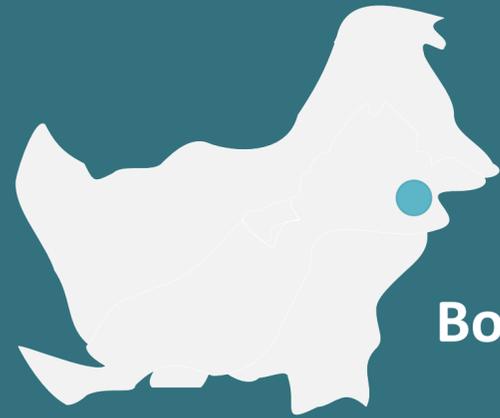




Majus Luther Sirait
SVP Operation

Improvement on Energy Efficiency and Conservation in Fertilizer Plant by Establishment of Energy Management System

The member of:



Bontang

December 7th, 1977

Vision

To become a growing and sustainable world-class Company in the fertilizer, chemical and Agrobusiness industry

Main Products



Urea



NPK



Ammonia

PUPUK KALTIM



5 Urea Plants
3.4 million tons/year

Amoniak Plants
2.7 million tons/year **5**

3 NPK Plants
350 thousand tons/year



35%

products for subsidies in 2/3 of eastern Indonesia

Baldrige Excellence Framework



Energy Performance

3 of 5 Ammonia-Urea plants are ISO 50001 certified



PLANTS IN PUPUK KALTIM

Energy source: **Natural Gas**



PKT-2 : 1984

Energy consumption:
Ton Oil Equivalent
(TOE) 366,566



PKT-4 : 2002

Energy consumption:
Ton Oil Equivalent
(TOE) 221,828



PKT-5 : 2015

Energy consumption:
Ton Oil Equivalent
(TOE) 269,543



PKT-3 : 1989

Energy consumption:
Ton Oil Equivalent (TOE)
183,131



PKT-1A : 2014

Energy consumption:
Ton Oil Equivalent
(TOE) 229,692

Total energy consumption (TOE)

1,270,761

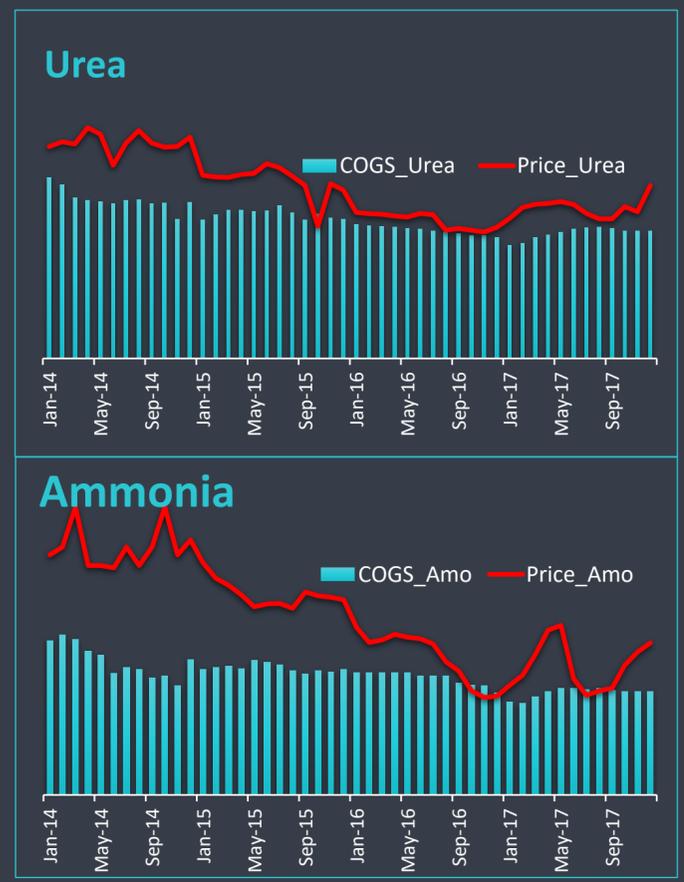
Note: Based on 2019 data and exclude energy as raw material

ENERGY MANAGEMENT SYSTEM DRIVERS



Reduction of production cost

Energy costs account for 40% of production costs | increase in natural gas prices | The price of products on the market fluctuates



Comply to government regulation

PP 70/2009 (about energy conservation) | Permen ESDM no. 14/2012 (about energy management) | Participate in Nationally Determined Contribution (NDC) to reduce CO₂ emissions



Integration and Sustainability

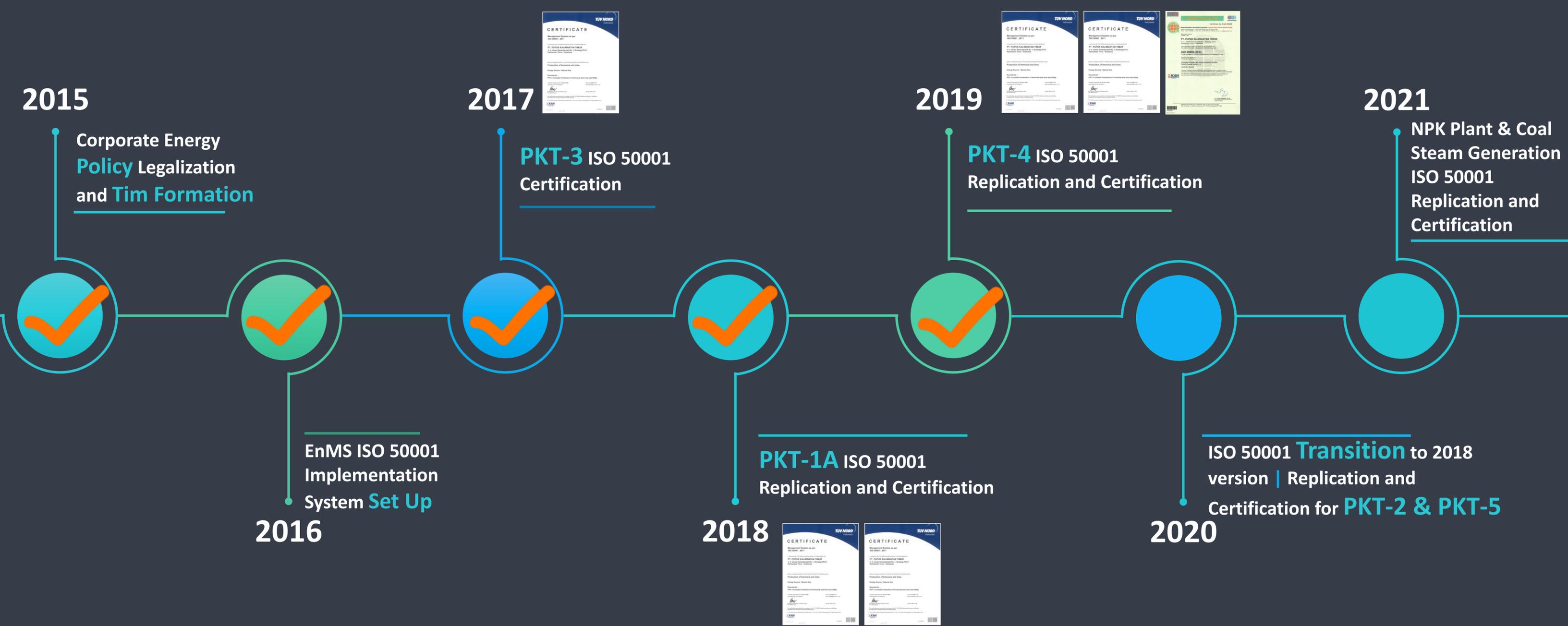
Ensure the sustainability of existing efficiency programs | integrate with other management systems

Enhance the company's reputation

to support the achievement of the vision and mission

ISO 50001 IMPLEMENTATION ROADMAP TARGET

Savings of **3%** by 2021 across all Ammonia-Urea-Utility plants



ENERGY MAPPING

Level-1

PKT-4

$Y = 12,37 A + 10,51 B + 109.026$
Regression

MMBTU

Level-2

AMMONIA

$Y = 9,54 A + 71.006$
Regression

MMBTU

UREA

$Y = 4,09 A + 11.270$
Regression

MMBTU

UTILITY

$Y = 0,01 A + 3,31 B + 10.660$
Regression

MMBTU

Level-3

Ammonia - Thermal

$Y = 6,57 A + 77.072$
Regression

MMBTU

Ammonia - Power

$Y = 0,72 A + 1.011$
Regression

MMBTU

Urea - Thermal

$Y = 3,26 A + 306$
Regression

MMBTU

Urea - Power

$Y = 0,83 A + 10.964$
Regression

MMBTU

Utility - Thermal

$Y = 0,62A + 2.987$ |
 $Y = 0,5A + 5.853$
Regression

MMBTU

Utility - Power

$Y = 0,002 A + 2.989$
Regression

MMBTU

SEU

39% Primary reformer

22% Syngas compressor turbine

13% Process air compressor turbine

61% Semi lean solution pump

13% Lean solution pump

9% Flue gas blower

50% CO2 compressor turbine

30% HP stripper

21% HP ammonia pump

16% Atomization air blower

13% Fluidization air fan

61% Desal A/B

18% BFW pump turbine

60% Sea water pump

15% NH3 SCW pump

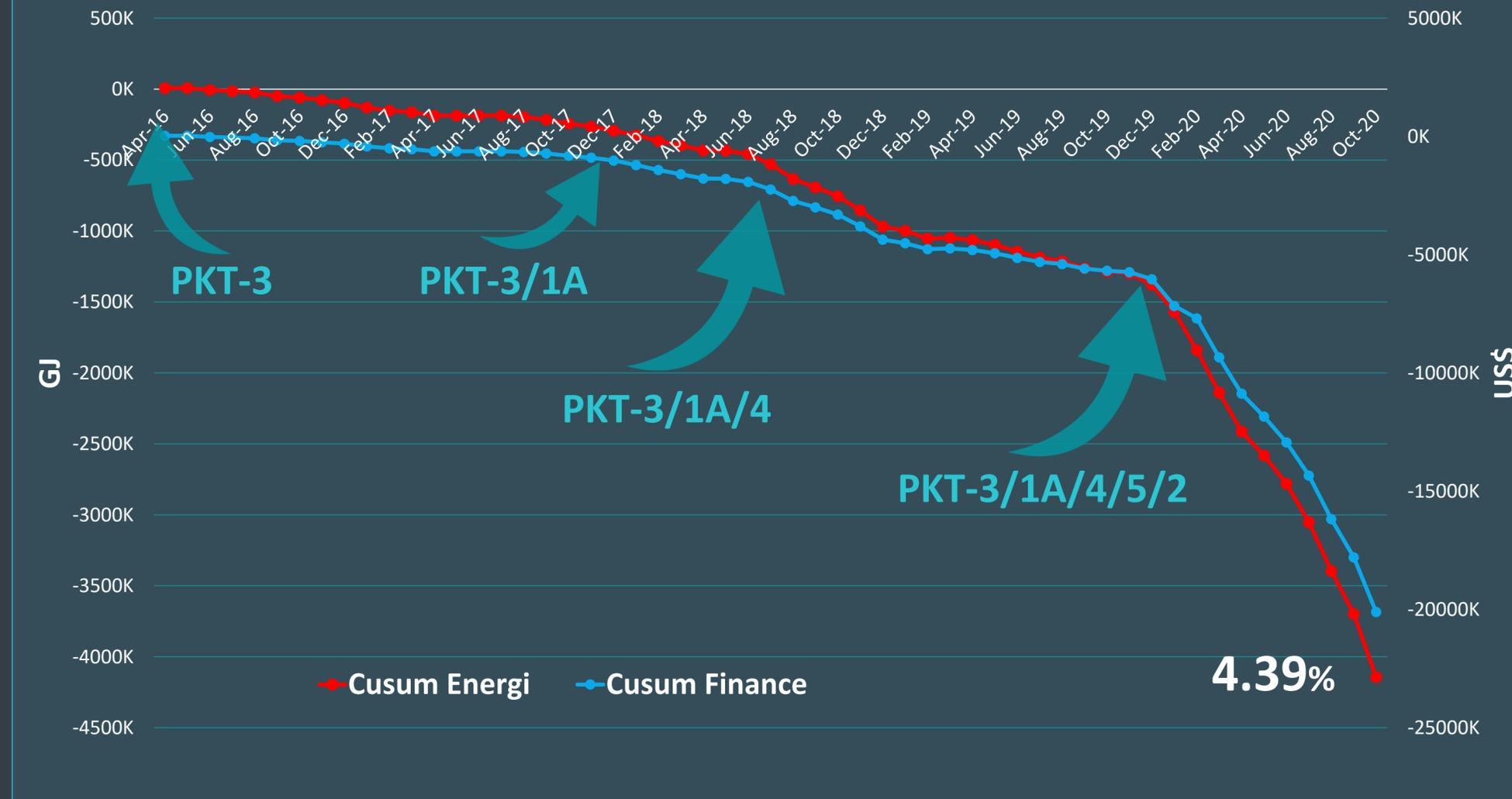
 = Energy baseline equation & type
 A&B = Energy driver
 = EnPI

TANGIBLE BENEFITS

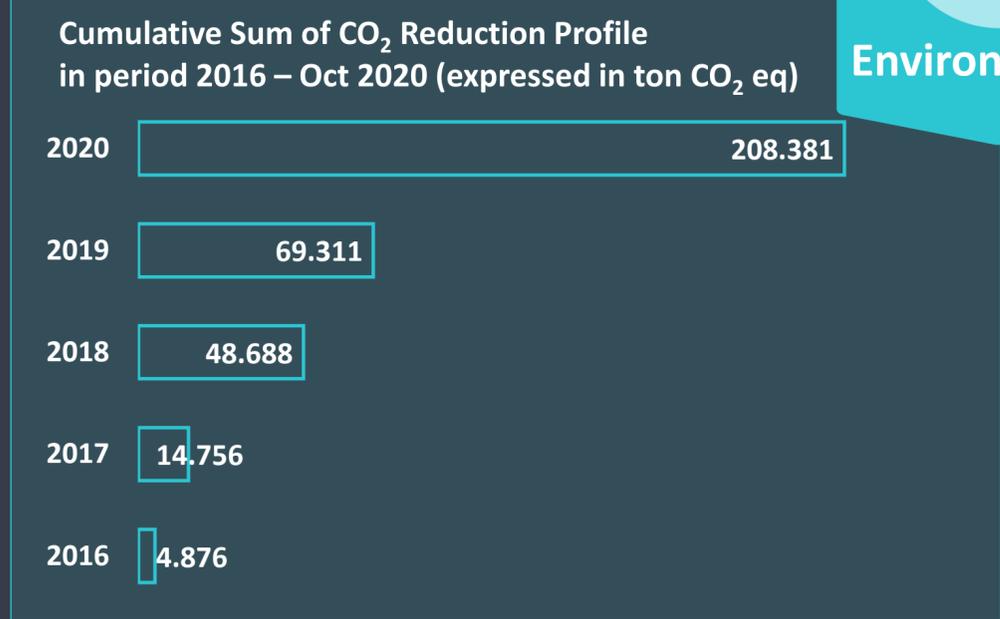


Financial

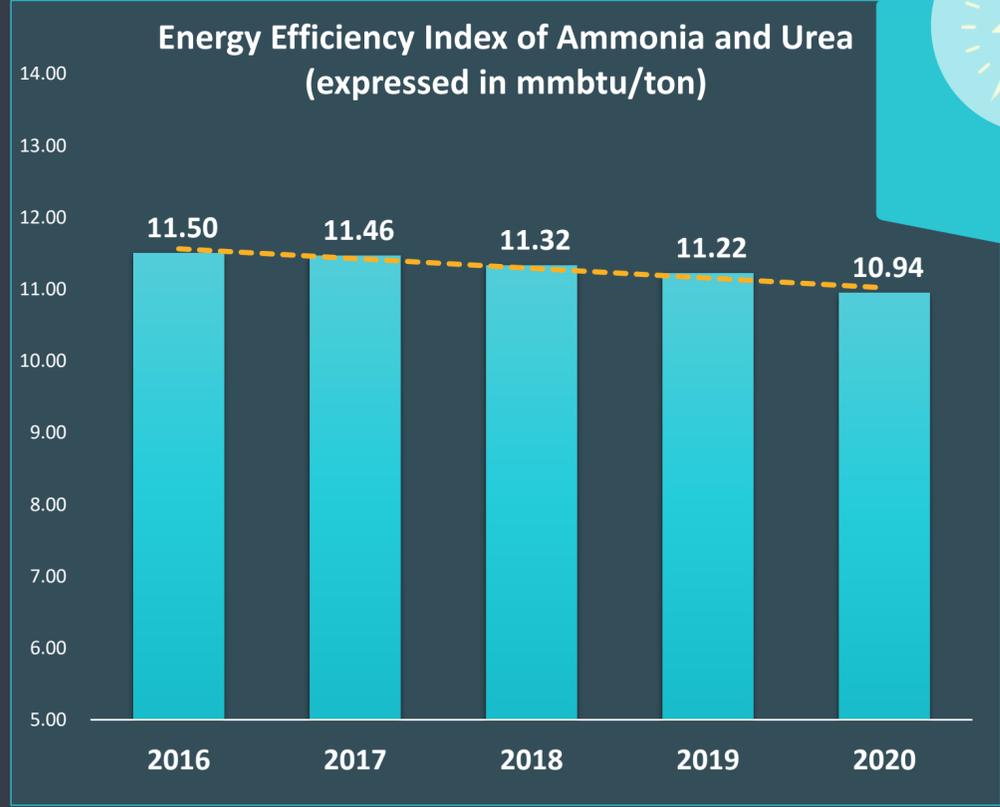
Cumulative Sum (CUSUM) of Energy Saving in period 2016 – Oct 2020 (expressed in GJ and \$USD)



Environmental



EII



INTANGIBLE BENEFITS



Inspire the Holding Company to implement EnMS in all subsidiaries



Increase energy-saving culture through energy efficiency innovations



Increase competitiveness in the global market, especially in countries that care about the environment and energy



Since 2017, Pupuk Kaltim has received Gold Medal-the highest award in National Program for Assessment of Company's Performance Rating in Environmental Management out of 1906 industry participate in national level



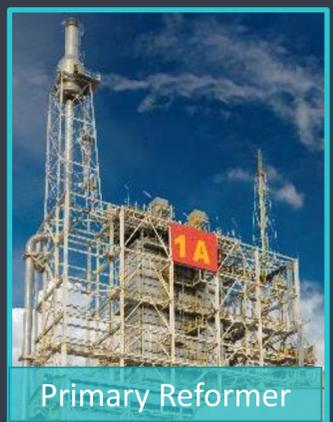
Achievement as world class industry by Global Performance Excellence Award (GPEA) in 2018 and 2019

ENERGY MANAGEMENT PROGRAM



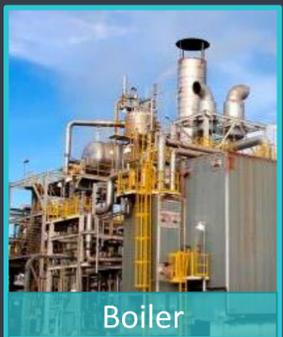
Operational Program

| New best practices



Primary Reformer

Reduce O₂ excess
 Reduce S/C ratio
 Off gas utilization
 Methane slip optimization



Boiler

Reduce O₂ excess
 Reduce flue gas temperature

| Predictive and preventive maintenance based on ISO 55001

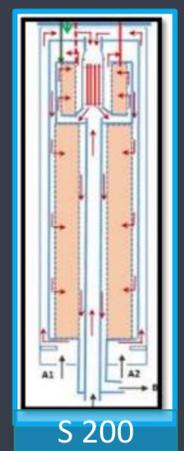
| SEU's online monitoring

| Procurement based on Life Cycle Cost Analysis

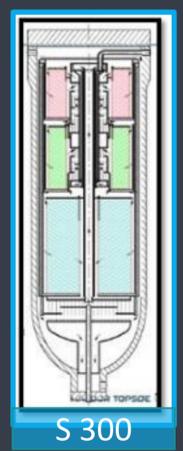


Investment Program

| Upgrade the type of Ammonia Converter (Reactor)



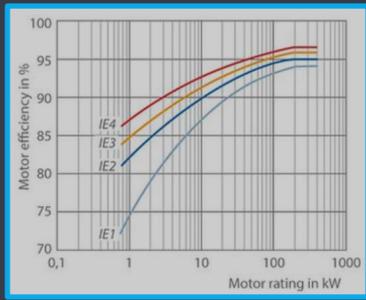
S 200



S 300



| New equipment: LP Ammonia Scrubber



| Upgrade pump to IE3 based



Turn Around Program

| High catalyst replacement efficiency due to implementation of LCA Analysis



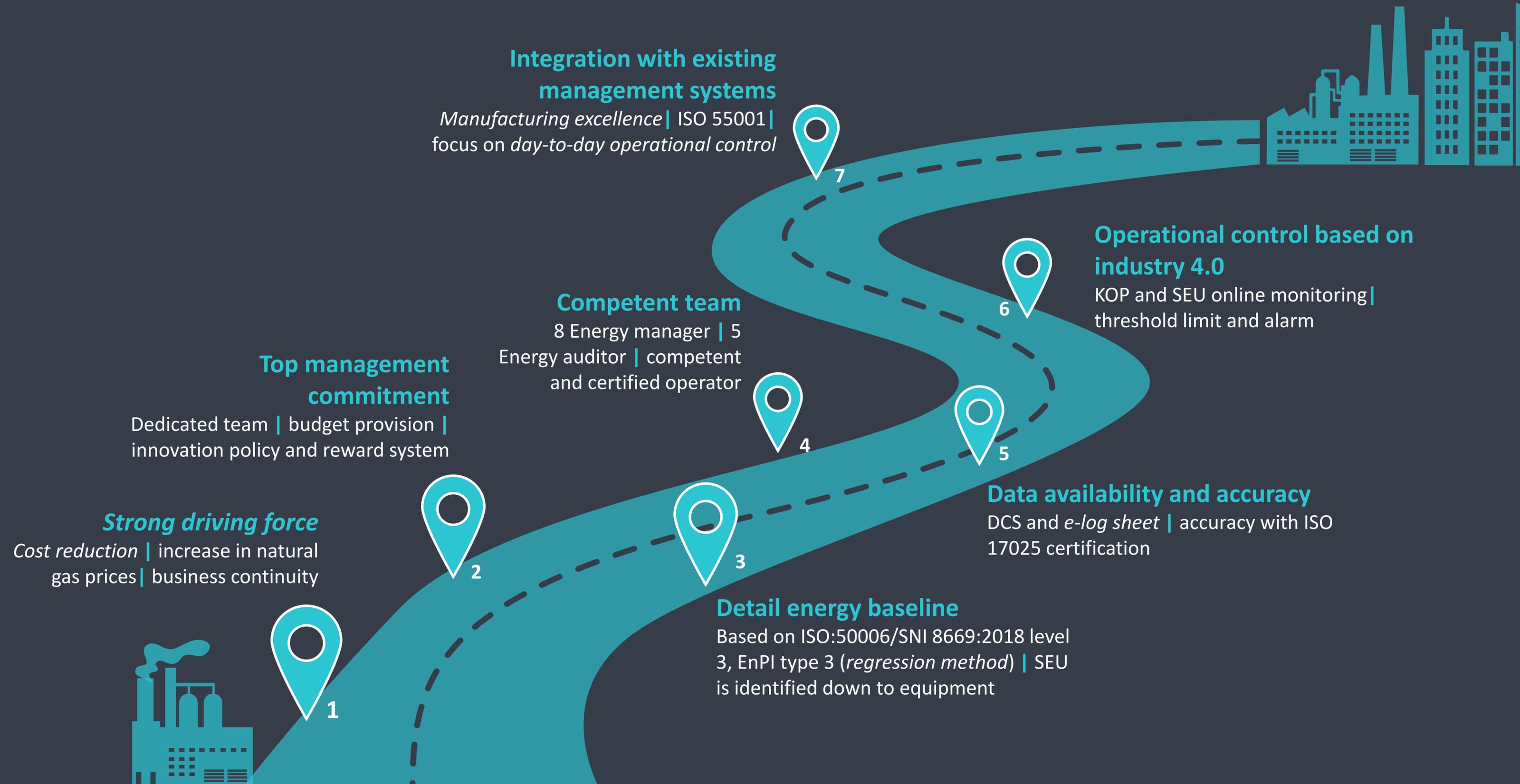
| Chemical and mechanical cleaning



| Rotating equipment overhaul



KEY SUCCESS FACTORS



Strong driving force
 Cost reduction | increase in natural gas prices | business continuity



Top management commitment
 Dedicated team | budget provision | innovation policy and reward system



Integration with existing management systems
 Manufacturing excellence | ISO 55001 | focus on day-to-day operational control



Competent team
 8 Energy manager | 5 Energy auditor | competent and certified operator



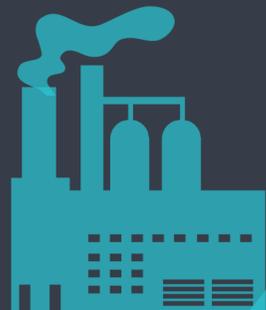
Detail energy baseline
 Based on ISO:50006/SNI 8669:2018 level 3, EnPI type 3 (regression method) | SEU is identified down to equipment



Data availability and accuracy
 DCS and e-log sheet | accuracy with ISO 17025 certification



Operational control based on industry 4.0
 KOP and SEU online monitoring | threshold limit and alarm





www.pupukkaltim.com



PT Pupuk Kaltim



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[@pupukkaltim_id](https://twitter.com/pupukkaltim_id)



[pupukkaltim](https://www.youtube.com/pupukkaltim)



PUPUK KALTIM

Thank You

.....and may we all conquer the pandemic together