

SNAMPROGETTI™ **UREA TECHNOLOGY**

**WE MAKE
GREAT THINGS HAPPEN.
TOGETHER.**



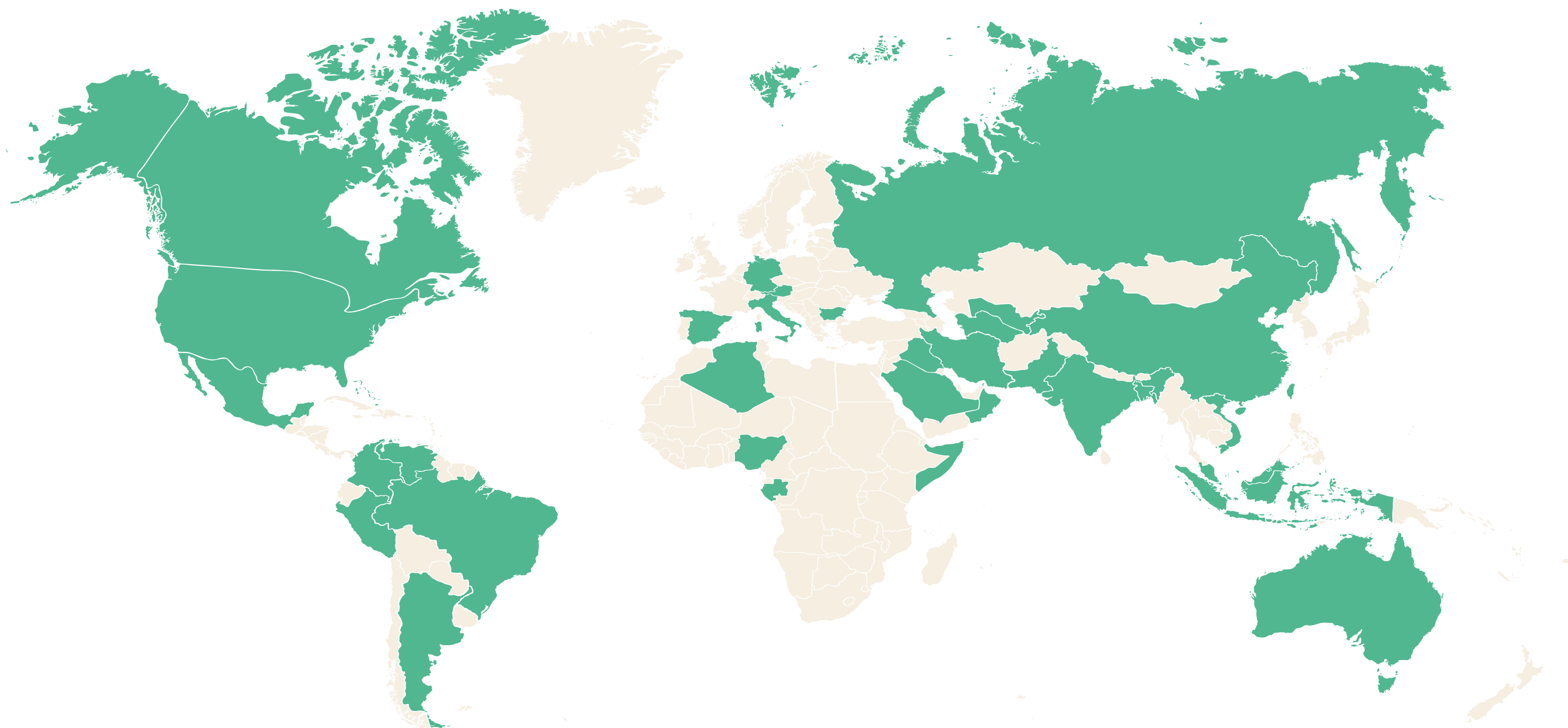


OUR UREA TECHNOLOGY SOLUTIONS

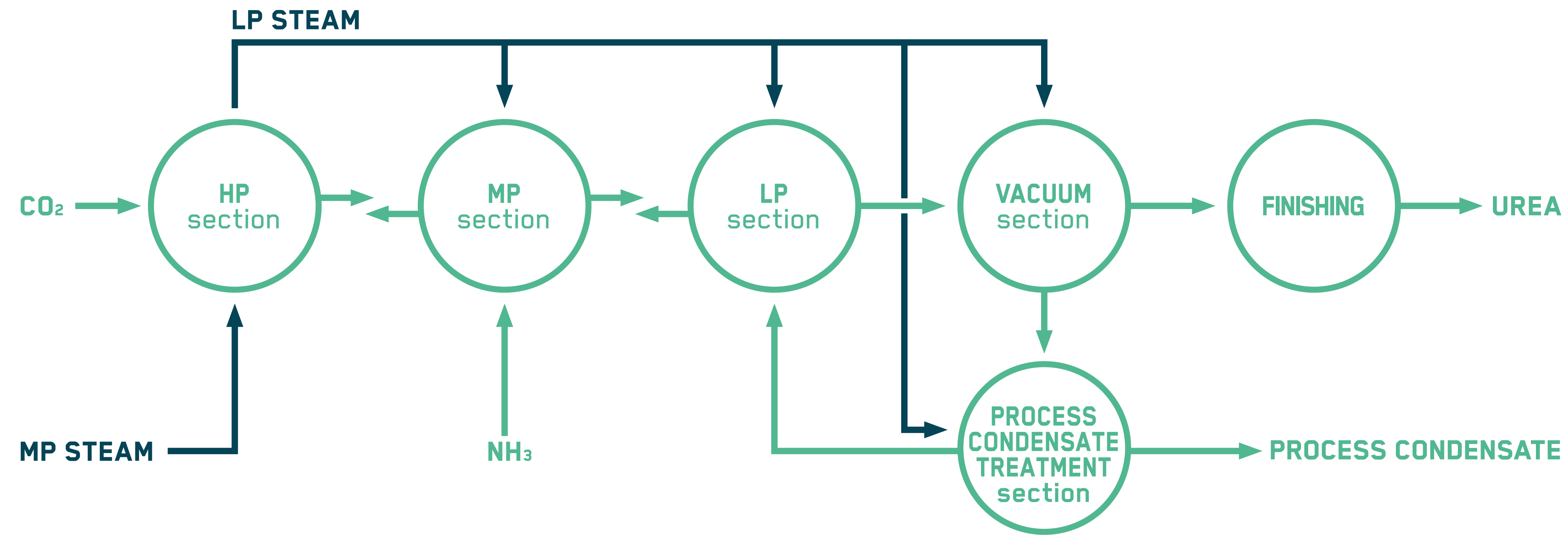
SECURING FOOD SUPPLY GLOBALLY

Since 1962 Saipem has contributed to the production of cutting-edge fertilizers, thanks to the first **Snamprogetti™ Urea Technology patent**, a method to produce urea from carbon dioxide and ammonia, focusing on a total recycle stripping process. Today Saipem established itself as a **key player** in urea production technologies with its plants **producing about one third of the world's urea**.

OUR WORLDWIDE PRESENCE



OUR PROCESS SCHEME



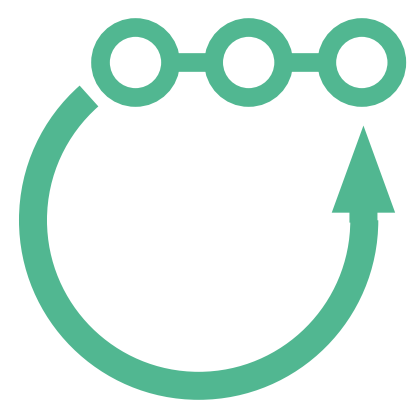
SPECIFICATION	u.o.m.	PRILLING	GRANULATION ⁽¹⁾	RAW MATERIALS AND UTILITIES CONSUMPTION ⁽²⁾	u.o.m.	PRILLING	GRANULATION ⁽¹⁾
Total Nitrogen	wt%	46.4	46.3	Ammonia (as 100%)	kg	566	563
Biuret	wt%	0.85	0.8	Carbon dioxide (as 100%)	kg	733	731
Moisture	wt%	0.25	0.2	HP steam to process (47 barg, 384 °C) ⁽³⁾	kg	38	36
Formaldehyde	wt%	-	0.4	MP steam to process (24.5 barg, 322 °C) ⁽³⁾	kg	559	543
Size distribution	%	97 (from 1-2 mm)	95 (from 2-4 mm)	Cooling water ($\Delta T = 10\text{ °C}$) ⁽³⁾	m ³	68	65
Crushing strength	kgf	0.8 (on 2 mm)	4.1 (on 3 mm)	Electric power ⁽³⁾	kWh	23	23

(1) Typical values based on fluid bed granulation tecnology (2) Referred to 1 ton of urea product (3) Excludes CO2 compressor and granulation unit, i.e., only urea solution process is considered for utilities consumption



STRENGTHS AND ADVANTAGES OF THE SNAMPROGETTI™ UREA TECHNOLOGY

Choosing Snamprogetti™ Urea Technology means choosing a **proven and referenced technology**, with support and **assistance throughout plant life**. This solution stands out for its **flexibility, high conversion** and **low emissions** and is characterized by maximum efficiency with **compact high-pressure equipment**.



**HIGH
CO₂
CONVERSION**

up to
85%
(within HP section)



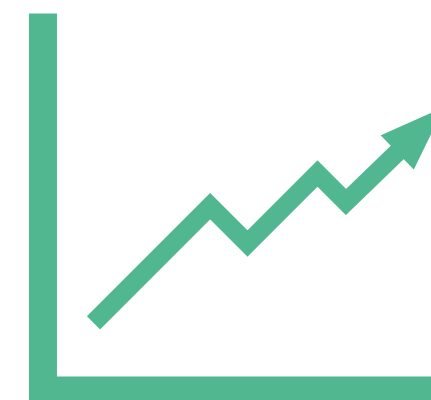
**LONG
BOTTLING-IN**

up to
48h



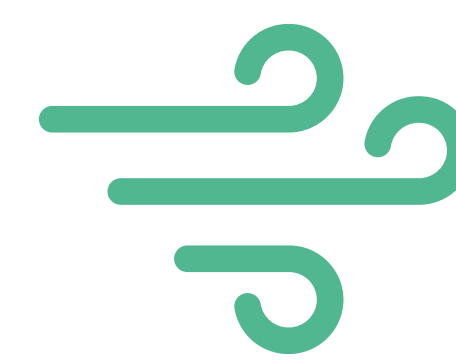
**LOW
TURN-DOWN
RATIO**

down to
40%



**HIGH
ON-STREAM
FACTOR**

up to
98%



**ENVIRONMENTALLY
FRIENDLY**

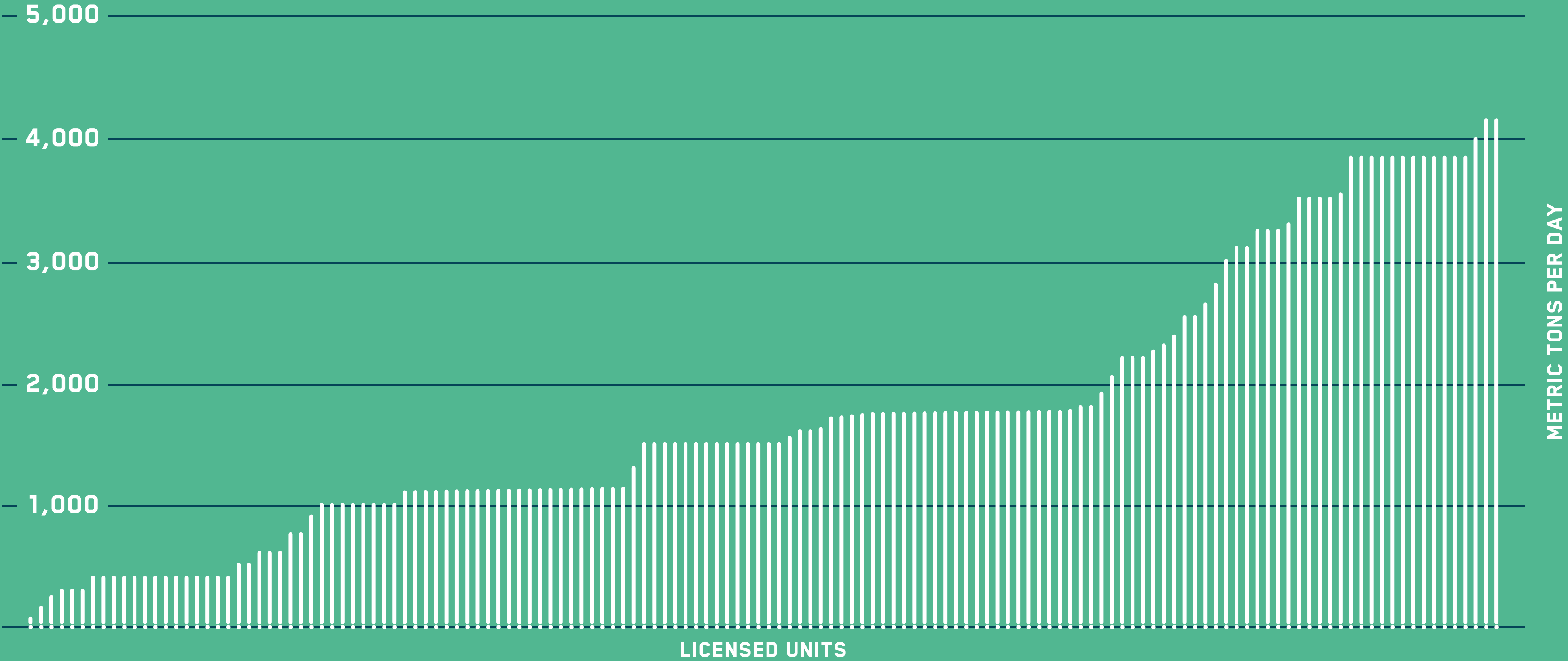
Nearly
0
emissions



**RE-USABLE
PROCESS
CONDENSATE**

1 ppm
of urea and ammonia

WIDE RANGE OF PRODUCTION CAPACITIES



**MORE THAN 140 UNITS
FROM 70 TO 4,235 MTPD**

**OPERATED ABOVE 4,250 MTPD
ON CONTINUOUS BASIS**

**DESIGNED
ABOVE 5,000 MTPD**

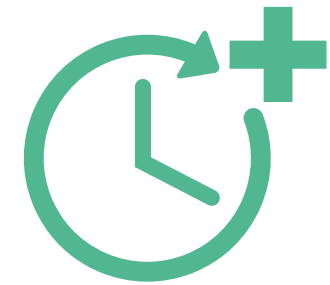
SNAMPROGETTI™ UREA TECHNOLOGY INNOVATIONS

1. SUPERCUPS™

High performance internals
for urea reactor



OPTIMAL MIXING
OF REAGENTS



INCREASED
RESIDENCE TIME



ENERGY
SAVING

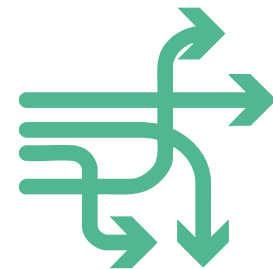
By combining an enhanced mixing of reagents with an optimized residence time within the tray geometry, SuperCups can **boost the reactor conversion rate** thus **reducing the plant energy consumption**.

2. TUTTLE PRILLING BUCKETS BY SAIPEM™

Outstanding
product quality



IMPROVED PRILL
QUALITY



OPERATIONAL
FLEXIBILITY



MINIMIZED DUST
GENERATION

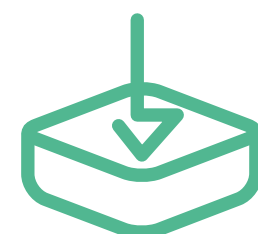
A **unique blend** of theoretical knowledge and extensive field experience. **Optimized** and **customized design** and **manufacturing**.

3. SATURN31™

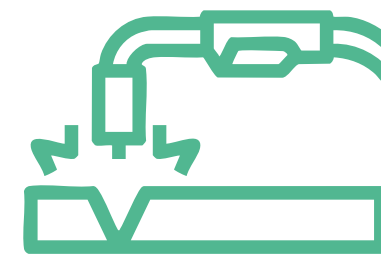
The SuperDuplex material
fit for Snamprogetti™
urea technology



TOP CORROSION
RESISTANCE



EXCELLENT
MECHANICAL
PROPERTIES



OPTIMAL
WELDABILITY

New frontiers for urea equipment design and manufacture ensuring **best performances** and **longer equipment life**.

SAIPEM EVERLASTING SUPPORT

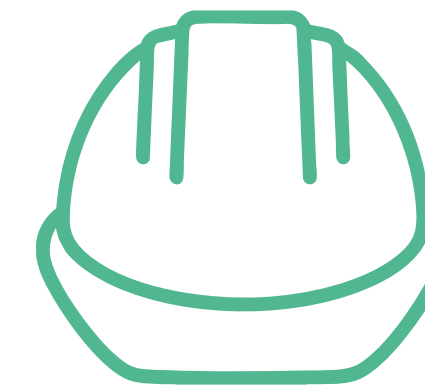
LICENSING



**TECHNOLOGY
PACKAGE
SERVICES
TRAINING**

Saipem assures a complete technology package tailored for Clients, starting from the design up to the assistance during the whole lifetime of your plant.

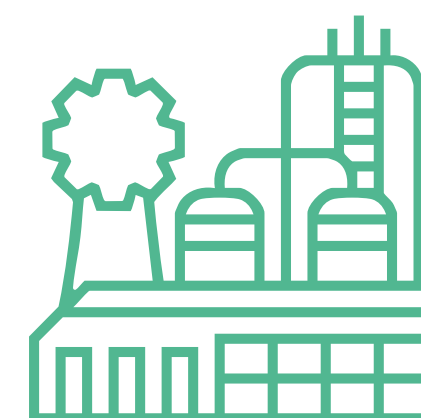
SITE SERVICES



**INSPECTIONS
MAINTENANCE
SUPERVISION**

A unique set of activities aimed at extending HP static equipment life thanks to a proven background in design, operation and maintenance.

REVAMPING



**PRODUCTION
CO-PRODUCTIONS
ENERGY
& EMISSIONS
RELIABILITY**

The longstanding experience demonstrates the capability to realize significant production increase, energy saving and environmental improvements with minimum economic impact.

REMOTE SERVICES



**POST SALES
ASSISTANCE
OPERATIONAL
HINTS
DIGITALIZATION**

A comprehensive set of services to assist Clients in daily plant aspects.

BY YOUR SIDE FROM PLANNING TO OPERATIONS

PLAN

CONCEPT / PRE-FEED

Technology
selection phase
Feasibility study

DESIGN

BASIC / FEED

Licensors' PDP
Front End
Engineering

BUILD

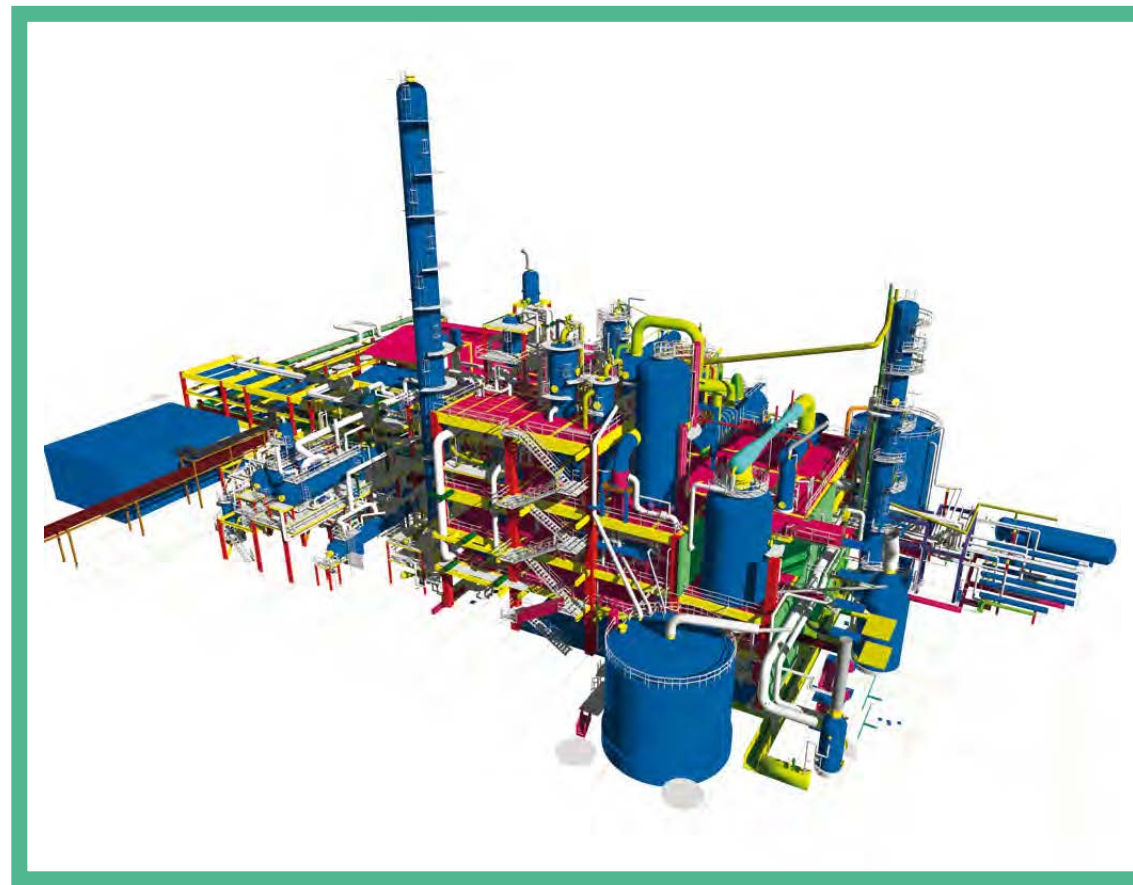
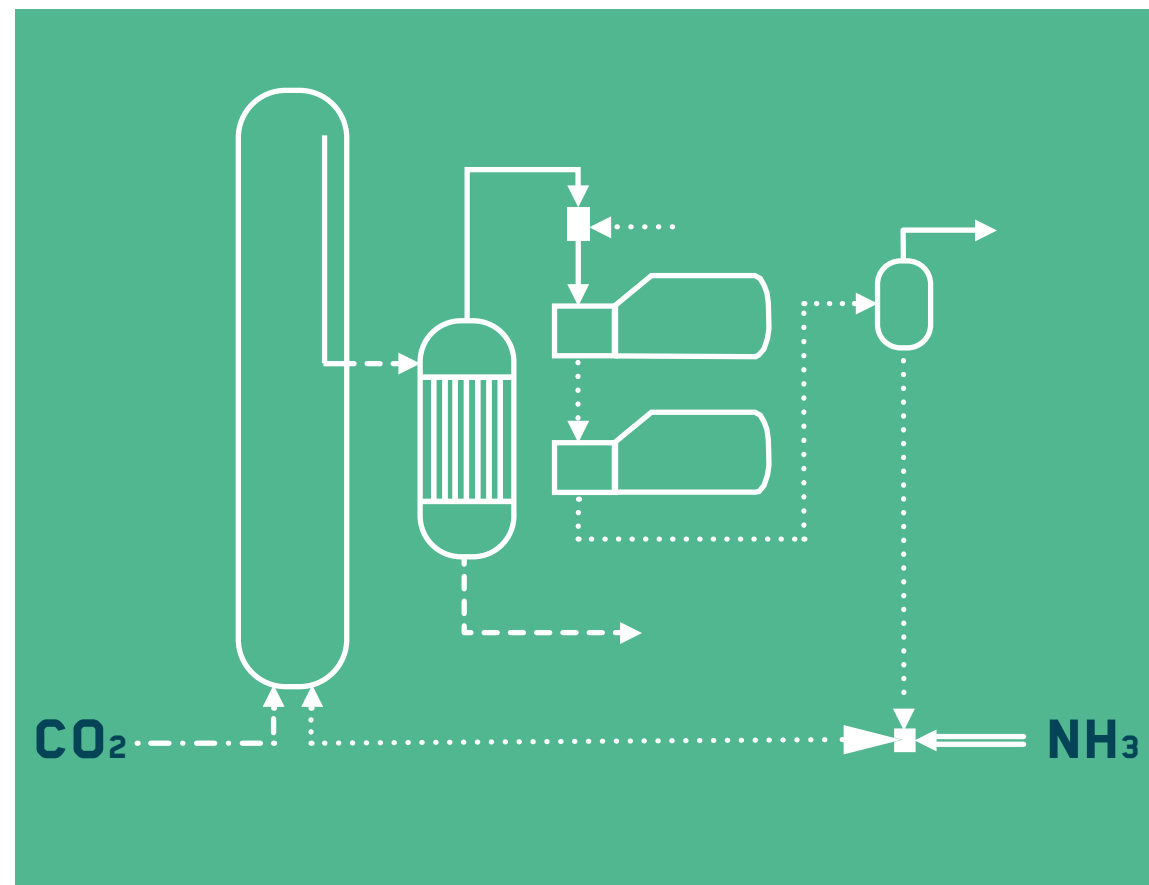
EPC

Detail Engineering
Commissioning, start-up
and performance test

OPERATE

FULL LIFE SUPPORT

Optimizations
& debottlenecking Inspections
HP equipment replacement





ENGINEERING FOR A SUSTAINABLE FUTURE

SNAMPROGETTITMTECHNOLOGYINFO@SAIPEM.COM