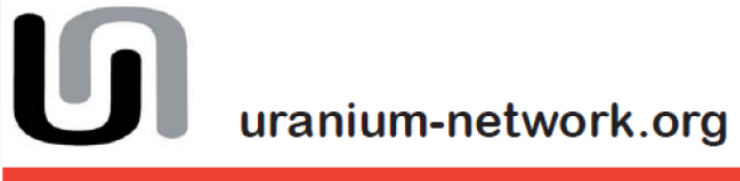


# **Overview on Uranium Activities in Africa / Global Uranium Activities New Developments**



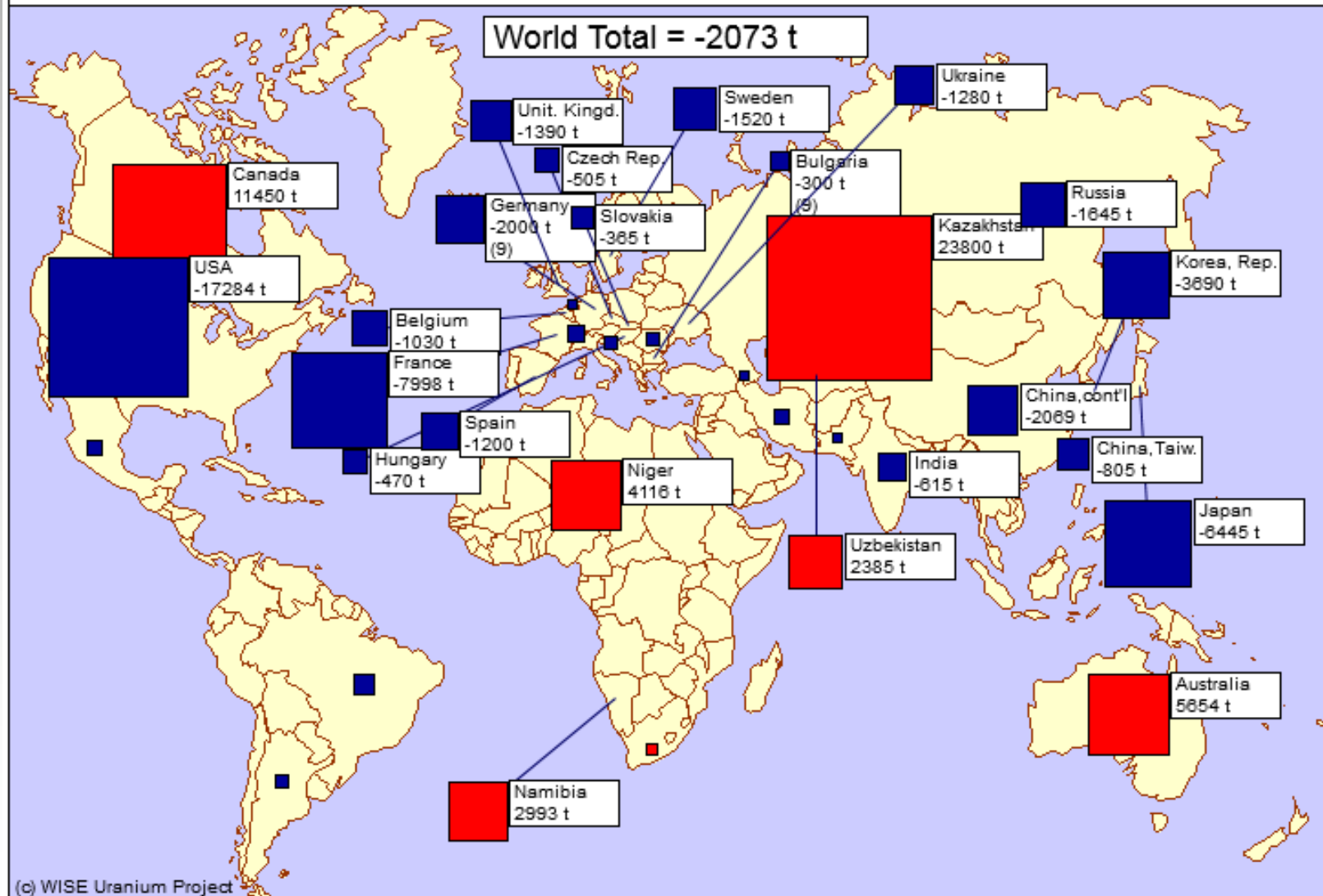
**in cooperation with**



# Uranproduction vs. Uranium Requirements 2015

## 2015 Uranium Production vs. Requirements (Low) Balance

[t U] (WNA 2016, OECD 2016)



(c) WISE Uranium Project

t = metric tonne · NA = Data not available  
Click unlabeled marks to show associated data.

# Uranium and the Nuclear Fuel Chain

Prospection  
Exploration

Mining

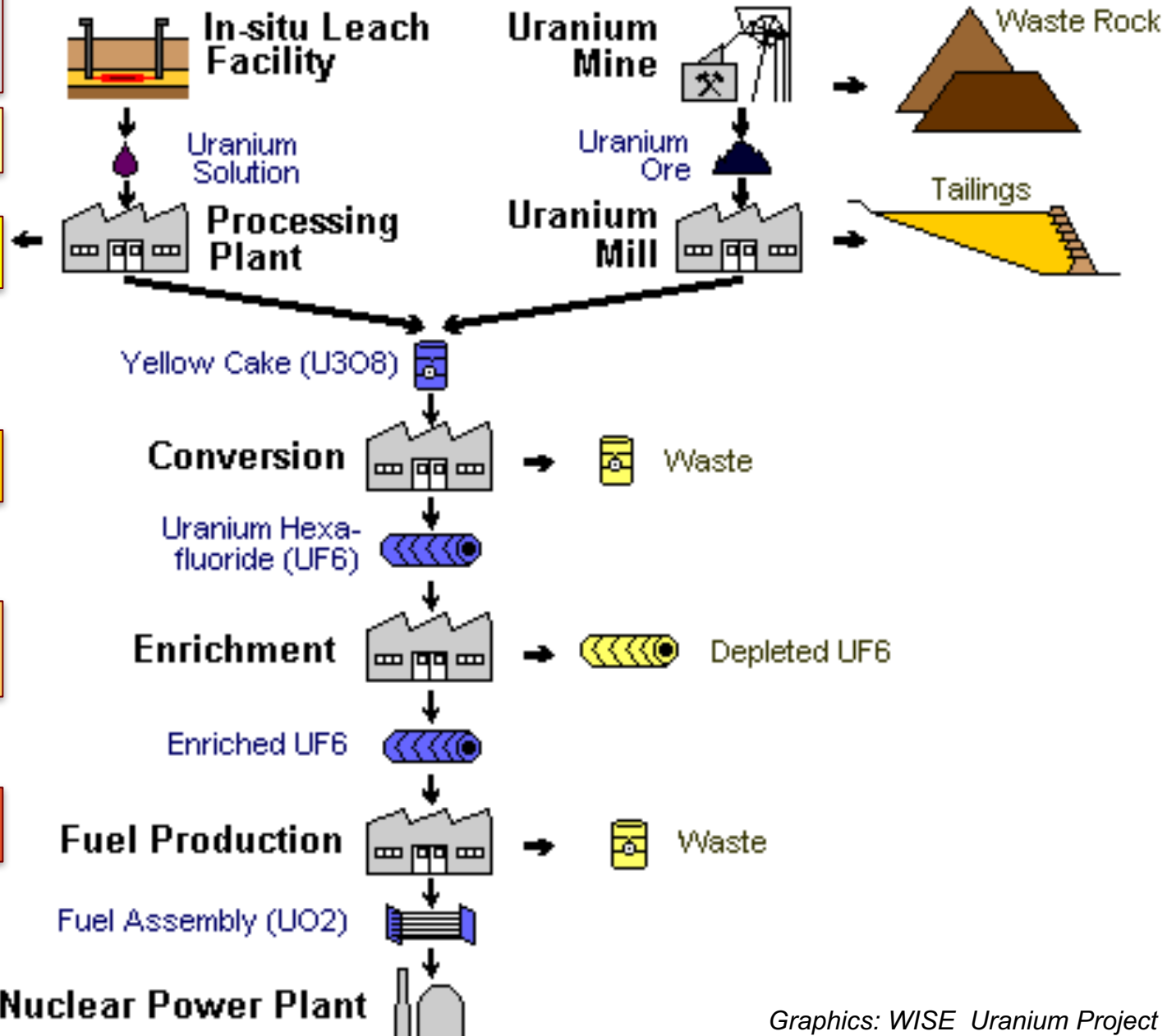
Uranium „mill“

Conversion

Enrichment

Production of fuel rods

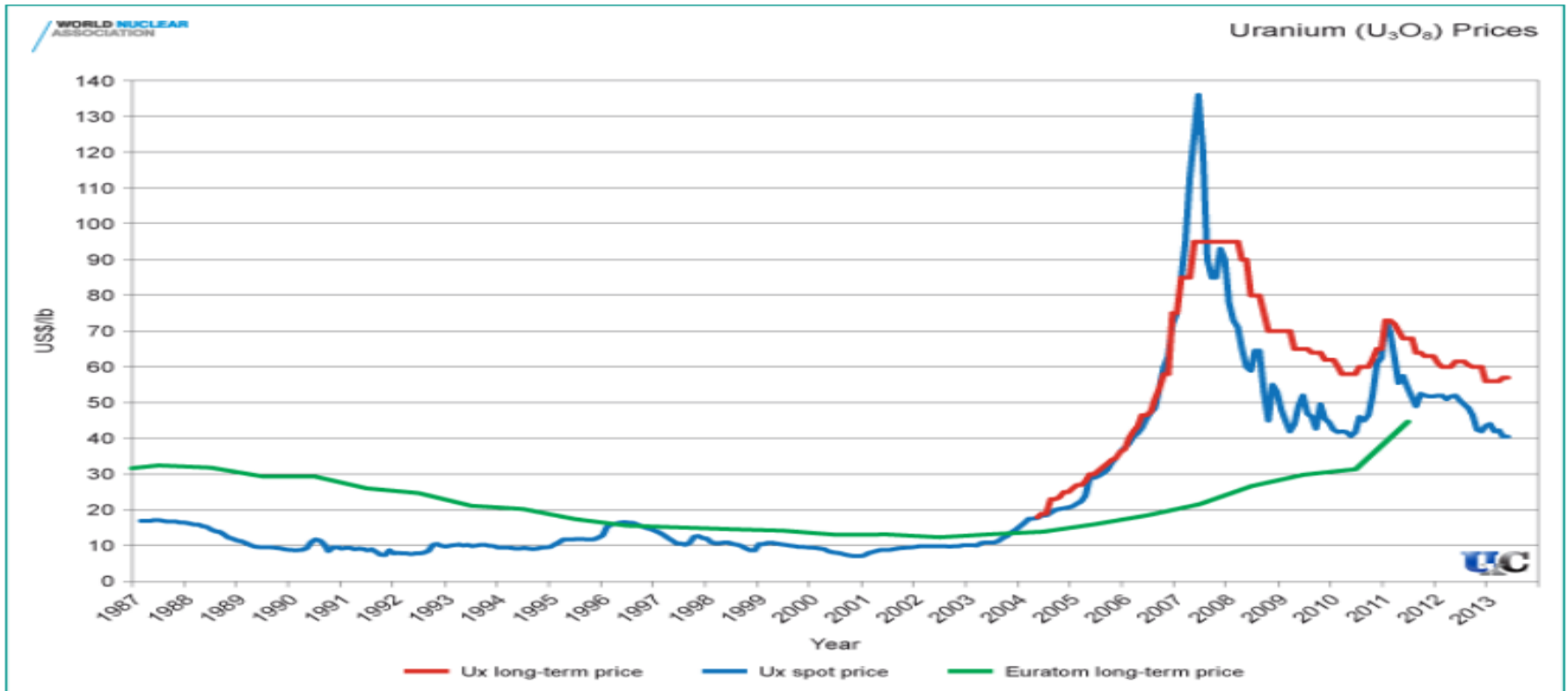
NPP



# **New Developments since 2007 / 2008**

# Uranium – Development of Price 1987 - 2013

high levels for longer than it takes for new producers to enter the market and anxiety about supply to subside.



Graph courtesy of UxC

*Note that the Euratom long-term price is the average price of uranium delivered into the EU that year under long term contracts. It is not the price at which long-term contracts are being written in that year.*

# New Developments since 2007 / 2008

**2007 / 2008 – Sudden rise of the price of uranium**

**Reasons not clear, probably based on excessive expectations re: new-builts of reactors**

## Consequences

- **approx. 200 new exploration companies start „chasing“ uranium globally**
- **Africa becomes one target area ... Why?**

***” The Australians and the Canadians have become over – sophisticated in their environmental and social concerns over uranium mining. The future is in Africa. ”***

John Borshoff, (former) CEO of Paladin, Australia

- **Exploration companies are „milking“ the capital market**
- **Focus on Africa in Presentation**

# Exploration activities and ,announced` mining projects

## Europe

- Finland
- Portugal

## Africa

- Namibia
- Malawi
- Namibia
- South Afrika
- Cameroon

## North America

- USA
- Kanada

## Australia

What became of these PROJECTS ?

What became of the COMPANIES ?

What to expect for the FUTURE ?

... some examples ...

# Niger - Imouraren



Announced as „ ... *the largest mining project ever undertaken in Niger, the largest open pit uranium mine in Africa, and the largest anywhere to use heap leaching ...*” (WNA)

2008 / 2009: Licensing, construction begins

Announced Investment: 1,2 billion €

Expected Production: 5.000 t Uranium / year

2013: AREVA announces postponement to 2015 – 2020, pays 35 Mio. € for postponement to Gvt. of Niger (!)



**2014: Imouraren Uranium Mine Project postponed indefinitely**

**AREVA changes deposit rating from „proven“ to „probable“**

**Deposit is considered „unmineable“ by other sources**

**2015 / 16: AREVA writes off 348 million € of Imouraren Project (WNA)**



# **Niger – Azelik**



**2008 / 2009: Niger's then President Tandja (1999 – 2010) tries to break French monopoly on resource extraction, attracts Chinese companies to Niger**

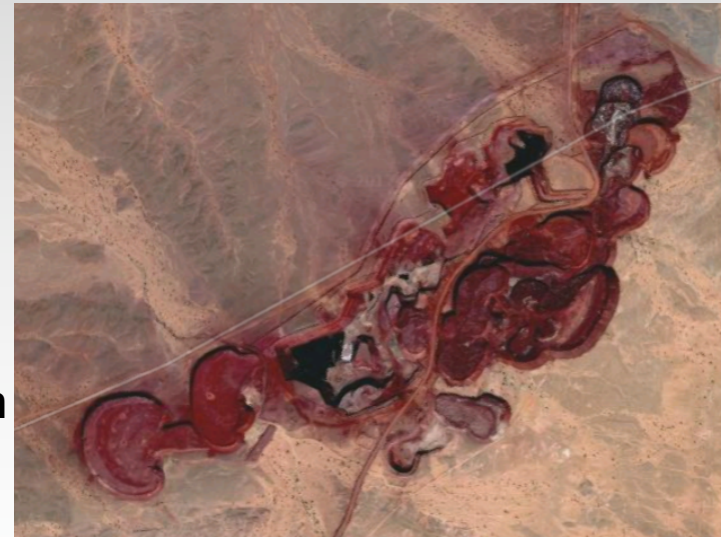
**2007: SOMINA, operator of Azelik mine, majority owned by CNNC – Chinese National Nuclear Corporation gets license to mine uranium**

**2010: President Tandja is overthrown in a (unbloody) coup**

**2010: Considerable shortcomings re: protection of environment, Touareg women loose water sources, the possibility to produce salt – and thus their livelihood**

**2010, Dezember: First delivery of uranium to China**

**2014, August: SOMINA fails to secure a cheap loan  
Investment higher than expected  
Price of uranium LOW (after Fukushima)**



**2015, 17. Februar: CNNC mothballs Azelik – unprofitable**

# Mali - Falea



Uranium-Silver-deposit, known since the 1980ies

2010: Rockgate Capital announces Environmental Impact Assessment

2012: Feasibility-Study

from 2011 onward: Strong resistance from local people, international support, ARACF – Association des Ressortissants et des Amis de Falea, [www.falea21.org](http://www.falea21.org)

2012, March: International Uranium Conference in Bamako

2013 / Jan 2014: Denison Mines (Canada) buys Rockgate Capital (US \$ 26 Mio)

2016: GoviEx buys project from Denison Mines, Denison gets shares of GoviEx



**Uranium mining plans currently not continued.**

## FALEA

Une commune malienne de 21 villages  
et 47 hameaux face à la menace  
d'une mine d'uranium



# Tanzania

## Region Bahi / Central part of Tanzania



2009: Gvt of Tanzania has given 70+ exploration licenses to foreign companies

Companies exploring for Uranium (mainly) from Australia:  
Mantra Resources, URANEX, and others

since 2009: Local people stage considerable resistance,  
informed by NGOs CESOPE, LHRC – Legal and Human  
Rights Center etc. and supported internationally



Tanzania Atomic Energy Commission (TAEC) admits later:  
„No social license“ for Uranium exploitation

2013: International Uranium Conference in Bahi/Dodoma and Dar es Salaam

2014: URANEX abandons plans to mine uranium in Bahi area

Mantra disappears from Bahi area

**Uranium mining plans in Bahi area / Tanzania currently not continued.**

# URANEX / now Magnis Resources share value

Magnis Resources Ltd

ASX: MNS - 27 Mar, 16:10 GMT+11

**0,56** AUD **↓0,00 (0,89 %)**

1 day

5 day

1 month

3 months

1 year

5 years

**max**



**URANEX – now MAGNIS – share value – 2004 – 2017**



# Tanzania / 2

## Region Namtumbo / Songea / South Tanzania

2011: UraniumOne, with a bad track record from its South African DRUM-Project, becomes operator of Mkuju River Uranium Project (MRP)  
MRP majority owned by Russian ROSATOM

2012: UNESCO World Heritage Committee ,excises‘ in an “exceptional and unique manner“ mine area from WH site to enable mining, breaking its principle „*Mining incompatible with status as WHS*“

2014: UNESCO WHC lists Selous Game Reserve as „**in DANGER**“ due to excessive poaching and „industrial developments“

2016, March: UraniumOne: NO start of mining at MRP until price of uranium rises by 70% to US\$ 55 / lb (price US \$ 30/ lb)

Tanzanian Minister deploras „loss of millions investment“





# Tanzania / 3



## Region Namtumbo / Songea / Southwest of Tanzania

**2009: Mantra discovered uranium deposit „Mkuju River“  
Deposit is located in World Heritage Site Selous Game Reserve**

**2010, Dec.: ROSATOM / ARMZ buys Mantra, pays off share holders**

**MRU : 5 year Share Chart :**



delisted following the merger by  
scheme of arrangement between  
the company and  
JSC Atomredmetzoloto effective  
15/06/2011

Scheme of arrangement by which  
JSC Atomredmetzoloto acquired all  
of the issued shares in Mantra was  
implemented with Mantra  
shareholders receiving the  
following amounts for each Mantra  
share they held:  
A\$6.87 in cash and  
an unfranked dividend of A\$0.15

**Mantra Resources Ltd - share price - 2008 – 15 / 06 / 2011**

# Tanzania / 4

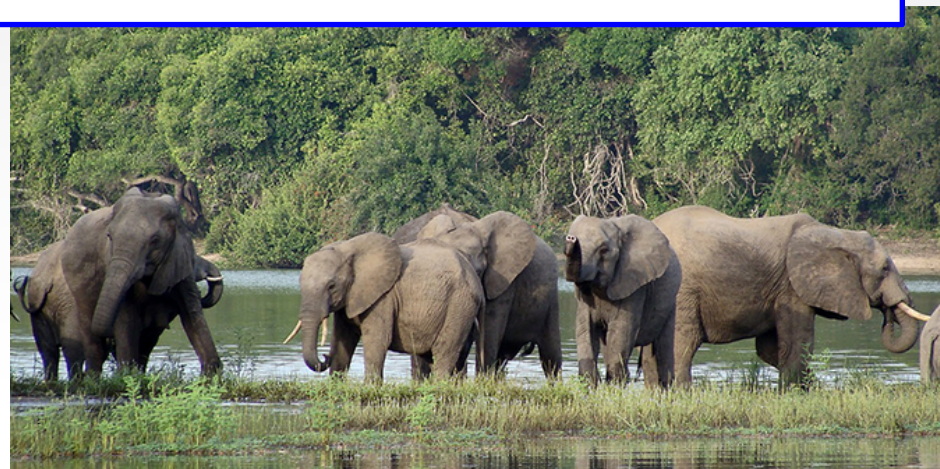


## Region Namtumbo / Songea / Southwest Tanzania

### Russian state corporation suspends \$1.2 billion uranium project in Tanzania [Vladimir Basov](#) | Jul. 7, 2017, 10:08 AM

Russian state nuclear corporation Rosatom [suspends](#) Mkuju River uranium project in Tanzania for at least three years due to depressed uranium market. Rosatom, which previously hoped to start construction and mining uranium at Mkuju River project in 2013, 2016 and in 2018 respectively, decided to suspend the development of this project until the demand for uranium is restored, which is expected not earlier than 2020.

**2017, July 7: ROSATOM announces 3 – 5 year suspension of Mkuju River Uranium Project**  
**ROSATOM continues to be owner of project**



# **DR Congo**



**Radium Mine between 1st and 2nd World War:  
Shinkolobwe Mine, Province of Katanga**

**Shinkolobwe closed after independence of DR Congo**

**Mining unofficially / illegally restarted**

**UN-Report re: Illegal trafficking of radioactive materials**

**2009: AREVA's then CEO Anne Lauvergeon and then Pres. Sarkozy make secret contract with Gvt of DRC – Joseph Kabila – granting AREVA a monopoly right to exploit uranium in DRC**

**2009: Human Rights-NGO ASADHO Katanga (Pres. Golden Misabiko) publishes Report on illegal mining of uranium and a secret contract; Misabiko is incarcerated, later liberated**

**2011: Due to insecurity in DR Congo (regime of Kabila),  
NO mining activities by AREVA.**

**AREVA retains monopoly for uranium exploitation**

**(→ „staking claims“)**



# **Centralafric. Republic (RCA / CAR)**



**2007: UraMin starts Feasibility Study for Bakouma-Project  
AREVA purchases UraMin**

**2008: RCA Gvt. upset since Mining License had been granted to  
Canadian UraMin – not to French AREVA**

**August: End of dispute between AREVA and RCA Gvt.:  
AREVA allowed to mine Bakouma Project**

**2011: AREVA suspends Bakouma Project, due to Fukushima  
and difficulties with mining**

**2012, June: „Guerilla“ Attack on Bakouma Project (possibly staged)  
since 2012: Bakouma Project abandoned**

**NO further activities, existing installations deteriorate ...**

**2015: Investigation against AREVA in France re: corrupting foreign  
officials, private individuals etc. related to purchase of UraMin**

**2012: Bakouma Project abandoned.**

**AREVA retains right to mine → „staking claims“**

# Malawi

## Uranium mine „Kayelekera“ / PALADIN



**2000: Paladin (Australia) purchases Kayelekera Uranium Project  
Founder and CEO: John Borshoff**

**2005 ff: Paladin starts licensing procedures  
HumanRights groups oppose, protest against 15 year tax break**

**2006 / 2007: EIS, Mine Development Agreement with Gvt**

**Mineral Policy Institute (Australia):**

**Mine would not have been licensed in Australia**

**CSOs, church groups protest, take to court**

**Repeated confrontations with workers/ strikes for better payment etc.**

**2013: Depreciation of mine (US \$ 99 Mio.) due to low price of uranium**

**2014, May 27: Production is stopped due to low price of Uranium**

**2014 ff: Environmental problems continue**

**NGOs: Malawi lost 12 Mio US \$ in taxes due to tax break for Paladin**

# **Namibia / 1**



## **Trekkopje Uranium Mine**

**2006: Preliminary Feasibility study**

**2007: Heap-leaching planned, construction of a desalination plant  
35% of production to be sold to China**

**2007, May: AREVA purchases UraMin at 2,5 billion (!) €**

**2009: First production of uranium from heap leaching**

**2011, Dec: AREVA scales down uranium reserves of by 42% ...**

**2011: Depreciation (write-off) of 1,46 billion (!) € (58% of purchase price)**

**Uranium reserves not existing or not mineable ...**

**2012: AREVA abandons Trekkopje Uranium Mine, mothballs mine**

**In addition: Suspicions of corruption / betrayal etc.**

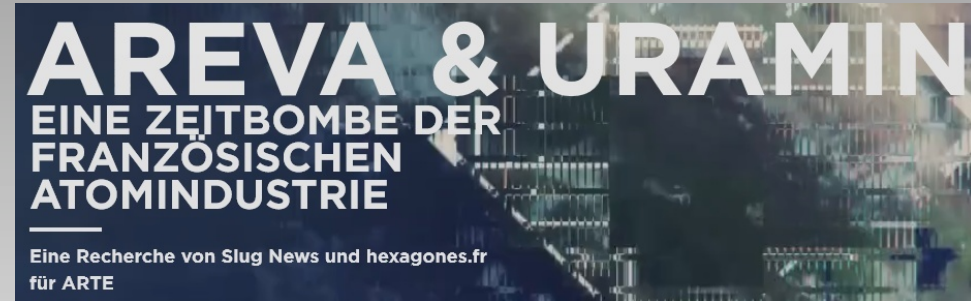
**AREVA investigated in France by police**

**Anne Lauvergeon, CEO of the time, steps down ...**

# Uranium project Trekkopje / UraMin → AREVA

arte - Documentation

**Ermittlungsverfahren wegen „Betrugs, Veruntreuung und Bestechung ausländischer Amtsträger“.**



**Das zweite Verfahren wegen der „Verbreitung falscher Informationen, Verwendung oder Vorlage falscher Bilanzen, Machtmissbrauch und der Fälschung von Dokumenten und der Verwendung von gefälschten Dokumenten“**

[www.arte.tv/sites/de/story/reportage/zeitbombe-der-franzoesischen-atomindustrie/?lang=de](http://www.arte.tv/sites/de/story/reportage/zeitbombe-der-franzoesischen-atomindustrie/?lang=de)



**UraMin/Areva,  
l'hallucinante saga  
d'un scandale d'État**

**Die Machenschaften um den Kauf von UraMin zu überhöhtem Preis werden zur Staatsaffäre in Frankreich, die überhöhten Zahlungen tragen erheblich zur Pleite von AREVA bei**

**Buch von Vincent Crouzet:**

**„Eine atomare Affaire - UraMin / AREVA – der haarsträubende Saga eines Staats-Skandals“**

# **Namibia / 2**



## **Langer Heinrich Uranium Mine / PALADIN (Australia)**

**2002: Paladin purchases „Langer Heinrich“ Uranium project**

**2004 / 2005: Paladin is granted Mining License for 25 years**

**EARTHLIFE Namibia and HumanRights-NGOs protest**

**German ÖKO-Institut: massive underestimation of radiation impact**

**2007: First production of uranium, delivery of uranium to China planned**

**2016 – 2017: Due to low price of uranium, mining is stopped  
to save expenses only uranium ore already mined is processed**

**2016 / 2017: Paladin cannot pay back US\$ 277 loan from EdF (!)**

**2017: Paladin faces bankruptcy, calls in „administrator“**

**July: Paladin shares suspended from trade at stock exchange**

**August: Paladin manages to stop take-over by Chinese CNNC**

**Future of company remains unclear**

# **Namibia / 3**



## **Zonghe Uranium Project**

**... one of the most secretive uranium projects in Namibia ...**

**2010: 'first sighting' of project (hundreds of garbage bags left ... )**

**Deposit 100% owned by Chinese companies**

**58% - China Uranium Corporation ("CUC")**

**42% - Namibia-China Mineral Resources Investment and Development**

**2012: CUC – China Uranium Corporation – is granted Mining License  
Public participation does not happen ...**

**2013: 2 years after writing and 1 year after granting of Mining License  
Environmental Impact Statement is published ...**

**Nothing known about construction, start of production etc.**

# **Namibia / 4**



## **HUSAB Uranium Mine**

**2009: Rössing plans to exploit „Rössing South“ deposit  
owner: Extract Resources**

**2010: KEPCO, Korea, ROSATOM consider partnership**

**2011: Mining License granted in record period of 2 months**

**2012: HUSAB becomes majority owned by Chinese companies (90%)**

### **Note:**

**Chinese companies pushed Rössing / RioTinto and others out of Rössing South, ROSATOM also not successful**

**HUSAB becomes one of the biggest uranium mines, 100.000 t Uran  
Production 5.000 t Uranium / year, area 19 qkm**

**Zone 1 pit: 2.5 km long, 1.0 km wide and 400 m deep.**

**Zone 2 pit: 1.9 km long, 1.4 km wide and 390 m deep**



# What AREVA dreamt of, the Chinese have done...

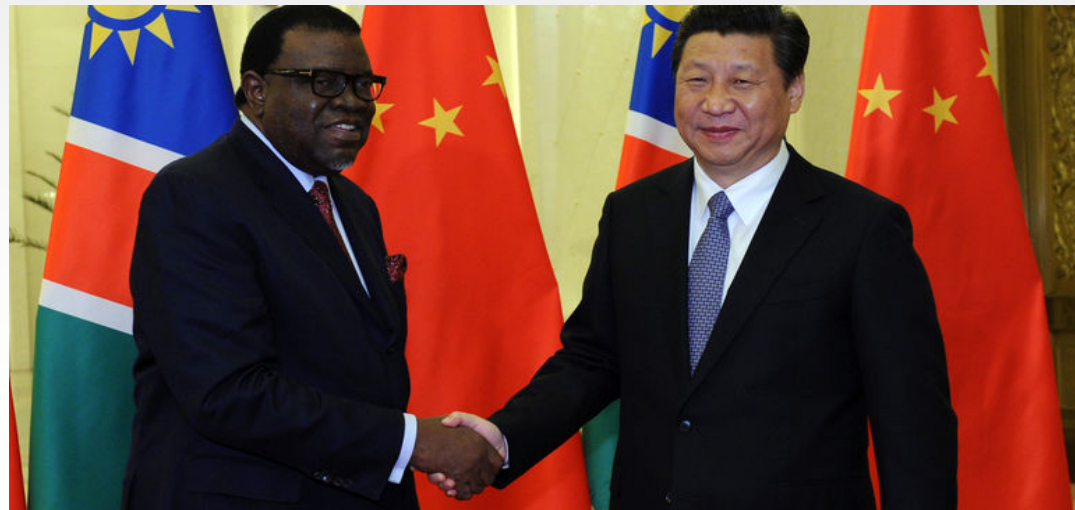
## Centrales chinoises, uranium namibien

Avec l'ouverture, fin 2016, de la mine géante de Husab, en Namibie, la Chine est parvenue à sécuriser ses approvisionnements. Désormais, elle lorgne le Niger.

Par Sébastien Le Belzic (chroniqueur Le Monde Afrique, Pékin)

LE MONDE Le 11.04.2017 à 15h28 • Mis à jour le 11.04.2017 à 15h30

Areva en rêvait, les Chinois l'ont fait. Le géant public du nucléaire, China General Nuclear Power Corporation (CGNPC), a ouvert, le 30 décembre 2016, sa mine géante de Husab, en Namibie, pour un investissement de 2 milliards de dollars (environ 1,9 milliard d'euros). L'ancien président chinois Hu Jintao était venu en personne négociateur avec le gouvernement la signature du contrat qui, en 2012, a accordé 90 % des parts au groupe chinois et 10 % à l'Etat namibien.



[www.lemonde.fr/afrique/article/2017/04/11/centrales-chinoises-uranium-namibien\\_5109570\\_3212.html](http://www.lemonde.fr/afrique/article/2017/04/11/centrales-chinoises-uranium-namibien_5109570_3212.html)



## Announced mining projects in Africa - SUMMARY

- Most of the new uranium mining projects announced in Africa did not succeed
- AREVA overpaid dearly for UraMin, this contributed heavily to AREVA's near bankruptcy and now split-up
- However, AREVA successfully 'staked claims' in Niger, DR Congo and Central African Republic for exploitation later on.
- AREVA is involved in a major scandal
- Newcomer Paladin, Australia, is in serious trouble, with one of its two U mines mothballed
- ROSATOM / UraniumOne announced 'suspension' of their Mkuju River Project, supposedly also overpaid
- Chinese CNNC successfully launches Husab U mine, Namibia

# **The Nuclear Companies**

## **(some ...)**

# AREVA

**Uranium mining, building of NPPs,  
all parts of the nuclear fuel chain**



## Areva SA

EPA: AREVA - 27 Mar, 17:35 CEST

**4,40** EUR **↓0,01 (0,23 %)**

1 day

5 day

1 month

3 months

1 year

5 years

max



**AREVA – share value 2004 – 2017 (from € 33 to € 4,44)**

# The Nuclear Companies ...



**AREVA** in its known form has ceased to exist

**2009 / 2010: AREVA over-pays for UraMin's uranium mines,  
approx. € 3 billion**

*Monies probably used to convince S.A. then president Mbeki to contract  
AREVA to built new NPPs in S.A. ... does not work.*

*Inside deals, corruption, etc. researched by French financial police,  
published on „arte“and other media channels ...*

**2015 ff: Depreciation of u mines (mainly Trekkopje / Namibia and Bakouma / RCA)  
→ high losses, AREVA factually bankrupt**

**2016 / 2017: AREVA group split up into**

- AREVA NP (reactors and fuel operations) and
- New AREVA group (fuel cycle operations)

# The Nuclear Companies ...



## The „restructuring“ of France's Areva group (...)

- implementation of a € 2.0 billion (\$2.3 billion) capital injection from the French state.
- NewCo – Areva's separated nuclear fuel cycle activities – is also to receive a € 2.5 billion capital increase from the state by the end of this month (July 2017).

[www.world-nuclear-news.org/C-Areva-implements-capital-increases-1307174.html](http://www.world-nuclear-news.org/C-Areva-implements-capital-increases-1307174.html)

„Old“ company has only TWO tasks:

- Pay-off of (old) debts
- Finishing building of Olkiluoto NPP, Finland

2017, 17./ 20. August: Shares of AREVA suspended from trading at Stock Exchange, final departure days later

AREVA becomes „ltd.“, 99% owned and controlled by French Gvt.

French nuclear industry rescued by French state at the cost of € 4,5 billion at taxpayers expense.

# The Nuclear Companies ...

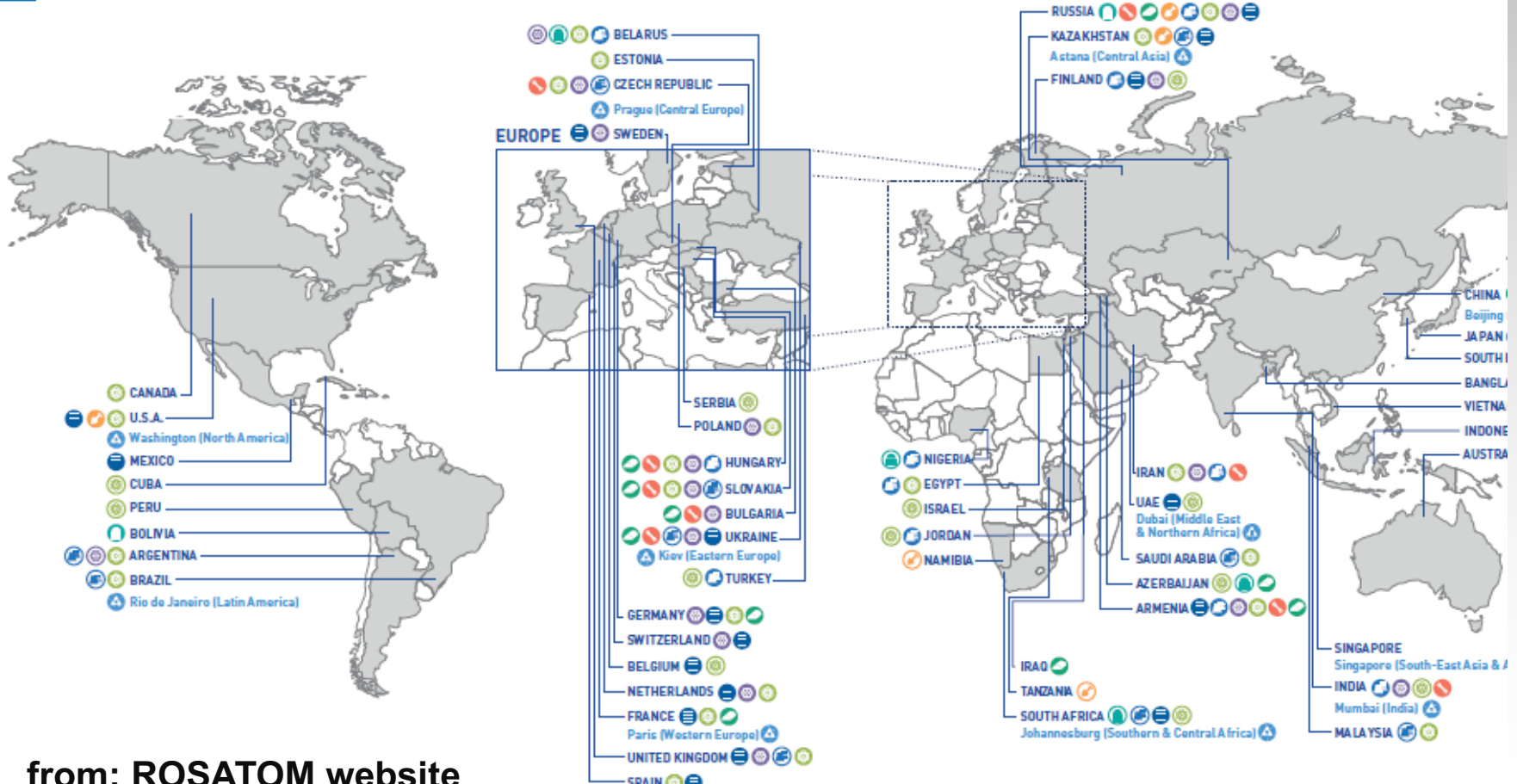


## ROSATOM, state-owned by Russia

### Russia – creating a global nuclear power empire (?)

2

#### Global Presence of ROSATOM



from: ROSATOM website  
“About us ...”, 2016

## ROSATOM

Bellona.org > Latest News > Nuclear Issues > Nuclear Russia > Rosatom loses hope in its international nuclear builds, eyes renewables

Nuclear issues, Nuclear Russia

### Rosatom loses hope in its international nuclear builds, eyes renewables

Amid decreasing world demand for nuclear energy, Russia's state nuclear corporation last week warned it would likely be receiving fewer requests to build nuclear power plants abroad.

## July 3, 2017: ROSATOM loses hope in int'l nuclear builds ...

Amid decreasing world demand for nuclear energy, Russia's state nuclear corporation last week warned **it would likely be receiving fewer requests to build nuclear power plants abroad.**

**The announcement marks a sharp departure for the corporation**, which until recently has posed its contracts with other countries as the bread and butter of its bottom line – as well as a potent tool for broadening Moscow's sphere of political influence.

Speaking at last month's **Tekhnoprom-2017** conference, a technical conference in the Siberian city of Novosibirsk, **Rosatom's deputy director Vyacheslav Pershukov called the market for nuclear power stations abroad "exhausted."**

<http://bellona.org/news/nuclear-issues/2017-07-rosatom-loses-hope-in-its-international-nuclear-builds-eyes-renewables>

creating a global nuclear power empire?

... probably not.

# The Nuclear Companies ...

MARCH 29, 2017

The New York Times

Westinghouse, once one of the major builders of nuclear power plants, owned by Toshiba

## *Westinghouse Files for Bankruptcy, a Blow to Nuclear Power*

Slowing demand for electricity and tumbling prices for natural gas have eroded the economic rationale for nuclear power, which is extremely costly and technically challenging to develop. Alternative-energy sources like wind and solar power are rapidly maturing and coming down in price. The 2011 earthquake in Japan that led to the nuclear disaster at the Fukushima Daiichi plant renewed worries about safety.

General Electric, a pioneer in the field, has scaled back its nuclear operations, expressing doubt about their economic viability. Areva, the French builder, is mired in losses and undergoing a large-scale restructuring.

Among the winners could be China, which has ambitions to turn its growing nuclear technical abilities into a major export. That has raised security concerns in some countries.



# Nuclear power plants are 'bleeding cash'

Business columnist: "Let it be written that environmentalists didn't kill the nuclear power industry, economics did"

JOE ROMM AUG 22, 2017, 4:50 PM

The nuclear industry is so uncompetitive now that over half of all existing U.S. nuclear power plants are "bleeding cash" according to a Bloomberg New Energy Finance (BNEF) report released earlier this summer. BNEF found that \$2.9 billion is lost every year by just 55 percent of all the nuclear plants in the United States.



August  
2017



HOUSTON★CHRONICLE

## Nuclear power as we know it is finished

By Chris Tomlinson | August 3, 2017 | Updated: August 4, 2017 10:44am



# **Uranium company PALADIN /Australia/Africa**

**Founded by John BORSHOFF**

- **Former employee of Uranerz Australien, subsidiary of German Uranerzbergbau GmbH; he secures their database ...**
- **Paladin purchases several projects with positive feasibility studies during time of low price of uranium**

**2005: Price of uranium starts to rise, Paladin starts mines**

**John Borshoff is highly acclaimed as CEO,  
Paladin becomes „the market’s darling“ ...**

**from 2011 on: Value of Paladin’s shares starts to go down**

**2014: Kayelekera Uranium Mine, Malawi, mothballed**

**2014: Langer Heinrich Uranium Mine / Namibia, Paladin’s second mine)  
in serious financial problems ...**

**Share value dropped from \$ 10 to \$ 0,10**

# Uranium company PALADIN



## PALADIN ENERGY CHART

Börse: Frankfurt Chart-Typ: Gefüllter-Chart Optio

Jetzt neu: für Paladin Energy ist der Dividenden-Chartvergleich verfügbar: Jetzt anzeigen



[www.finanzen.net/aktien/Paladin\\_Energy-Aktie](http://www.finanzen.net/aktien/Paladin_Energy-Aktie)

Paladin Energy Ltd

+ Watchlist

**PDN:AU** ASE

Trading has been suspended for  
**PDN:AU**

**2017: Paladin faces bankruptcy, calls in „administrator“**

**July: Paladin shares suspended from trade at stock exchange**

**August: Paladin manages to stop take-over by Chinese CNNC**

**Future of company remains unclear**

# Uranium Company CAMECO, Canada

## Cameco faces CRA in court over \$2.2B tax bill

The Canadian Press Posted: Oct 03, 2016 9:54 AM ET Last Updated: Oct 03, 2016 10:52 AM ET



## Cameco Corp. Faces a Nuclear Implosion Due to Tax Avoidance

Chris MacDonald | December 19, 2016 | More on: [CCJ](#) [CCO](#)

# Uranium Company CAMECO, Canada

Cameco Corp

ETR: CJ6 - 27 Mar, 17:30 CEST

**9,80** EUR **↓0,34 (3,39 %)**

1 day

5 day

1 month

3 months

1 year

5 years

max



**CAMECO – Share value – 2004 – 2017**

# **Summary ...**

## **1. Regional Shifts ...**

### **... re: Uranium Mining**

- **away from US, Canada, also partially from Australia**
- **towards Kasakhstan (currently world's biggest uranium producer) (low environmental standards, politically no problems ...)**
- **and targeting Africa (due to low environmental standards, lack of enforcement of laws, and cheap labour)**

### **... re: Nuclear Power Plants (NPP)**

- **Central Europe, USA, Canada: very few new builds of NPPs (economically not feasible, much resistance, renewables cheaper)**
- **New builds / new connections to grid 80% in Asia (China, India ...)**

# **Summary ...**

## **2. Shifts re: Companies**

### **... re: Uranium Mining**

- **‘Traditional’ uranium miners (AREVA, CAMECO) in difficulties**
- **AREVA successfully ‘staked claims’ (DR Congo, RCA, Canada) ,Newcomers’ (such as Paladin) → serious problems by now**
- **KAZATOMPROM – leading position in the world market  
ROSATOM -**
- **CNNC – Chinese National Nuclear Corporation – in Namibia  
→ quietly launched big U mine (Husab, 5.000 t U / year)**

### **... re: Nuclear Power Plants**

- **AREVA bankrupt, restructured, future re. NPP new builds unclear  
Westinghouse filed for bankruptcy (March 2017)  
ROSATOM ‘looses hope’ in int’l new builds of NPPs (July 2017)**
- **New builds of NPPs mainly Asia (China, India ...)**

***What to expect in the  
Future?***



# World Nuclear Industry Status Report 2017

published 12. Sept. 2017

**The report makes clear, in telling detail, that the debate is over. Nuclear power has been eclipsed by the sun and the wind.** These renewable, free-fuel sources are no longer a dream or a projection-they are a reality that are replacing nuclear as the preferred choice for new power plants worldwide.

It no longer matters whether your greatest concern is nuclear power or climate change the answer is the same. The modern-day “Edisons” have learned to harness economically the everlasting sources of energy delivered to earth by Mother Nature free of charge.

**The value of this report is that this conclusion no longer relies on hope or opinion but is what is actually happening. In country after country the facts are the same. Nuclear power is far from dead but it is in decline and renewable energy is growing by leaps and bounds.**

( ... )

It is more than symbolic that the Japanese Government has formally accepted the death of its breeder reactor, which was the original holy-grail of nuclear power.

Most revealing is the fact that nowhere in the world, where there is a competitive market for electricity, has even one single nuclear power plant been initiated. Only where the government or the consumer takes the risks of cost overruns and delays is nuclear power even being considered.

# **Future ...**

## ***Impacts on (future) demand for uranium***

- **Some 350 NPPs remain in operation, continue to need uranium**
- **New builds of NPPs**
  - **Central Europe, US, Canada 'dead' or only minimum numbers of NPPs**
  - **Attempts to extend life-span of existing NPPs**
- **? Re-start of NPPs in Japan ?**  
**(much slower than expected / advertised by nuclear industry)**
- **Other sources of uranium not relevant** (i.e. programs like „Megatons to Megawatts“ not expected to be renewed under Trump and Putin)
- **Some of the 'traditional' uranium companies in trouble**
- **80% of new connections to the grid in the past 3 - 4 years in Asia**  
**(mainly China, India)**

# **Future ... NPPs connected to the grid 2014 – 2017**

<u>2014</u>	<u>2015</u>	<u>2016</u>
5 connections	10 connections	10 connections
<b>China 3</b>	<b>China 8</b>	<b>China 5</b>
<b>Russia 1</b>	<b>Russia 1</b>	<b>Russia 1</b>
<b>Argentina 1</b>	<b>South-Korea 1</b>	<b>South-Korea 1</b>
		<b>India 1</b>
		<b>Pakistan 1</b>
		<b>USA 1</b>

**2017 – projected**  
**16 connections**  
**China 10**  
**Russia 1**  
**South-Korea 1**  
**India 1**  
**Pakistan 1**  
**UAE Emirates 1**  
**Slowakia 1**

**2018 – projected**  
**8 connections**  
**China 2**  
**Russia 1**  
**South-Korea 1**  
**UAE Emirates 1**  
**Slowakia 1**  
**France 1 (?)**  
**Finland 1 (?)**

**.Grid Connections**  
**2014 – 2017 (total 41)**  
**China: 64%**  
**Asia (others): 17%**  
**Russia: 9,8%**  
**USA, Canada: 2,5%**  
**Central-Europa: 2,5%**

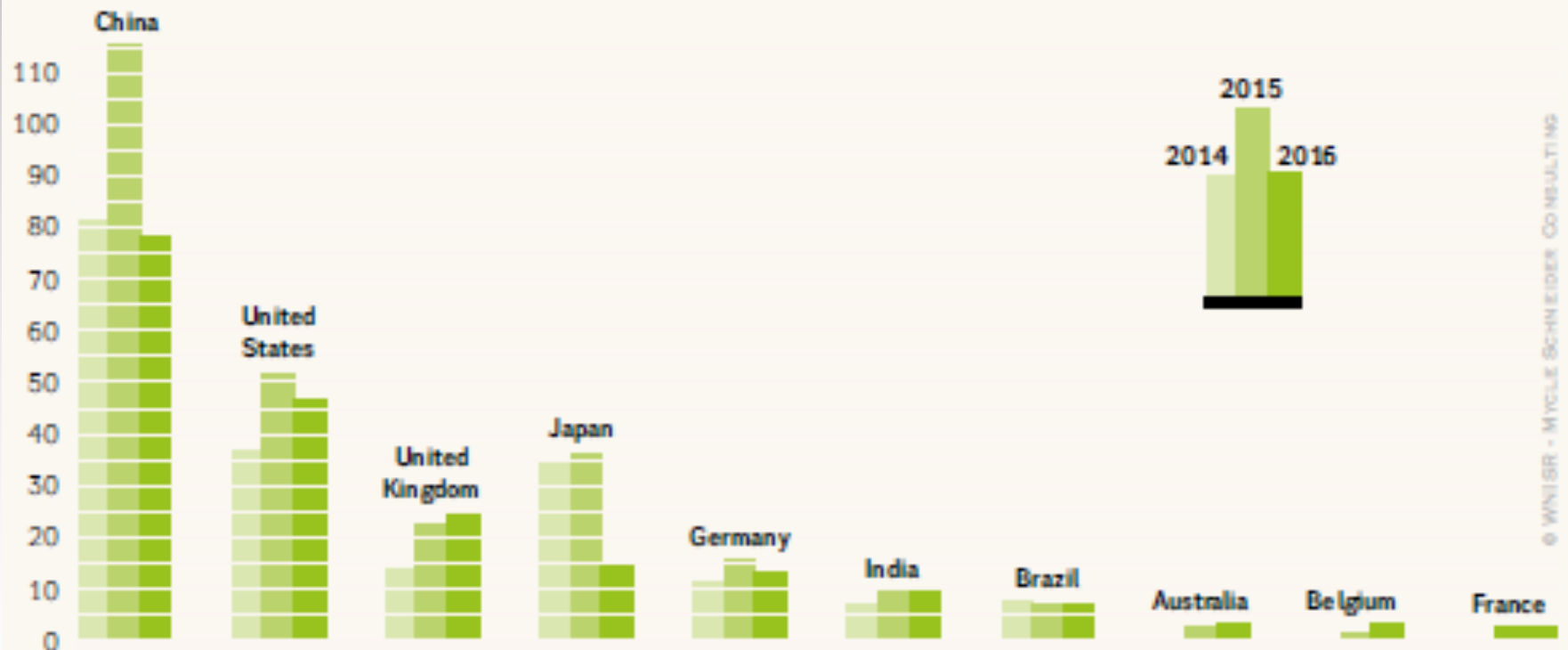
**81%**

# China: Increase in Nuclear - Increase in Renewables

Figure 41 | Top 10 Countries for Renewable Energy Investment 2014-2016

## Top 10 Countries for Renewable Energy Investment 2014-2016

in US\$ billion



Source: FS-UNEP 2017, 2016, 2015

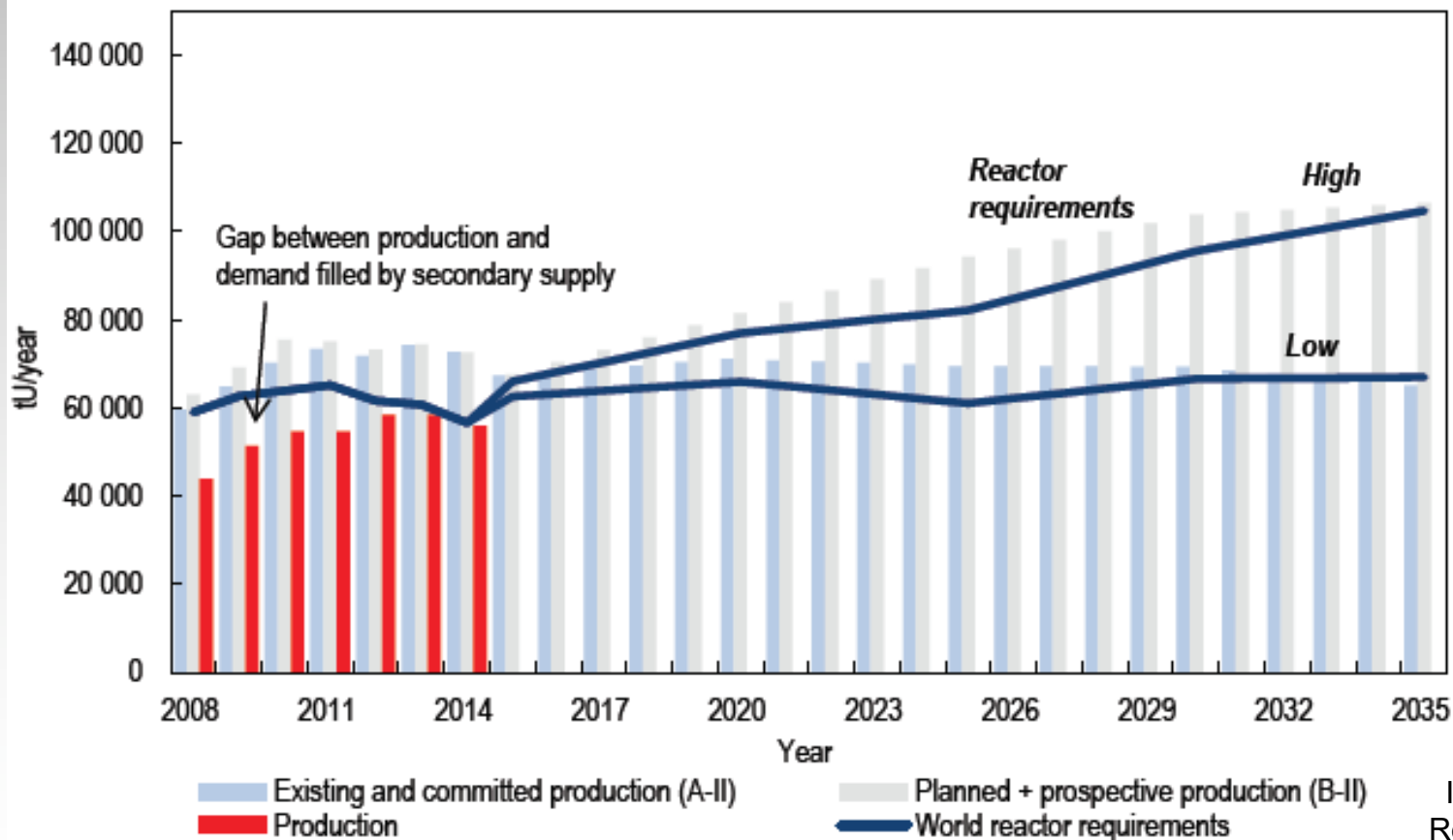
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# Future ...

## Projected Uranium Production Capacity vs.

## Reactor Requirements

Figure 2.11. Projected world uranium production capability to 2035 compared with reactor requirements\*



Source: Tables 1.26 and 2.4.

\* Includes all existing, committed, planned and prospective production centres supported by reasonably assured resources and inferred resources recoverable at a cost of <USD 130/kgU. Does not include the secondary supply forecast.

# Future ...

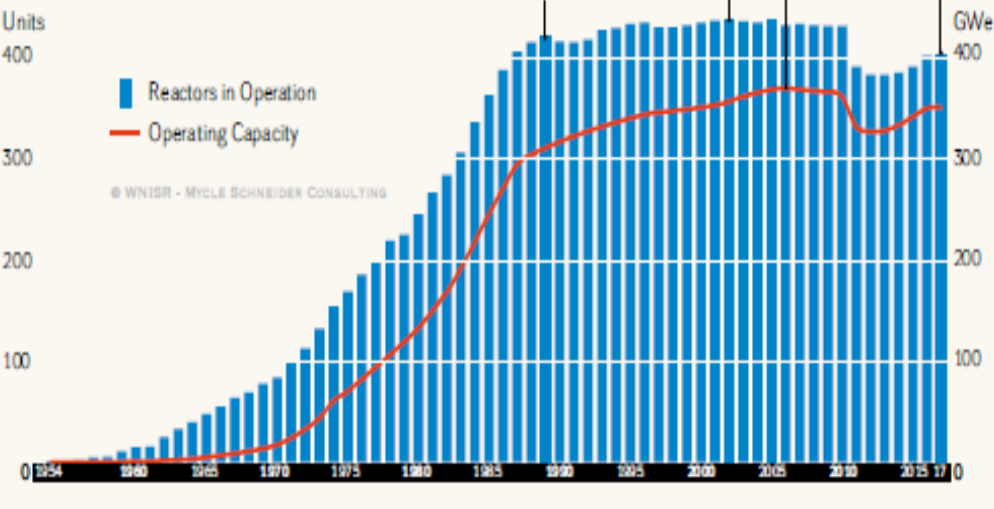
## Historic Development

## Projections

Figure 5 | World Nuclear Reactor Fleet, 1954-2017

### Nuclear Reactors and Net Operating Capacity in the World

in Units and GWe, from 1954 to 1 July 2017



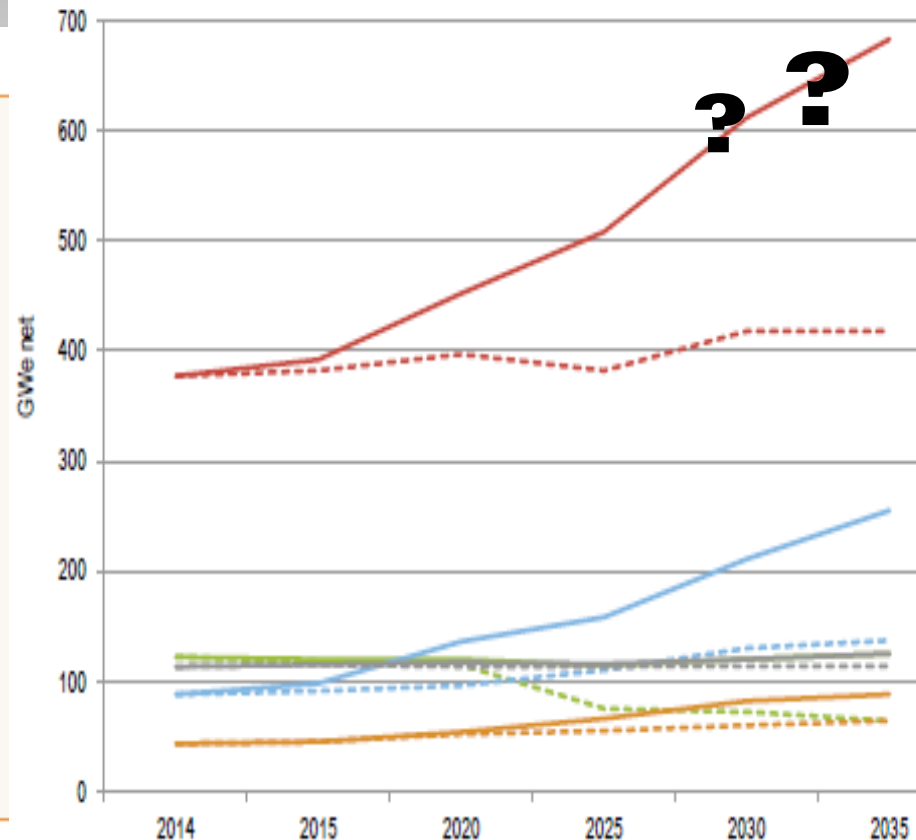
Sources: WNER, with IAEA-PRIS, 2017



World Nuclear Industry Status Report 2017

Figure 2.3. Projected installed nuclear capacity to 2035

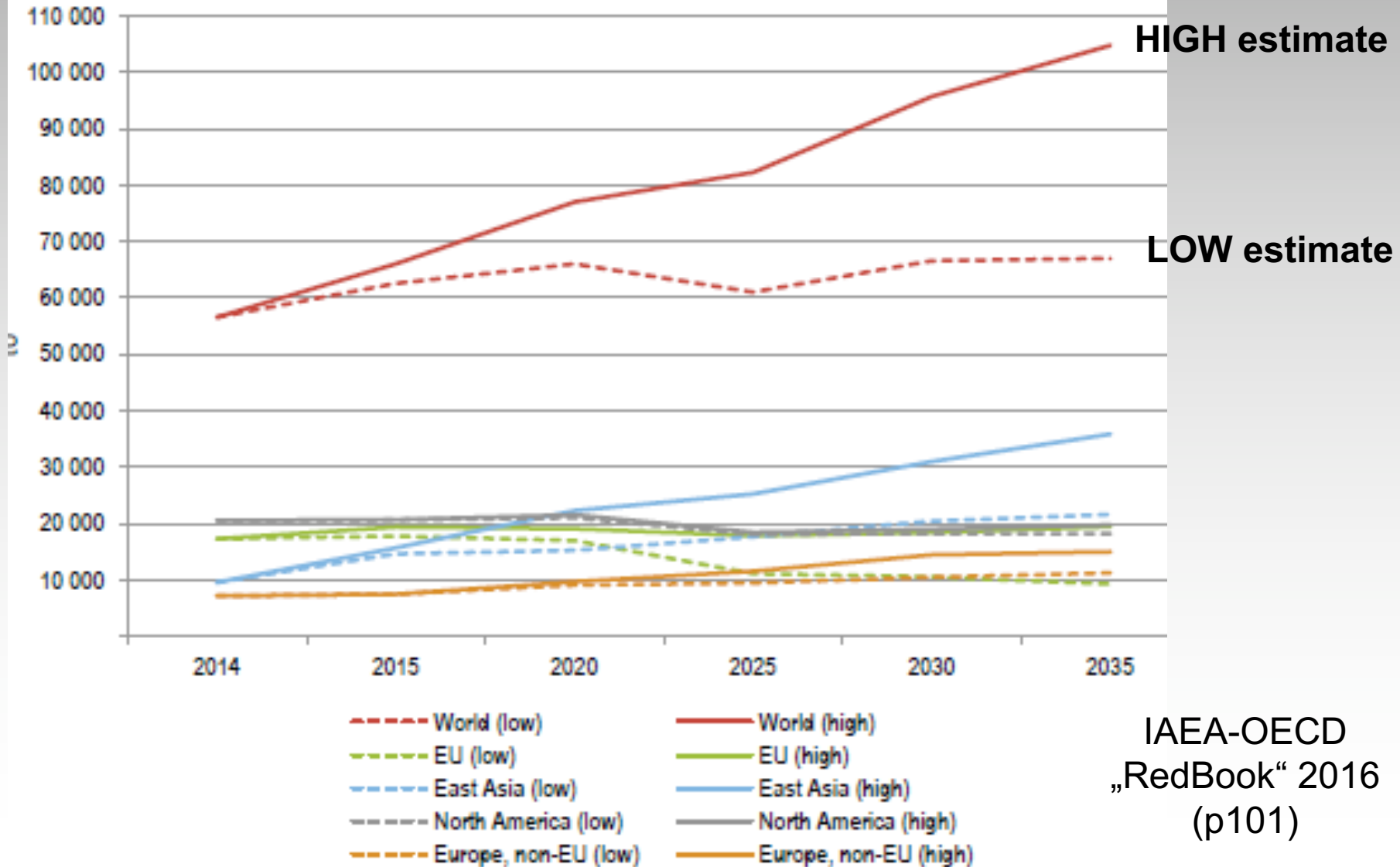
(low and high projections)



OECD - IAEA 'Red Book' 2016

# Future ... Projections Uranium Demand by OECD / IAEA

Figure 2.4. Annual reactor uranium requirements to 2035  
(low and high projections)



IAEA-OECD  
„RedBook“ 2016  
(p101)



# **Future ... *End of Nuclear Age ?***

**US, Canada, Central Europe**

- + very few new builds**
- Life-time expansion of existing NPPs**

**China, India, some Asian countries**

- numerous new builds of NPPs**  
however: China also invests heavily in renewables

**? Japan: future of NPPs unclear, no fast re-start, though**

**Africa**

**→ targeted for uranium mining**

**→ Nuclear companies push for and IAEA promotes nuclear power**

**Note:**

- Nuclear industry pushes for small scale reactors**
- EU European Union keeps investing heavily in nuclear research via EURATOM**

# **Future ... re: Uranium Mining**

„Traditional“ uranium miners (AREVA, CAMECO ...) in difficulties

**Chinese Companies advancing**

**China's future uranium needs will raise to 16% of the world uranium market**

**Uranium / Exploration companies continue to „milk the capital market“  
(for ex. Azincourt ... and others)**

**→ In fact, few new starts of uranium mines due to low price of U**

**→ Companies “stake claims“, wait for rise of the price of U**

**→ African Gvt. WANT U mining - income for the state / Gvt.**

**→ Pressure on the resources has 'relaxed' a bit  
and thus also pressure on the (grassroots) people ...**



*...thanks for your attention !*  
*... and LEAVE URANIUM in the GROUND!*