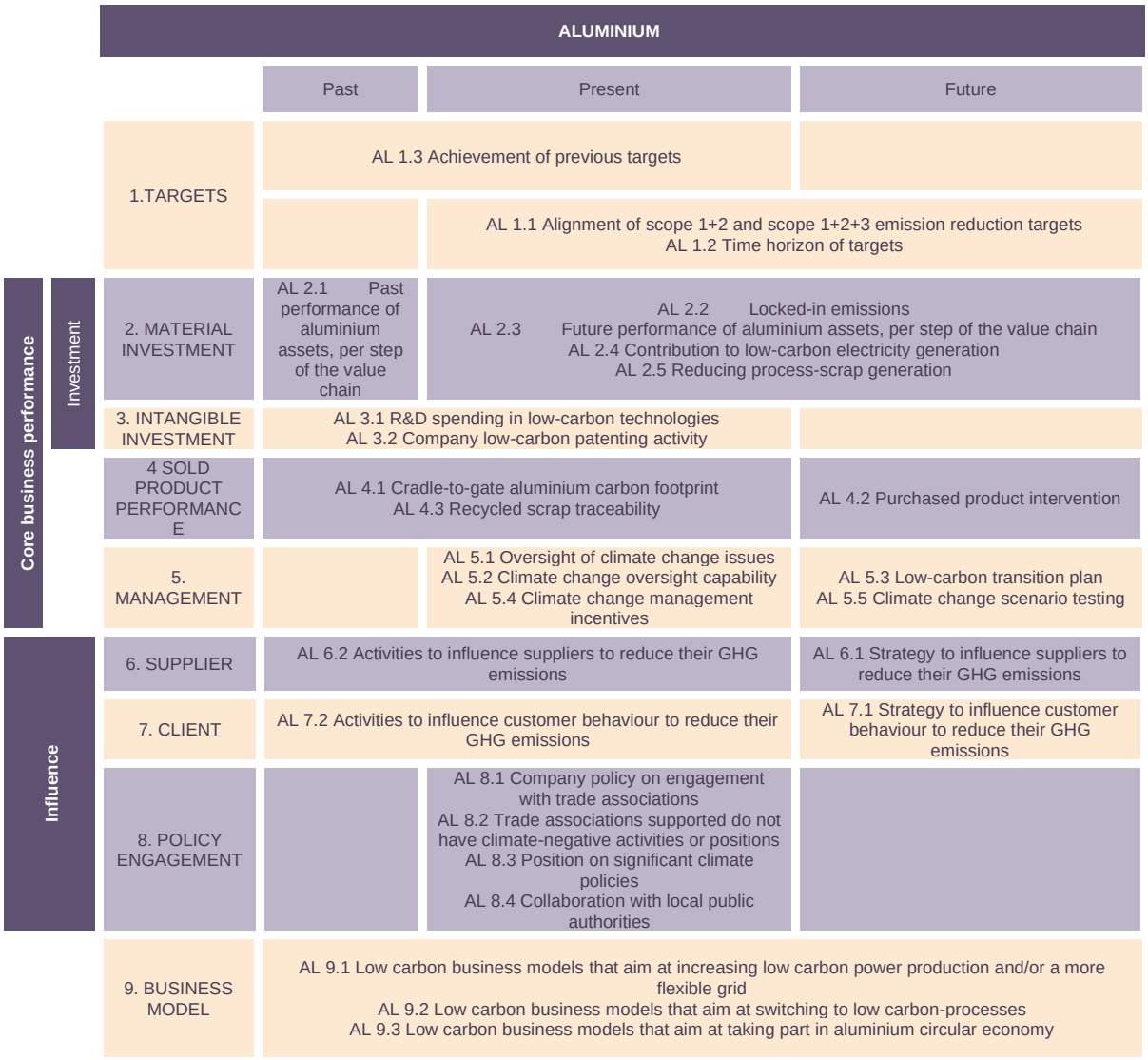

FIGURE 3: ALUMINIUM METHODOLOGY INDICATORS, MODULES AND TIME HORIZON ASSESSED

The assessment is carried out based on the information provided for each of these indicators by the company. The Aluminium Methodology uses a combination of quantitative and qualitative indicators. Purely quantitative indicators are scored according to a formula and based on the data provided by the company. In these cases, analysts must ensure the calculation is correct and the information provided by the company is consistent and, to the extent possible, verifiable[4]. Qualitative indicators are evaluated by the analyst using the company responses and indicator-level maturity matrices with up to five scoring levels: Basic (0 points), Standard (0.25 points), Advanced (0.5 points), Next practice (0.75 points), and Low-carbon aligned (1 point). Maturity matrices provide scoring criteria per indicator for each of these levels.

ACT ALUMINIUM METHODOLOGY ASSESSMENT

Like all ACT assessments, the Aluminium Methodology generates a three-part rating enabling companies to understand how they were scored based on the key performance indicators, how their overall strategy is rated with reference to a low-carbon (below-2°C) transition scenario, and if their strategy is effective in aligning with

[4] Given the granularity of quantitative data required and the confidentiality of this information, it was not always possible to verify the data provided

a low-carbon pathway. The final score is presented as the performance score (0 to 20) followed by the narrative score (E to A) and the trend score (+, -, or =). For the Aluminium road test, some adjustments were implemented, as described below:

1. **The performance score** ranges from 0 to 20 and is the result of the sum of all points achieved and weighted according to the company's activities in each step of the value chain. The Aluminium Methodology introduced a dynamic weighting scheme, where a company-specific weighting is developed based on the share of each step of the value chain in the scope 1+2 emissions of the company for the reference year.
2. **The narrative score** is the result of the analyst's evaluation of the overall response, complemented by an external data review for the company in question, and graded from E (lowest score) to A (highest score). The narrative score is assessed using a maturity matrix developed by the ACT initiative and composed of four criteria (Business model and strategy; Consistency and credibility; Reputation; and Risk).
3. **The trend score** evaluates whether a company is increasingly aligning with a low-carbon transition pathway or distancing itself from a low-carbon transition pathway. The trend score is indicated by a + sign (best score, reflecting increasing alignment), a – sign (worst score, reflecting reducing alignment), and an = sign (indicating no projected change in its alignment). A specific tool was developed by ACT for the trend score, and adapted to ACT Aluminium. This tool was used as a guidance for the analyst, but the outcome could also be influenced by the analyst's final judgment. The inputs for this tool were taken directly from the Aluminium Methodology using a simple grading scale from -1 to 1 that analysts assigned based on the results of 12 forward-looking indicators:
    - AL 1.1 Alignment of scope 1+2 and scope 1+2+3 targets
    - AL 1.2 Time horizon of targets for aluminium production
    - AL 2.2 Locked-in emissions
    - AL 2.3 Future performance of aluminium assets, per step of the value chain
    - AL 2.4 Contribution to low carbon electricity generation
    - AL 2.5 Reducing process-scrap generation
    - AL 4.2 Purchased product intervention
    - AL 5.3 Low carbon transition plan
    - AL 5.5 Climate change scenario testing
    - AL 9.1 Low carbon business models that aim at increasing low carbon power production and/or a more flexible grid
    - AL 9.2 Low carbon business models that aim at switching to low carbon-processes
    - AL 9.3 Low carbon business models that aim at taking part in aluminium circular economy.

    The results shown by the tool implied positive scores (>0) were more likely to be trending in a low carbon-aligned pathway, while negative scores (<0) were more likely to be diverging from a low carbon-aligned pathway.

On completion of the assessment, companies received two main files, which remains confidential between Solinnen, I Care, Novasirhe, ADEME, the MHQA team and each individual company:

1. The Excel questionnaire, completed with data from the company, as well as comments and explanations from the analyst. This document also includes the company-specific weightings for ACT Aluminium indicators.
2. An ACT company feedback report (PowerPoint) summarising the results and providing a brief overview of the challenges and opportunities the company may face. This presentation is built based on a template generated by ACT.

FOCUS ON THE ACT ALUMINIUM SCORE

The aluminium questionnaire is structured according to nine modules presented in the table below:

TABLE 1: LIST OF MODULES IN THE ACT ALUMINIUM ASSESSMENT

Modules
1. Targets
2. Material investments
3. Intangible investments
4. Sold product performance
5. Management
6. Supplier engagement
7. Client engagement
8. Policy engagement
9. Business model

Modules 1 through 4 contain mostly quantitative indicators that are evaluated by the analyst based on the results of a quantitative calculation. These modules rely on companies providing financial and GHG targets data, as well as scope 1+2 GHG emissions for the reference year and reference year minus 5. Average cradle-to-gate carbon footprint of products is also required for one indicator in Module 4.

TABLE 2: ACT ALUMINIUM SCORE WEIGHTINGS

Module	Range of weightings
Targets	15%
Material investments	12 – 35%
Intangible investments	10%
Sold product performance	7 – 30%
Management	10%
Supplier engagement	2 – 6%
Client engagement	2 – 6%
Policy engagement	5%
Business model	10%

The weightings above indicate the range for each module. Indeed, depending on where the company operates along the aluminium value chain, module weightings are different. To compute the weighting for these modules, two different calculations are done:

- For modules 2 and 4, a weighted average based on the percentages of scope 1+2 CO_2e emissions of the company corresponding to each step of the value chain, and the default weightings for each step of the value chain (cf. Table 3). For each indicator of modules 2 and 4, the calculation is done to reach the specific weighting of the company.
- For module 6 and 7, the company is asked to indicate the aluminium product that generates the highest amount of revenue, and depending on if this product is present at the upstream or downstream part of the value chain, the weightings of the supplier and client engagement modules will be updated (e.g. if the highest revenue comes from semis production, then the suppliers module will have higher weightings as the company can have more influence there). Default weightings are presented in Table 4.

TABLE 3: DEFAULT WEIGHTING FOR EACH STEP OF THE VALUE CHAIN FOR MODULE 2 AND MODULE 4 IN THE VERSION OF ACT ALUMINIUM USED DURING THE ROAD-TEST

Module	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
2. Material investments	35%	35%	30%	30%	25%	30%	12%	30%
4. Sold product performance	7%	7%	12%	12%	17%	12%	30%	12%

TABLE 4: DEFAULT WEIGHTING FOR EACH STEP OF THE VALUE CHAIN FOR MODULE 6 AND MODULE 7 IN THE VERSION OF ACT ALUMINIUM USED DURING THE ROAD-TEST

Module	Bauxite	Alumina	Anode	Primary	Recycled aluminium	Semis products	Internal scrap remelted
6. Supplier engagement	2%	2%	2%	4%	6%	6%	6%
7. Client engagement	6%	6%	6%	4%	2%	2%	2%

TABLE 5: DEFAULT WEIGHTINGS PER INDICATOR AND PER STEP OF THE VALUE CHAIN IN THE VERSION OF ACT ALUMINIUM USED DURING THE ROAD-TEST

Indicator	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
1.1 Alignment of Scope 1+2 and Scope 1+2+3 emissions reduction targets	67%	67%	67%	67%	67%	67%	67%	67%
1.2 Time horizon of targets	20%	20%	20%	20%	20%	20%	20%	20%
1.3 Achievement of past and current targets	13%	13%	13%	13%	13%	13%	13%	13%
2.1 Past performance for aluminium assets, per step of the value chain	40%	20%	40%	15%	10%	20%	25%	20%
2.2 Locked-in emissions	0%	40%	0%	30%	0%	0%	0%	0%

Indicator	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
2.3 Future performance of aluminium assets, per step of the value chain	60%	40%	60%	25%	10%	30%	35%	30%
2.4 Contribution to low carbon electricity generation	0%	0%	0%	20%	0%	0%	0%	0%
2.5 Reducing process-scrap generation	0%	0%	0%	10%	80%	50%	40%	50%
3.1 R&D spending in low-carbon technologies	60%	60%	60%	60%	60%	60%	60%	60%
3.2 Company low-carbon patenting activity	40%	40%	40%	40%	40%	40%	40%	40%
4.1 Cradle-to-gate aluminium carbon footprint	100%	100%	100%	70%	70%	20%	70%	20%
4.2 Purchased product intervention	0%	0%	0%	30%	30%	0%	30%	0%
4.3 Recycled scrap traceability	0%	0%	0%	0%	0%	80%	0%	80%
5.1 Oversight of climate change issues	20%	20%	20%	20%	20%	20%	20%	20%
5.2 Climate change oversight capability	10%	10%	10%	10%	10%	10%	10%	10%
5.3 Low-carbon transition plan	30%	30%	30%	30%	30%	30%	30%	30%
5.4 Climate change management incentives	10%	10%	10%	10%	10%	10%	10%	10%
5.5 Climate change scenario testing	30%	30%	30%	30%	30%	30%	30%	30%
6.1 Strategy to influence suppliers to reduce their GHG emissions	50%	50%	50%	50%	50%	50%	50%	50%
6.2 Activities to influence suppliers to reduce their GHG emissions	50%	50%	50%	50%	50%	50%	50%	50%
7.1 Strategy to influence customer behaviour to reduce their GHG emissions	50%	50%	50%	50%	50%	50%	50%	50%
7.2 Activities to influence customer behaviour to reduce their GHG emissions	50%	50%	50%	50%	50%	50%	50%	50%
8.1 Company policy on engagement with trade associations	40%	40%	40%	30%	35%	35%	35%	35%
8.2 Trade associations supported do not have climate-negative activities or positions	20%	20%	20%	10%	15%	15%	15%	15%
8.3 Position on significant climate policies	40%	40%	40%	30%	35%	35%	35%	35%

Indicator	Bauxite mining	Alumina refining	Anode production	Electrolysis	Casting	Recycling	Semis production	Internal scrap remelting
8.4 Collaboration with local public authorities	0%	0%	0%	30%	15%	15%	15%	15%
9.1 Low carbon business models that aim at increasing low carbon power production and/or a more flexible grid	0%	0%	0%	60%	0%	0%	0%	0%
9.2 Low carbon business models that aim at switching to low carbon-processes	100%	100%	100%	20%	70%	70%	70%	70%
9.3 Low carbon business models that aim at taking part in aluminium circular economy	0%	0%	0%	20%	30%	30%	30%	30%

PHYSICAL RISKS AND ADAPTATION SCORE

While ACT sectoral methodologies focus on mitigation, adaptation to climate change is another important topic for companies. Following the global goal of the Article 7 of the Paris agreement of "enhancing adaptive capacity, strengthening resilience and reducing vulnerabilities to climate change", the ACT Initiative is willing to develop a methodology to embrace these topics. The ACT aluminium road test, alongside the 3 other road test conducted in parallel, was an opportunity to experiment a very first draft of an ACT adaptation methodology. The aim is to assess the physical risks analysis and the adaptation strategy of companies, considering the whole value chain, through two maturity matrices, one for each topic.

As the ACT adaptation methodology is meant to be a stand-alone methodology, this specific part will be removed from the final version of the ACT aluminium methodology.

1.3. RESULTS OF THE COMPANY ASSESSMENTS

INTRODUCTION

This section presents the results of the ACT Aluminium Methodology road test. This summary includes an overall comparison of results per module and a brief outlook on the indicator-level results for the whole sample.

OVERALL RESULTS

The average final score of the ACT Aluminium road test is **10B+**. These results are representative of the company sample assessed during this road test, not of the global aluminium industry.

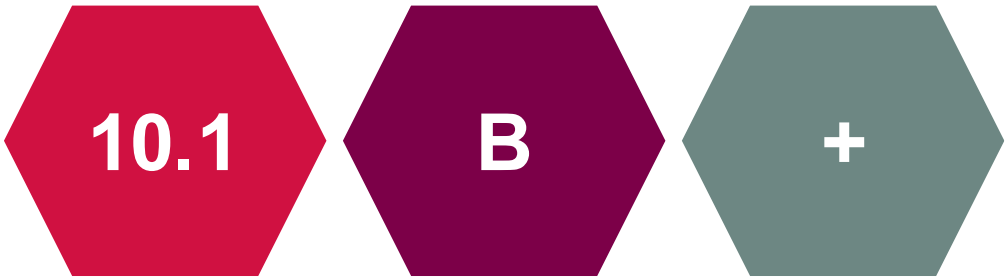

FIGURE 4: ACT ALUMINIUM ROAD TEST OVERALL RESULTS

The average performance score was 10.1, where 14.0 was the highest and 4.0 was the lowest. The best scores were obtained by companies which have set targets compatible with the IAI pathways and started implementing actions to reach these targets, such as increasing the share of low-carbon electricity generation and improving material efficiency through aluminium scrap recycling.

The average narrative score was B, indicating an overall good maturity on low-carbon transition topics, with a wide range of results on the 4 dimensions of this score. In general, assessed companies received a high reputation score, indicating the absence of environmental controversies or that companies faced with such controversies resolved them with due importance. Risk was a dimension that received lower scores in general. Companies will face many business risks, regarding upcoming regulations, technology transition, demand for low-carbon energy and scrap, for example.

The average trend score was rated **positive (+)** for the aluminium sector. This indicates companies are moving towards alignment with a low-carbon scenario and it is likely that this trend will be confirmed in the near future. However, this average score hides variation between companies. 7 of them obtained a positive (+) trend score, indicating they have already begun to incorporate climate issues in their management processes and are progressively developing programs, that will come to fruition in the near future. However, 3 obtained a negative (-) trend score, due to a high reliance on fossil fuel electricity generation and the absence of a coherent strategy to reduce this reliance.

OVERALL PROFILE OF THE 5 ACT DIMENSIONS

Like all ACT road tests, the aluminium road test provides a snapshot of the companies sample performance in each of the 5 ACT dimensions (see Figure 5). The following paragraphs summarize sector-level trends and challenges in these 5 elements. These insights do not apply uniformly to all participating companies and should not be interpreted as indicative of individual company performance nor overall global sector

performance. This is a high-level analysis of common trends identified throughout the road test. Company-specific insights are given in the company feedback reports, which are not publicly available.

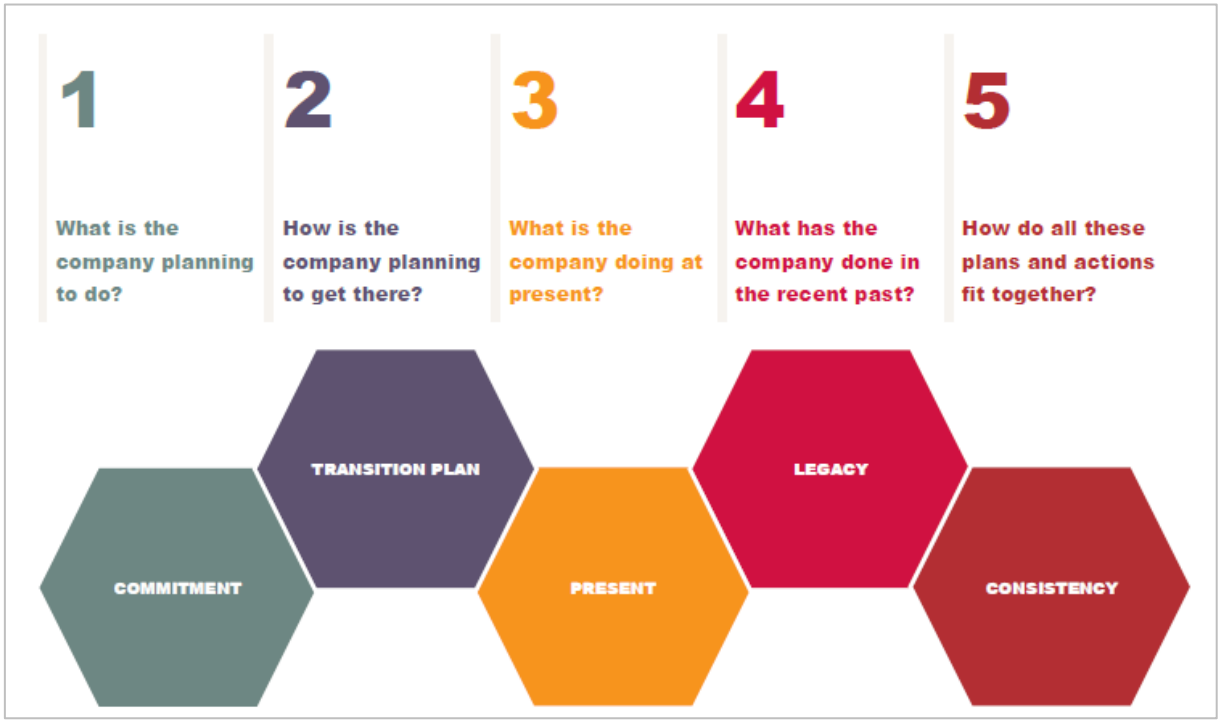

FIGURE 5: ACT ASSESSMENT FRAMEWORK

Commitment

All companies in the ACT Aluminium road test have defined targets. Only one company in the sample has developed targets for 2050, covering scopes 1+2+3. The others defined short-term targets (e.g. 2025) for scope 1+2 emissions.

Many of these short-term targets are compatible with the expected pathway of the sector, but this is often due to companies already relying on low-carbon electricity and therefore having a smaller effort to make than companies relying on fossil fuels.

Transition plan

Various actions are planned throughout the aluminium value chain:

- Sourcing low-carbon electricity and investing in low-carbon electricity generation is a key action for most companies, especially when they are producing primary aluminium.
- Improving material efficiency and increasing the collection rate of post-consumer scrap to maximize the potential of recycling is also a major part of the low-carbon transition.
- Investing in low-carbon processes (e.g. inert anode, switch away from fossil fuels for alumina refining)
- Developing effective supplier and client engagement policies will be key for companies specialized in one activity, while also improving the emissions intensity of their own assets.

Most of the assessed companies are focusing on only the most relevant aspects for them and still need to strengthen their low-carbon transition plans and expand their scope to cover all required aspects.

Present

Most of the companies assessed have developed a transition plan and have started implementing it. Currently, these plans often focus on the main sources of emissions and implementing gradual improvements to existing practices.

Current R&D expenditure related to climate change is mostly focused on mature technologies and is much lower than what is needed. Contribution to additional low-carbon electricity generation assets by aluminium companies and provision of demand-side management services should also be increased, as aluminium is a major electricity consumer.

Legacy

Past performance varies a lot among the companies that have been assessed:

- Companies scoring high on past-oriented indicators often have a lower emissions intensity than the industry average. They have started implementing a climate strategy in the past and can demonstrate improvements.
- Others are just starting on their sustainability journey and are facing bigger challenges in transitioning to low-carbon activities.

Consistency

Overall, assessments have shown that climate strategies of most of the assessed companies were consistent and fairly reflected the level of maturity of the company.

However, some inconsistencies and gaps have been identified between companies' commitments and their transition plans. This has been reflected in the narrative score of each company.

AVERAGE RATINGS PER MODULE FOR THE PERFORMANCE SCORE

Overall, the sector had a medium performance in the ACT assessment (see Figure 6). Six modules had average scores between 50% and 65%.

The lowest scoring module was **Module 3. Intangible investment**. This can be explained by two aspects: few companies declared investments in R&D for non-mature climate mitigation technologies, and no company declared any patent activity. Overall, this indicates an important area for improvement regarding R&D for most companies.

Average scores for **Module 6. Supplier engagement** and **Module 7. Client engagement** are 35% and 39% respectively. These relatively low results indicate that there is a lever for improvement by increasing collaboration between different companies within the aluminium value chain. At the same time, some of the participating companies questioned the relevance of the indicators in these modules (especially Module 7. Client engagement) for small- to medium-sized companies, as they considered being too far from the final client to be able to engage in a relevant way with their clients.

Highest scores were obtained for **Module 1. Targets**, rewarding companies which have set scope 1+2 targets, mostly compatible with the IAI pathways. Most assessed companies could demonstrate also that they had achieved previously set targets. Good results were also obtained in **Module 4. Sold product performance**, mainly since many companies in the sample produce aluminium products with a lower carbon footprint that the world average and have worked on improving it further in the past year.

The details of the score obtained for each module are given in the following paragraphs.

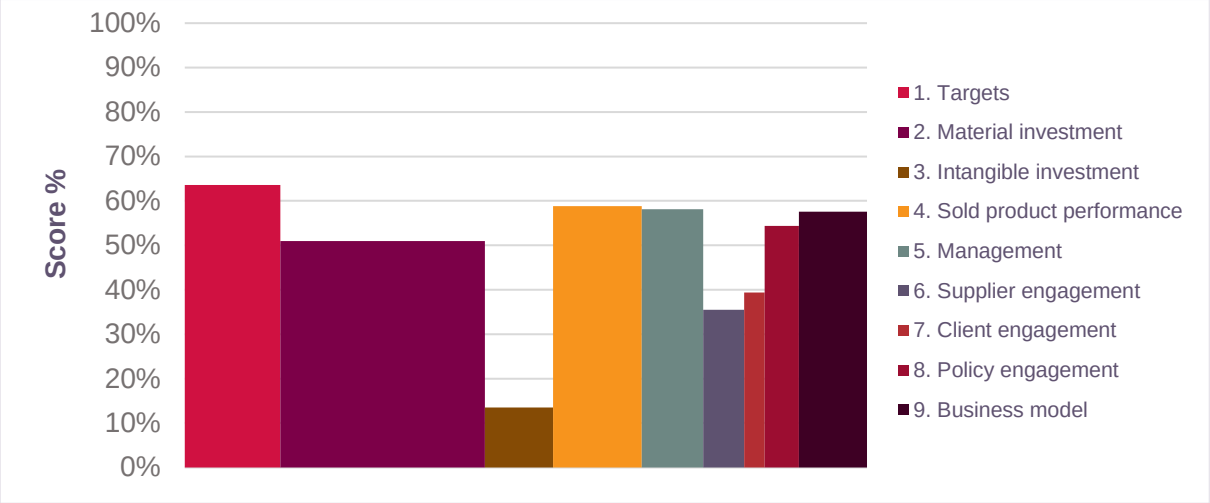

FIGURE 6: AVERAGE SCORES PER MODULE - ALUMINIUM SECTOR

MODULE 1. TARGETS (64%)

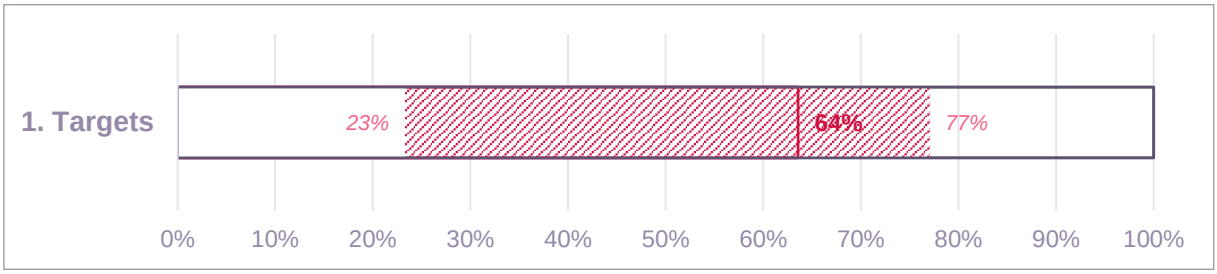

FIGURE 7: MODULE 1. TARGETS

Module description: Module 1 assesses a company's long-term targets and aims to compare these with the relevant low-carbon pathway for that company. All companies reported their targets.

Materiality for the aluminium sector: This module is material in the definition of a climate strategy with a weighting of 15%.

Main feedback / conclusions: All of the assessed companies have defined targets. Most of these targets cover scope 1 + 2 emissions with a short-term horizon (2025 being the most common target year among assessed companies). The lowest score in this module has been obtained for a company whose emissions intensity at reference year is already lower than its target set for 5 years later, without redefining a new and more ambitious target. Only one company reported targets covering scope 1, scope 2 and scope 3 upstream emissions. Most of these targets are aligned with the IAI pathways. Moreover, most companies could demonstrate that they had achieved the targets which they had previously set themselves.

A better score could be obtained in this module by setting longer-term targets, and covering scope 3 upstream emissions.

MODULE 2. MATERIAL INVESTMENT (51%)

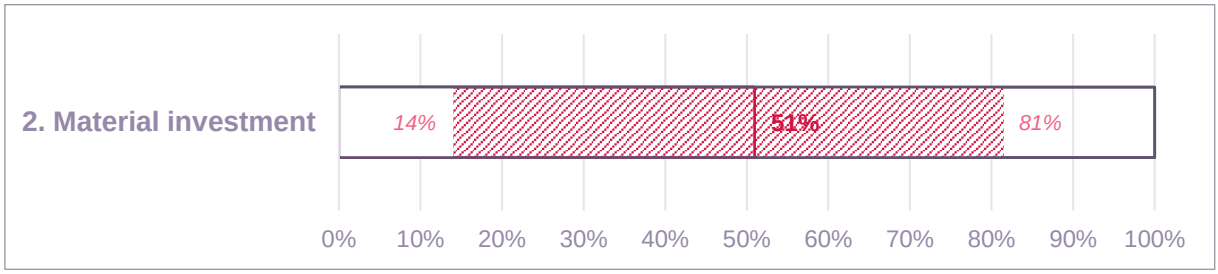

FIGURE 8: MODULE 2. MATERIAL INVESTMENT

Module description: Module 2 measures material investments in low-carbon activities and technologies. It calculates the performances as well as the locked-in emissions linked to aluminium assets. It also evaluates the contribution of the company to low-carbon electricity generation, and its maturity regarding process scrap generation reduction.

Materiality for the aluminium sector: This module assesses the consistency between a company's investment plan and the targets that have been set. The module has a weighting ranging from 12 to 35%. It was around 20% for one company which main activity is semis production, and around 30% for the 9 other ones.

Main feedback / conclusions: For companies assessed based on publicly available data, indicator AL 2.2 (Locked-in emissions) was difficult to assess, because information about planned investments is generally not publicly available. Data from the CRU Emissions Analysis Tool was however useful to get an estimate of the emissions intensity of the assets of those companies. For voluntary companies, concrete and detailed business plans were communicated, under the protection of the non-disclosure agreement.

Among the 10 assessed companies, 7 are operating at the electrolysis step. Their score for this module is mainly explained by investments in electrolysis assets, as they are responsible for most of their scope 1+2 emissions. For their respective reference year, 4 of these companies have an electrolysis emissions intensity which is already lower than what the IAI pathway expects for 2040, thanks to low scope 2 emissions. These 4 companies are the smelters which obtained the best score on this module. Smelters consuming electricity mainly generated from fossil fuels (coal and natural gas) obtained relatively low scores on this module, as the investment plan they declared was not compatible with the IAI pathways.

For companies which were not operating at the electrolysis step, better scores were obtained for past-oriented and present indicators than for future-oriented indicators in this module. This means that an action plan has been initiated, but its level of ambition must be reinforced to be compatible with the IAI pathways.

During the road test, indicator AL 2.4 (Contribution to low- carbon electricity generation) has been calculated for smelters only. The average score is 25%, which could be due to several reasons:

- This indicator required detailed information about the origin of electricity and was thus difficult to calculate. An updated version of this indicator has been developed during the road test and will be used in the final methodology.
- Smelters with low scope 2 emissions already rely on a low-carbon electricity mix, mainly for historical reasons (e.g. plants being located in areas where low-carbon electricity is produced thanks to hydropower or nuclear). These companies have therefore very little incentive to contribute further to low-carbon electricity generation.
- Among the assessed companies, smelters relying on fossil fuels have not yet implemented their strategy for increasing their share of low-carbon electricity consumption, and therefore cannot get a high score on this indicator.

Regarding indicator AL 2.5 (Reducing process-scrap generation), not enough data could be obtained for scoring 2 companies based on public data. For the 8 other ones, the average score is 79%, indicating a high level of maturity of the sector regarding this aspect. This is understandable considering the high economic incentive in reducing this scrap.

MODULE 3. INTANGIBLE INVESTMENT (14%)

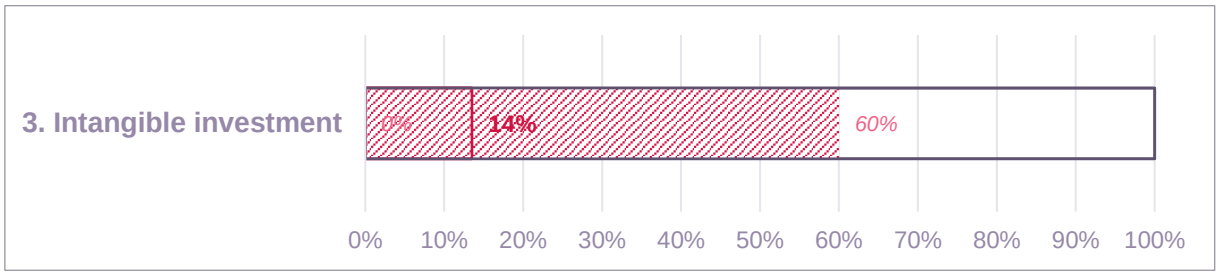

FIGURE 9: MODULE 3. INTANGIBLE INVESTMENT

Module description: Module 3 measures investments in the research and development of low-carbon and mitigation technologies. Companies are required to present expenditure figures in “mature” and “non-mature” technologies.

Materiality for the aluminium sector: R&D is key for developing new technologies to reduce direct emissions of the sector, improve electricity efficiency, and improve the contribution of the sector to low-carbon electricity generation (e.g. through improved electricity demand-side management). This module has a weighting of 10% for all companies.

Main feedback / conclusions: This module is the one with the lowest average score. Few companies declared investments in R&D for non-mature climate mitigation technologies, and no company declared any patent activity, leading to a score of 0% on indicator AL 3.2. Investing in R&D for climate mitigation technologies, and especially non-mature technologies, is a key aspect of a climate mitigation strategy. Aluminium companies could improve their ACT performance score by improving on this aspect.

MODULE 4. SOLD PRODUCT PERFORMANCE (59%)

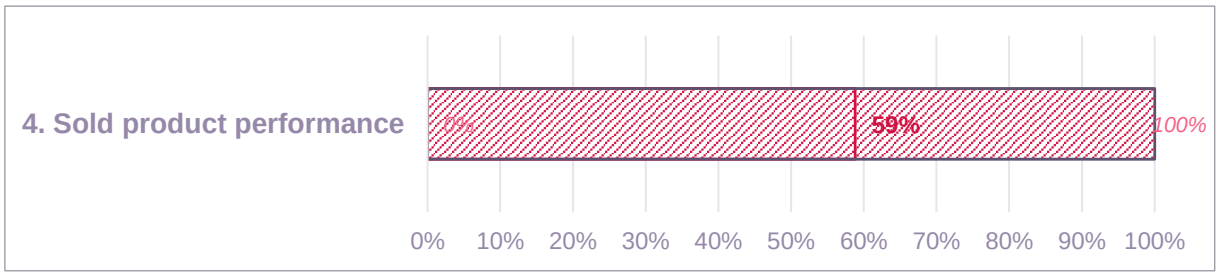

FIGURE 10: MODULE 4. SOLD PRODUCT PERFORMANCE

Module description: Module 4 analyses the trend in companies’ past emissions intensity and the specific interventions taken by companies to reduce the emission of their main purchased products.

Materiality for the aluminium sector: This module is material for the sector with a weighting ranging from 7% to 30%. It was around 22% for one company which main activity is semis production, and about 12% for the 9 other ones.

Main feedback / conclusions:

Results in this module are very diverse, as it does not assess the same type of actions for all types of companies. Indicator AL 4.1 (Cradle-to-gate aluminium carbon footprint) differs depending on the last step of the value chain operated by the company. For 6 of the assessed companies, the carbon footprint of their products has improved over the last 5 years at a rate which is compatible with the IAI pathway, leading to the highest possible score on this indicator.

Only three companies declared purchasing either alumina or aluminium externally, so AL 4.2 (Purchased product intervention) has been calculated for only these two companies. This information is generally not provided publicly by companies, so none of the companies assessed based on public data were scored. For those companies which were assessed on AL 4.2, scores were generally low. This means that whenever a purchase policy has been implemented on alumina or aluminium, its level of requirement must be raised to get a better score.

Scores on AL 4.3 (Recycled scrap traceability) ranged from 0% to 100%. This indicator has a higher weighting for recyclers in particular. The two recyclers obtained different scores, indicating that there are different practices, and that the indicator is able to score them differently.

MODULE 5. MANAGEMENT (58%)

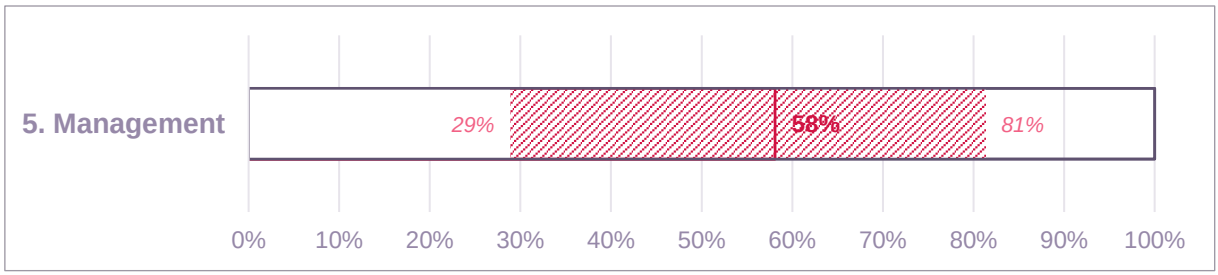

FIGURE 11: MODULE 5. MANAGEMENT

Module description: Module 5 evaluates whether companies have sound policies, structures, and oversight on climate-related issues. It incorporates many sub-indicators that together draw a picture of the company's management and strategic approach to the low-carbon transition.

Materiality for the aluminium sector: This module assesses companies' ability to carry out their transition plan and meet ambitious science-based targets. It is therefore material with a weighting of 10%.

Main feedback / conclusions: This was one of the highest-scoring modules, with an average score of 58%. However, the distribution of the score (ranging from 29% to 81%) shows that companies from the road test are at different stages along their low-carbon transition journeys. Some already display active management and leadership in this area (transition plan, incentives, oversight of climate change issues, etc.), while others are further behind. For most companies, decision-makers and employees have relevant expertise, but a more detailed and coherent low-carbon transition plan must be defined, including scenario testing.

MODULE 6. SUPPLIER ENGAGEMENT (35%)

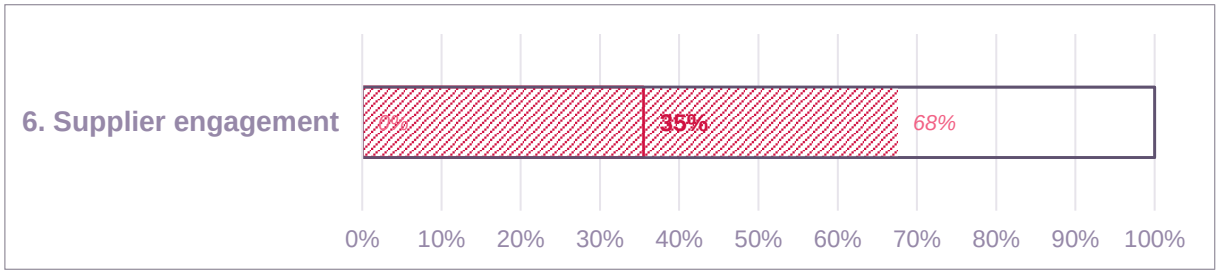

FIGURE 12: MODULE 6. SUPPLIER ENGAGEMENT

Module description: This module scores companies' strategies and actions for influencing their suppliers to improve their sustainability performance and decrease GHG emissions.

Materiality for the aluminium sector: While upstream suppliers are not necessarily of strategic importance to smelters and integrated companies, semis producers have a high level of influence on upstream actors, making this module material for them. Thus, the weighting ranges from 2% to 6% depending on the aluminium product that generates the highest amount of revenue.

Main feedback / conclusions: As this was the case with most qualitative modules, almost all companies were able to provide answers for Module 6. However, the distribution of the score (ranging from 0% to 95%) and the low average score shows variation in the level of supplier engagement maturity between companies. Most companies with high scope 3 upstream emissions have implemented a supplier engagement policy. When existing, the requirements of those policies must be raised, and their scope must be extended.

MODULE 7. CLIENT ENGAGEMENT (39%)

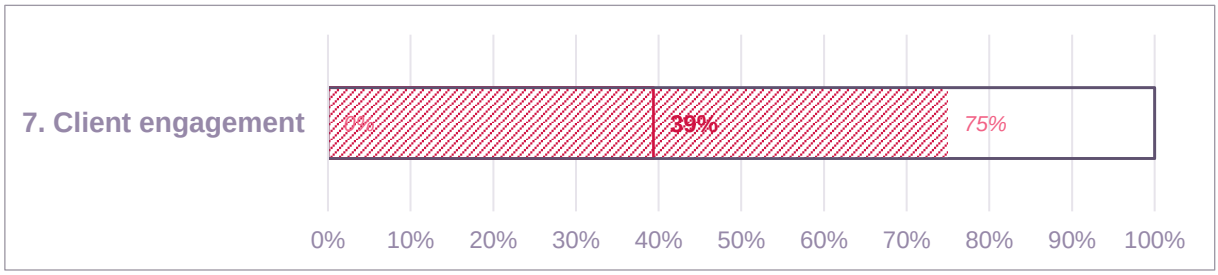

FIGURE 13: MODULE 7. CLIENT

Module description: The client engagement module is focused on companies' efforts to promote low-carbon products, more efficient use of aluminium (the right aluminium alloy for the right use, in the right quantity) and the recycling of products to their customers.

Materiality for the aluminium sector: Like Module 6, the weighting of Module 7 ranges from 2% to 6% depending on the aluminium product that generates the highest amount of revenue, with a higher weighting for products upstream in the value chain.

Main feedback / conclusions: The criteria for this module require companies to implement a strategy and mix of actions to encourage customers to decrease their climate impact, including awareness and education campaigns, monetary incentives, offering low-carbon products, etc. These strategies and actions must also target over 90% of customers and must include personalised support for clients representing over 60% of revenues to decrease their GHG emissions. Most companies reported implementing some of these action levers. Results suggest companies are not implementing multiple strategies at once or covering a large enough percentage of their client base. Therefore, the road test average score is 39% in this module,

indicating that companies need to strengthen and broaden the reach of their client engagement strategies and activities. Once again, similarly to the Supplier engagement module, scoring for Client engagement can be very different from one company to another.

MODULE 8. POLICY ENGAGEMENT (54%)

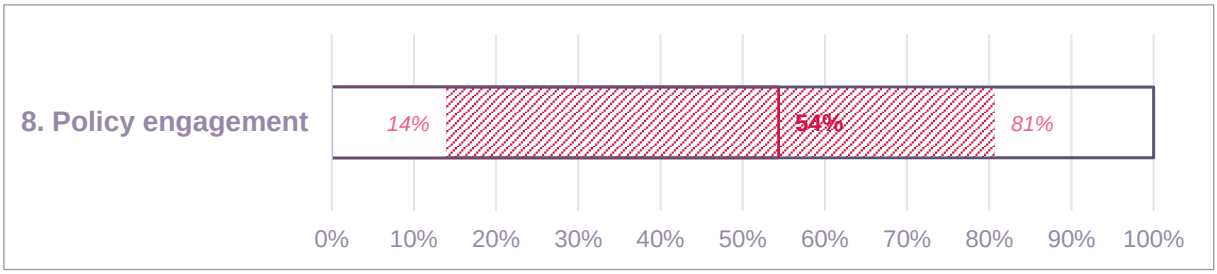

FIGURE 14: MODULE 8. POLICY ENGAGEMENT

Module description: The module evaluates companies' engagement with trade associations and their public positions on climate policies. Indicator AL 8.1 requires companies to disclose their internal policies and processes for joining, interacting with and influencing trade associations. Indicator AL 8.2 asks if companies support trade associations with climate-negative positions. Similarly, indicator AL 8.3 asks companies to disclose their position on significant climate policies. Specifically in ACT Aluminium, indicator AL 8.4 was introduced to assess collaboration with local public authorities, regarding aluminium scrap collection and sorting, and enhancing low-carbon transition of the grid (through contribution to low-carbon electricity generation and demand-side management).

Materiality for the aluminium sector: The policy engagement indicators provide a narrative about the company's stance on climate change and how the company expresses this in their engagement with policymakers and trade associations. The materiality of this module is therefore medium with a weighting of 5%.

Main feedback / conclusions: The lowest score obtained in this module is due to a company not providing enough information to be able to rate the maturity matrixes for related indicators. Scores for AL 8.1 (Company policy on engagement with trade associations) and AL 8.2 (Trade associations supported do not have climate-negative activities or positions) are specific to each company. They are mostly above 50% for companies which provided data, but few companies have practices which could be qualified as low-carbon aligned. Most assessed companies are members of the Aluminium Stewardship Initiative, a global non-profit standard-setting and certification organisation, which brings together producers, users and stakeholders in the aluminium value chain with a commitment to maximise the contribution of aluminium to a sustainable society and aims to collaboratively foster responsible production, sourcing and stewardship of aluminium.

Engagement with local authorities regarding electricity generation and circular economy is not common practice and should be reinforced.

MODULE 9. BUSINESS MODEL (58%)

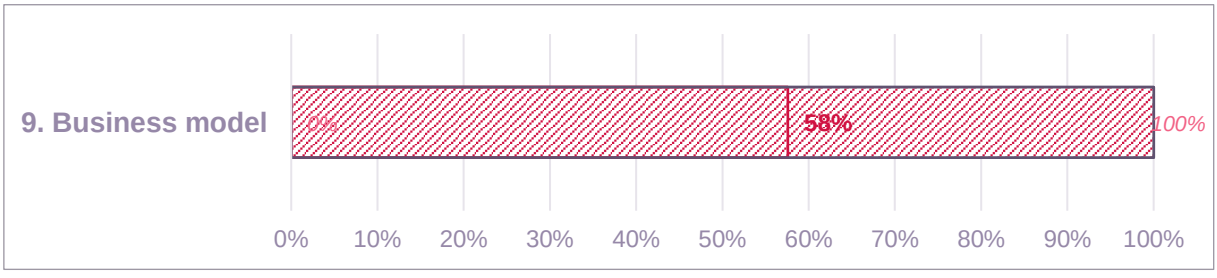

FIGURE 15: MODULE 9. BUSINESS MODEL

Module description: This module aims to evaluate new business activities that are being undertaken for the low-carbon transition. It evaluates activities that aim at 1) increasing low-carbon power production and/or a more flexible grid, 2) switching to low-carbon processes, or 3) taking part in aluminium circular economy.

Materiality for the aluminium sector: This module is future-oriented since it asks companies about their narrative on specific changes to business models and strategy that the sector can/must make to transition. As this is an important aspect of long-term future planning, it is material for the sector with a weighting of 10%.

Main feedback / conclusions: One company did not provide enough information for rating this module, which lead to 0% being the lowest score.

As for module 2, different categories of companies obtained similar score on indicators in this module:

- Four companies are operating at the electrolysis step and have an electrolysis emissions intensity which is already lower than what the IAI pathway expects for 2040, thanks to low scope 2 emissions. Those companies have a clear advantage in the low-carbon transition and performed well on most indicators in this module, as they have developed business models taking advantage of their current better performance.
- Integrated companies operating at the electrolysis step which have higher scope 2 emissions due to higher consumption of electricity generated from fossil fuels have comparatively lower scores, as their level of maturity on low-carbon transition is lower.
- Recyclers are key players for aluminium circular economy, and therefore score particularly well on AL 9.3.

AVERAGE ASSESSMENT RATING BY CRITERIA FOR THE NARRATIVE SCORE

The narrative score assesses the overall response of the company in four criteria: Business model and strategy, Consistency and credibility, Reputation, and Risk. Once a company's response was reviewed and scored, analysts completed the narrative score in the tool provided by ACT. It includes the scoring criteria for each dimension using the same achievement levels as other maturity matrices, from Basic (0 points) to Low-carbon transition aligned (4 points), as shown in Figure 16.

		Basic	Standard	Advanced	Next practice	Low-carbon transition aligned
1	Business model and strategy	The company does not seem to be able to be profitable in a low-carbon economy and there is no sign of internal efforts.	The company has begun to seek profitable activities in a low-carbon economy.	The company has identified profitable activities in a low-carbon economy, and climate issues have been integrated into its business model and strategy.	The company is in transition toward profitable activities in a low-carbon economy and there is evidence that mechanisms are being put in place for this purpose.	The company's activities seem to be profitable and its short-term strategy and targets are compatible with the low-carbon transition.
2	Consistency and credibility	The past and present actions, and transition plan if there is one, do not demonstrate overall coherence and the company does not seem to be able to achieve its climate objectives. Important efforts are needed for the implementation of a low-carbon transition plan.	The past and present actions are not in line with the company's potential climate objectives. However, there is some evidence that the company already begun to consider mechanisms to implement a low-carbon transition plan.	The past and present actions demonstrate that the company has a climate ambition, but additional efforts may still be needed to achieve climate targets. The company has started to establish an action plan to improve its climate performance.	The past and present actions are coherent with the company's transition plan. Additional efforts are needed but the company has always demonstrated the will to implement the needed mechanisms to stay aligned with its climate goals.	The past and present actions are coherent and already in line or beyond with a low-carbon transition.
3	Reputation	Existence of serious or several environmental controversies harming the company's climate commitments. There is no evidence that the company is addressing or taking the controversies seriously.	Existence of minor environmental controversies. There is no evidence that the company is working to avoid this kind of controversy.	Existence of minor environmental controversies. The company has made reliable commitments to address these types of controversies.	Existence of negligible environmental controversies that do not hamper the company's climate commitments. The company has always resolved environmental controversies with due importance.	No environmental controversies.
4	Risk	There are serious risks that could undermine the company's profitability and its ability to successfully implement a low-carbon transition plan. The company does not consider climate issues related to its activities and remains passive in the face of climate risks.	There are minor risks that could undermine the company's profitability and its ability to successfully implement a low-carbon transition plan. The company has begun to consider climate issues related to its activities.	There are minor potential risks that could undermine the company's profitability and its ability to successfully implement a low-carbon transition plan. However, there is evidence that the company is directing efforts to reduce these risks.	Risks that could undermine the company's profitability and its ability to implement a low-carbon transition plan are very limited. In addition, the company has always addressed and considered climate risks in its strategy.	No potential risk to the future profitability of the company or its ability to implement its transition to a low-carbon economic model.

FIGURE 16: NARRATIVE SCORING MATURITY MATRIX

The final average narrative score for the sector is B, suggesting assessed companies display an overall good performance but still need efforts to be aligned with a low-carbon pathway. This score is calculated by assessing each scoring criterion. Reputation was the highest-scoring criterion with an average score of 78%. The criteria Consistency and credibility and Risk obtained the lowest average scores, with 60% and 55% respectively. These average scores cover different realities specific to each assessed company.

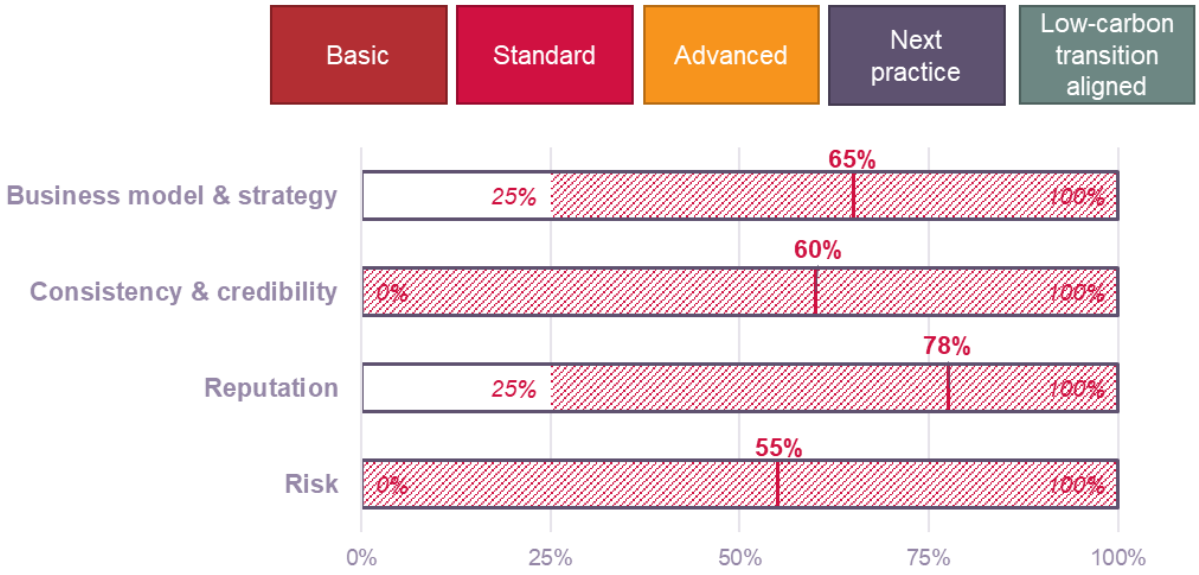

FIGURE 17: ACT ALUMINIUM ROAD TEST NARRATIVE SCORE RESULTS

Business model and strategy

This criterion obtained an average score of 65%. 4 companies obtained the maximum score on this criterion, having demonstrated that their business model is compatible with the low-carbon transition and profitable in the short-term. At the other end of the spectrum, 3 companies were rated Basic, as they have reported limited investments for developing a low-carbon offering or have not yet begun implementing a low-carbon strategy.

Consistency and credibility

The average score for this criterion was 60%. This criterion evaluates past, present and future performance and how it drives companies' low-carbon plans and commitments. The maximum score was 100% for this module. One company failed to provide information for previous or future sustainability performance, meaning analysts were unable to properly assess progress in this topic. The remaining companies have a Basic or Standard achievement, indicating that they are not yet taking sufficient climate action to transition to a low-carbon economy. It also reveals some mismatches between targets set and actual plans to achieve those targets.

Reputation

This is the highest-scored criterion of the narrative score, with 78% as average score. 5 companies have obtained the maximum score possible as research indicated they have no controversies or reputational issues.

Risk

The average score for this criterion is 55%. Only one company obtained a "Next practice" rating on this criterion. This result suggests companies are still exposed to transition risks as they have not implemented scenario testing or have not prepared sufficiently for alignment with a low-carbon economy. Most companies

obtained a Basic or Standard rating, suggesting they need to develop more advanced processes for identifying climate-related transition risks, and better strategies to mitigate them.

Final narrative scores

The average narrative score obtained was 12.9/20, which is equivalent to a B letter score.

Most companies obtained a B or a C score, suggesting they are in the development phase of low-carbon transition plans, but need to go further in the implementation of activities aiming to push forward the evolution of their business models. Companies in the sector should work on increasing transparency, boosting their low-carbon offering, and increasing their understanding of climate-related transition risks which might affect their future business activities.

TREND SCORE

Companies that received a positive trend score (7 companies) have reported relevant investments in low-carbon products and are working to substantially increase their offering with more sustainable fuels and low-carbon technologies. These companies have also incorporated suppliers and customers into their sustainability strategies and are attempting to reduce their indirect GHG emissions by implementing marketing strategies (promotion of low-carbon products or training of sales team) or diversifying their sold products.

However, the sector faces serious challenges, as evidenced by the 3 companies that obtained a negative trend score. Areas of improvement can be found in most areas assessed by ACT. Beginning with more transparency in reporting their performance, companies must prepare for a more demanding market, in which sustainability impacts are increasingly being scrutinised.

None of the assessed companies obtained an equal trend score.

ACT ADAPTATION

Elements of the new ACT Adaptation Methodology were tested with voluntary companies. It was not possible to test this for companies assessed based on public data, as very little data is publicly available on this topic.

Maturity matrices were found to be comprehensive, but it was difficult for companies to provide evidence for the scoring. It was also unclear for analysts what evidence should be provided. These observations tend to indicate that the requirements in the maturity matrixes should be more precise.

The current approach helps companies identify topics they should take into account. Companies who do not have any policy regarding those topics can be identified easily. However, making a distinction between companies that just started working on those questions, and companies which have implemented concrete actions was more difficult with the current framework.

FEEDBACK FROM PARTICIPATING COMPANIES

At the end of the assessment, analysts shared a form with participating companies to collect insights and feedback. The answers have been gathered to identify key findings. Several topics have been addressed through this form:

Key topics	Feedback from companies
Data collection process	- The methodology could build on data which was already available in the company environmental management system. Sometimes it needed some reworking to fit the expected format. Financial data were mostly estimated since the internal data do not *per se* offer the required categories and grouping. GHG emissions, energy intensities etc. had to be filtered to match the scope of the ACT work, which is different from the normal scope of the company.

Key topics	Feedback from companies
	- Significant work was needed for data collection: collecting all data for a comprehensive assessment took from 16 work hours for data collection (medium-sized company) to 15 days of work (large company). - Answers to the CDP questionnaire could be reused for several indicators, which helped the data collection process for companies which already answered. - Past data (reference year minus 5) is needed for some indicators. This data has to be reconstructed with the same boundaries when they were not available (level of robustness, calculation method and emissions factors could have changed in 5 years). This sometimes required some “educated guesses”.

ACT Assessment	- Good to exchange with the analyst to have orientations for data collection and explanations of the methodology and the scoring and recommendations
	- Terminology and concepts behind the questionnaire are sometimes confusing and difficult to understand. Guidance from the assessor was mandatory for fully understanding how to complete it. It would not be possible to complete the questionnaire in a meaningful way without this guidance.
	- The scope of the methodology does not fully match the scope of the companies. It was necessary to define which plants should be included in the ACT assessment.
	- Some concepts of the methodology are asked for all actors in the value chain, while some participants considered they are not really suitable:
	  - Module 3 (Intangible investment) is deemed applicable only for large companies. Small to medium-sized companies are rarely able to invest as much in R&D for non-mature climate mitigation technologies and develop patents.
	  - Module 7. Client engagement is deemed ignorant to some extent of market forces, scenario testing is a rather academic exercise, much too resource intensive for companies other than very large ones; etc.
	- One company reported that the ACT assessment performed during the road test will help strengthen its low-carbon transition strategy, as the assessment identified areas of improvement which were previously not considered.

ACT Methodology	- The ACT Methodology is globally well-designed tool for assessing the low-carbon strategy of a company in the aluminium sector. - The methodology is very operational and pragmatic. For one company, the road test took place during the update of their low-carbon transition strategy, and has been used to challenge the proposed strategy and ensure it was covering all relevant aspects
ACT Framework	- ACT has a wide approach. It covers not only targets, but a wide range of qualitative and quantitative indicators, as well as the business model criterion. This is very relevant as all aspects of the strategy can be assessed. Questions are relevant to challenge the strategy and decision-making regarding climate change. - ACT is more future oriented than other questionnaires, which helps to ask the right questions and guide the definition of the strategy. It is also complementary with other approaches such as the CDP questionnaire.

Key topics	Feedback from companies
ACT Adaptation	- ACT Adaptation provides a structured approach which is a good first step to tackle the topic of climate change adaptation.

FEEDBACK FROM ANALYSTS

Analysts have a key role during the road test:

- To guide companies through data collection and provide a relevant assessment;
- To have a critical view on the methodology and provide relevant feedback on all key aspects of the ACT Aluminium Methodology;
- To suggest solutions to improve the methodology and the data collection tool.

Therefore, analysts were asked to complete a form to give their opinion on the road test on 3 topics:

Key topics	Feedback from analysts
Data collection process	- Most companies were reactive and committed during data collection. However, the more effort the assessment takes, the less responsive the company becomes. - More guidance could be added in the questionnaire, especially on challenging indicators (Module 2, Module 9) - Important to warn the key contact that they might need the help of other departments at the beginning of the road test. - Interesting discussion with companies that were really involved - Process was clear: Steering Committee and MHQA meeting were helpful to validate questions from companies - If a company does not take the time to understand the methodology, it can later be time consuming for the analyst (major errors, not enough details, etc.).
ACT Assessment	- The process is very interesting and permits a constructive dialogue with the company. It helps to point out weaknesses and strengths from the company's climate strategy. - The ACT assessment tool has been developed in parallel to the road test, and several updates had to be performed for it to be completely usable, which brought about delays and inefficiencies in assessments. For future versions, a proper testing procedure of the tool should be conducted (e.g. with a set of theoretical case studies where the performance score can be easily calculated, and tool results can be checked). The tool should be as bug free as possible before being circulated to analysts. - Coherence between corporate-level data (Modules 1 and 2), and cradle-to-gate carbon footprint at product level (Module 4) is difficult for integrated companies purchasing or selling products at intermediate steps. Analysts had to rely on own calculations by companies, and this was difficult to check. - Module 5: more guidance should be provided on how to assess a company which is a subsidiary of a larger group, where management decisions regarding the climate strategy is defined at the group level. - Narrative score: Not enough guidance (categories affecting the narrative score if data not available or not justified) - The trend score tool could help better justifying how this score is evaluated.

Key topics	Feedback from analysts
ACT Methodology	- ACT Aluminium has been designed as a modular methodology, to adapt to the specificities of each type of aluminium producing company. However, it can make it more difficult to understand. Having the dynamic weighting tool within the data collection questionnaire makes it easier to understand which indicators are material for the company. - Maturity matrices could be more detailed, or examples could be provided to define the level of ambition of each level. A harmonisation meeting has been organised during the road test. During the meeting, the fact that different analysts would score the same company differently on several maturity matrixes was highlighted. While this harmonisation process is possible during a road test, it will not be possible when the methodology will be released. Clearer rules should be established regarding ACT assessment to ensure comparability within the sector and between sectors (objective of MHQA).

2. Conclusion and outlook

SUCCESS OF THE ROAD TEST

- Ten assessments were completed during the road test, with a good coverage of the aluminium value chain.
- There was **good engagement** from many of the companies involved in the road test, including, in many cases, valuable feedback on the data collection process and the methodology.
- The consortium believes that thanks to improvements which will be made after the road test (mainly to improve the usability of the online tool and some methodological amendments), the Aluminium Methodology will provide a fair reflection of a company's readiness to transition to a low-carbon economy.
- Global data collection rate is fairly satisfactory, with only a few indicators for which data collection was limited by confidentiality issues.
- The current assessment methodology illustrates clearly to companies where the main gaps / areas for improvement are and encourages much greater transparency on climate performance, strategies and transition plans and will help to raise the bar for the sector as a whole.

LIMITATIONS OF THE ROAD TEST

- **Usability of the online tool:** without making the tool more user-friendly, analysts will continue to find it challenging to use the tool and carrying out the assessments. This could lead to a push-back on the methodology / framework itself. In particular, if the online tool and the Excel data collection questionnaire are kept as two separate documents, it would be preferable to have exactly the same format of data between both tools, so that copy / pasting is facilitated. Ideally, automatic import of the data collection questionnaire within the assessment tool would be implemented.
- **Data confidentiality** was a challenge for many of the companies, mainly regarding the signature of non-disclosure agreements and some particular modules (3 and 9). Several companies which were initially interested in participating to the road test did not join or withdrew from the process due to confidentiality issues. The methodology requires companies to disclose in full commercially sensitive information. This will likely be reflected in low scores for the given modules and potential reluctance from companies to participate in the assessment.
- **Representativity of the company sample:** Only 5 voluntary companies were assessed. Regarding assessments based on public data, not all companies disclose the data required for an ACT assessment. The most transparent companies were selected for an assessment, and they are likely to be the most mature ones regarding climate change mitigation. Road test results should therefore not be considered as representative of an average company from the aluminium sector.

RECOMMENDATIONS TO EXTEND THE METHODOLOGY TO THE REST OF THE SECTOR

The consortium has provided a list of all the comments received by companies, and is currently considering them to enhance the methodology and the data collection tool. Improvements on the on-line tool will be realised by ADEME. The following points summarise the key recommendations to be addressed.

Improving tools:

- **More guidance in the data collection tool should be provided:** Lots of exchanges between analysts and assessed companies have been needed to carry out assessments. Most of them were about clarifying concepts and helping in interpretating the content of the data collection tool. While such engagement is important, some could have been avoided with clearer guidance on how to complete the data collection tool.
- **A more user-friendly and stable online tool should be provided:** The pace of the assessment was often slowed by repetitive bugs encountered in the online tool. These hiccups in the process led to delays and lowered companies' confidence in the overall ACT initiative. Also, companies would like to be able to review their results in the tool, and currently the Json format is not common enough for this purpose. Having a more stable ACT assessment tool, and improving its consistency with the data collection tool would make the work of analysts simpler, helping them to focus on assisting companies and provide more added value.

Clarifying technical aspects of the methodology:

- **Emissions reporting should be clarified:** All emissions from electrolysis should be reported in the electrolysis segment, regardless of whether the input material includes a small portion of scrap aluminium. The casting step in the tool applies only to primary casting. Secondary casting emissions should be included in either recycling or internal scrap remelting. The boundary between semis production (emissions to be reported for an ACT assessment) and further manufacturing steps which are sometimes included within selected plants (e.g., painting) should be clarified in the methodology.
- **Emissions from hydrogen and biofuels production in Module 2:** Some companies plan to invest in hydrogen or biofuels technologies in order to decarbonize the alumina refining process. Emissions for producing those fuels are not negligible, but they are generally not included as scope 2 emissions. As IAI pathways integrate emissions from H2 production in their figures, it should be included in the calculation, even if it is not strictly consistent with the current definition of scope 2. Regarding biofuels, emissions from producing biofuel from biomass should also be included. CO_2 emissions from burning biofuels can be neglected as long as they are produced from sustainable sources. These clarifications should be added to the methodology.
- **Extending some indicators from Module 2 and Module 8 to all actors:** indicators AL 2.2 (Locked-in emissions), AL 2.4 (Contribution to low-carbon electricity) and AL 8.4 (Collaboration with local public authorities) are calculated only if the company is active in specific segments. While these aspects are more relevant for emission intensive processes, those aspects are also relevant for other actors. Therefore, it is recommended to extend those indicators to all actors as well, with weighting reflecting their relevance.
- **Adapting the dynamic weighting system:**
    - During the road test, weights of Modules 6 (Supplier engagement) and 7 (Client engagement) were calculated according to the product generating the highest share of revenue for the company. The road test highlighted that this system is not relevant: an integrated company selling semis using its own primary aluminium production should be focusing more on client engagement than supplier engagement, which is the opposite of the weighting obtained with this system. Considering the lack of a better solution, it is recommended to harmonise the weightings of Module 6 and Module 7 to 4% for all actors.
    - Regarding Module 2 and 4, all integrated actors obtained similar weights (30% ± 1% for Module 2 and about 12% ± 1% for Module 4), which are very close to weights expected for

pure smelters. Despite this observation, the dynamic weighting for Module 2 and 4 is still deemed relevant for the following reasons:

- One of the assessed companies was active on both semis production, recycling and internal scrap remelting. Its weights were specific to its activities and different from the default pure segment weights.
- A similar calculation is required to define the indicator weighting within each module. Keeping a dynamic weighting for Modules 2 and 4 does not make it much more complex, while being adaptable to each type of company.

- **Clarifying the concept of "decarbonisation of electricity generation":** some companies assessed during the road test are selling electricity generated from natural gas to a grid where average emissions are higher than the ones from natural gas. The methodology should be clearer regarding whether this should be considered as contributing to the decarbonisation of electricity generation or not. It is recommended to set a clear emission threshold for electricity generation, helping categorising electricity generation assets. The consortium suggests using the criteria of a cradle-to-gate carbon footprint of electricity lower than 100 g CO_2e/kWh, aligning with Climate Bonds and the EU taxonomy. This criteria should be used consistently throughout the methodology (in AL 2.4, AL 8.4 and AL 9.1).

CONTRIBUTION OF ACT TO ENGAGING COMPANIES IN THE LOW-CARBON TRANSITION

Throughout the road test, most companies showed interest in completing the assessment and acknowledged the role of ACT in encouraging greater shifts within the sector, in relation to increased transparency and ambition around low-carbon transition plans. In addition, companies provided feedback on the assessment methodology and tools. With a few exceptions, companies in the road test demonstrated they are working towards developing and implementing effective sustainability strategies, but that there is some way to go before these 1) reach the level of ambition required to align with a low-carbon pathway, and 2) are being complemented by real action and adequate material investments, for example in investing in more efficient electrolysis processes and reducing indirect emission from electricity generation.

Given this context, the following themes emerged in relation to the contribution of ACT, and the road test process, in engaging companies in the low-carbon transition:

- **Companies understand the importance of having and communicating a robust and ambitious sustainability strategy**: Almost all companies in the road test had sustainability strategies or low-carbon plans in the development process, but not everyone of them were yet finalised, published, or supported by in-depth capex programs.
- **Companies are better aware the level of transparency being called for:** Companies acknowledged that the ACT assessment is more ambitious than other frameworks, and recognise the need to update their GHG accounting and push for a higher degree of transparency in order to perform well in the assessment. However, the feedback from companies and significant data confidentiality concerns suggests it will take some time for them to adjust to this new standard.