October 2026

NEXTCHEM

UREA FINISHING TECHNOLOGIES

NEXTCHEM
MAIRE Sustainable Technology Solutions

SPEAKERS OF THE DAY



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Process Engineer



SEBASTIAN MURELLO
Licensing Manager

AGENDA

01 WHO WE ARE

02 HISTORY AND REFERENCES

03 FLUID-BED GRANULATION TECHNOLOGY

04 PRILLING TECHNOLOGY AND COMPARISON WITH GRANULATION

05 MANAGING DUST, AMMONIA AND SCRUBBER BY-PRODUCTS

06 EXPANDING THE UREA PRODUCT PORTFOLIO

01

WHO WE ARE

MAIRE AT A GLANCE

We are a technology and Engineering Group that develops and implements innovative solutions to enable the Energy Transition.

We offer Sustainable Technology Solutions, optimizing conventional processes and creating new ones from non-fossil feedstock and Integrated E&C Solutions, bringing into reality complex plants and frontier project to provide access to the latest technologies.



7.1
Revenues (€ billion)

12.7
Backlog (€ billion)

284.5
Net Income (€ million)

50
Countries

~11,200
Employees*

~76,000
People engaged worldwide**

Data as of 31st December, 2025
* Data as of Ballestra Group acquisition closing
** Data includes employees, collaborators and sub-contractors

BRAND ARCHITECTURE

MAIRE

Integrated E&C Solutions

TECNIMONT
MAIRE Integrated E&C Solutions

KT
MAIRE Integrated E&C Solutions

Project Development

MET DEVELOPMENT
MAIRE Project Development

Sustainable Technology Solutions

NEXTCHEM
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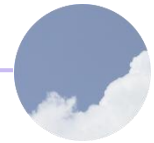
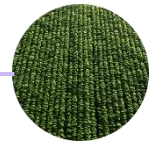
STAMICARBON
NEXTCHEM Sustainable Technology Solutions



Low-Carbon Energy Vectors Sustainable



Sustainable Materials & Circular Solutions



Fertilizers & Nitrogen-Based Fuels

Urea
Nitrates
Ammonia
Specialty fertilizers
Sulphuric acid
Phosphoric acid

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PROVIDING TOMORROW'S TECHNOLOGY

Technology Licensing

Process Design Package
Basic Engineering Design

Proprietary Equipment & Catalysts

Services and Digital Solutions

Selected Specialty Solutions

02

HISTORY AND REFERENCES

UREA FINISHING TECHNOLOGY

SOLID FINISHING

Granulation Design
- Urea Ammonium Sulfate (UAS)
- Specialty Fertilizers

Prilling Design

Pastillation Design

LIQUID FINISHING

Urea Ammonium Nitrate (UAN)
Alternative fertilizer (liquid) with a low crystallization temperature, facilitating transport and storage.

AdBlue® / (DEF)
When sprayed into the exhaust of automobiles, it reduces the NO_x gases to nitrogen and oxygen (clean air).

Technical Grade Urea for Melamine, Resins and Pharmaceutical applications
Used in the coating layer on tabletops, work surfaces and laminate floors, or as molding powder for kitchenware.

WE HAVE MORE THAN 20 YEARS OF GRANULATION EXPERIENCE

Late 1970s

Granulation technology originates and is developed through research and pilot facilities.

2002

First commercial-scale reference at Grodno Azot; scale starts from 280 MTPD.

2008

Major market milestone: Stamicarbon surpasses competitors in awarded granulation capacity.

2010

Market share increases from less than 1% at introduction to nearly 40%.

2020

Scale-up reaches 3600 MTPD through accumulated plant experience.

Today

More than 40 licenses sold worldwide; contracts awarded up to 5000 MTPD.

WE HAVE MORE THAN 20 YEARS OF GRANULATION EXPERIENCE

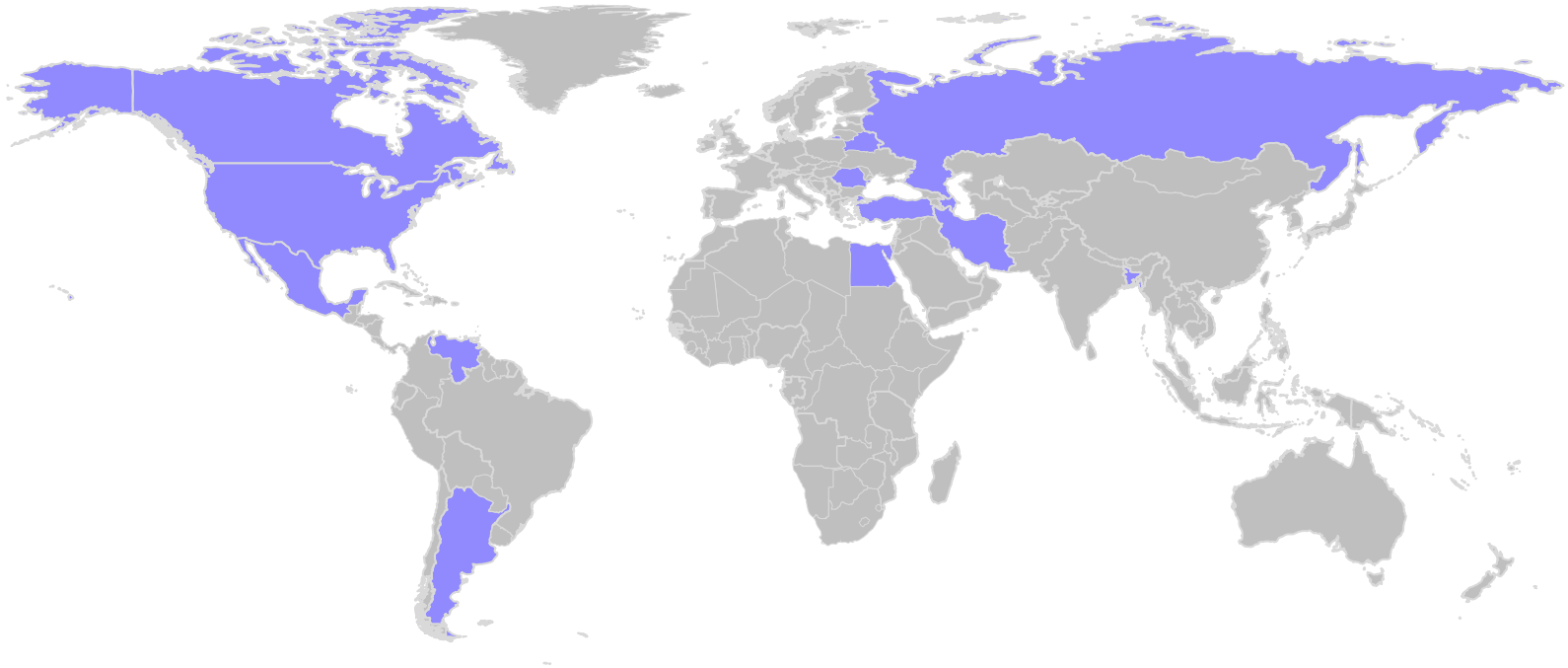
40+

LICENSES SOLD WORLDWIDE

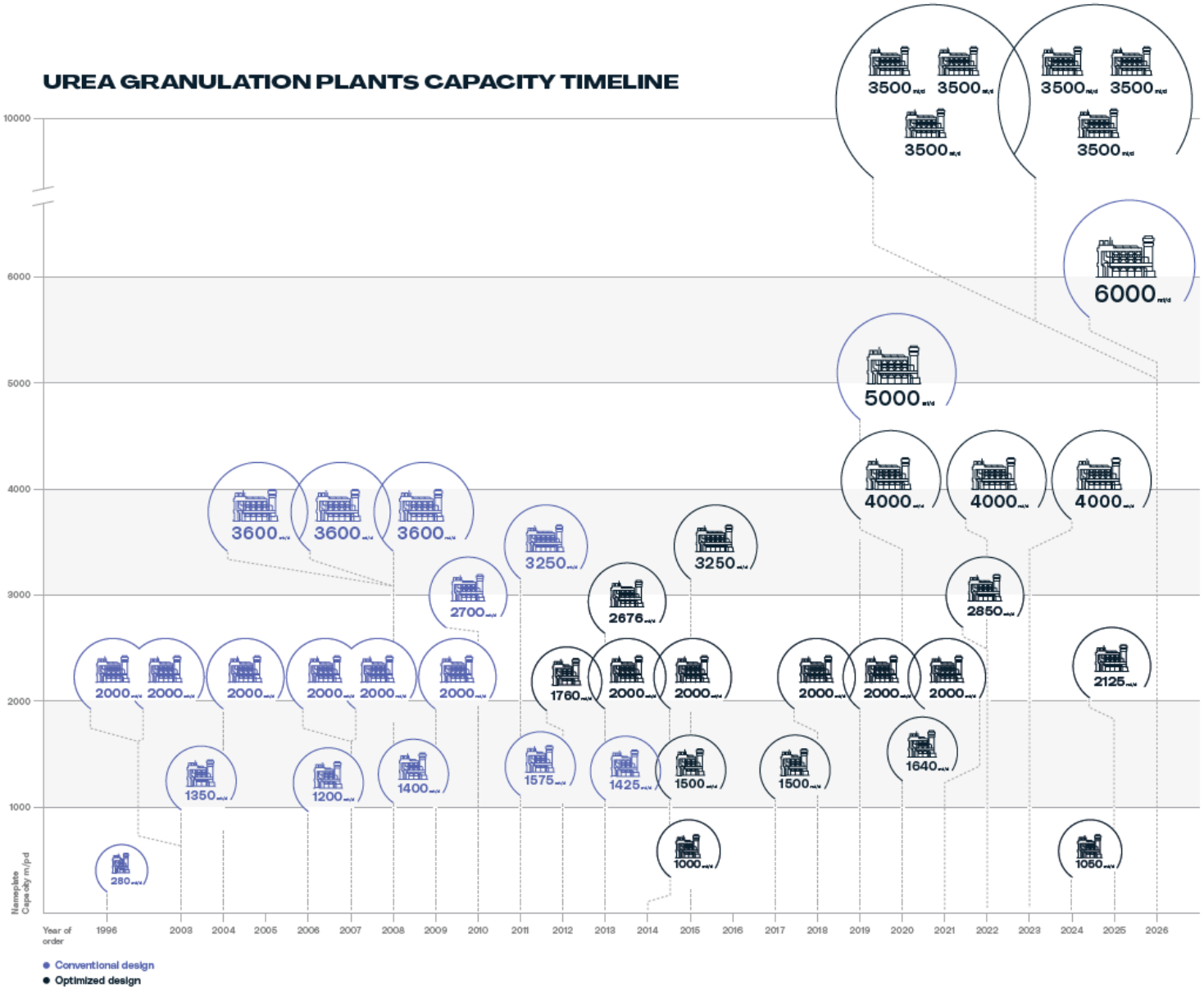
~60%

MARKET SHARE 2020-2026

(based on awarded capacity)



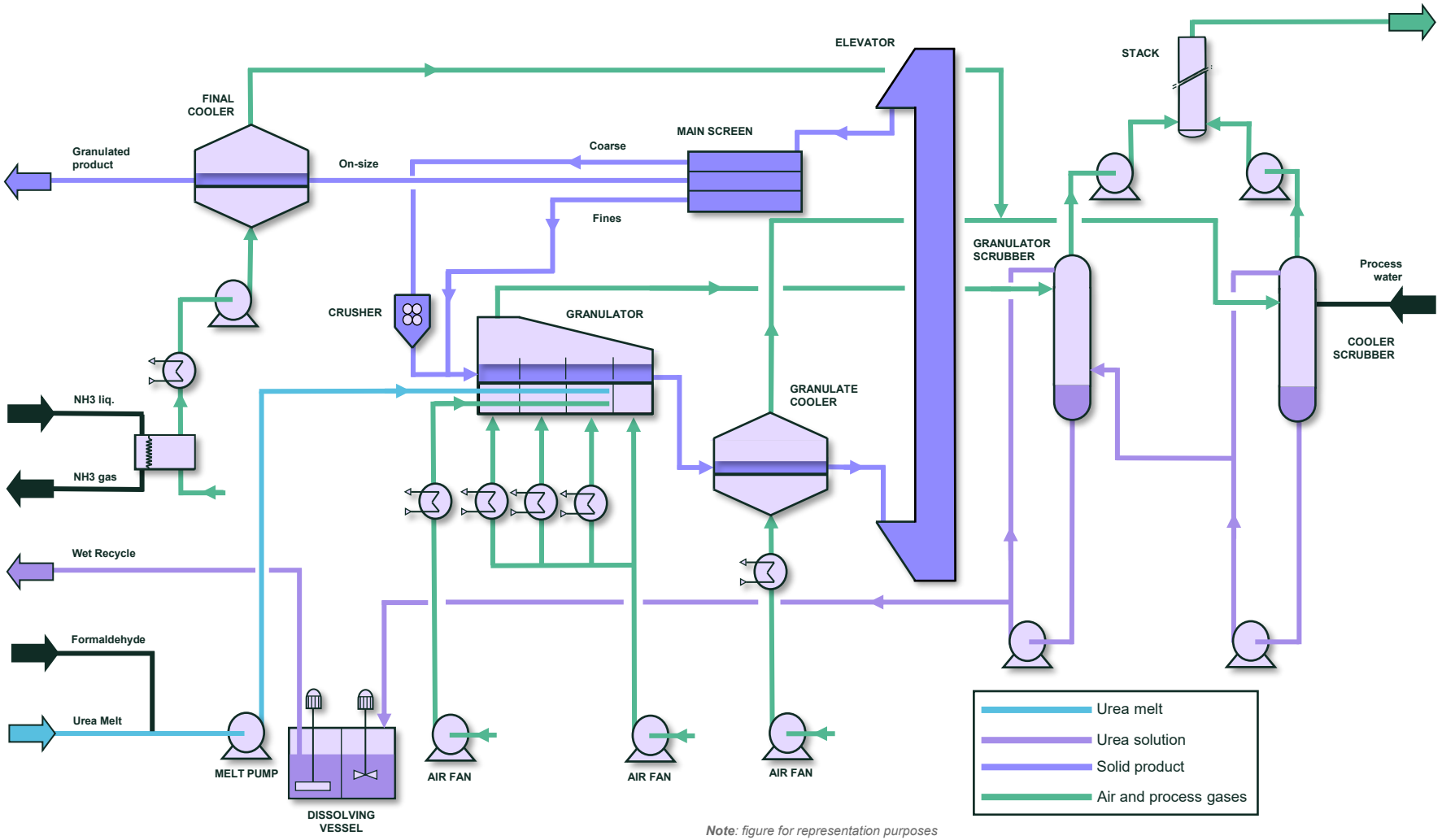
GRANULATION PLANT CAPACITY TIMELINE



03

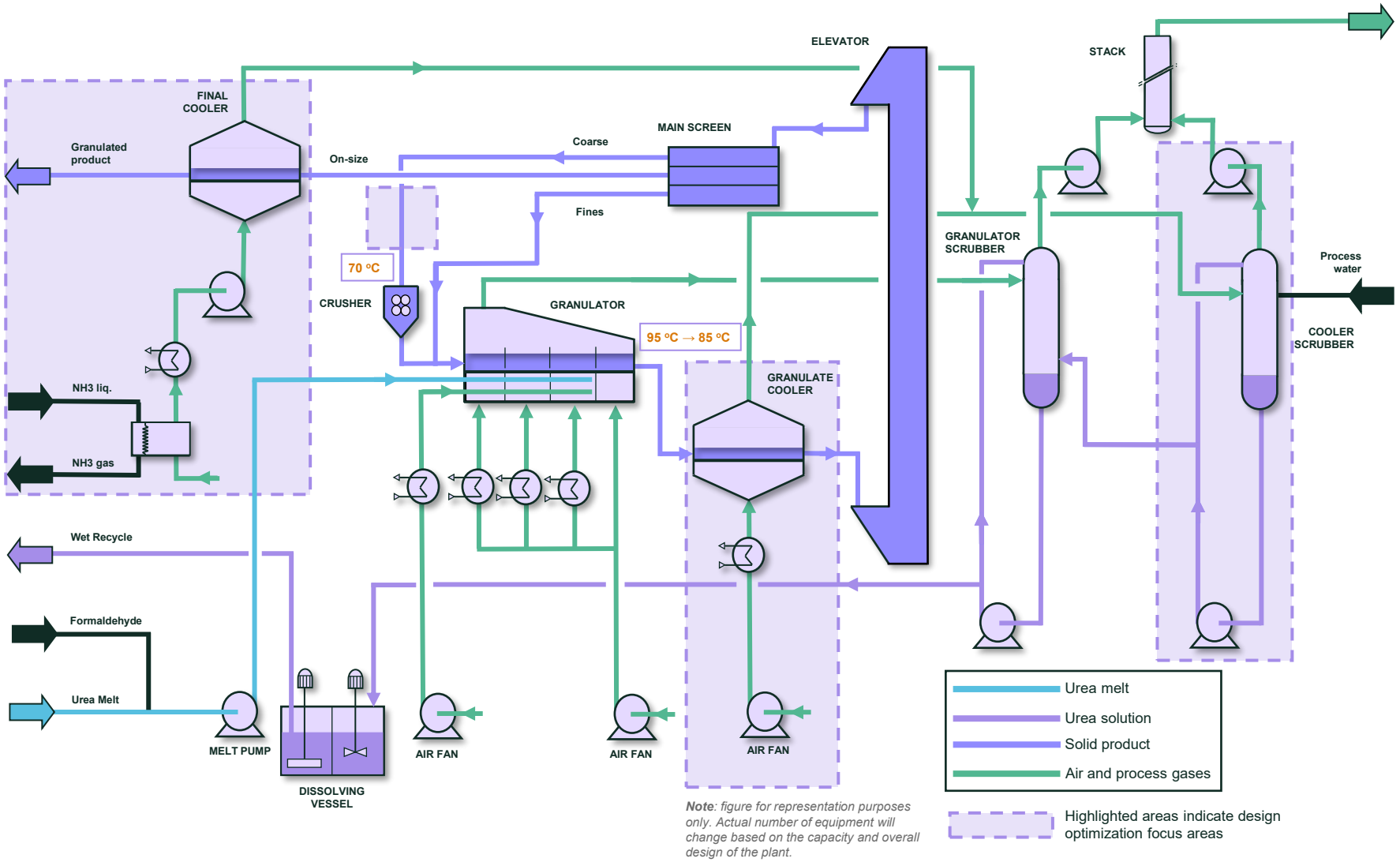
FLUID-BED GRANULATION TECHNOLOGY

CONVENTIONAL GRANULATION DESIGN



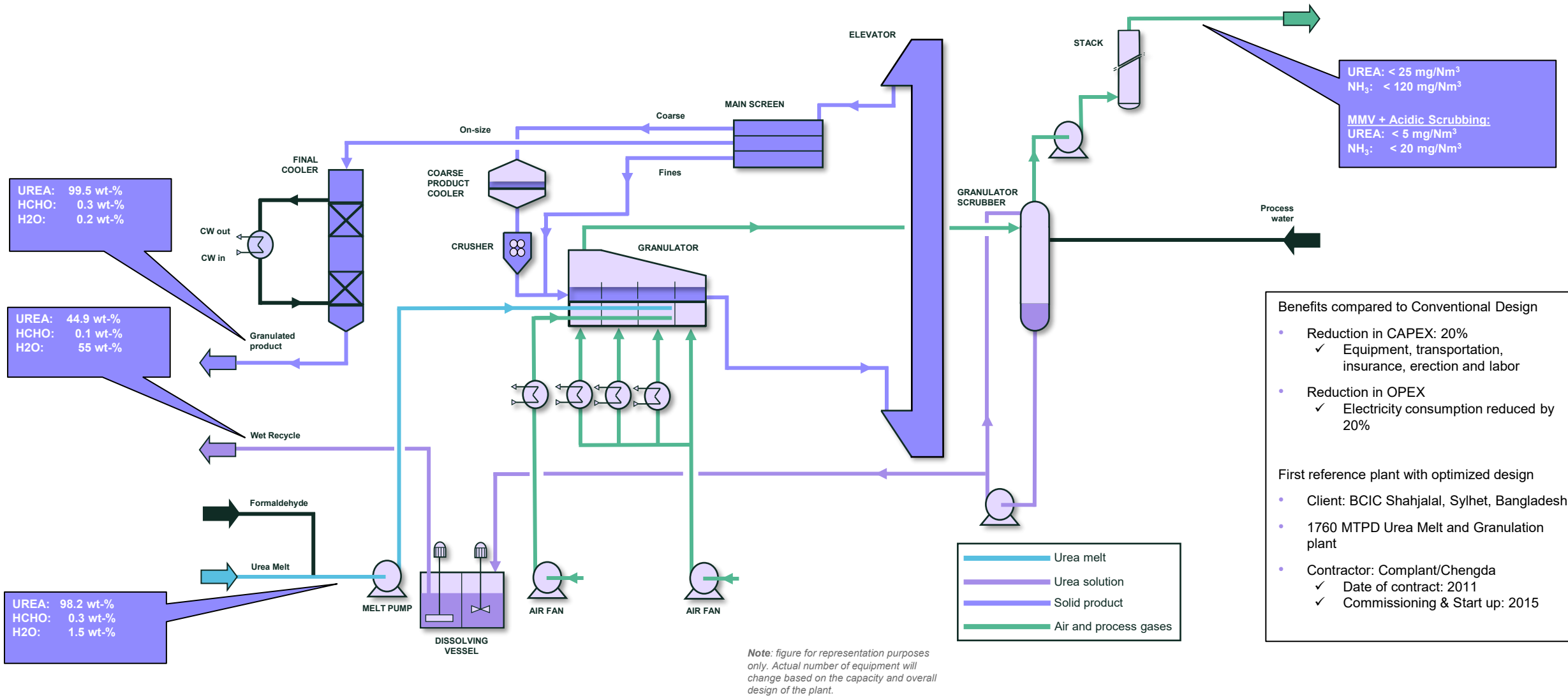
Note: figure for representation purposes only. Actual number of equipment will change based on the capacity and overall design of the plant.

CONVENTIONAL GRANULATION DESIGN



***Note**: figure for representation purposes only. Actual number of equipment will change based on the capacity and overall design of the plant.*

OPTIMIZED GRANULATION DESIGN



Note: figure for representation purposes only. Actual number of equipment will change based on the capacity and overall design of the plant.

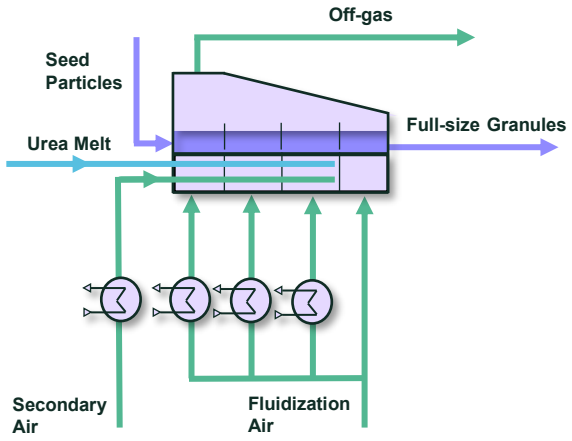
Benefits compared to Conventional Design

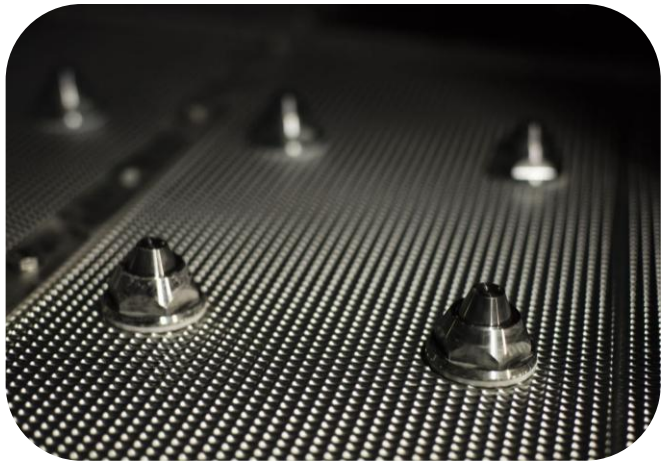
- Reduction in CAPEX: 20%
  - ✓ Equipment, transportation, insurance, erection and labor
- Reduction in OPEX
  - ✓ Electricity consumption reduced by 20%

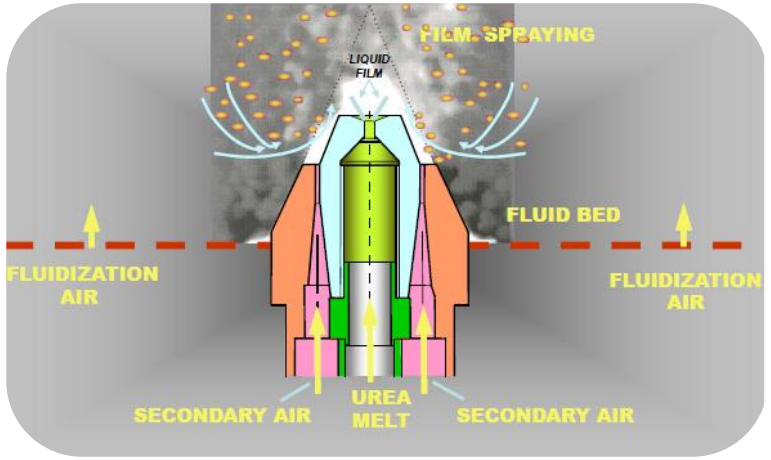
First reference plant with optimized design

- Client: BCIC Shahjalal, Sylhet, Bangladesh
- 1760 MTPD Urea Melt and Granulation plant
- Contractor: Complant/Chengda
  - ✓ Date of contract: 2011
  - ✓ Commissioning & Start up: 2015

OUR GRANULATION PRINCIPLE





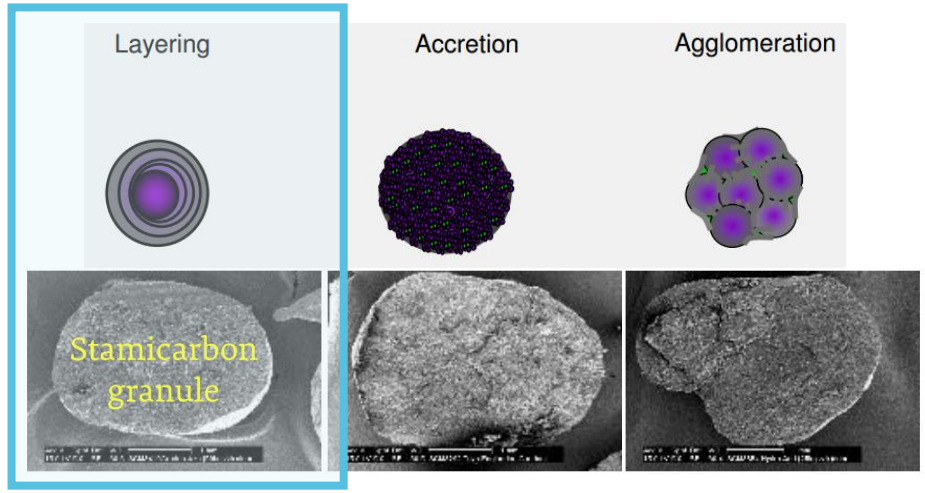


Superior OPEX performance achieved by Stamicarbon film spraying technology:

- Large reduction in
  - ✓ formaldehyde consumption and
  - ✓ urea dust formation

  compared to other technologies, resulting in lower OPEX costs

- Long running times (exceeding average 90 days), unmatched on the market, due to less dust formation owing to the applied film spraying nozzles



OUR GRANULATION PRODUCT QUALITY

	Unit	Expected values
Nitrogen	wt-%	≥ 46.3
Biuret	wt-%	≤ 0.85
Moisture	wt-%	≤ 0.2
Formaldehyde	wt-%	≤ 0.3
Free ammonia	ppm-wt	≤ 25
Temperature	^{0}C	45
d_{50}	mm	3.0
Crushing strength (granule of 3.15 mm)	kgf	≥ 4.5
Fraction of product between 2 – 4 mm		≥ 0.95
Fraction of product < 1 mm		≤ 0.02
Washing interval	Avg days	90

Equivalent product quality as competitors with less Formaldehyde consumption

Outstanding mechanical strength for both export and storage requirements

Our client record is 190 days!

Formaldehyde (HCHO) is main OPEX contributor in a granulation plant.

Calculation*) for a 4000 MTPD plant (1,332,000 MTPY) by reducing HCHO content in the final product from 0.5 wt% to 0.3 wt%, assuming 800 EUR/ton UF85 (60% HCHO), shows savings of 3.5 million EUR annually.

*) *2 kgHCHO/ton X 1,332, 000 ton/year X 0.8 EUR/kgUF85 ÷ 0.6 kgHCHO/kgUF85 = 3,552,000 EUR/year*

04

PRILLING TECHNOLOGY AND COMPARISON WITH GRANULATION

PRILLING TECHNOLOGY

SOLIDIFICATION OF CONCENTRATED UREA MELT BY COUNTER-CURRENT AIR COOLING

PROCESS PRINCIPLE

1. **Melt distribution**
   Concentrated molten urea, approximately 99.7 wt% urea plus biuret, is introduced at the top of the prilling tower.

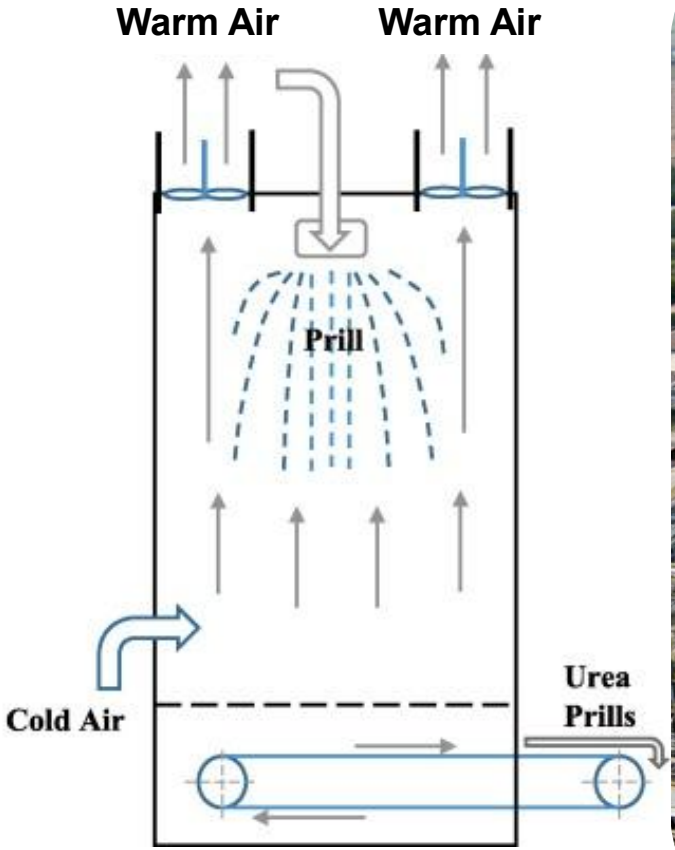
2. **Droplet formation**
   The urea melt is distributed as droplets through the prilling device.

3. **Cooling and solidification**
   Droplets fall through the tower while counter-current cold air removes crystallization heat and the liquid solidifies.

4. **Product temperature**
   Tower height and air-cooling duty influence the outlet temperature of the urea prills.



PRILLING DEVICE
Forms uniform melt droplets

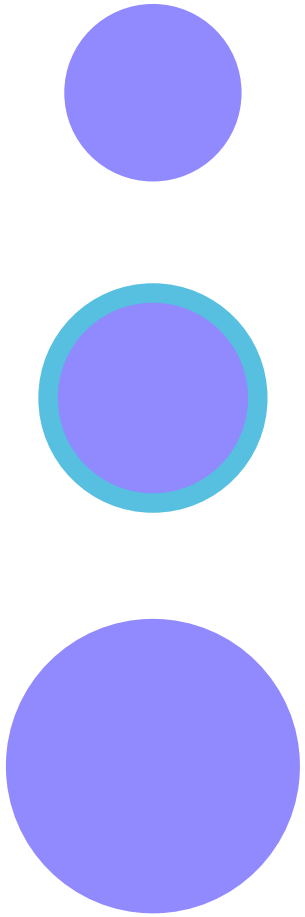




SHAPES OF SOLID PRODUCT

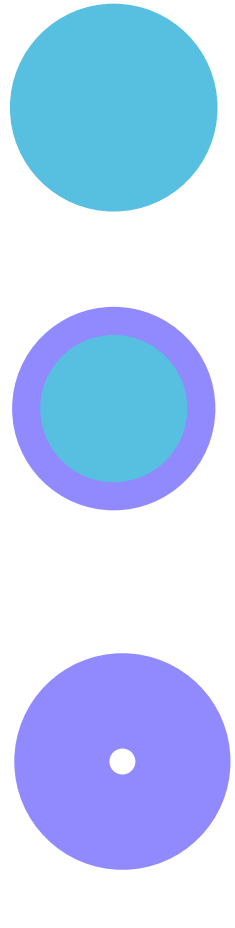
GRANULATION

STAGE 1	A solid seeding particle is introduced
STAGE 2	A liquid layer of the melt mixture is sprayed on the shell of the seeding particle
STAGE 3	Solid granule



PRILLING

STAGE 1	A liquid droplet is formed
STAGE 2	Solidification starts at the shell of the droplet
STAGE 3	Solid prill. A small cavity is formed in the center



Solid

Liquid

GRANULATION VS PRILLING

SELECTING THE FINISHING ROUTE ACCORDING TO PRODUCT STRENGTH, LOGISTICS AND MARKET STRATEGY

GRANULATION

Premium, logistics-resilient product

High crushing strength

Suitable for long-distance transport by truck, sea or other heavy mechanical handling while maintaining product shape.

Premium market positioning

Higher production cost than prilling, but higher market price as traders are willing to pay a premium for granules.

Local and export suitability

Applicable to both nearby markets and longer export supply chains.

Lower handling losses

Reduced dust-related product losses during shipping, loading and unloading.

Lower caking tendency

Improved resistance to caking during storage and distribution.

PRILLING

Cost-focused, local-market product

Lower crushing strength

Less suited to severe mechanical handling and long-distance shipping. Product strength may be improved with additives such as formaldehyde.

Typically serves local markets

Commonly positioned for a distribution radius of approximately 500 km.

Higher dust-loss sensitivity

More susceptible to product loss from dust generation during transport, loading and unloading.

Lowest production cost

Lower-cost finishing route but generally associated with a lower market price.

Tall tower requirement

Long melt lines can increase biuret formation; prilling towers are typically approximately 70–110 m high.

05

MANAGING DUST, AMMONIA AND SCRUBBER BY-PRODUCTS

EMISSIONS OVERVIEW: GRANULATION

Understanding emissions before scrubbing

DUST
~3 wt-%
of plant load

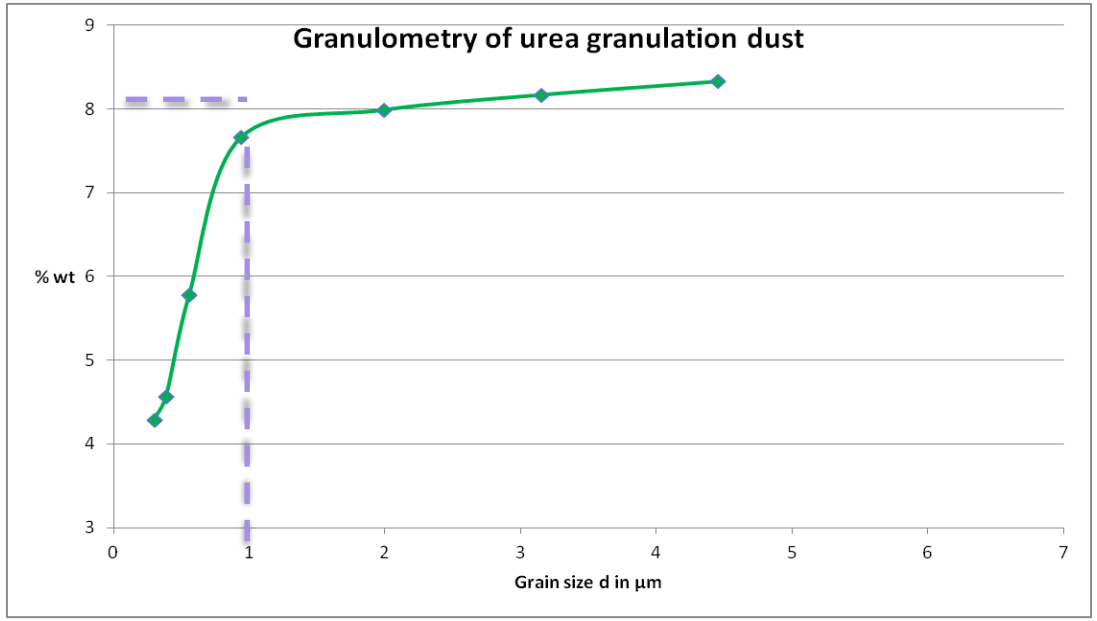
AMMONIA
~120 mg/Nm³

Dust characteristics

COARSE DUST > 3 µm
- Large quantity
- Fair visibility in plume
- Easy to remove

FINE DUST < 3 µm
- Smaller quantity
- Good visibility in plume
- Difficult to remove

SUB-MICRON DUST < 1 µm
- Opacity contributor
- Most difficult to remove



Emission control solutions

CONVENTIONAL DUST SCRUBBING TECHNOLOGY
Dust **< 25 mg/Nm³**

MICRO-MIST™ VENTURI (MMV) SCRUBBING TECHNOLOGY
Dust **< 5 mg/Nm³**

AMMONIA ABATEMENT TECHNOLOGY – ACIDIC SCRUBBING
NH_3 **< 20 mg/Nm³**

EMISSIONS OVERVIEW: PRILLING

Understanding emissions before scrubbing

DUST
~200 mg/Nm³

AMMONIA
~120 mg/Nm³

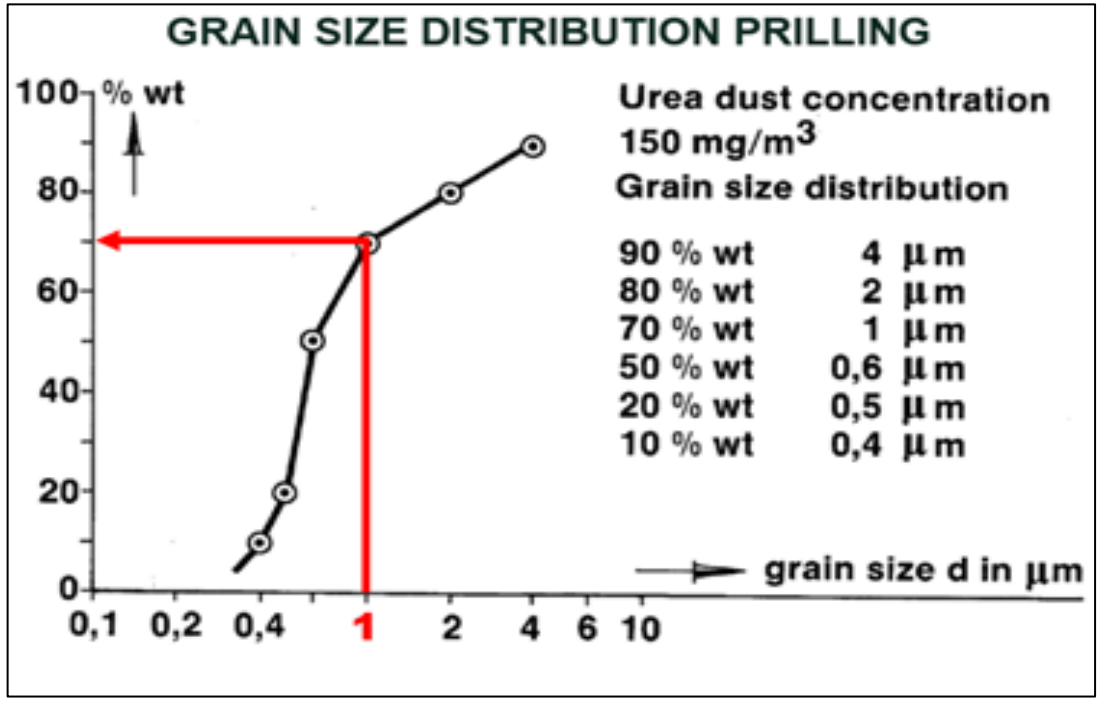
Note: Strongly depends on factors such as air flow rate

Dust characteristics

COARSE DUST > 3 µm
- Fair visibility in plume
- Easy to remove

FINE DUST < 3 µm
- Smaller quantity
- Good visibility in plume
- Difficult to remove

SUB-MICRON DUST < 1 µm
- Large quantity
- Opacity contributor
- Most difficult to remove



Emission control solutions

JET VENTURI
SCRUBBING TECHNOLOGY

Dust **< 15 mg/Nm³**

AMMONIA ABATEMENT
TECHNOLOGY – ACIDIC SCRUBBING

NH_3 **< 20 mg/Nm³**

MICRO-MIST™ VENTURI (MMV) REFERENCES

Proven emission-control performance at commercial urea granulation plants

Dakota Gasification Company

Beulah, North Dakota, USA

1,000 MTPD
Urea granulation

EMISSION CONTROL
MMV

DUST **< 10 mg/Nm³**

NH_3 **< 25 mg/Nm³**

KOCH Fertilizer

Enid, Oklahoma, USA

2,676 MTPD
Urea granulation

EMISSION CONTROL
MMV + WESP

DUST **< 5 mg/Nm³**

NH_3 **< 20 mg/Nm³**

Measured opacity: 0% (Method 9)



AMMONIA SCRUBBING

Why chemical absorption is required for effective NH_3 removal

PHYSICAL SCRUBBING

Not efficient for ammonia removal

LOW DRIVING FORCE

Low NH_3 partial pressure in finishing-plant off-gas

LIMITED MASS TRANSFER

Gas - liquid contact time is insufficient for significant NH_3 transfer

CHEMICAL SCRUBBING — **Strong acid + Weak base → Stable aqueous salt**

Acid options

SULFURIC ACID

H_2SO_4

$$2\,NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$$

Ammonium sulfate solution

- ✓ Widely available at affordable price
- ✓ Contains sulfur (supplementary crop nutrient)
- ✓ No additional safety risks

NITRIC ACID

HNO_3

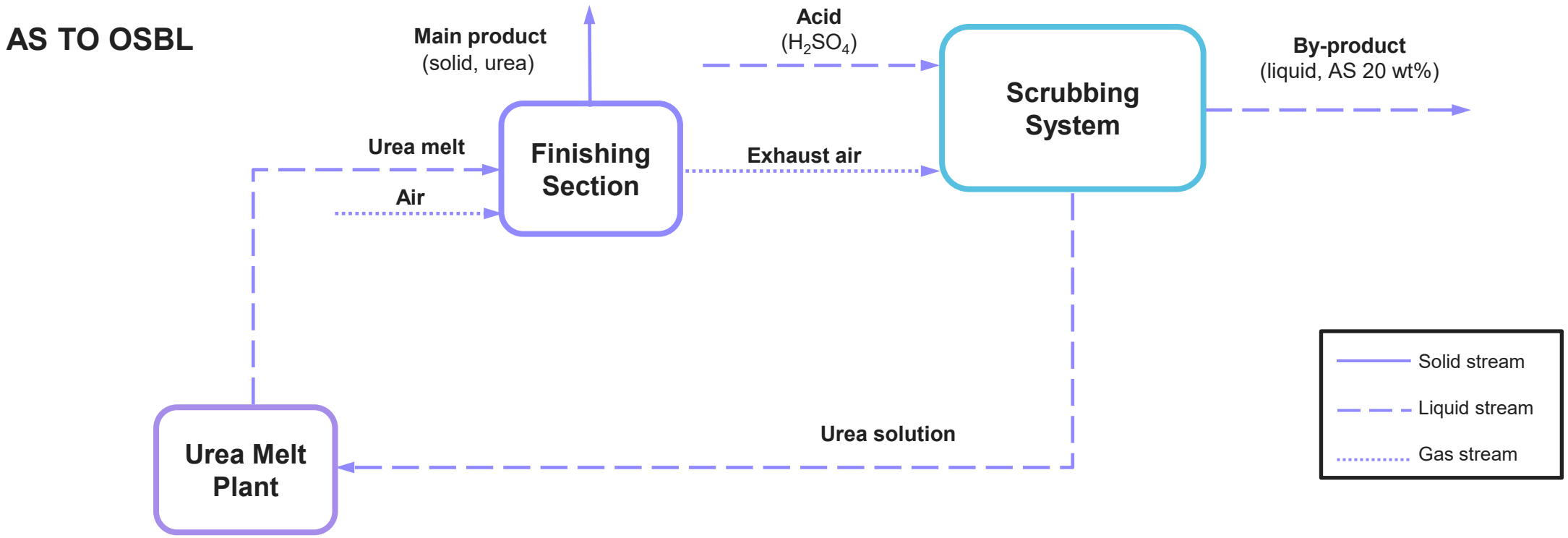
$$NH_3 + HNO_3 \rightarrow NH_4NO_3$$

Ammonium nitrate solution

- ✓ Suitable when nitric acid is available on site
- ✓ Requires facilities suitable for handling ammonium nitrate

SALT REWORKING OPTIONS

Ammonium Sulfate Handling: Ammonium sulfate can be routed to OSBL for external processing or recycled back into the granulation process to reduce waste.



SALT REWORKING OPTIONS

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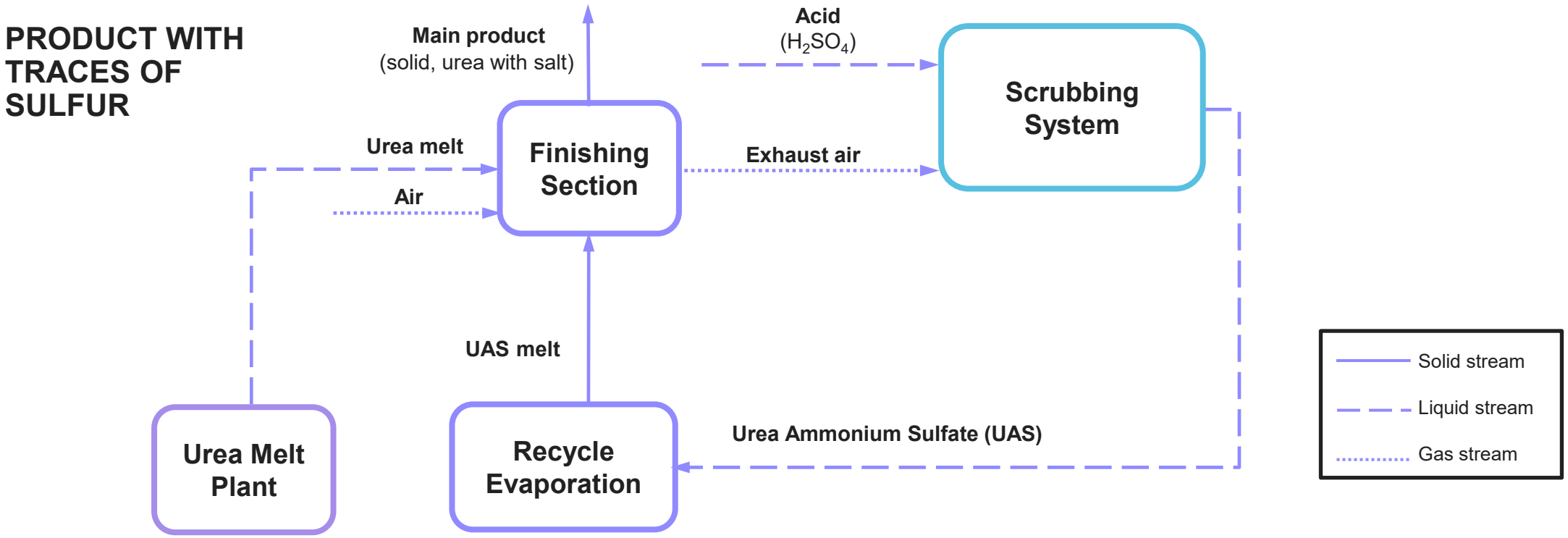
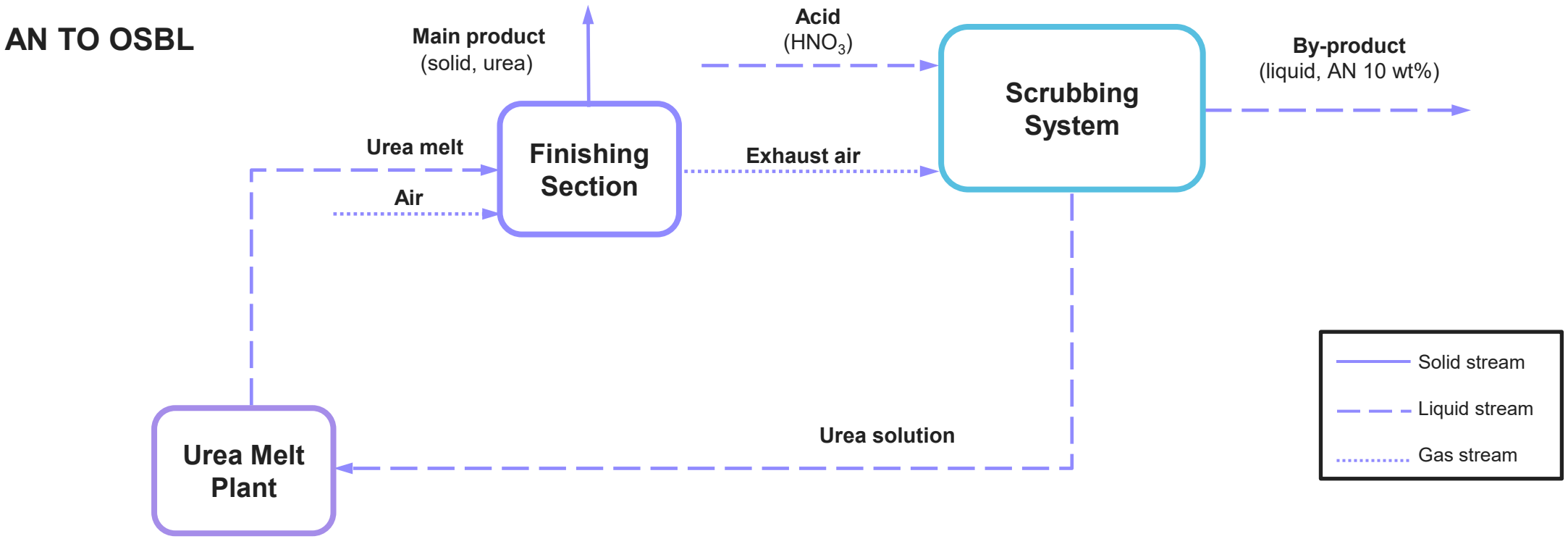


SALT REWORKING OPTIONS

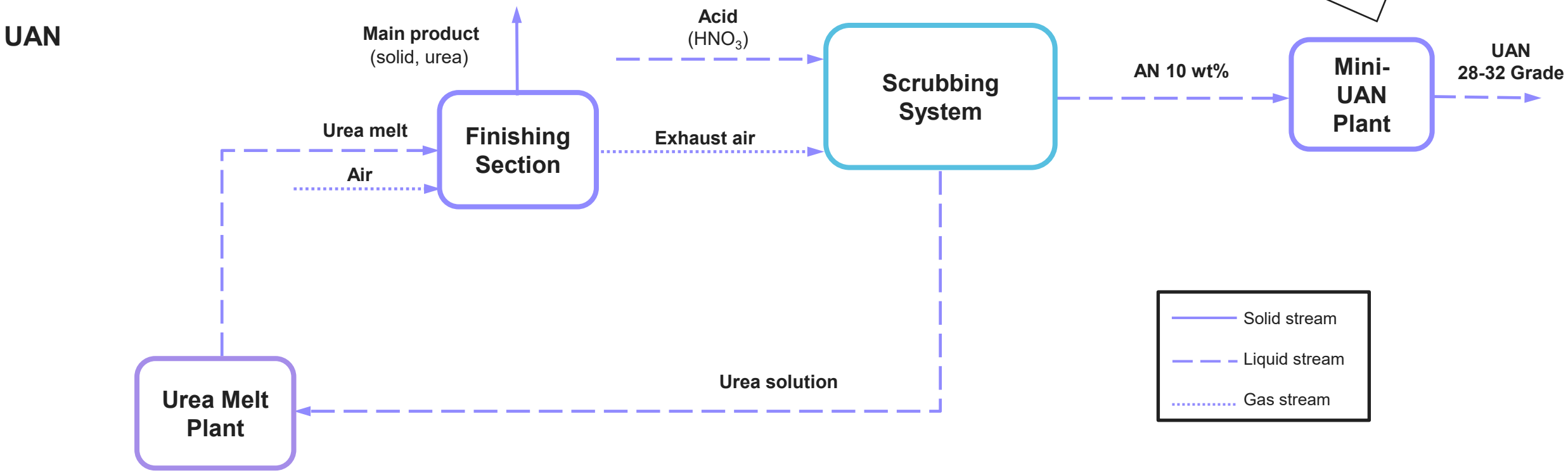
Ammonium Nitrate Handling: Options include sending ammonium nitrate to OSBL or converting it into UAN, a valuable liquid fertilizer for enhanced plant nutrition.



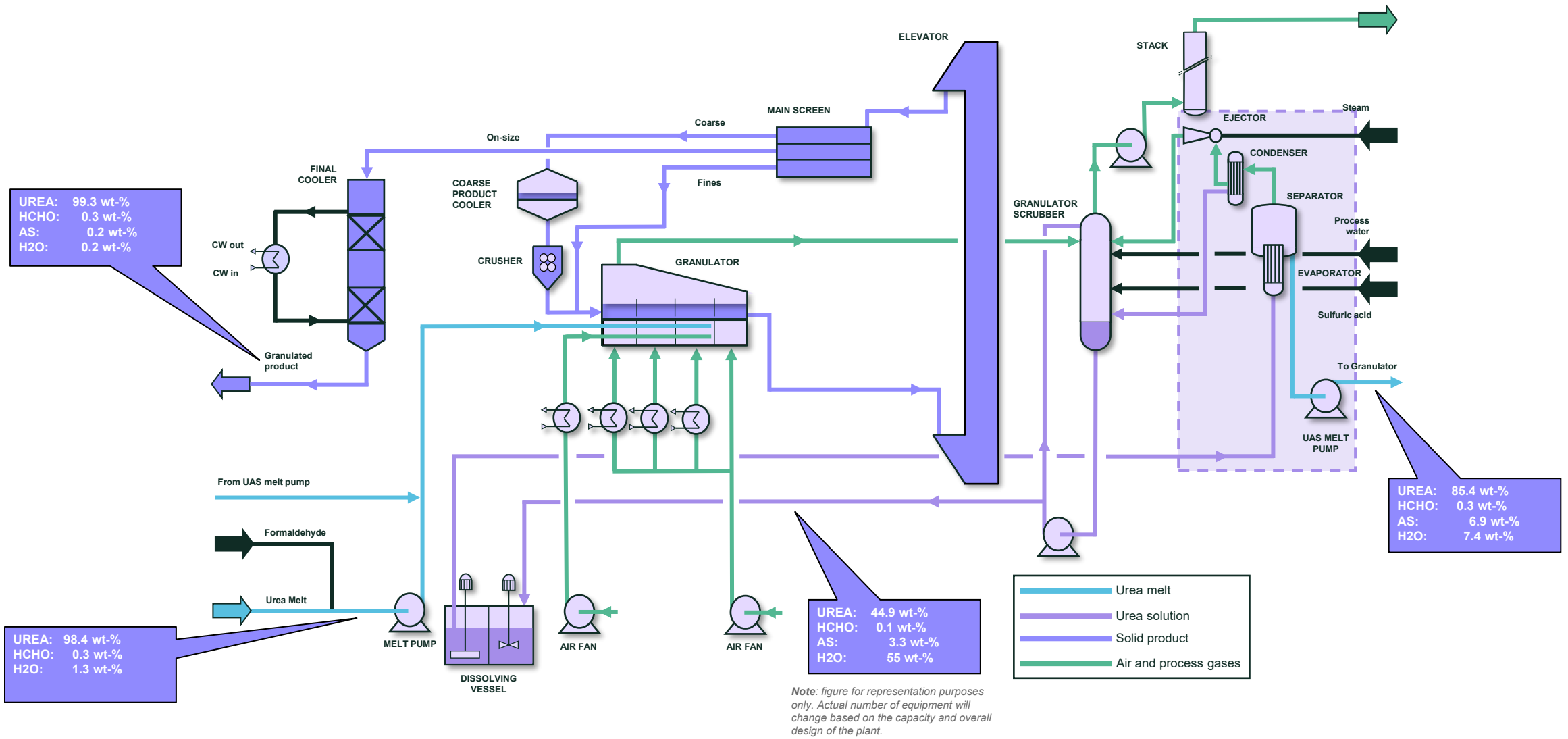
SALT REWORKING OPTIONS

Ammonium Nitrate Handling: Options include sending ammonium nitrate to OSBL or converting it into UAN, a valuable liquid fertilizer for enhanced plant nutrition.

Process Integration Benefits: Salt reworking strategies minimize waste, improve process integration, and create additional revenue streams through fertilizer production.



AMMONIUM SULFATE REWORKING: PRODUCT WITH TRACES OF SULFUR



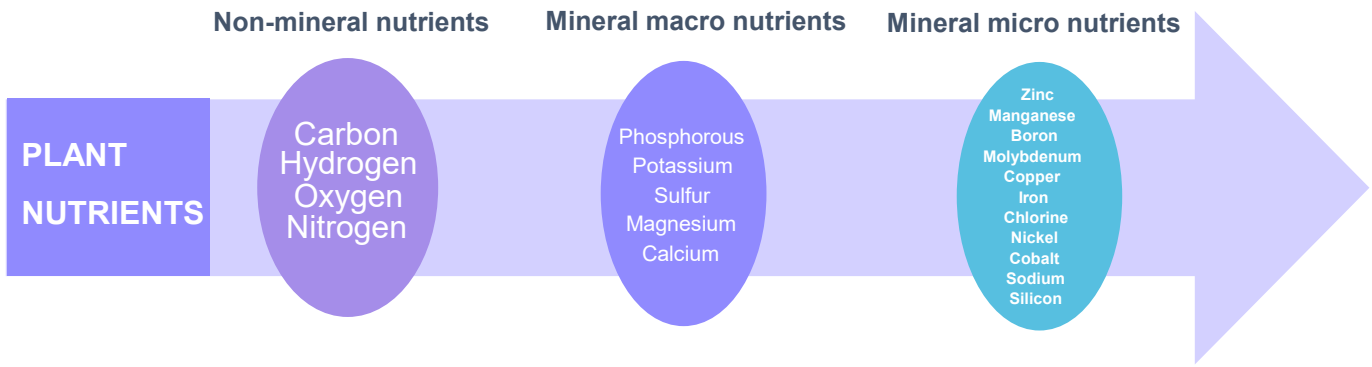
***Note**: figure for representation purposes only. Actual number of equipment will change based on the capacity and overall design of the plant.*

06

EXPANDING THE UREA PRODUCT PORTFOLIO

GRANULATION PRODUCTION FLEXIBILITY

MARKET DEMAND FOR SPECIALTY FERTILIZER



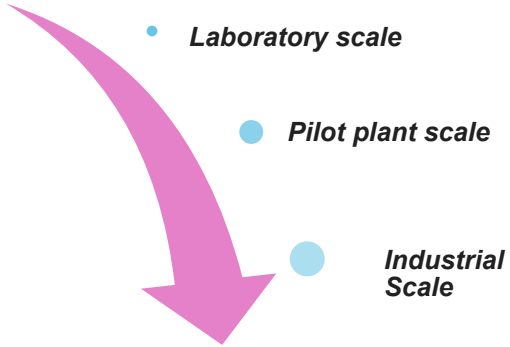
Reduced nitrogen losses

Increased crop production

Improved soil health

Reduced negative enviro. effect

via Innovation:



Urea granules with increased Nitrogen Use Efficiency

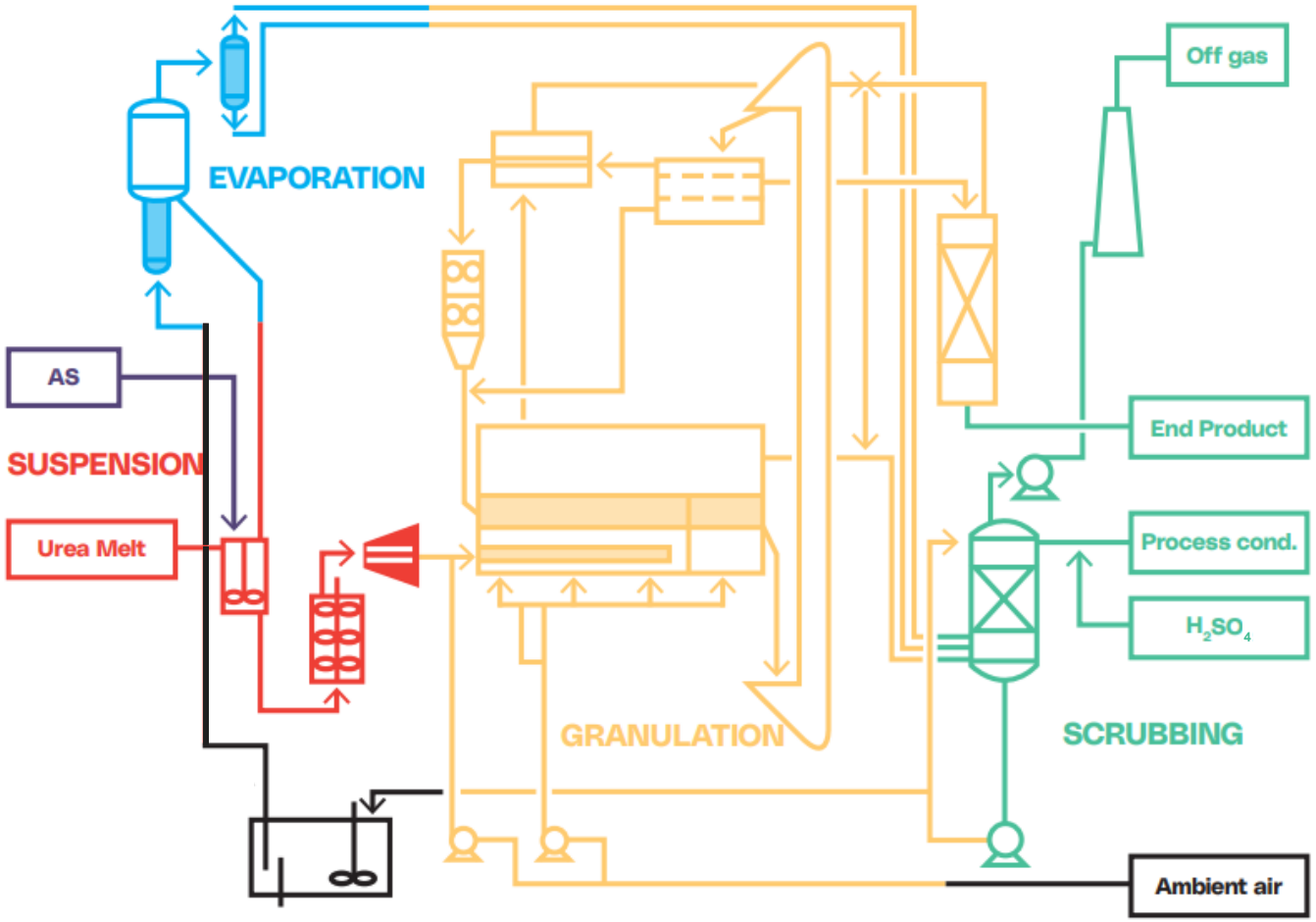
- Integration of solid micronutrient sources into the urea melt stream. Produces micronutrient-compounded urea granules using Stamicarbon fluidized bed technology
- Dedicated design for UAS granules. Supports production of UAS granules in fluidized bed granulation

Formaldehyde-free urea for AdBlue applications

- Enables intermittent TGU production within our granulation process

Flexible Engineering design facilitates switching between production of various grades of urea based on market demand

UAS GRANULATION



Addition of solid AS in the process to achieve richer sulfur content in the final product

Suspension section ensures that the added AS is properly milled and mixed with urea melt

UAS granules can be produced up to 32wt% AS

Low NH_3 emissions in the granulation stack due to the acidic scrubbing (< 20 mg/Nm^3)

Configuration of evaporation section allows for a complete containment of AS in the granulation plant

***Note**: figure for representation purposes only. Actual number of equipment will change based on the capacity and overall design of the plant.*

UAS PLANT IN OPERATION

JSC MCC Eurochem

Novomoskovsk, Russia

600 MTPD

UAS granulation plant

Date of contract: 2011
Commissioning & Start-up: Q3 2018
Urea with 0 – 21 wt-% AS (0 – 5 wt-% S)



07

CONCLUSION

CONCLUSIONS

- The **urea finishing section** has evolved into a strategic technology platform that directly influences product quality, market competitiveness, and the ability to diversify into next-generation fertilizer products.
- **Prilling and granulation** remain the most widely adopted urea finishing technologies worldwide.
- Part of the market is evolving towards **value-added fertilizers** enriched with macro and micronutrients, and liquid urea solutions.
- Increasingly stringent environmental regulations are driving the implementation of advanced emission control systems and more integrated sustainable designs.

STAMICARBON (NEXTCHEM) is committed to continuously improving and innovating its technologies to support all our customers and the fertilizer industry in achieving long-term operational excellence, sustainability, and growth.

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