CIRCULAR SYSTEM ALUMINUM

Photo by Massimo Virgilio via Unsplash

Aluminum, EU - Circular System Characteristic

System characteristics:

The demand for aluminum is still growing (40 % until 2050). Despite high recycling rates, less than 50 percent of the raw material supply in Europe (West) can be covered by scrap aluminum. Significant differences between western European and eastern European countries and between the industrial sectors exist. Highest recycling rates and circularity rates in key industries with technology leadership in the world market are aircraft construction, automotive, industrial construction and construction industry, packaging.

Availability/Role of recycling technology:

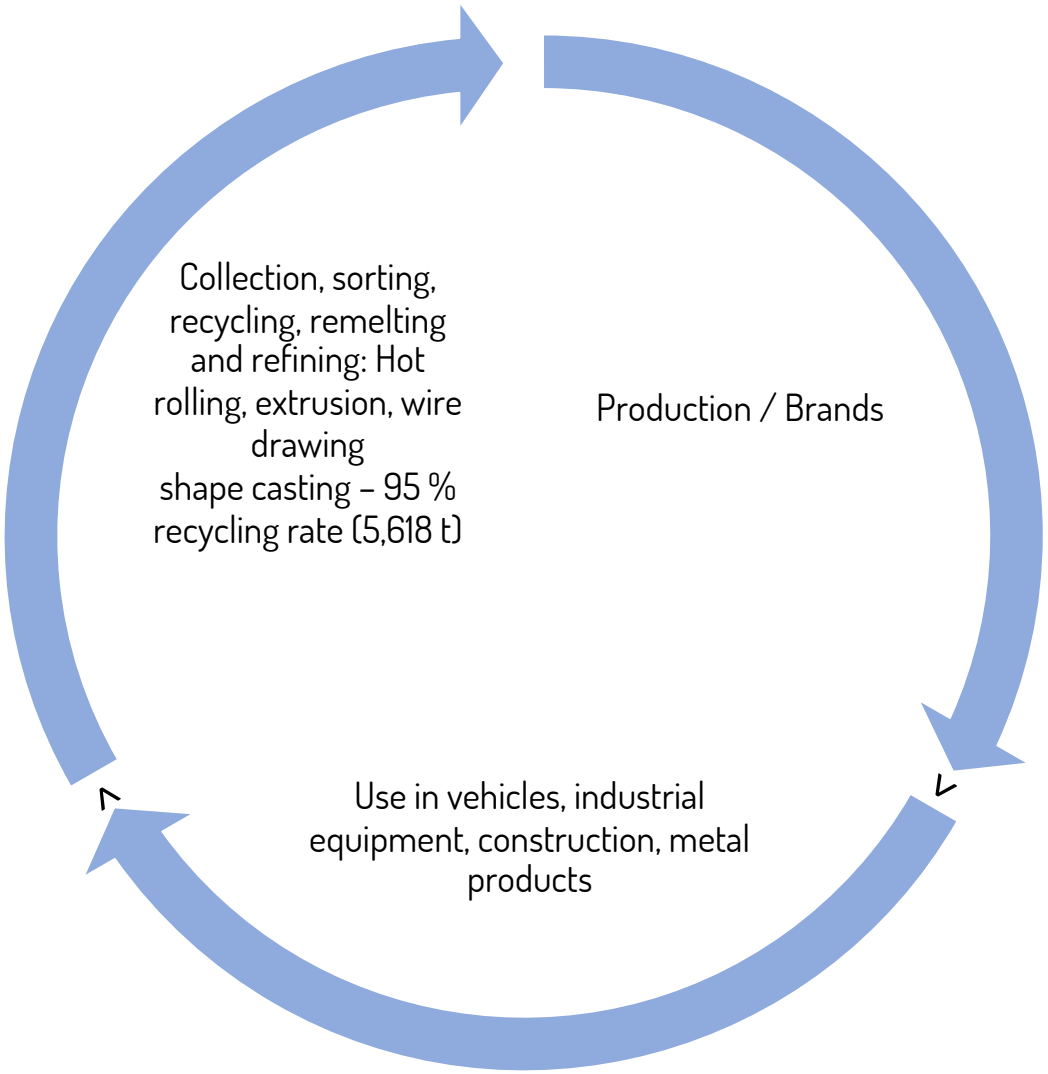
- The **growth of the aviation industry** in 20th century and **resource scarcity for airplanes in World War I and II** enabled break-through of recycling technology.

Maturity of market:

- Well organized European aluminum recycling industry comprises several thousand actors and includes scrap collectors, scrap merchants, remelters and refiners (160).
- Oligopoly market(s) – for bauxite (aluminum source).
- Aluminium is expected to increasingly replace other materials (like steel, copper, plastics, PVC, etc.).

Policy intervention type/regulations/directives:

- Circular Aluminum Action Plan – addressing the environmental, economic and social potential of a circular aluminum industry (strategy to achieve full circularity, launched by the European aluminum industry, April 2020).
- European Green Deal/Circular Economy, EU Commission (2019).
- 2nd Circular Economy Action Plan, EU Commission (2020).



Source:, European Aluminium Association 2020, Lanham 2015 , Giani 2015; Sustainable Bauxite Mining Guidelines, International Aluminium Institute 2018

SWOT Aluminum

Strength

1. Nearly closed loop
2. Technical cycle, C2C
3. 75 % of aluminum ever produced is still in use
4. Recycling is energy efficient (95% less energy)
5. Highly efficient market allocation

Weakness

1. Low supply responses to demand
2. Loss of scrap in composite waste

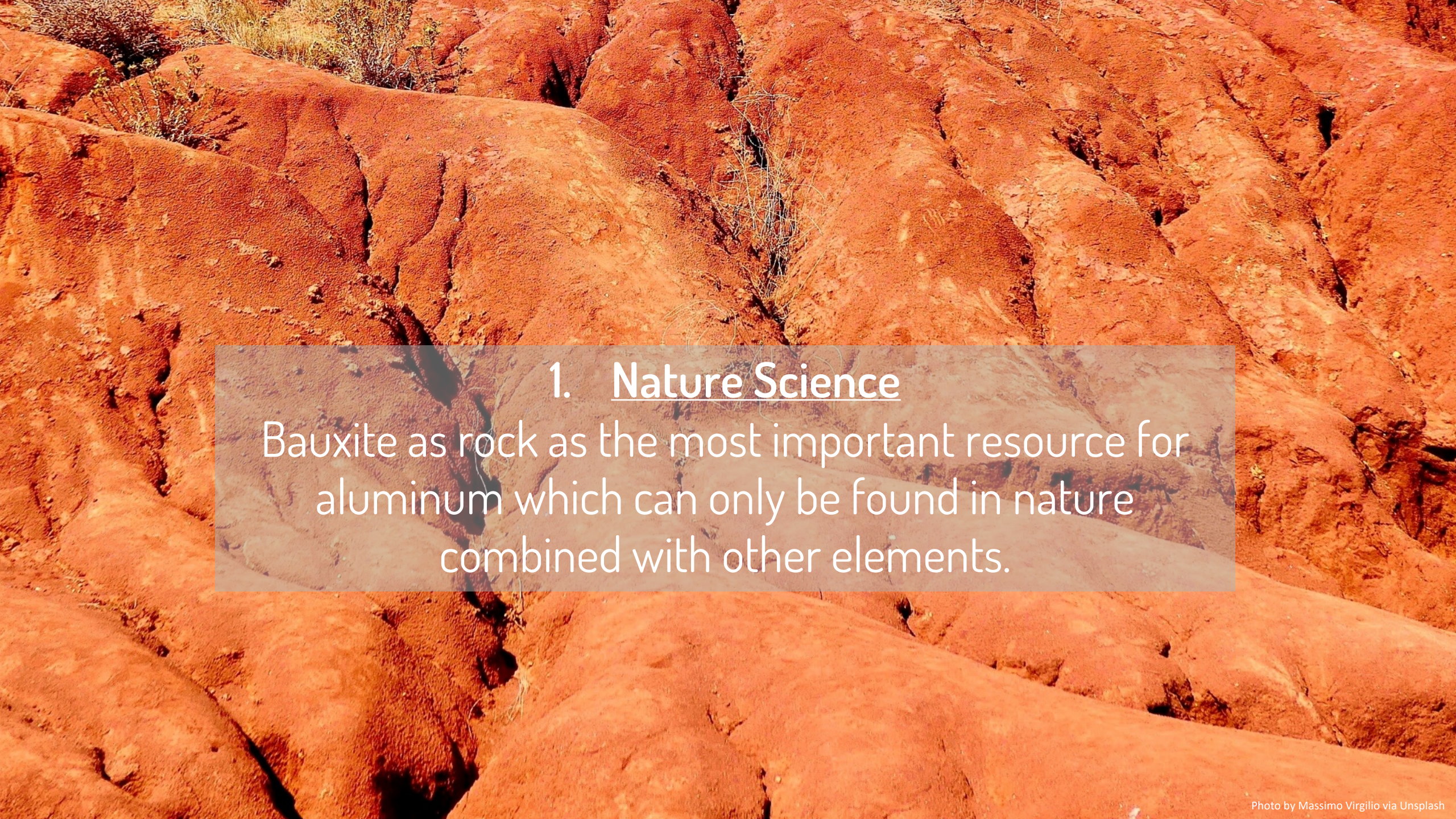
Opportunity

1. Growing industrial demand
2. Cost effectiveness
3. Recovery from incineration possible
4. Little policy intervention needed

Threat

1. Monopolistic resource concentration
2. Geopolitical resource policies

Source: European Aluminum Association 2019, Int. Aluminum Institute 2018, Ellen MacArthur Foundation 2017, European Green Deal 2021, First Circular Economy Action Plan 2020, Alumina Production 2021



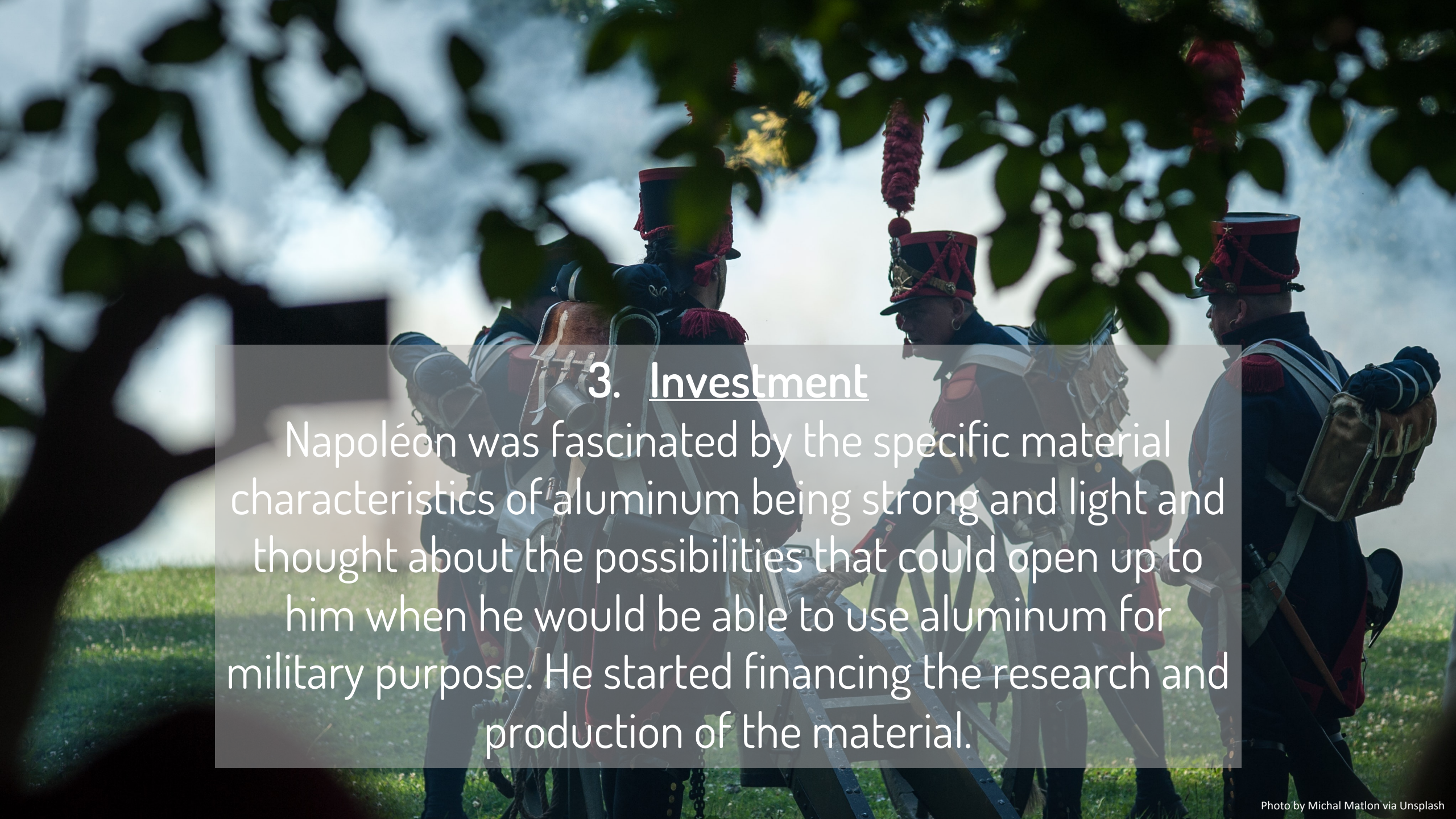
1. **Nature Science**

Bauxite as rock as the most important resource for aluminum which can only be found in nature combined with other elements.

Photo by Massimo Virgilio via Unsplash

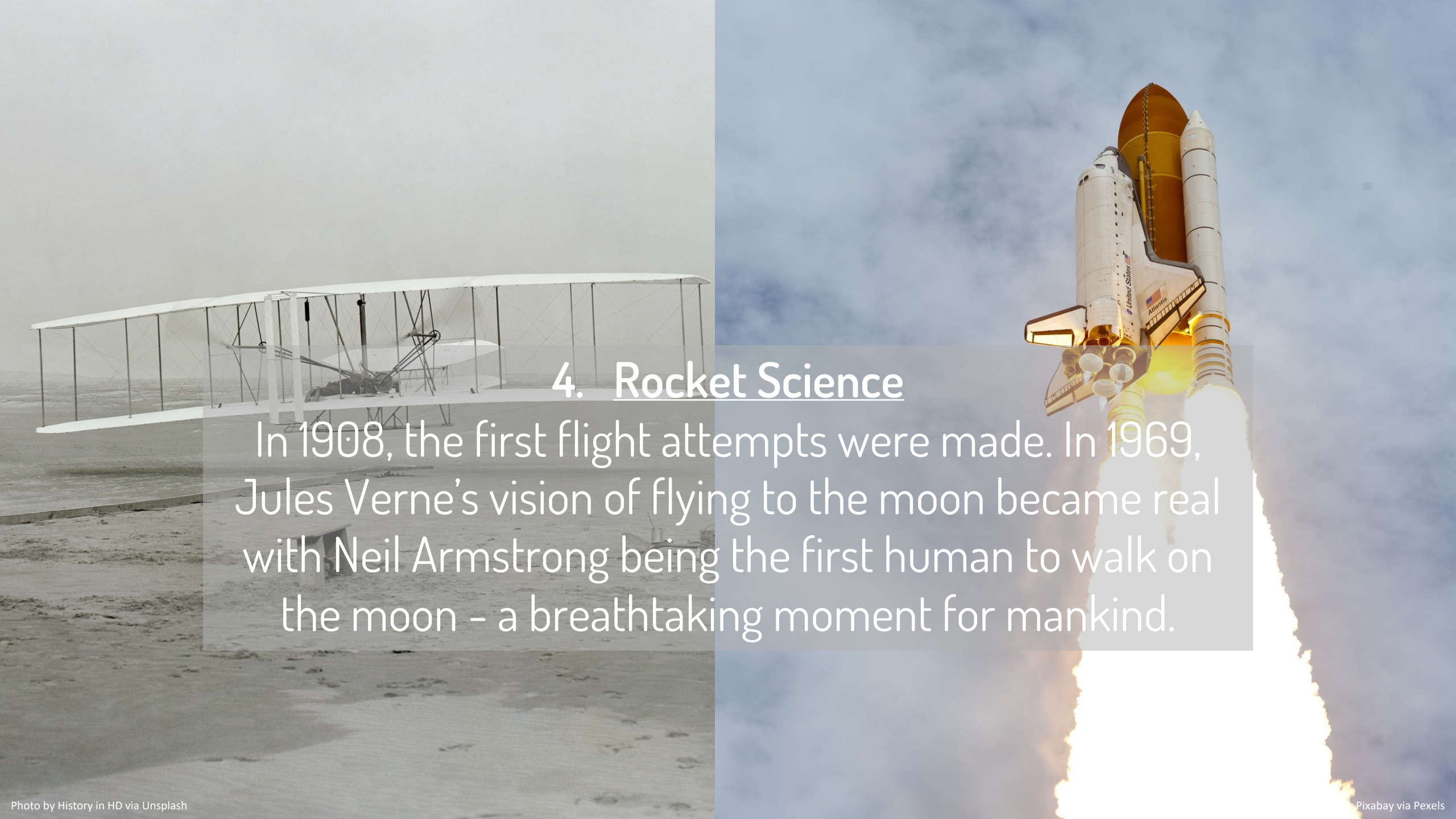
2. Envisioning

It is not long ago that humans were dreaming about flying but never thought it could and would happen. It was in 1890 that French engineer Clément Adler, who was actually the inventor of the term “avion” and one of the fathers of aviation, said: “Whoever dominates the sky will be master of the world!”



3. Investment

Napoléon was fascinated by the specific material characteristics of aluminum being strong and light and thought about the possibilities that could open up to him when he would be able to use aluminum for military purpose. He started financing the research and production of the material.



4. Rocket Science

In 1908, the first flight attempts were made. In 1969, Jules Verne's vision of flying to the moon became real with Neil Armstrong being the first human to walk on the moon - a breathtaking moment for mankind.

Photo by History in HD via Unsplash

Pixabay via Pexels

5. Historic Event

In World War I and II, aluminum supply went short. Companies started recycling.

6. Cognition for System Relevance

Aluminum has become indispensable for many applications.

Photo by Jerome Monta via Unsplash

7. Technical Innovation

Market players have developed decentral small-scale sorting and recycling technology to solve diversification. Anyhow, scrapyards still exist –mainly in Global South.

Photo by David [illegible] on Unsplash

Photo via luftfahrt24.de

EUROPEAN ALUMINIUM

8. Business Innovation

The system has become manageable through a network of players.

The Aluminum Association

9. Life Cycle

System has evolved. Technical cycle is working.

Photo by Darren Patterson via Pexels

10. Forecast

Aluminum demand is forecasted to remain and even rise but also threatened through composites.

Photo by Pixabay via Pexels

Society

Organization

Individuum

7. Handling Diversity

8. Business Innovation

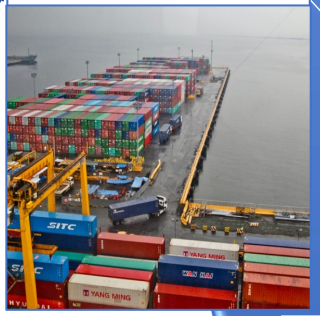
EUROPEAN ALUMINIUM

The Aluminum Association

9. LCA

10. Foresight

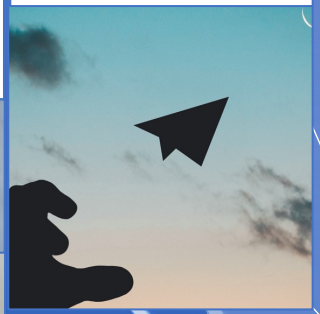
6. Cognition for System Relevance



5. Historic Event

4. Rocket Science

2. Vision



3. Investment

1. Discovery

Aluminum cycle evolvement

Thank you for your attention

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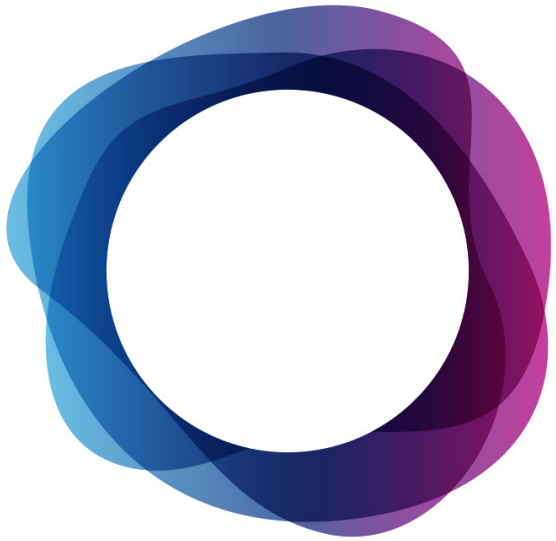

Thinking Circular