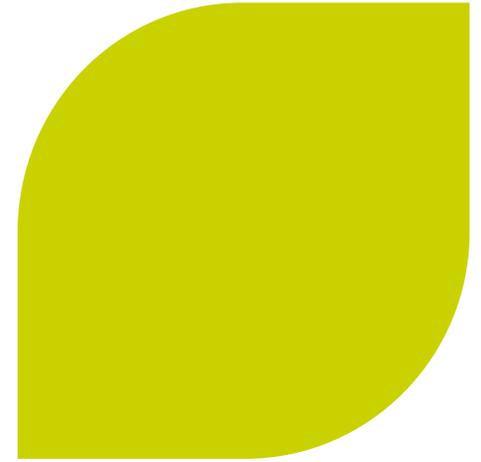
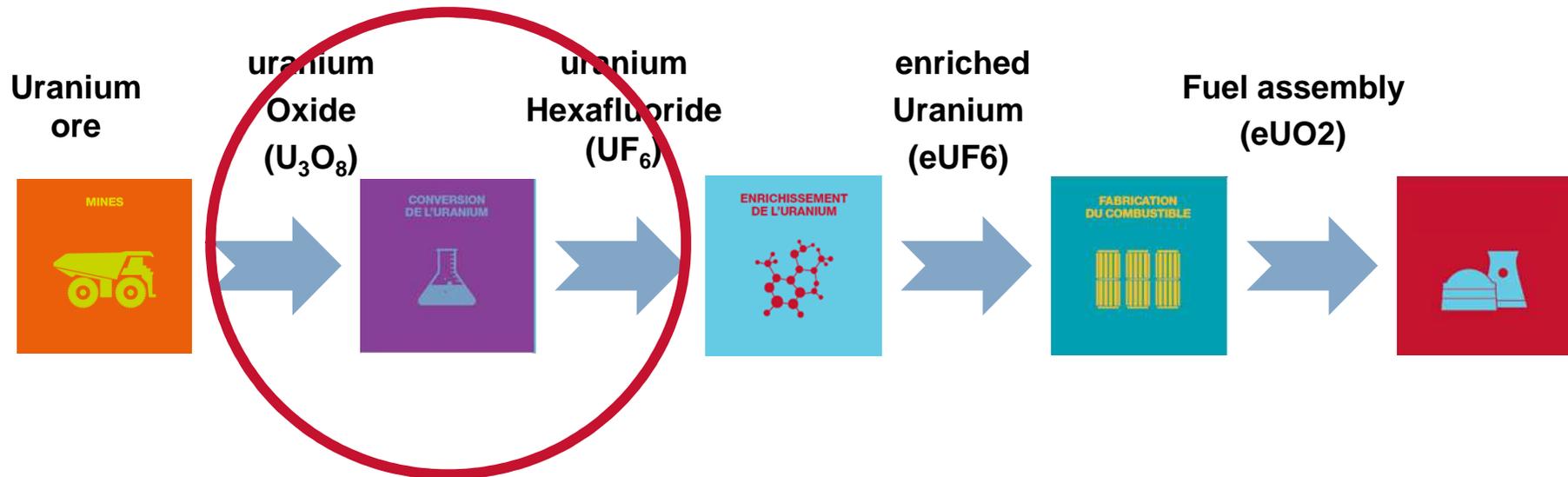


Conversion overview and CXII project update

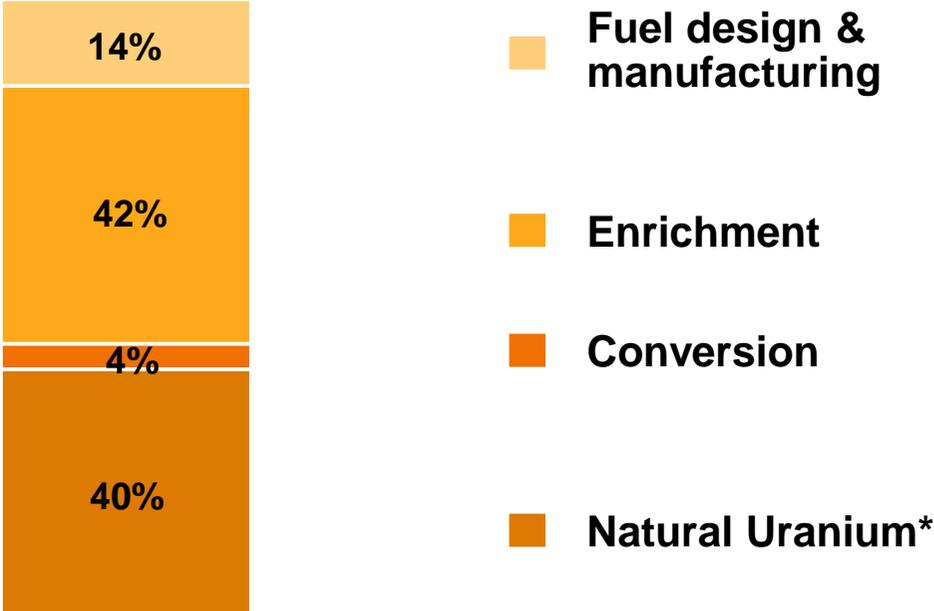
Jean-Michel GUIHEUX
Vice President Sourcing & Supply contracts
BU Mining & BU Chemistry-Enrichment
Moscow, May 30, 2016



From ore to Fuelthe conversion



Conversion represents a tiny part of a fuel assembly cost although it is an essential component of the nuclear fuel supply chain



Illustrative example



The Conversion market is supplied by 5 main industrial players



Cameco

- ▶ Blind River (1983) Port Hope (1984)
- ▶ Average production: ~6,500 tU/year
- ▶ Nominal capacity: ~12,500 tU/y

Existing facilities



Cameco

- ▶ Springfields (1993)
- ▶ Average production : 3,500 tU/year

Shutdown



TVEL

- ▶ Angarsk (1960 - **shutdown**)
- ▶ Seversk (1952)
- ▶ Average production: ~12,000 tU/year
- ▶ Nominal capacity : ~16,000 tU/y



ConverDyn

- ▶ Metropolis Works Plant (1959)
- ▶ Average production : ~8,500 tU/year
- ▶ Nominal capacity: ~15,000 tU/y



AREVA

- ▶ Comurhex Malvési (1959) & Pierrelatte (1961)
- ▶ Average production: 13,000 tU/year
- ▶ Nominal capacity: 14,000 tU/y
- ▶ Adaptable to a wide range of uranium concentrates
- ▶ Comurhex II under construction



CNNC

- ▶ Lanzhou & Diwopu (2008)
- ▶ Production : ~4,000 MTU
- ▶ Nominal capacity: ~5,000 tU/y
- ▶ National requirements

Industrial production (2015)

Source: Trade Press and AREVA estimates

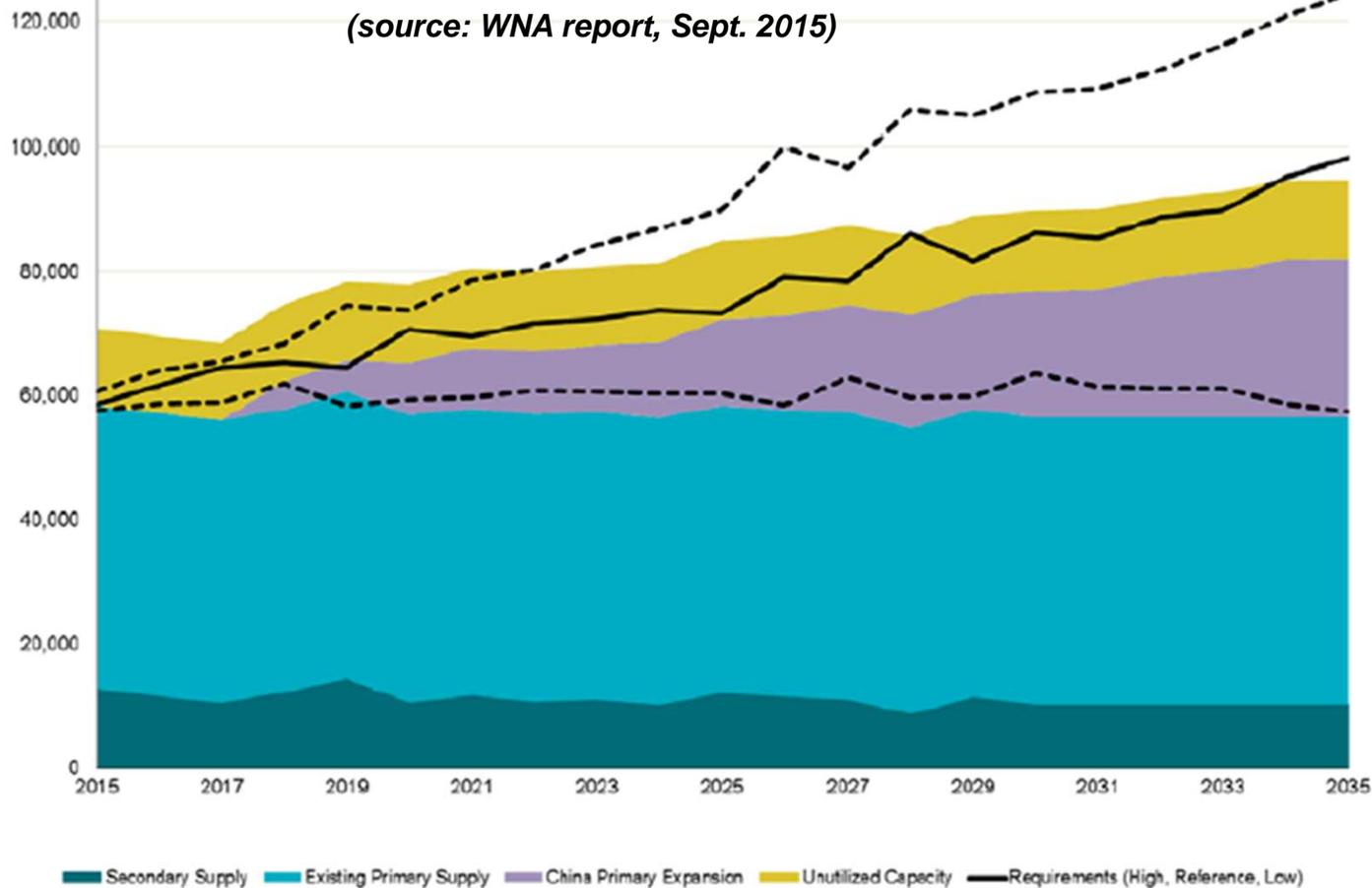


An oligopolistic market with aging facilities
Most of them do not operate at full capacity

Conversion market should remain unbalanced in the mid and long-term



Tons of Uranium in UF₆ Form



New capacity and/or extension of current facilities operating life will be necessary to ensure UF₆ production continues to meet demand



Secondary sources will remain a permanent contributor to conversion market

► Inventories

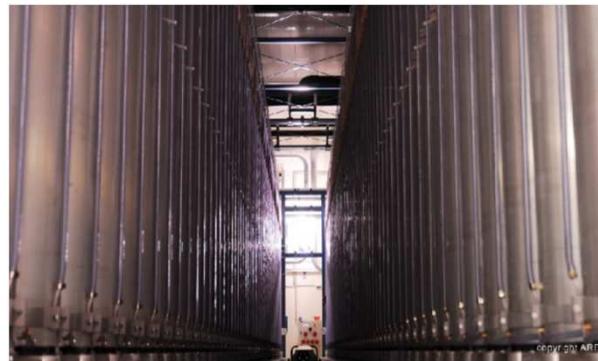


► Reprocessing

Pu (Mox), ERU



► Underfeeding



Despite adverse market conditions, investment in a new conversion facility in the OECD zone is needed :



- ▶ **Need to ensure OECD utilities security of supply:**
 - ▶ **Support their diversified procurement strategies :**
 - ▶ **By being able to receive all chemical types of concentrates**
 - ▶ **By being allowed to receive concentrates from all mines in the world under any bilateral agreement**
 - ▶ **By providing a sustainable trading hub for uranium producers and intermediaries serving utilities**
 - ▶ **Enable OECD utilities to safely store their strategic inventories in a safe place without license or tax risk**

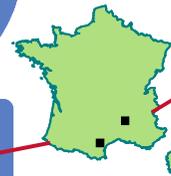
- ▶ **Need to maintain a robust supply chain to feed European enrichers with Customers in OECD zone**

- ▶ **Need to address utilities stakeholders environmental concerns by providing environmentally friendly industrial supply**

Comurhex II

A brand new conversion plant in the Market

- ▶ Production capacity of 15ktU/year for the first phase
- ▶ Improve production performance
- ▶ Reduce environmental impact compared to CMX 1 / reinforced nuclear safety
- ▶ LT security of supply towards customers



Tried-and-trusted processes and technological innovations:

- ▶ Modular conception gradually replacing the current conversion facility
- ▶ Important decrease of gaseous emissions and liquid effluents

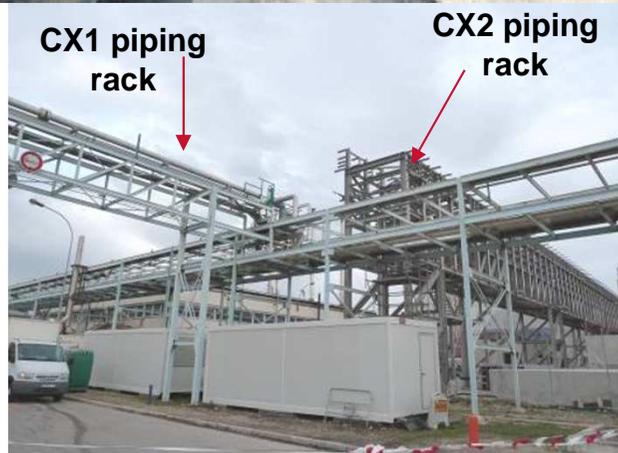
COMURHEX II: seismic resistance



CX2 rack is the backbone for all fluids & electricity



Pierrelatte HF storage



CX1 piping rack

CX2 piping rack



Malvésí

► Compliant to latest requirements:

- ◆ A new seismic standard for chemical plants (ICPE – Seveso) issued in 2011 was anticipated at design (mandatory application in 2021):
 - calculation spectra of 0,55 m2/s horizontal at peak, and 0,33m2/s vertical at peak
- ◆ Use of Eurocode 8 calculation method
- ◆ Resistant to ECS (postFukushima) seismic spectra

COMURHEX II: confinement

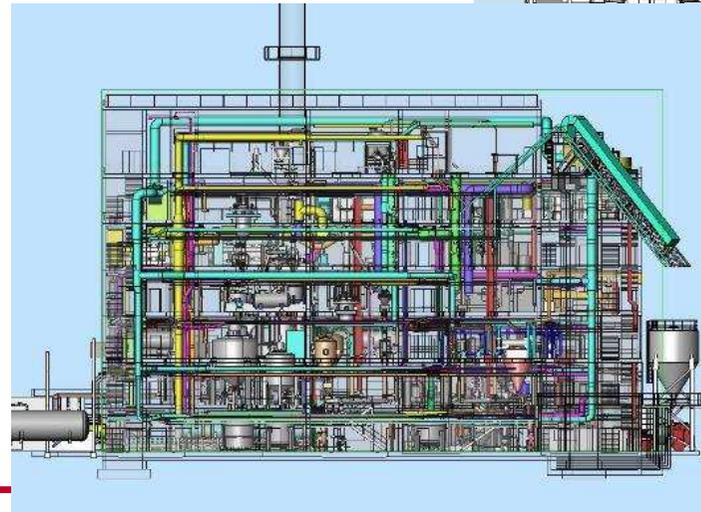


- ▶ To reduce hazards (fire, explosion, HF dispersion, radioactivity,..), special care was taken in space allotment

- ◆ 200 separate rooms in fluoration building
- ◆ Air conditioning to maintain low constant temperature in HF storage and UF6 cristallisation
- ◆ Leak tightness workstations (HF truck unloading, UF6 cylinders filling,..)
- ◆ Filtered ventilation,



Pierrelatte
Fluoration
building in 2011



2015 Major Milestones



2015 Milestones

Malvési

- ▶ Full qualification of the new thermal denitration process
- ▶ Full qualification of the UF4 production line
- ▶ Commercial UF4 production from thermal denitration process



Tricastin

- ▶ Final installation of key equipment
- ▶ Most of piping achieved
- ▶ Significant portion of Electrical and Instrumentation installed



As a conclusion



- ▶ **Prevailing prices fuelled by continuous flow of secondary supplies do not provide the highest stimulation to invest in new facilities**
- ▶ **Despite this market situation CX2 is the only major investment in conversion capacity in the OECD countries**
- ▶ **Its construction is moving forward and all workshops and facilities will be up and running by 2018**
- ▶ **With CXII, Utility Customers will benefit of a safe, environmentally-friendly , Customer dedicated , conversion plant designed to support their security of supply policy**

