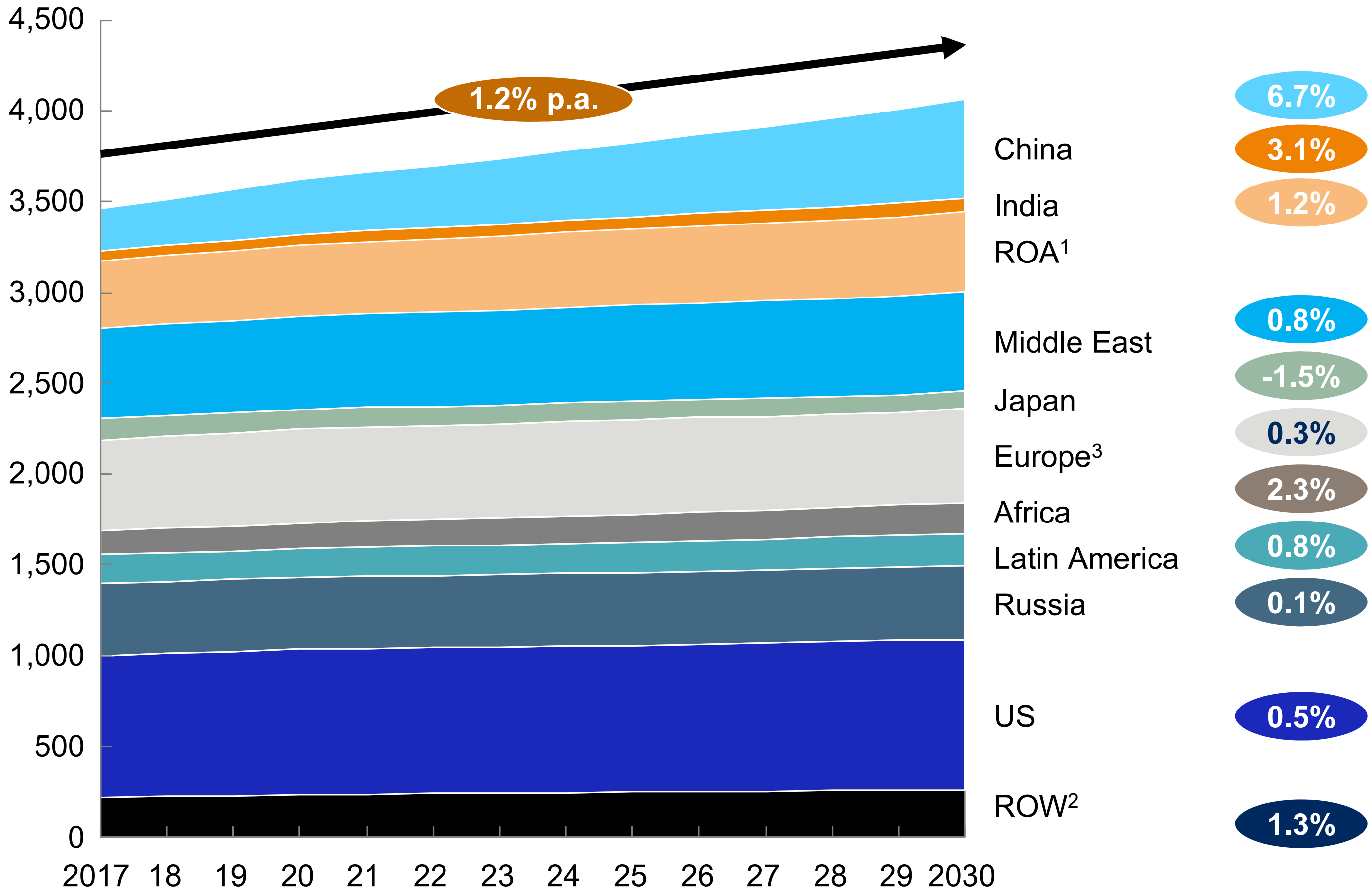
SONATRACH PERSPECTIVES ON ASIAN LNG MARKETS

65% of global gas demand growth by 2030 is expected to come from Asia, with traditional demand centers remaining stagnant

Global gas demand by region to 2030
Bcm

CAGR
2017-30, %



Main drivers

- **Asia (especially China) remains the main driver of demand growth:** adding 400 bcm of additional demand between 2017 and 2030
- **Africa will grow at 2.3% p.a. between 2017 and 2030:** bringing in approximately 40 bcm of additional demand
- **0.5% and 0.8% demand growth in the US and the Middle East respectively translates into substantial volume additions** (around 50 bcm each)
- **Europe and Russia to remain stagnant,** adding altogether around 25 bcm of demand between 2017 and 2030

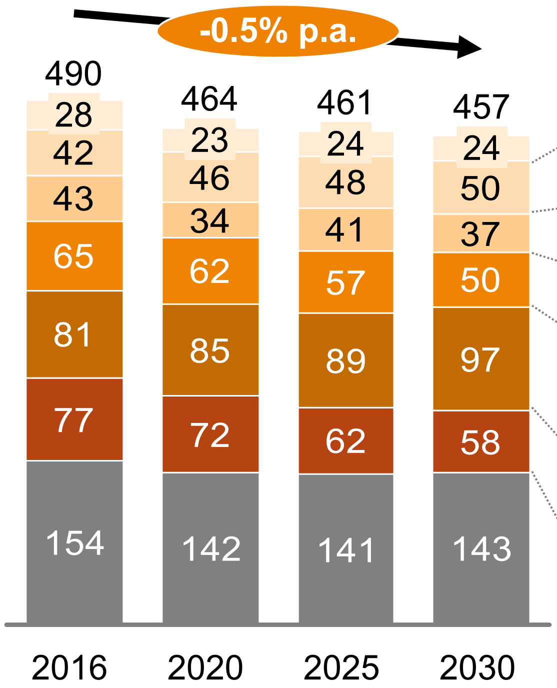
1 Rest of Asia 2 Rest of World 3 Continental Europe incl. Ukraine

SOURCE: Sonatrach Analysis, Energy Insights by McKinsey

European gas demand expected to stabilize around 460 bcm in 2020 and to remain flat through 2030

Spain | France | Germany | Rest of Europe
Turkey | Italy | United Kingdom

EU 28+3[1] natural gas consumption by country, bcm



NB: ca 20 BCM extra demand in power in 2016 due to a) cold winter, b) coal price floor UK and c) high coal prices

CAGR 2016-30, %	**Main drivers**
-1.2	▪ Demand decline driven mainly by power and industry sectors affected by **renewable energy's increasing competitiveness and hence growing capacity**
1.2	▪ Fast demand growth in buildings and industry sectors due to **increasing gas penetration as well as growing urbanization, population and overall economic progress**
-1.2	▪ Growth in residential and transportation sectors, where **cleaner gas will push out traditional fuels, will be offset from 2025 onwards by improving overall energy efficiency**
-1.8	▪ Gas to power demand expected to **decline due to growing competition from renewables, mainly solar energy**
1.3	▪ Move away from nuclear power and coal-fired generation will **further stimulate use of cleaner fuels, including natural gas** serving also as a backup for volatile renewables
-2.0	▪ New nuclear power generation capacity and renewables expansion to **decrease gas to power demand** ▪ **Decline in accessible gas resources** to constrain development of gas intensive industries
-0.5	▪ **Energy efficiency and renewables additions combined with uncompetitiveness of industry** due to high feedstock costs and declining gas-to-power demand will limit underlying demand growth

1 EU28 + Norway, Switzerland, Turkey

SOURCE: Sonatrach analysis, BP Statistical Review of World Energy 2017, Energy Insights, Rystad Energy, Press search

Sonatrach is uniquely positioned -

STRENGTHS

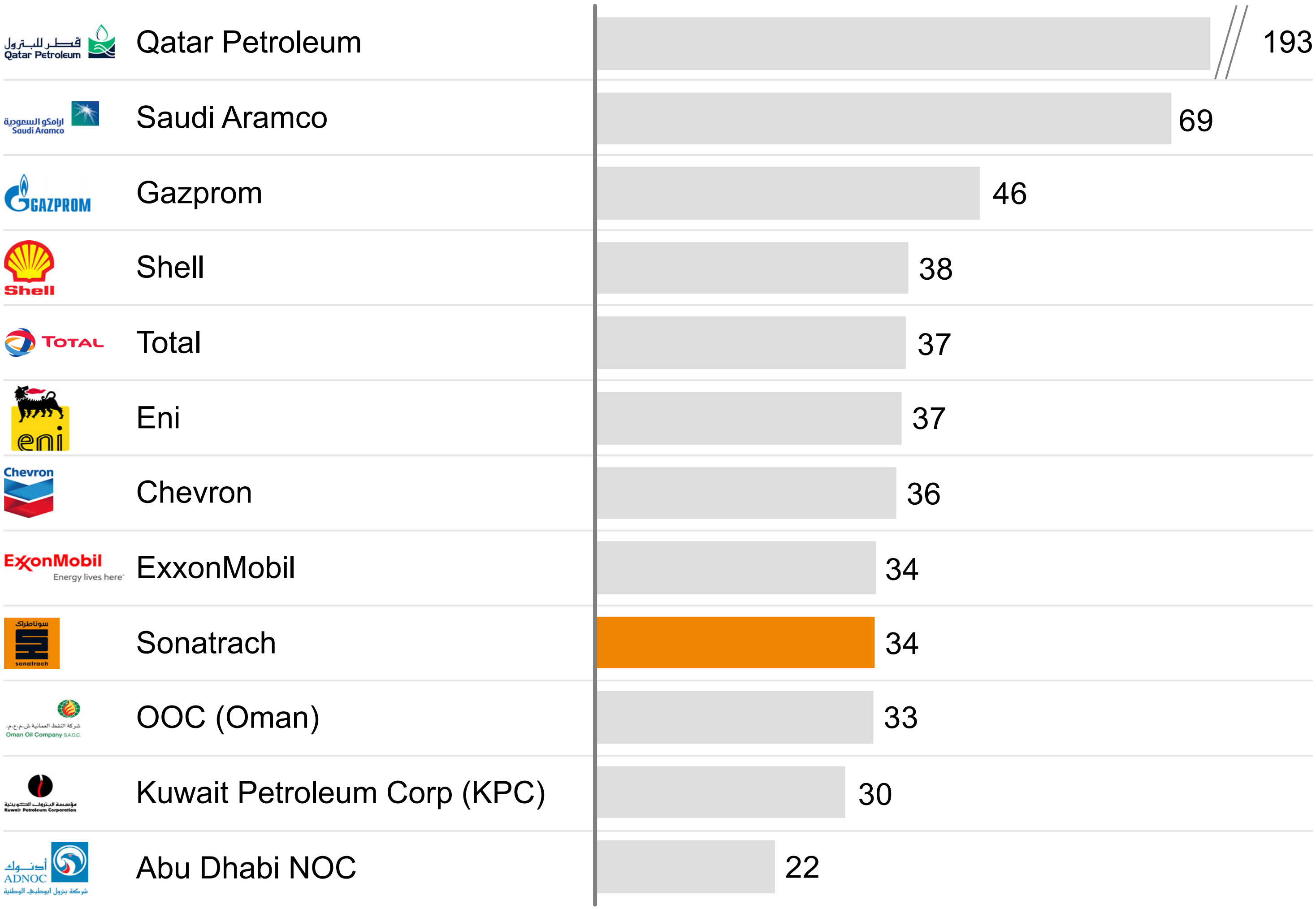
- **Close proximity to attractive markets** in Europe via pipeline and LNG **enabling low cost for marketed gas**
- **Strong commercial capabilities** in negotiating long-term contracts (SPA)
- High LNG spare capacity (6 Bcm) with the **ability to quickly ramp up production**
- **Great flexibility in the calorific value of the gas** with ability to modulate supplies
- **Flexible shipping capacity through varying ship sizes** allowing to serve both large and small buyers

OPPORTUNITIES

- **Expiring contracts create opportunities for commercial portfolio restructuring (e.g.** expiration of Italian LT contracts in 2019, 37 bcm of contracts)
- **Explore new markets such as Asia LNG** (currently representing only 5% of Sonatrach's volumes while ~70% of the Global LNG production goes to Asia)
- **Development of multimodal trading and short term opportunities** can change the current market landscape
- **Expand gas available for exports** via unconventional resources, domestic demand management

Sonatrach’s reserves to production ratio is in line with peers at approximately 34 years of production

R/P ratio for selected companies[1]**,** Years



- Sonatrach’s R/P ratio is **comparable with most peers**
- Qatar Petroleum, Saudi Aramco, and Gazprom have the highest R/P ratios in the market
  - ✓ Qatar and Saudi have relatively large resource bases
  - ✓ Gazprom has the highest resource base, as well as the highest production amongst peers

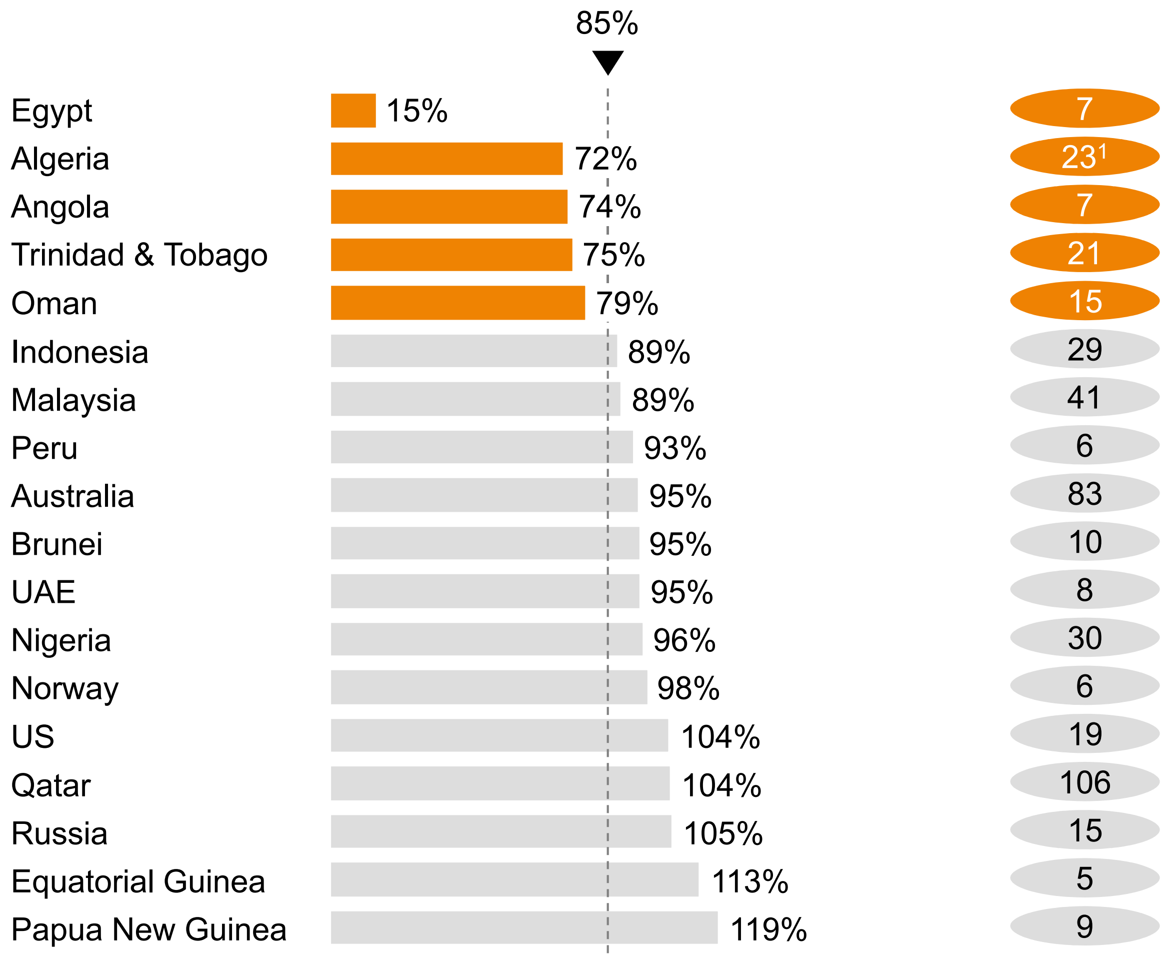
1 Balance calculated based on 2017 production and reserves levels

SOURCE: Rystad Ucube

Sonatrach has the fourth largest liquefaction capacity with high spare capacity (~6bcm)

LNG terminal utilization rates
%, 2017

LNG terminal capacity
Bcm, 2017



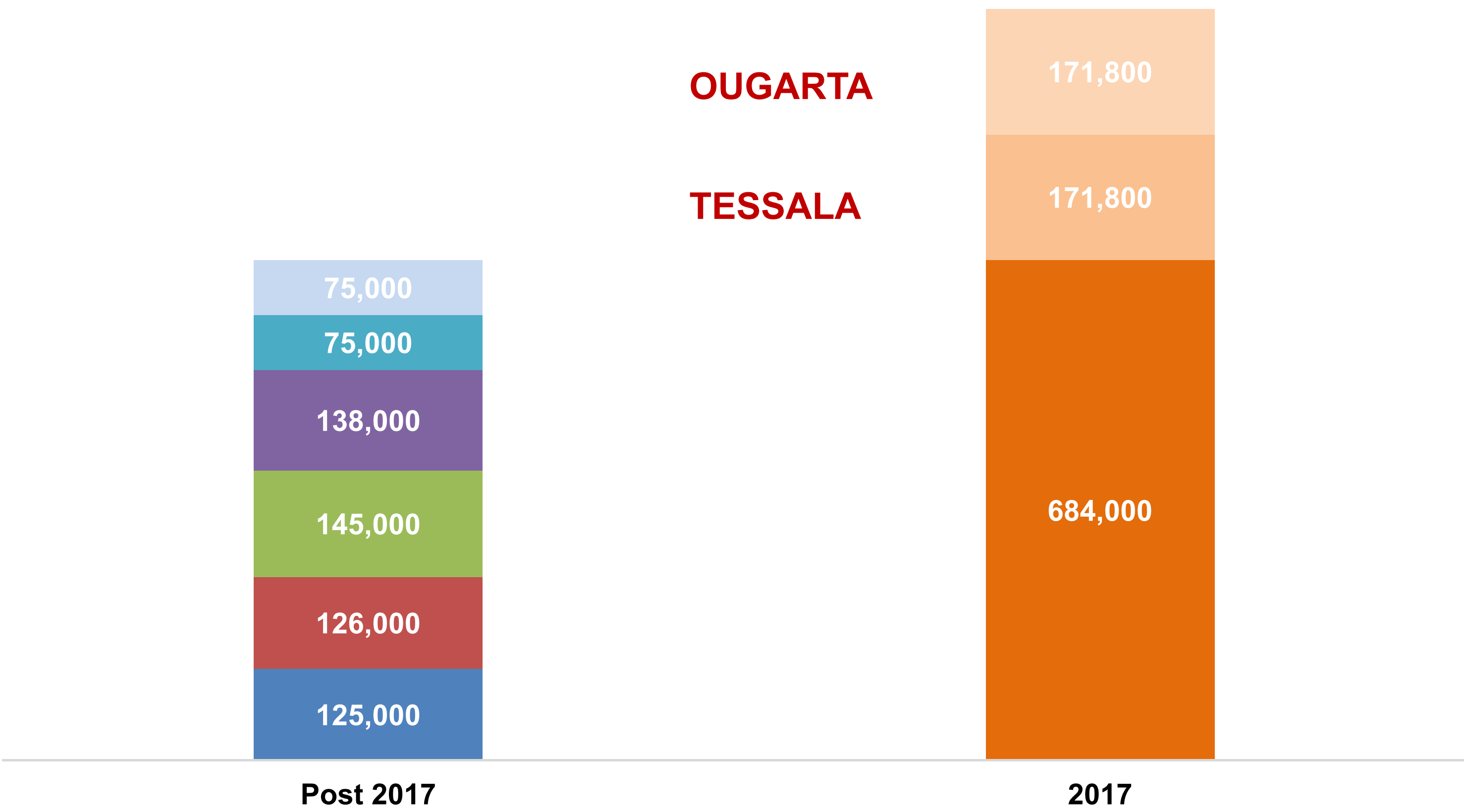
- Should the LNG market become more attractive, Sonatrach has the ability to ramp up the two modular liquefaction terminals (GL1Z, GL2Z) within **two days for additional LNG exports.**

NB: utilizations over 100% are occurring from plants operating above nameplate capacity
1 Based of "realised" capacity of 3 trains each for GL1Z, GL2Z

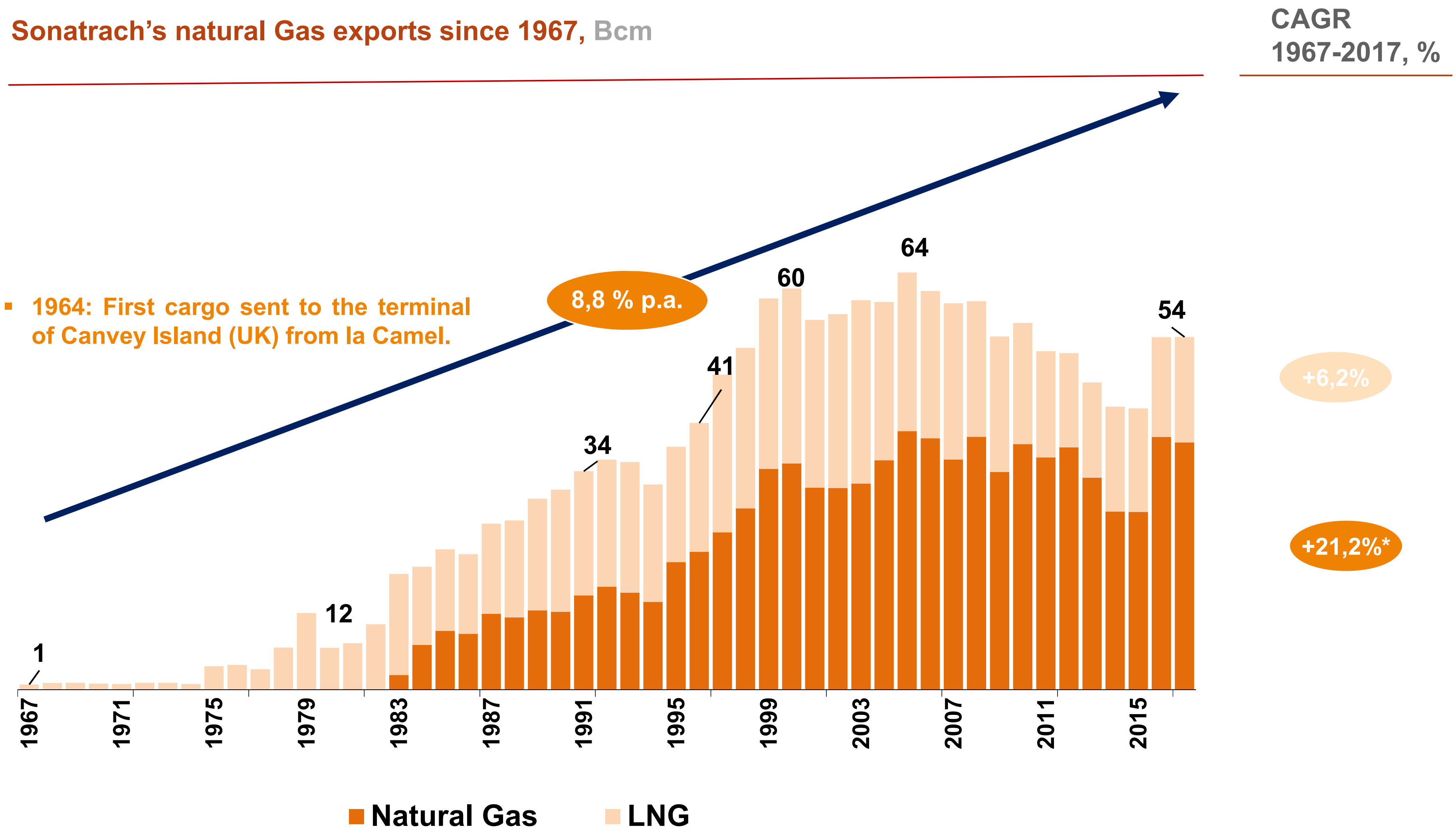
Source: Sonatrach Analysis, McKinsey energy Insights

New VLGC OUGARTA and TESSALA suit more long distance deliveries.

Sonatrach's Shipping Capacity, Cm

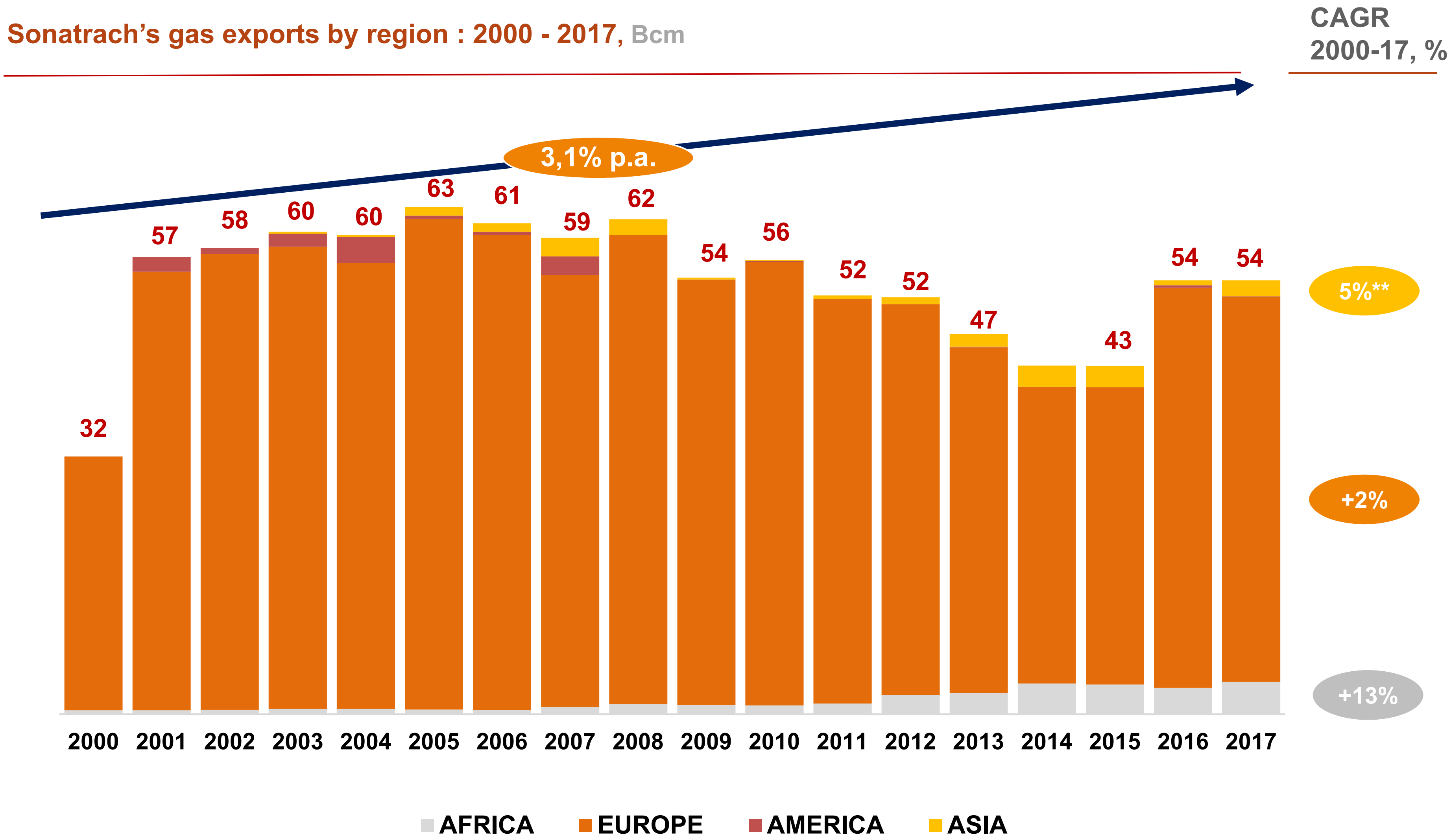


Sonatrach's Exports progressed by 8,8% per year.



(*): 1979-2017

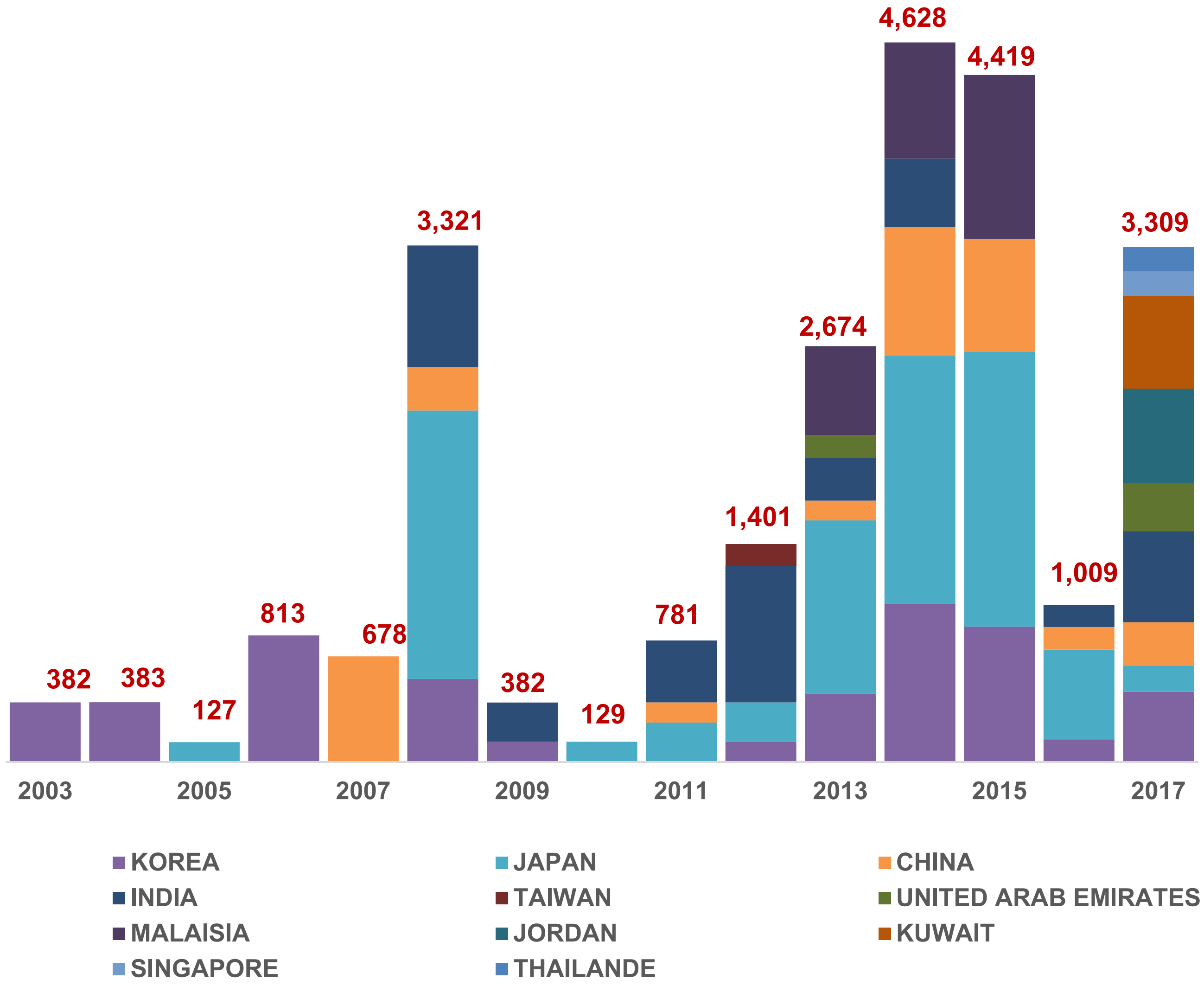
New entrants 'Africa and Asia' are becoming sustainable clients of Sonatrach



(*): Including LNG
(**): 2003-17

LNG expedition to Asia multiplied by 10 in 12 years

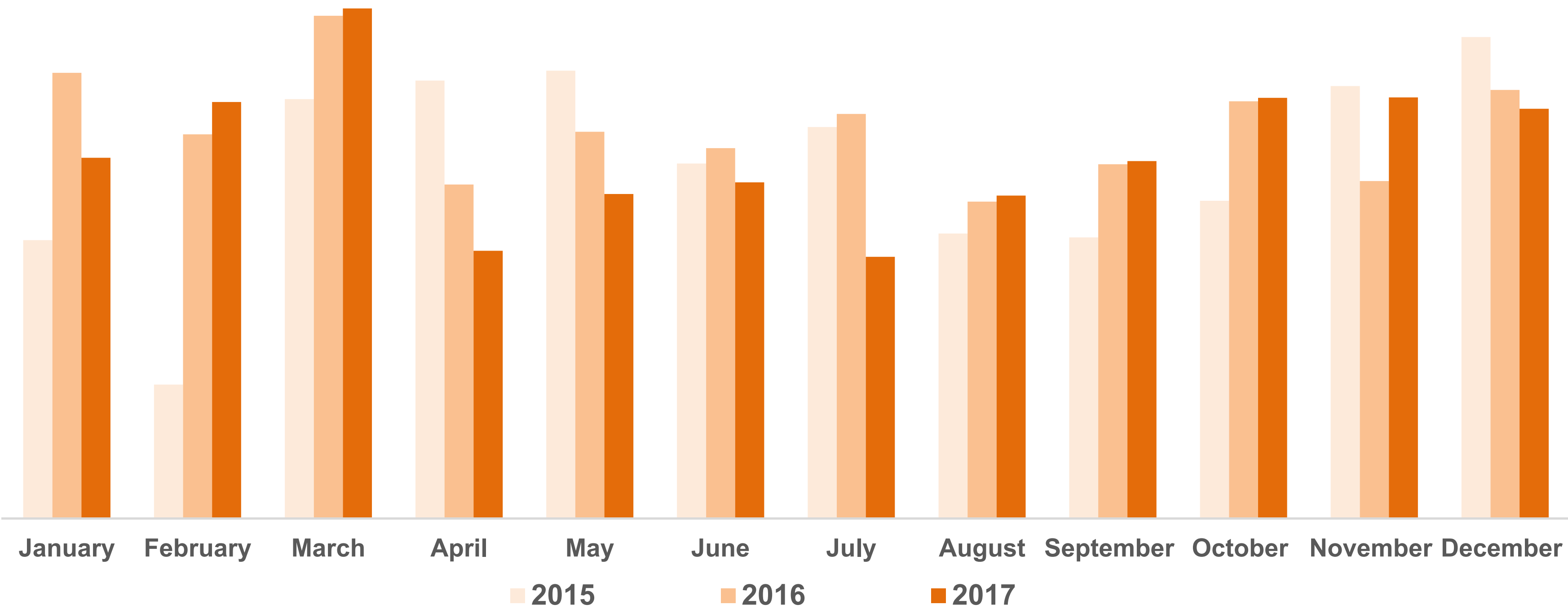
Sonatrach's LNG exports to Asia: 2003-2017, Thousand cm



- **25 millions cm** of LNG exported to Asia, since 2003.
- Sonatrach has supported the Japanese market after the Fukushima incident.

Sonatrach sales to Asia can counter balance the weak demand of the European market during summer.

Sonatrach's LNG exports to Europe on monthly basis,



(*): Including LNG
(**): 2003-17

Future

Current challenges

- Free quantities of gas from the expiry of LTC.
- Spare piped gas capacity.
- Spare LNG capacity
- Varying size LNG shipping capacity

Target markets

<u>EUROPE</u>

- Huge competitive pressure (REN, other competitors, Northern and eastern projects).
- But a high option value for the short term trading.

<u>ASIA</u>

- Huge growth potential, possibilities to index to oil
- But, remote markets

The way forward

- Decrease in the duration of LTC.
- Increase in the share of short term trading (less than 2 years), either in Europe or in Asia.
- More innovation and sophistication in our marketing / trading scheme.