



Bauxite & Alumina – path to full operations

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Strong assets and organization

Capable of quickly adapting to changes

- Highly qualified and engaged organization in Brazil
- High-quality assets
 - Cost position
 - Product quality
 - Operational flexibility
- February events drives even faster improvements in:
 - Refinery operations aiming to becoming the industry benchmark
 - Involving communities in emergency preparedness plans
 - Community and stakeholders relations

*Better
Bigger
Greener*



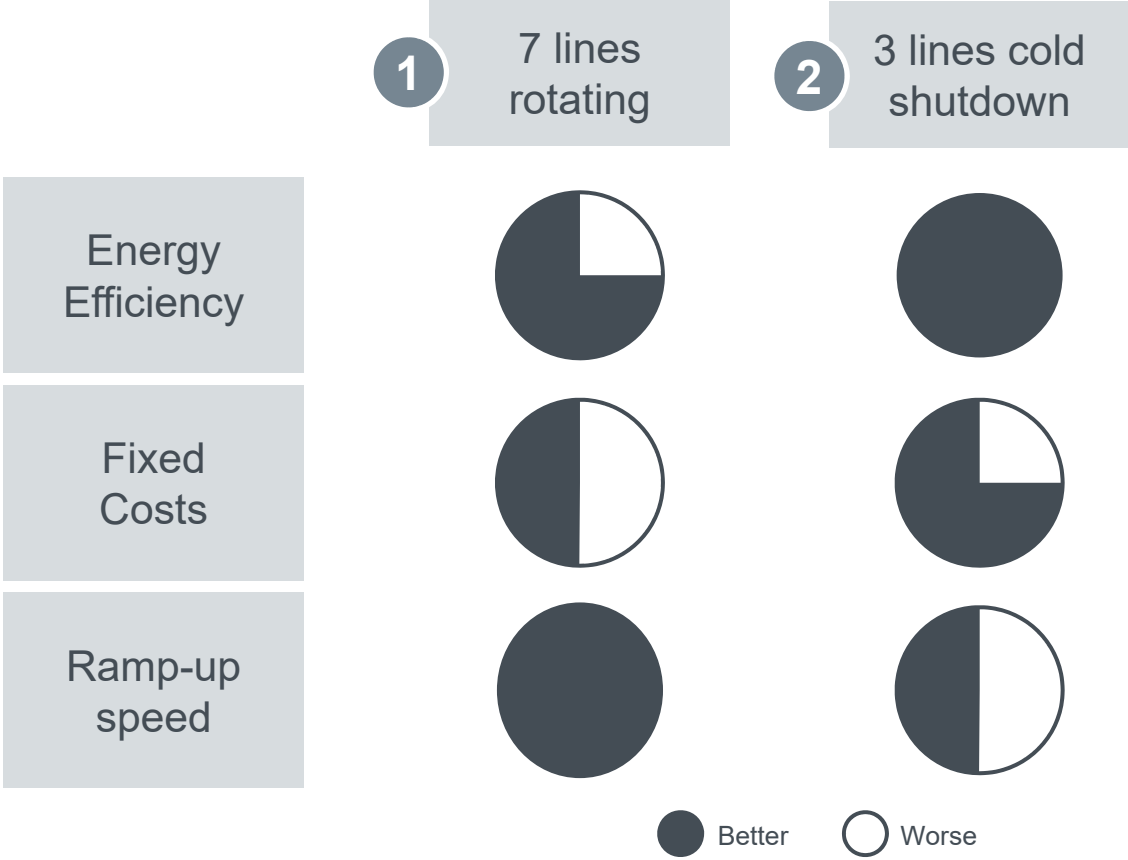
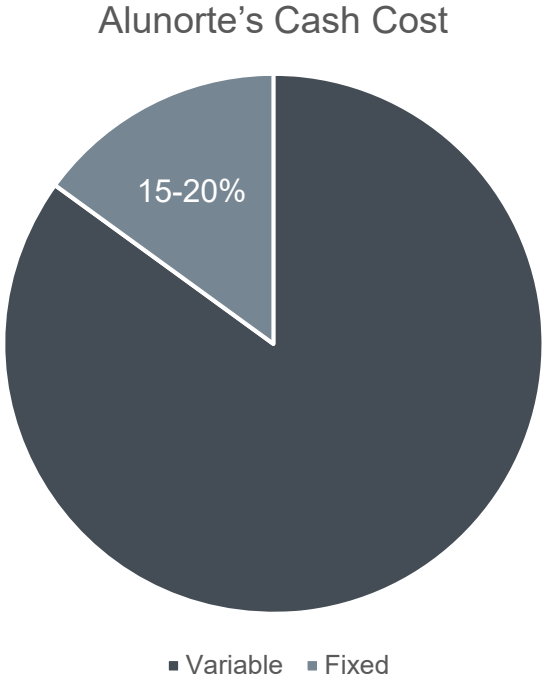
Care. Courage. Collaboration.

Alunorte's operating mode under curtailment



Currently rotating all 7 lines – operating mode continuously evaluated

Alunorte's competitive cash cost is mostly variable and therefore not materially affected by the production level



Bauxite supply to Alunorte

Maintaining the bauxite mix

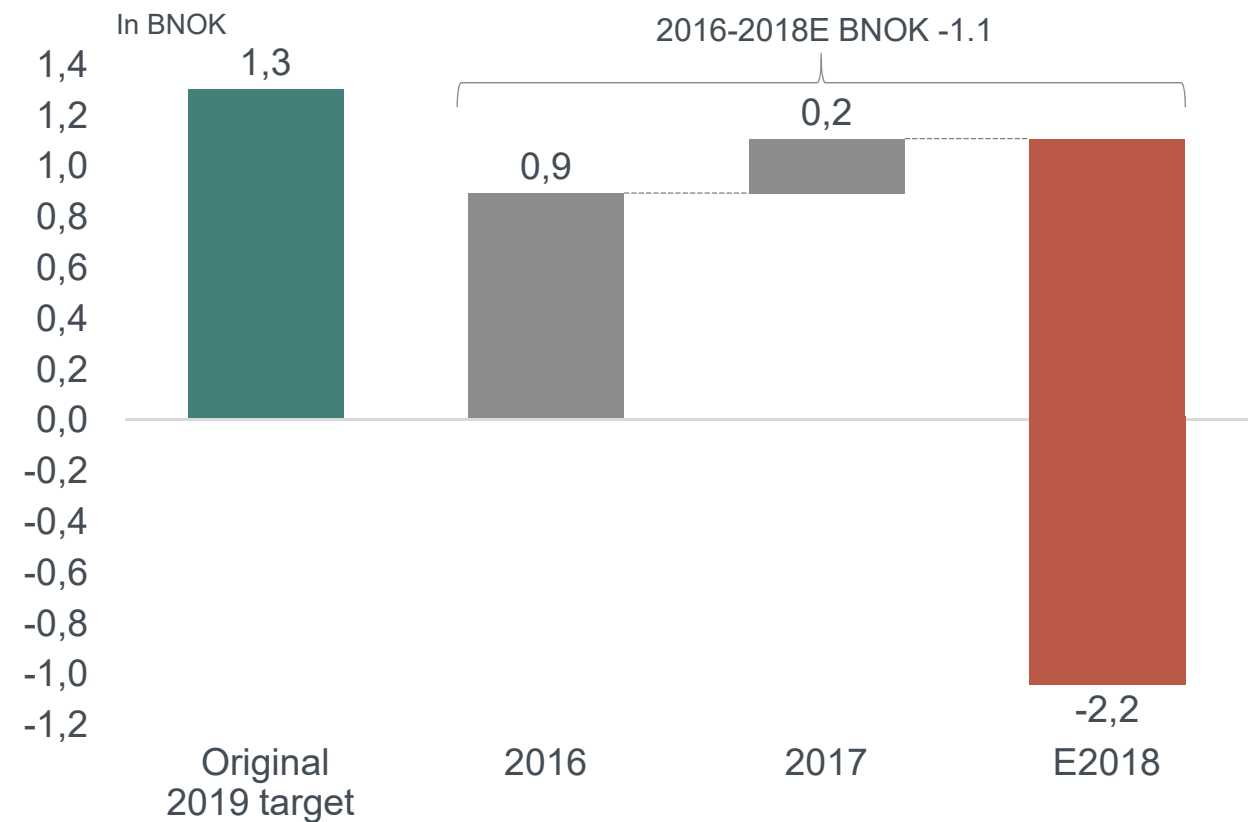
- Alunorte has declared Force Majeure to its bauxite suppliers MRN and Paragominas
- Alunorte continues to be supplied with bauxite from both MRN and Paragominas, in same proportion as before production reduction
- Paragominas costs are 60-70% fixed
 - Managed to reduce absolute cost level by ~15%, partially offsetting effects from lower production level
 - Reduced production leads to postponement of capital expenditures



Significant negative curtailment effects on *Better* improvement program

- 50% production at Alunorte and Paragominas with strong negative impact on improvement program
- 2016-17 improvements more than offset by negative 2018 effects
- Curtailment effect of negative BNOK 2.2 in 2018
- Some positive effects from commercial and procurement, as well as non-volume related contributions at Alunorte and Paragominas

Bauxite & Alumina *Better* program progress



Enhancing Alunorte robustness, preparing for more extreme weather

- Improved water treatment and holding capacity
- Short-term improvements of the water management systems and treatment capacity, maintenance systems, as well as emergency preparedness plans and training

	Amount	Purpose	Time frame
Water treatment plant	235 MBRL	Increase water treatment capacity by 50%	Q2 2019
Infrastructure related to water management system	250 MBRL	Increase water reservoir capacity by 350%	End-2018
		Strengthen infrastructure related to the water management system, enhance robustness and flexibility of the system	Q2 2019
Enhanced operational robustness at the plant	190 MBRL	Modifications to improve equipment robustness at the plant for heavy rainfall, enhance environmental performance	2018-2020



Status of main commitments under technical agreement (TAC)



All activities on track

Q4 2018

- ✓ Insurance bond
- ✓ Payment of fines
- ✓ Flood contention windrows efficiency
- ✓ Audit of internal drainage system
- ✓ Mud characterization (drum filters)
- Food cards – Census report
- Food cards – Distribution
- Providing SEMAS with access to existing camera monitoring

Q1 2019

- Updated Risk Management Plan
- Mud characterization (press filters)
- Updated dam break study
- Water balance study
- Real time effluent monitoring
- Providing SEMAS with real time access to water levels in basins and channels

Q2 2019

- New camera monitoring system in DRS area and access to SEMAS
- Automatic stream flow reduction on effluent treatment system
- Report on rain water segregation
- Drainage system project and concept
- Subfluvial emission study
- R&D project on alternative use of bauxite residue (first report)

✓ Completed ● On-going / on-track

Path towards normal operations, building a common platform

Timing for embargoes being lifted remains uncertain

TAC/TC signed on September 5

✓ Technical TAC agreement

- Audits, studies and monitoring of environmental situation, and improvements of the water treatment system, estimated at BRL 70 million
- BRL 65 million for food cards to families living in close vicinity
- Settlement of fines, totaling BRL 33 million

✓ Social TC agreement

- Investment of BRL 150 million in projects supporting sustainable urban development in defined communities

Lifting of Press Filter / DRS 2 embargos

✓ Press Filter

- Embargo lifted by IBAMA on Oct 5

• DRS2

- ✓ SEMAS issued technical note confirming validity of existing licence
- ✓ Embargo lifted by IBAMA on Oct 25
 - Petition filed in court for lifting of DRS2 embargo

Lifting of production embargo

- Key stakeholders
 - SEMAS, Ministerio Público, Court
- Need to assure / document safety of operations
 - Independent opinions
 - Development of TAC commitments

Press filter is best available technology – Hydro in the forefront

DRS2 with press filter technology only long-term sustainable solution for Alunorte

- Improves geotechnical safety of deposit
- Cuts CO2-emissions from transportation
- Reduces environmental footprint by storing 4-5x more residues in same area compared to conventional drum filters

Press Filters commissioning process

- 8 press filters in place, 9th press filter to further increase robustness, to become operational Q2/Q3 2019
- Embargo halted commissioning, learning and optimization of press filters - may lead to delay in Alunorte ramp-up
- Alunorte operating only with press filters since October 15

Fuel switch project

- Liquid natural gas to replace heavy fuel oil for calciners and potentially for boilers



Environment and CSR – our social license to operate

Environment

- Third-party environmental study on quality of air, water, springs, soil and forest
- Toxicological study to evaluate health conditions of people in the communities nearby Alunorte (Red Cross)
- Update of emergency procedures, including review of communication practices towards local communities as well as training

Strengthen community engagement

- Short-term actions
 - Support during flooding event of February
 - Enhanced Community dialogue and volunteer program
- Longer-term actions
 - Terms of commitment signed with Government of Pará
 - Sustainable Barcarena Initiative for the longer term





Key priorities 2019

- Resume normal operations
- Continued focus on safety
- Deliver on all improvements and commitments
- Further contribute to sustainable development in Barcarena
- Maintain competitive cost position