



EURATOM SUPPLY AGENCY

ESA ANNUAL REPORT 2011

VRAILA Aikaterini
Economic Analyst
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● Outline

- Nuclear fuel market monitoring
- U Demand (2011- 2031)
- U Supply (2011 -2031)
- U Prices 2011
- Enrichment Services (2011 -2031)
- Security of Supply
- ESA Findings

● Nuclear market monitoring

ESA Annual Survey

- Monitoring supplies of natural and enriched uranium
 - Co-signing or refusing to sign contracts
 - Statistical reporting on nuclear market developments
- Annual survey
 - statistical market monitoring tool
 - information on 2011 data provided in January 2012
 - EU nuclear utilities

● Nuclear market monitoring

ESA Annual Survey

Information on:

- U Deliveries and U included in fuel loaded into reactors
- Future U and SWU reactor requirements (2012-2031)
- NatU Prices paid in 2011
- Origins of Uranium delivered in 2011
- Uranium Suppliers to EU Utilities
- Enrichment Services delivered in EU in 2011
- EU Uranium inventories
- Future contractual coverage 2012-2020

● Demand of U EU Nuclear Utilities

- Magnox Ltd (UAM)
- CEZ
- EDF & EDF Energy
- ENBW
- ENUSA
- EoNKK
- EPZ
- FORTUM
- IGNALINA
- KOZLODUY
- KRSKO
- OKG
- PAKS
- RWE
- SLOVELEKT
- SNN-Nuclearelectrica
- SYNATOM
- TVO
- VATTENFALL

● Demand of U

EU demand

- 18 EU nuclear utilities
- 14 EU Member states
- 134 EU-based nuclear reactors
- 28% of EU energy mix
- 1/3 of world nuclear electricity generation

● Demand of U

U loaded in EU reactors,

EU27 Utilities, 2011

Fuel loaded (2011): 2 583 tLEU

- Produced by using as feed
 - 17 465 tU of natural uranium
 - 1 195tU of reprocessed uranium
- Enriched with 13 091 tSWU
- Decreased by -5% in 2011
- Average enrichment assay: 3.56%
- Average tails assay: 0.25%

● Demand of U U delivered

EU27 Utilities, 2011

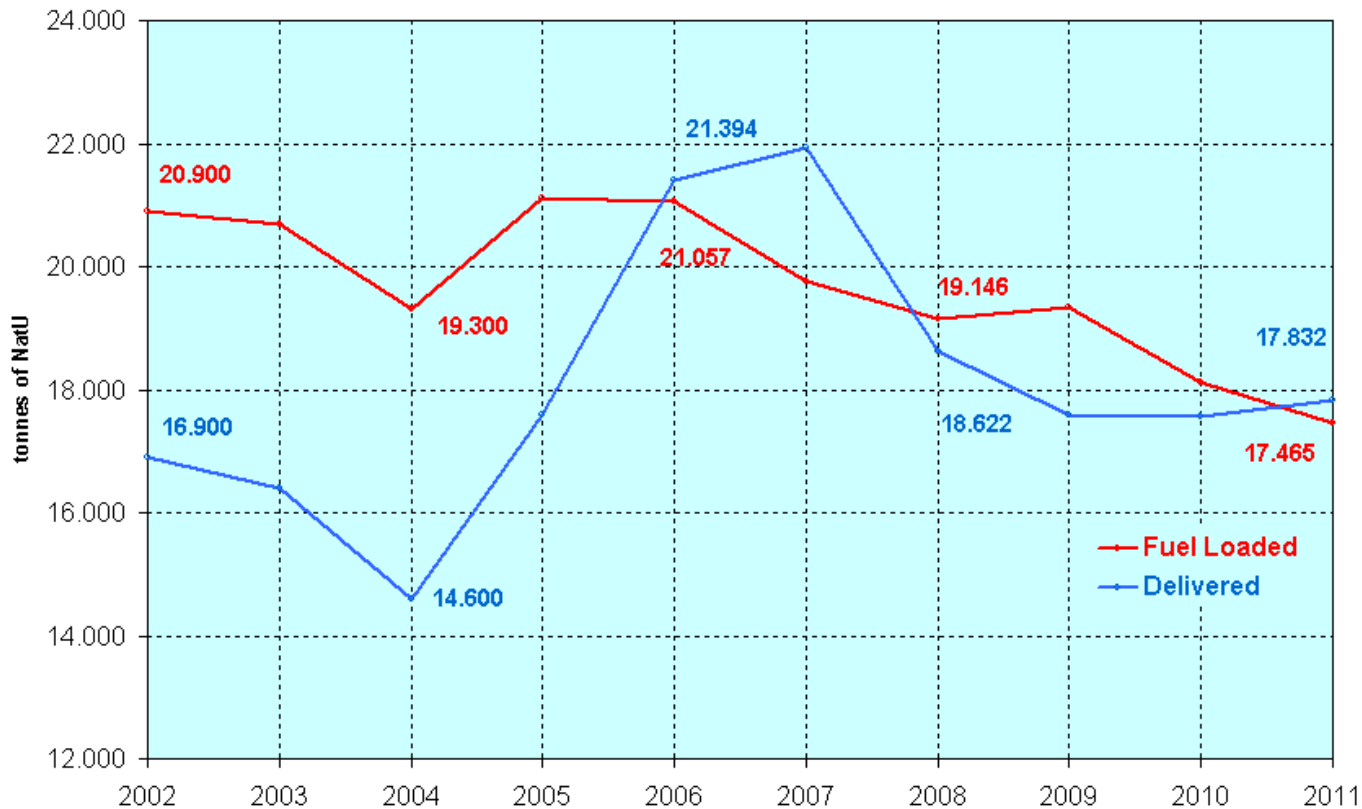
U delivered (2011): 17 832 tU of natural uranium

- Remained **stable** in 2011
- Purchased through **133** deliveries
- **96%** delivered under long-term contracts
- EU Demand represents **28%** of global U demand

● U Demand

EU U Demand 2002-2011

U contained in fuel loaded and fuel delivered to EU-27 Utilities in tonnes U, 2002-2011



Fuel delivered
17 832 tU

>

Fuel loaded
17 465 tU

● Demand of U

Future uranium demand in EU

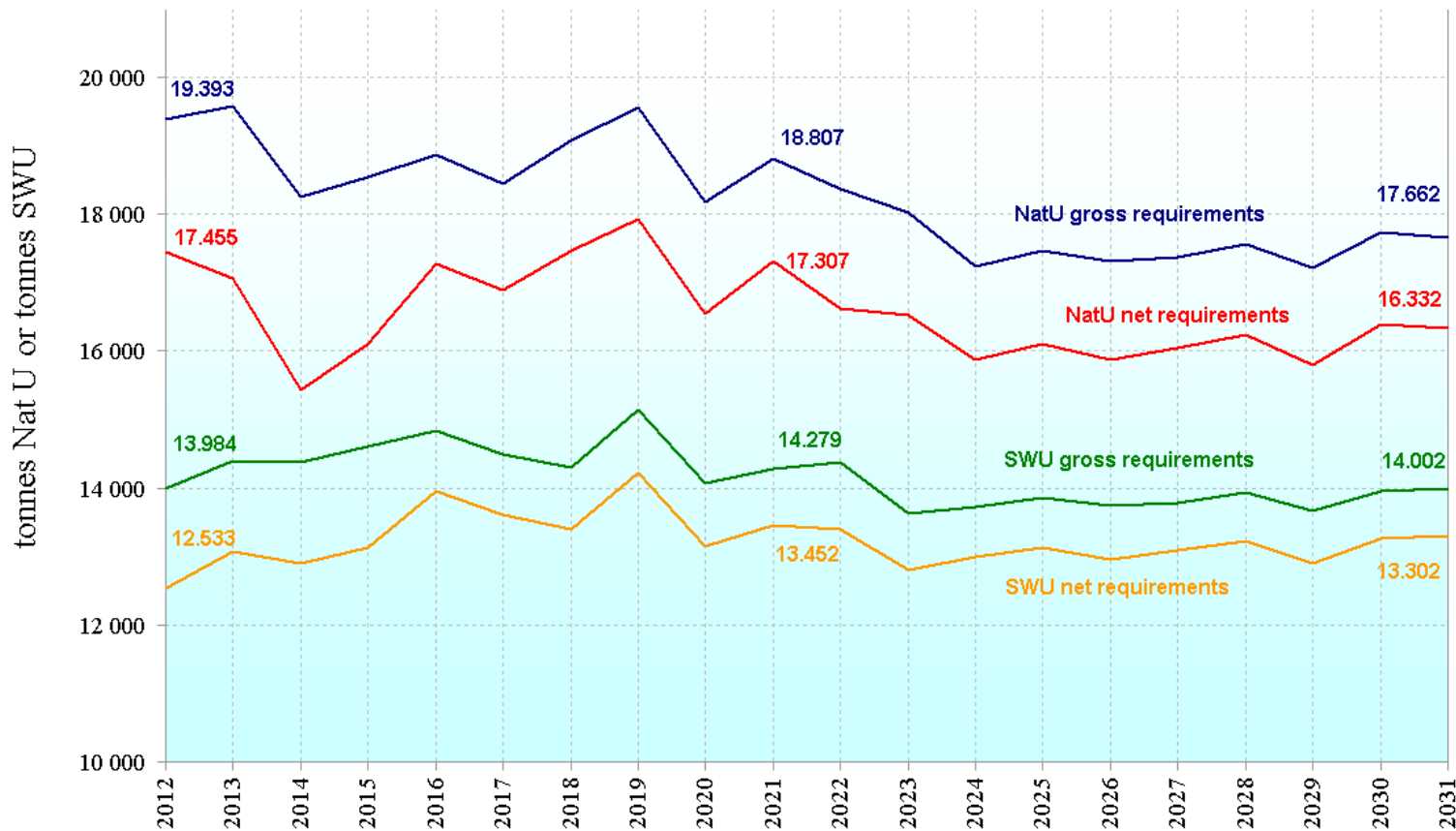
EU Long-term reactor requirements for U from 2012-2031

Average reactor requirements for Natural uranium

2012-2021	<i>19 000 tU/year (Gross req.)</i>	←	-8%
	<i>17 000 tU/year (Net req.)</i>		
2022-2031	<i>17 500 tU/year (Gross req.)</i>	←	
	<i>16 000 tU/year (Net req.)</i>		

● Demand of U

EU Future reactor requirements (U and SWU) *in tonnes U and SWU, 2012-2031*



● Future Demand of U EU and worldwide up to 2030

- EU U demand is approximately **stable** around **18 000 tU /year** up to 2030 whereas global demand is increasing rapidly
- EU Share of Global U Demand falls from **29%** in 2011 to **16%** in 2030

	2012	2015	2020	2030
EU Demand	19 393	18 537	18 178	17 729
Global Demand*	66 512	72 682	87 014	107 557
EU Share%	29%	26%	21%	16%

● U Supply

Actual & Prospective world U production 2011-2030

- World U primary production (2011)= 53 000 tU **-1%**

In the WNA Global Nuclear Fuel Market Report reference scenario for **prospective** world uranium production:

- World U production (2015) ~ 60 000 tU **13%**
- World U production (2020) ~ 75 000 tU **41%**
- World U production (2030) ~ 89 000 tU **68%**

● U Supply

Uranium Suppliers

to EU Utilities in 2011

- Areva NC and Areva NP
- BHP Billiton (formerly WMC)
- CAMECO Inc. Corporation USA
- CAMECO Canada
- CNU
- DIAMO
- ERA
- INTERNEXCO
- ITOCHU International
- KATEP
- KAZATOMPROM
- Nufcor International
- NUKEM Inc.
- NUKEM GmbH (Advent Intl)
- Rossing Uranium
- TENEX
- TVEL
- UEM
- UG
- URENCO
- USEC

21 suppliers

● U Prices

ESA U Price Indices

ESA publishes 3 U price indices:

- *ESA Spot U_3O_8 price*: weighted average of U_3O_8 prices paid by EU utilities for U delivered under **spot** contracts in 2011
- *ESA Long-term U_3O_8 price*: weighted average of U_3O_8 prices paid by EU utilities for U delivered under **long-term contracts** with deliveries in 2011
- *ESA MAC-3 U_3O_8 price*: weighted average of U_3O_8 prices paid by EU utilities for U delivered **only** under **newly signed long-term contracts i.e.** signed/amended within the last **three** years (2009-2011) with deliveries in 2011

● U Prices

ESA Prices Calculation Methodology

- Deliveries database
 - made under Nat U or EUP purchasing contracts by EU utilities during the reference year i.e. 2011
- Currency Conversion
 - converted into EUR
 - ECB annual average exchange rates
 - ECB EUR/USD (2011) = 1.39 from 1.33 in 2010
- Unit Conversion
 - kg U in the chemical form U_3O_8 , using conventional conversion factors
- ESA average conversion price
 - If included, deducted to obtain the net natural uranium price as U_3O_8
 - ESA Conversion Price (2011) = \$13.46/kgU or €9.67/kgU

● U Prices

ESA Spot U_3O_8 prices

- Reflects the most recent developments on the uranium market
- Based on deliveries made under **spot** contracts
- **4%** of total deliveries

USD 57.52/lb U_3O_8

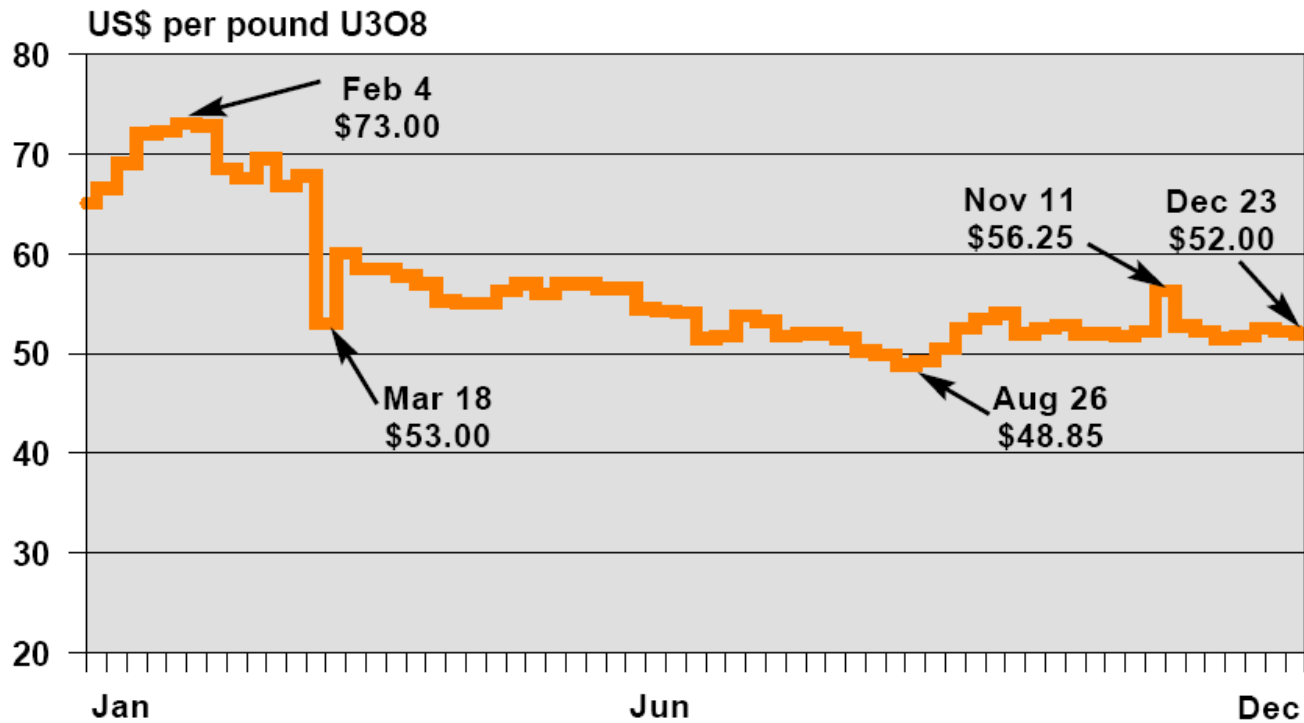
(42% up from USD 40.53/lb U_3O_8 in 2010)

EUR 107.43/kgU contained in U_3O_8

(35% up from EUR 79.48/kgU in 2010)

● U Prices

Market U_3O_8 Spot prices



UxC and
TradeTech
Annual Average
= 57lb/ U_3O_8

ESA Spot U_3O_8
price
= 57.52lb/ U_3O_8

FIGURE 1

TradeTech Uranium Spot Price Indicator - 2011

● U Prices

ESA Long-term U_3O_8 price

- Based on deliveries made under **multiannual** contracts
- **96%** of total deliveries
- Widely dispersed
- **Historical** not forward looking prices
- Based on fixed prices or index-based formulae
- Signed on average **9** years ago

USD 44.68/lb U_3O_8

(42% up from USD 31.45/lb U_3O_8 in 2010)

EUR 83.45/kgU contained in U_3O_8

(35% up from EUR 61.68/kgU in 2010)

● U Prices

ESA 'MAC-3' New Multiannual U_3O_8 price

- Based on deliveries made **only** under **newly** signed multiannual contracts of the last 3 years
- incorporating better current market conditions

USD 53.55/lb U_3O_8

(34% up from USD 39.83/lb U_3O_8 in 2010)

EUR 100.02/kgU contained in U_3O_8

(28% up from EUR 78.12/kgU in 2010)

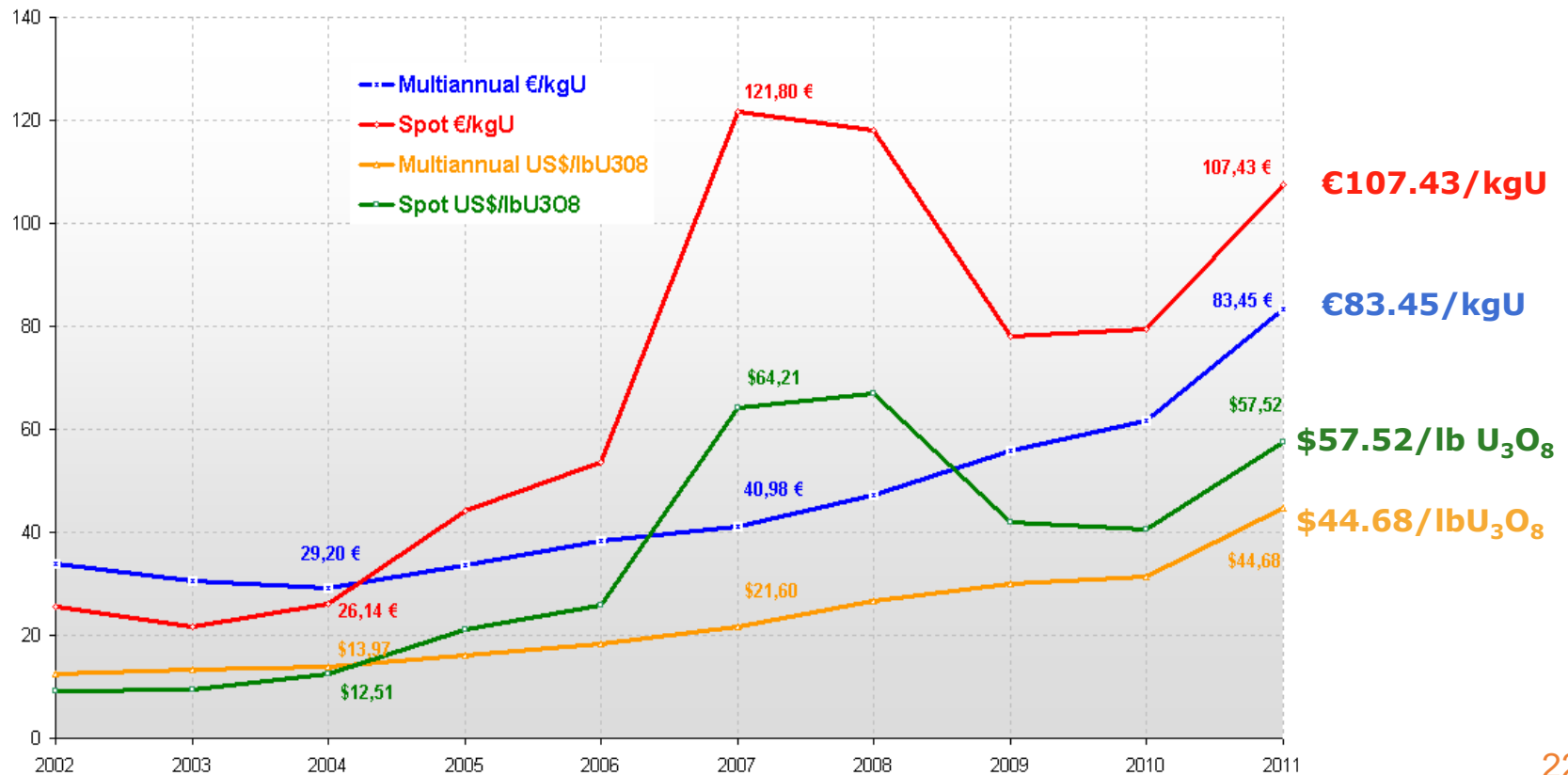
● U Prices

ESA U prices 2011

Year	Spot Contracts (historic weighted average of Spot contracts)		Multiannual Contracts (historical weighted average of Long-term contracts)		MAC-3 New Multiannual Contracts (historic weighted average of Long-term contracts, concluded during last 3 years)	
	€/kgU	US\$/lb U_3O_8	€/kgU	US\$/lb U_3O_8	€/kgU	US\$/lb U_3O_8
2011	107.43 (↑ 35%)	57.52	83.45 (↑ 35%)	44.68	100.02 (↑ 28%)	53.55

U Prices

ESA average price indices Historical data, 2002-2011



● Enrichment services

EU demand

Global enrichment capacity: 65 000 tSWU

Global demand (2011): 47 000 tSWU

EU Demand (2011): 12 507 tSWU (27% of global demand)

- delivered in 2 166 tLEU
- contained the equivalent of 17 877 tU feed
- Decreased by -16% in 2011
- average enrichment assay of 3.91%
- average tails assay of 0.25%

● Enrichment services

Suppliers of EU Utilities

Enricher	Quantities 2011 (tSWU)	Quantities 2010 (tSWU)	% Share 2011
EURODIF + URENCO (EU)	6 717	8 785	54%
TENEX/TVEL (RUS)	5 057	4 896	40%
USEC (USA)	643	1 047	5%
Other	90	127	1%
TOTAL	12 507	14 855	100%

31%
9%

EU Demand = 32%
of global demand

● Enrichment services

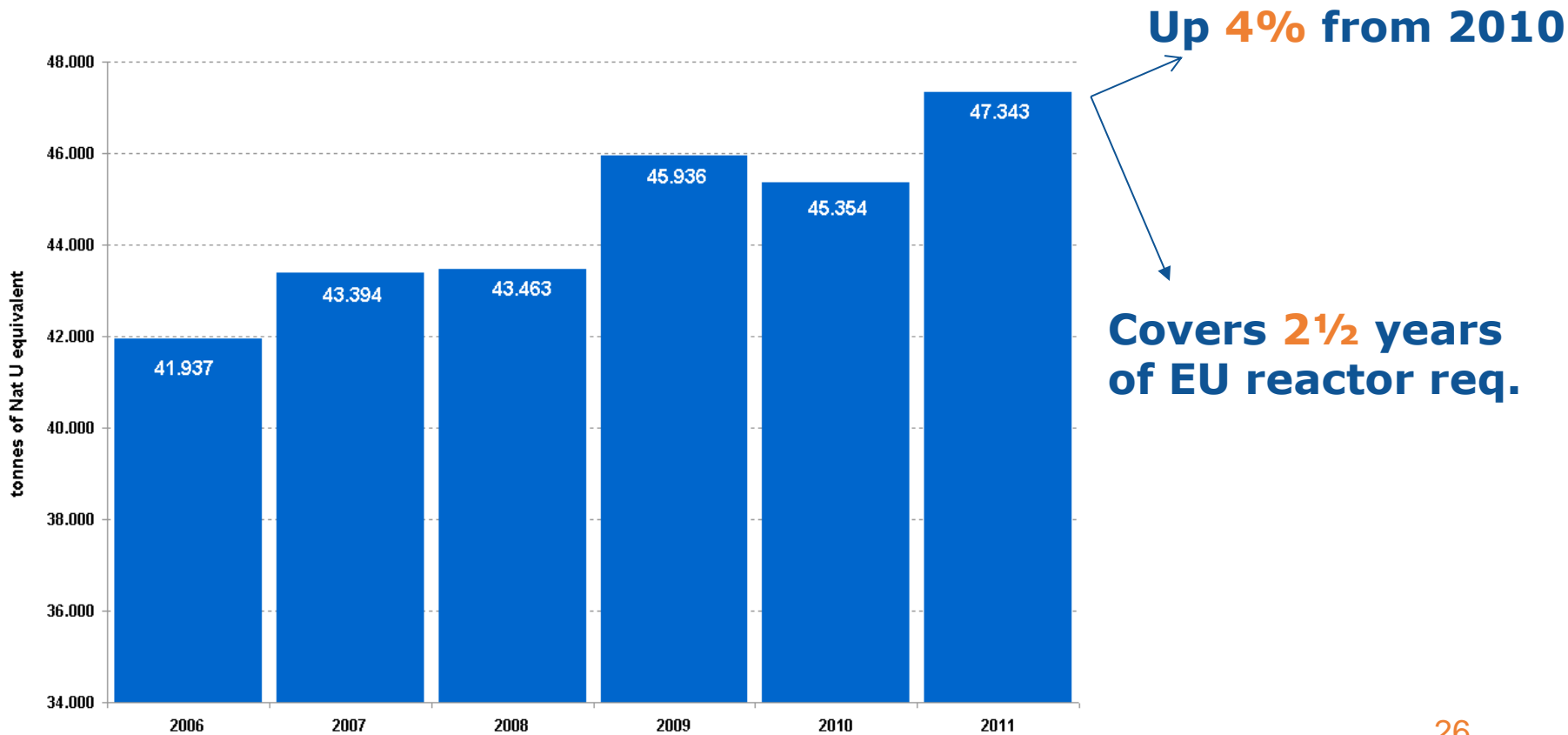
EU Future Demand, EU Long-term reactor requirements, 2012-2031

Average EU reactor requirements for enrichment services

2012-2021	14 500 tSWU/year (Gross req.)	-3%
	13 000 tSWU/year (Net req.)	
2022-2031	14 000 tSWU/year (Gross req.)	
	13 000 tSWU/year (Net req.)	

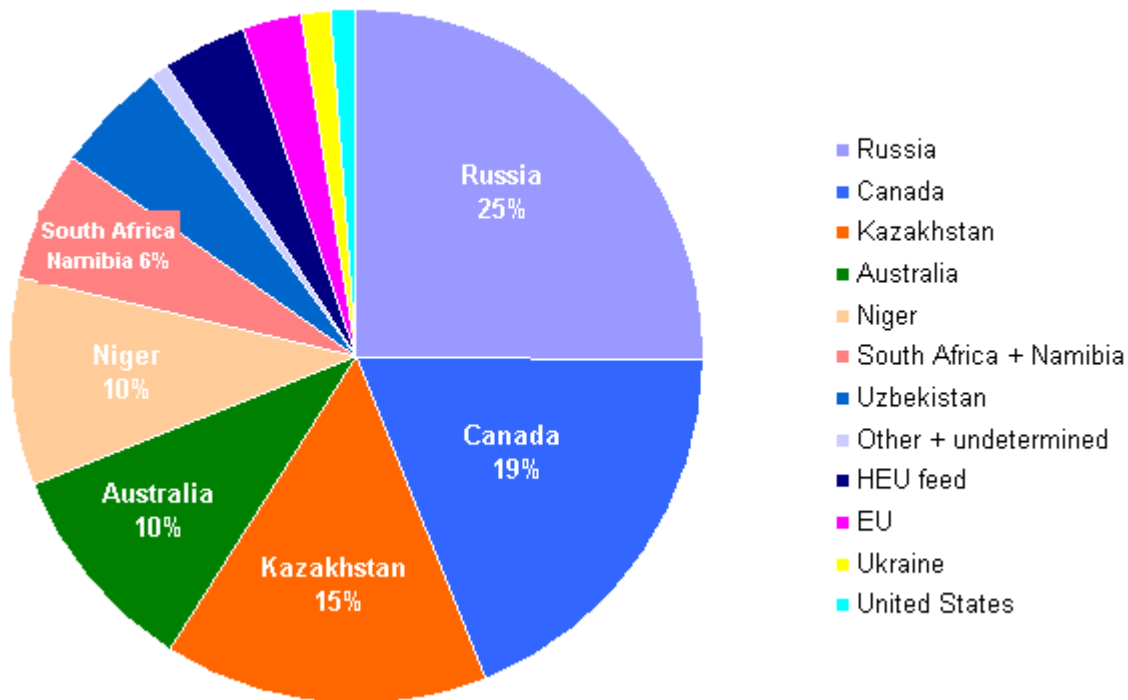
● Security of Supply

EU Uranium stocks



● Security of Supply

Diversification of U origin supplied to EU Utilities in 2011



5 continents

13 countries

● Security of supply

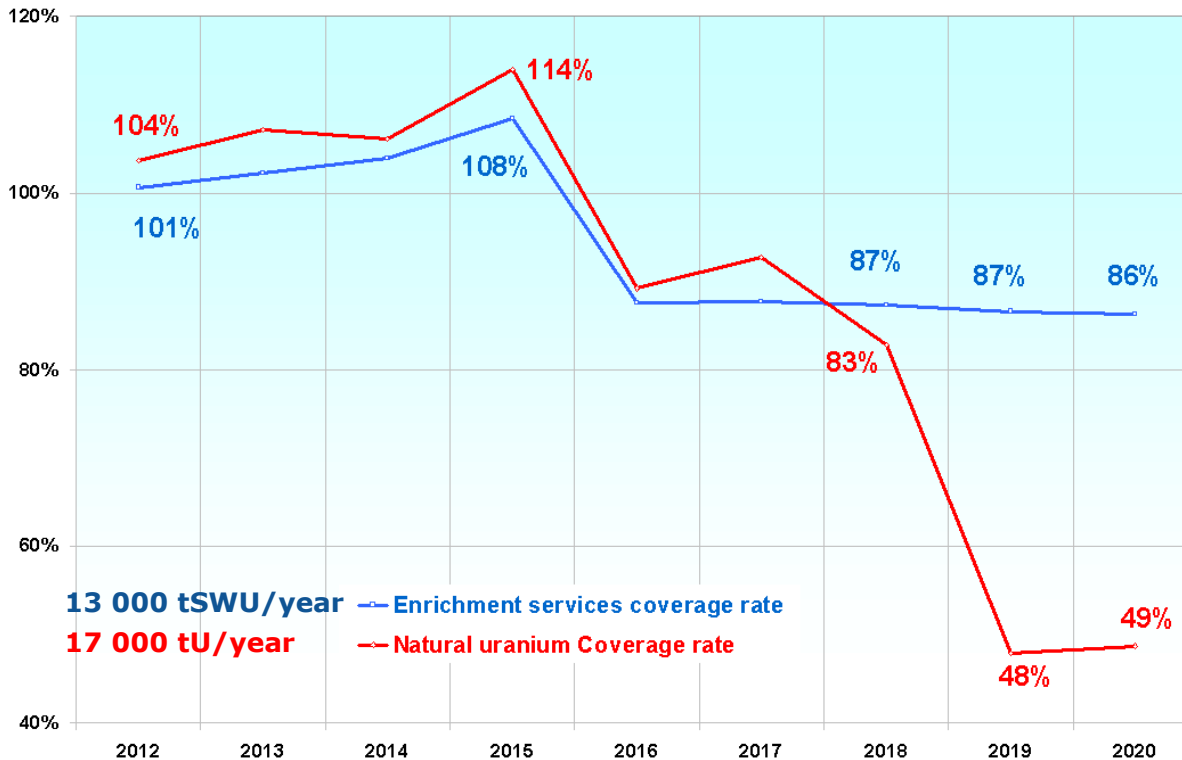
Usage of secondary sources

EU27 Utilities, 2011

- MOX Fuel usage
 - MOX Fuel loaded (2011): 9 410 kgPu
 - Decreased by **-12%** in 2011
 - Resulted in estimated savings of
 - **824 tU** of natural uranium
 - **571 tSWU** in terms of enrichment services
- Reprocessed U Usage as feed for ERU
 - **1 195 tU** of RepU

● Security of Supply

Long-term contractual coverage ^{NEW} for U & SWU, 2012-2020



max Contracted deliveries
Net Reactor req.

U: more than
80% covered
until 2018

SWU: more than
80% covered
until 2020

● ESA Findings

- In 2011, total deliveries of natural uranium to EU-27 utilities (17 832 tU) were higher than fuel loaded (17 465 tU tonnes natU equiv).
- EU utilities used mainly long term contracts (96%) to cover their U requirements, in line with ESA recommendations.
- The long-term average price was €83.45 /kg U, the average spot price was €107.43/kgU and MAC-3 was €100.02/kgU.
- In 2011 natural uranium continued to be supplied to the EU by diversified sources.

● ESA Findings

- Over **1/2** of enrichment services were performed by two European enrichers (AREVA/EURODIF and URENCO).
- **USEC** supplied **5%** of the total enrichment service deliveries.
- Russian **TENEX/TVEL** provided **40%** of enriched uranium delivered to EU. The figure splits in **9** percentage points delivered through contracts 'grandfathered' under Art.105 and **31** percentage points for contracts concluded by ESA.
- EU uranium inventories at the end of 2011 totalled **47 343 tU** which could fuel EU reactors for at least **2 ½** years .
- The natural uranium and enrichment services coverage rate is above **80%** at least until **2016** which permit us to conclude that the short and medium term needs of the EU utilities are **well covered**.

Further information available at:

http://ec.europa.eu/euratom/index_en.html

Thank you for your attention!