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Investor Contact
James Dwyer
412-992-5450
James.Dwyer@alcoa.com

Media Contact
Jim Beck
412-315-2909
Jim.Beck@alcoa.com

Alcoa Announces Technology Roadmap to Support Its Vision to Reinvent the Aluminum Industry for a Sustainable Future

PITTSBURGH – November 8, 2021 – Alcoa Corp. (NYSE: AA) today unveiled a technology roadmap to support the Company's vision to reinvent the aluminum industry for a sustainable future.

The technologies in Alcoa's roadmap, including a new, proprietary post-consumer scrap recycling process, have the potential to decarbonize a significant portion of the upstream aluminum supply chain and provide a competitive advantage in a carbon-constrained world.

Materials regarding the technologies are included with other information available on the Company's website related to Investor Day, which includes a live question and answer session at 9 a.m. EST on Tuesday, November 9, 2021.

The roadmap, which aligns with the Company's Purpose to "Turn Raw Potential into Real Progress," includes three key programs:

- The Refinery of the Future, which aims to both reduce the capital cost of developing a refinery and enable decarbonization of the alumina refining process. Alcoa would use a combination of processes and technologies that are under development, including mechanical vapor recompression and electric calcination to develop this future-focused design.
- The ASTRAEA™ metal purification process developed by Alcoa for recycling post-consumer, aluminum scrap into high-purity aluminum. The process could create an entirely new value chain to economically produce aluminum of a quality that far exceeds the purity of the commercial-grade aluminum produced in a smelter.
- The ELYSIS™ joint venture technology that eliminates all greenhouse gases from the traditional smelting process. The breakthrough process uses next-generation electrode design and proprietary materials first developed at the Alcoa Technical Center and emits pure oxygen as a byproduct at a lower operating and capital cost than conventional technology.

"Our technology roadmap represents an array of next-generation solutions that could significantly reduce emissions across the upstream value chain and concurrently generate significant stockholder value," said Alcoa President and CEO Roy Harvey. "Our Refinery of the Future design and the ELYSIS zero carbon smelting technology, as just two examples, not only aim to reduce costs and improve efficiency in aluminum production, but target complete reduction of greenhouse gas generation from their respective production processes."

Harvey continued: "Alcoa developed the aluminum industry more than 135 years ago, and that legacy of innovation motivates us to help create a better future for tomorrow – one where we are leveraging our products, processes, and people to realize our vision to reinvent the aluminum industry for a sustainable future."

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The technology roadmap also helps support Alcoa's pathway to reaching its ambition to achieve net zero greenhouse gas (GHG) emissions by 2050 across its global operations, including Scope 1 and Scope 2 emissions.

The ASTRAEA technology: Enabling a new value chain to create high purity aluminum
Alcoa has developed a patented process to purify any post-consumer aluminum scrap into a purity level of P0101, surpassing the purity of P1020 aluminum that is produced at any commercial smelter. Today, there is a vast supply of aluminum scrap that can only be used for limited applications due its combination of impurities.

As feedstock for this process, Alcoa is targeting Zorba auto shred scrap as a raw material. Today, there are no commercially available processes to strip this scrap of trace metals and bring it to the suitable purity for most rolling or extrusion applications. Alcoa's ASTRAEA process is the first and only technology that can purify this low-value scrap.

By converting this low-value, aluminum scrap into high purity aluminum, the ASTRAEA process enables manufacturers to blend with lower-purity scrap, significantly increasing the pool of post-consumer scrap that can be used as a raw material once more. It also allows some specialty aerospace and defense applications to use scrap, which would be a first for those industries.

The Refinery of the Future: Targeting zero-carbon emissions alumina refining
Alcoa's Refinery of the Future program will use a host of technologies and processes to design a refinery that lowers capital intensity, eliminates carbon emissions, and addresses other industry challenges, including reducing or eliminating bauxite residue. From the environmental perspective, it will be designed around two technologies – mechanical vapor recompression (MVR) and electric calcination, which allows for a self-enclosed calciner operating environment that captures steam and allows the calciner to be connected to a renewable-powered electric grid. The technology also retains all the water from the original feedstock.

When combined with a decarbonized grid, these two technologies enable a pathway to a zero-emissions alumina refining system.

MVR is a renewable energy-powered process that recycles low-pressure steam in the refining process, offering the potential to reduce carbon emissions in alumina refining by up to 70 percent. Alcoa is currently evaluating the application of this technology in Australia with support from $11M grant from the Australian Renewable Energy Agency (ARENA). The process reduces water consumption by up to 35 percent.

ELYSIS: Decarbonizing aluminum smelting
The ELYSIS joint venture is built around a zero-carbon smelting technology invented by Alcoa that has the potential to revolutionize how aluminum is made by removing all carbon dioxide emissions from the traditional aluminum smelting process, while lowering operating costs and improving productivity.

Last week, ELYSIS announced that it is now producing metal with the carbon-free smelting process at its Industrial Research and Development Center, using a full industrial design. The design is similar in size to small, commercial smelting cells in operation today. Also, metal produced from the ELYSIS process has been used by companies such as Apple and Audi.

ELYSIS expects its technology can be offered for commercial application as soon as 2024 with installation by smelting customers possible approximately two years later. The joint venture intends to operate a commercial-scale prototype of the technology in 2023, and construction of prototype cells operating on an electrical current of 450 kA currently underway. These cells are designed to be used as a 'drop-in' replacement to retrofit existing smelters or build new ones and can be scaled to other sizes as needed.

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About Alcoa Corporation
Alcoa (NYSE: AA) is a global industry leader in bauxite, alumina, and aluminum products, and is built on a foundation of strong values and operating excellence dating back 135 years to the world-changing discovery that made aluminum an affordable and vital part of modern life. Since developing the aluminum industry, and throughout our history, our talented Alcoans have followed on with breakthrough innovationsand best practices that have led to efficiency, safety, sustainability, and stronger communities wherever we operate.

Dissemination of Company Information
Alcoa intends to make future announcements regarding company developments and financial performance through its website, www.alcoa.com, as well as through press releases, filings with theSecurities and Exchange Commission, conference calls, and webcasts.

Forward-Looking Statements
The session may contain statements that relate to future events and expectations and as such constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements include those containing such words as “anticipates,” “endeavors,” “working,” “potential,” “ambition,” “develop,” “reach,” “believes,” “could,” “estimates,” “expects,” “forecasts,” “goal,” “intends,” “may,” “outlook,” “plans,” “projects,” “seeks,” “sees,” “should,” “targets,” “will,” “would,” or other words of similar meaning. All statements by Alcoa Corporation that reflect expectations, assumptions or projections about the future, other than statements of historical fact, are forward-looking statements. Forward-looking statements are not guarantees of future performance and are subject to known and unknown risks, uncertainties, and changes in circumstances that are difficult to predict. Although Alcoa Corporation believes that the expectations reflected in any forward-looking statements are based on reasonable assumptions, it can give no assurance that these expectations will be attained and it is possible that actual results may differ materially from those indicated by these forward-looking statements due to a variety of risks and uncertainties. Additional information concerning factors that could cause actual results to differ materially from those projected in the forward-looking statements is contained in Alcoa Corporation’s filings with the Securities and Exchange Commission. Alcoa Corporation disclaims any obligation to update publicly any forward-looking statements, whether in response to new information, future events or otherwise, except as required by applicable law.

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