INVESTMENT PROGRAM ALUM 2018

The ALUM SA Investment Program for the year 2018 although imply high costs is a program absolutely necessary to:

- increase energy efficiency by optimization of combustion and heat transfer processes;
- increase competitiveness by installing new equipment that will allow to obtain new types of products;
- increasing operation safety for plant installation supplied with steam and natural gas;
- ensuring plant operational continuity by complying with environmental stipulations to which ALUM is mandatory to align.

Executive Summary:

ALUM's investment program for the year 2018 requires a total estimated budget of **14,419,000 USD** and contain 20 investment projects,

US$'000

Company	***No. of investment projects***	***Necessary Capex***
		2018
ALUM SA Tulcea	***20***	***14,419***

from which:

- 15 investment projects approved and started in 2017 (12,579,000 US$) of which:
  - 9 projects will be completed during the year 2018 (9,344,000 US$ of which a project co-financed by EU funds);
  - 6 projects will be completed in the period 2019-2021 (3,235,000 US$) of which a new project EU co-financed with completion in 2020 and a project that foresees the gradual height increase of Red mud pond piers.

- 5 new investment projects (1,840,000 US$) of which:
  - 3 projects will be completed during the year 2018 (1,690,000 US$);
  - 2 projects will be completed during the year 2019 (150,000 US$).

The 20 investment objectives of the ALUM SA Investment Program for 2018 are structured in four chapters as follows:

- **Chapter 1 - Projects to ensure plant operational continuity and to increase red mud pond lifetime** – includes 3 investment objectives with a necessary forecasted budget of **2,185,000 US$;**

- **Chapter 2 - Projects for efficient and safe operation of industrial facilities** – includes 10 investment objectives with a necessary forecasted budget of **6,572,000 US$;**

- **Chapter 3 - Projects to support ANRE proposals** - includes 5 investment objectives with a necessary forecasted budget of **1,705,000 US$;**

- **Chapter 4 - New ALUM products** – includes 2 objectives of which a project co-financed by EU funds with a necessary forecasted budget for 2018 of **3,957,000 US$;**

The capacity of performing investments is decisive for the future of SC ALUM SA and the evaluation of investments is a very important task for ALUM S.A.

The main key aspect of investments request is financial evaluation and budgeting the investments objectives spending.

Financial effort of these investments will be assured both by internal financial resources and by loans, like leasing financing or credits.

Chapter 1 - Projects to ensure plant operational continuity and to increase red mud pond lifetime

Includes necessary investment projects:

- increase ALUM competitiveness by obtaining and commercialization of new types of products;
- decrease natural gas and bauxite specific consumption by increasing recuperation degree of heat in technological process streams;
- increasing functioning safety of static and dynamic equipments necessary for activities of ALUM's departments;
- ensuring operational continuity by compliance with requirements of ALUM's Integrated Environmental Authorization and ISU.

Objective Code	Objective denomination
D-072.18.SRR.01	**Increasing the storage capacity of the red mud pond by elevating the dikes throughout the perimeter** This investment objective is necessary to continue the safe exploitation of the Red mud pond and increase its lifetime and has a forecasted total budget of 950 thousand US$;
D-060.17.SRF.01	**Purchasing press filters for disposal bauxite residue moisture decreasing** This investment objective is to increase the lifetime of the Red mud pond and to increase the possibilities for red mud valorification. The investment objective is scheduled to be

	implemented between 2018-2020. The total projected budget for 2018 is 650 thousand US$;
D-064.17.SRR.01	**Red mud pipe, length 4,5 km (refinery to red mud pond)** This investment objective is scheduled to be implemented in the period 2017-2019 and is required to secure the safe pumping of red mud from the factory towards the Red mud pond. The total projected budget for 2018 is 585 thousands US$.

Chapter 2 - Projects for efficient and safe operation of industrial facilities

Objective Code	Objective denomination
D-076.18.CET.01	**Reducing emissions and increasing energy efficiency by installing a low NOx combustion system at boiler no. 4** The investment objective will be implemented in the year 2018 and has a total forecasted budget for 2018 is 800 thousand US$.
D-067.16.CET.01	**Burned gases fan for Steam Boiler no. 2** This investment objective has been approved and will be implemented in 2018. The total forcasted budget for 2018 is 300 thousand US$.
D-056.16.SAD.01	**Consolidation foundations Precipitation tanks** This investment objective is scheduled to be implemented between 2017-2018 with an estimated total budget of 490,000 thousand US$. The work will take place in two stages and consists in removing from the circuit 10 decomposing vessels and consolidating their foundations; The forcasted budget for 2018 is 100 thousand US$
D-076.18.SRF.01	**Filtering process control efficiency enhancing by acquiring and installing vertical filters** the investment objective is scheduled to be implemented between 2018 and 2019 and has a total forcasted budget of 100 thousand US$ for the year 2018.
D-073.18.CET.01	**Thermal energy recovery system from combustion gases of steam boilers** The investment objective provides for the acquisition and installation of a heat recovery system from the gases evacuated to the Power House chimney and will be implemented between 2018-2019. The budget proposed for 2018 is 50 thousand US$.
D-074.18.ALM.01	**Increasing energy efficiency by thermal isolation of vessels and technological paths** The budget proposed for 2018 is 350 thousand US$.
D-075.18.FAD.01	**Acquisition and installation a disc filter for coarse seed** The budget proposed for 2018 is 540 thousand US$.
D-071.18.ALM.01	**Investments for maintenance and improvement of equipment parameters - Alum (PPE) 2018)** The total forcasted budget for this investment objective in 2018 is 2,124 thousand US$.
D-069.17.ALM.01	**Plant economic lightning** The investment objective has a forecasted total budget of 150 US$ and will be phased in over the period 2017-2018. The total forcasted budget for this investment objective in 2018 is 100 thousand US$.
D-066.18.ALM.01	**Replacing the obsolete equipments, Endowments 2018** The projected total budget for this investment objective is US $ 2,108 thousand US$. ○ Heat exchangers for heating attack solution and dense pulp; ○ Calcined alumina elevator; ○ End-of-life equipment or no longer having the functional characteristics for which it has been purchased; ○ Electric motors and pumps with high energy efficiency;

Chapter 3 - Projects to support ANRE proposals

Objective Code	Objective denomination
D-051.16.CET.01	**New natural gas burners at Steam Boiler no 1 (low Nox)** This investment objective has been approved and is scheduled to be implemented between 2017-2018 with a forecast total budget of 1,338 thousand US$. o Acquisition and installation of low NOx combustion system on the C2Ap1 boiler; The total forecasted budget for this investment objective in 2018 is 205 thousand US $.
D-058.16.SRL.01	**Optimization of steam lines and installing steam traps in 2 Digestion batteries** This investment objective has been approved and is scheduled to be implemented in the period 2017-2019, the total planned budget for this investment objective is 600 thousand US$ and for the year 2018 the estimated necessary budget is 350 thousand US$.
D-070.16.ALM.01	**Maintenance Capex (Digestion modernization - autoclaves registers and agitators for 2 Digestion and Evaporation batteries)** The investment objective has been approved and is expected to be completed in 2017 2019, the total forecasted budget for this investment objective is 1,050 thousand US$ of which 600 thousand US$ for 2018.
D-001.17.ALM.01	**Modernization 6 kV electrical installations (capacitors, electric cells, electric circuits)** The budget proposed for 2018 is 300 thousand US$
D-070.17.ALM.01	**Increasing energy efficiency by installing frequency converters** The investment objective has a forecasted total budget of 370 thousand US$ and will be gradually implemented during 2017-2019.

Chapter 4 - New ALUM products

Objective Code	Objective denomination
D-059.16.ALM.01	**Alum Increasing competitiveness by installing equipment to obtain wet and dry hydrate** The investment objective: - is approved and started in the year 2016; - to be completed in August 2018; - has a total forecasted budget for 2018 is 3,100 thousand US$.
D-059.17.ALM.01	**Site arrangement and installation of hydrate drying, grinding and classification equipment** The investment objective is approved, it will be completed in early 2018 and has a projected budget for 2018 of 857 thousand US$.

The net budget requested for approval is 14,419,000 US$.

The key decisions necessary to be taken for investment plane implementation are as follows:

- investment program approval
- development of investment program accordingly with detailed diagram
- establishment and approval of detailed action planes for each one investment project.

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