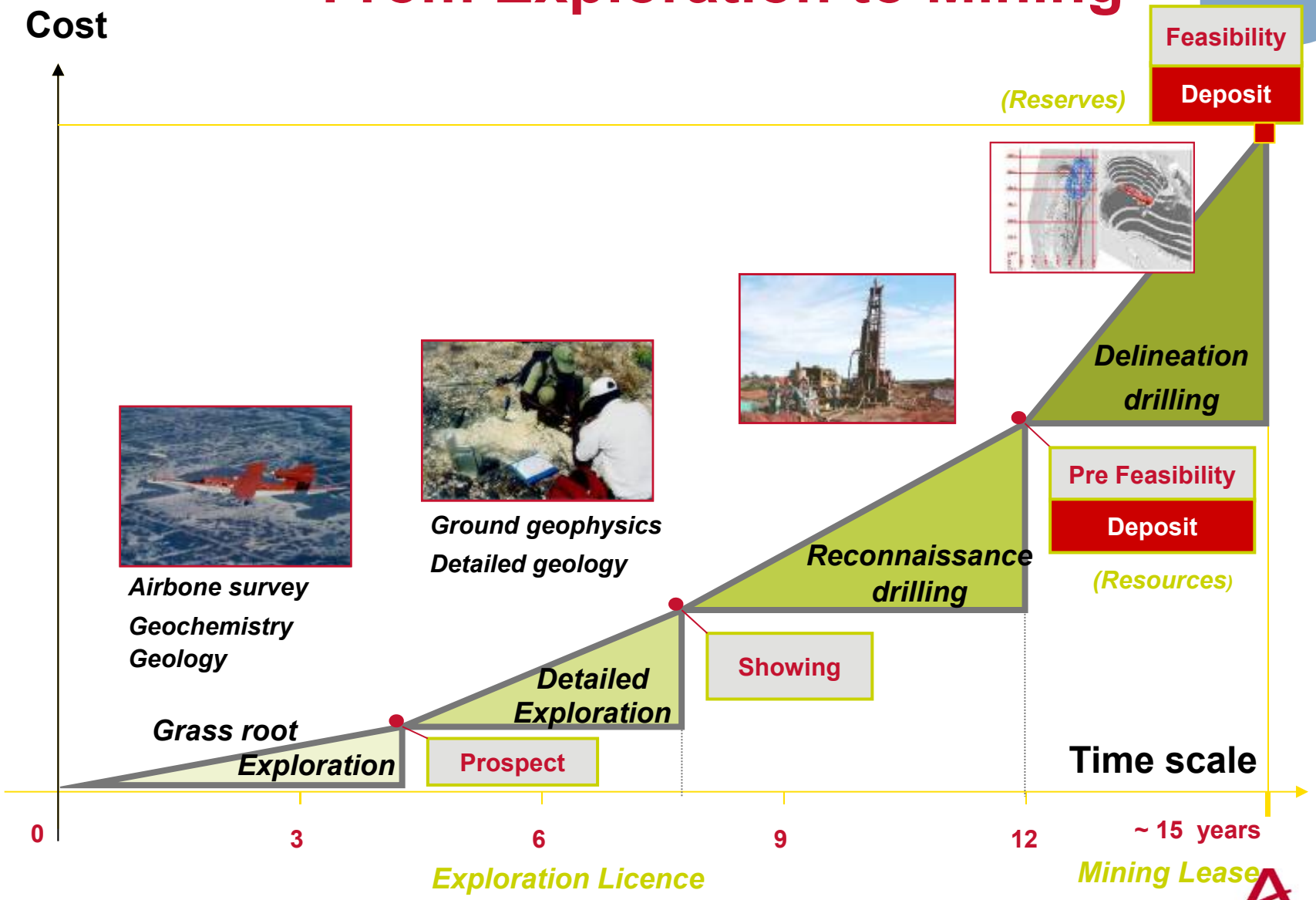
Uranium Exploration (2004-2014): New Discoveries, New Resources

June 2014 IAEA-URAM
Vienna

Christian POLAK, AREVA MINES/DDP

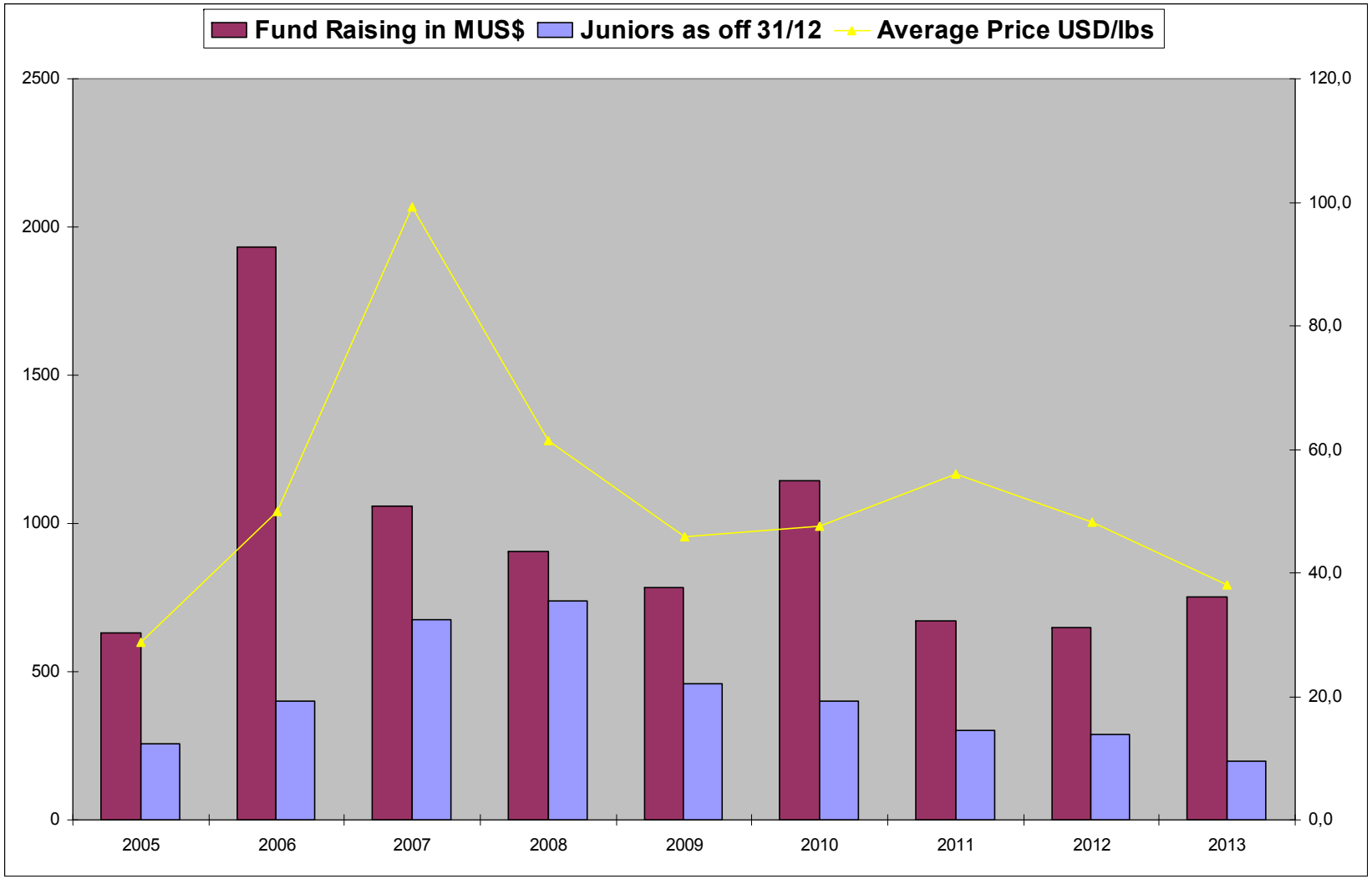
AREVA

From Exploration to Mining

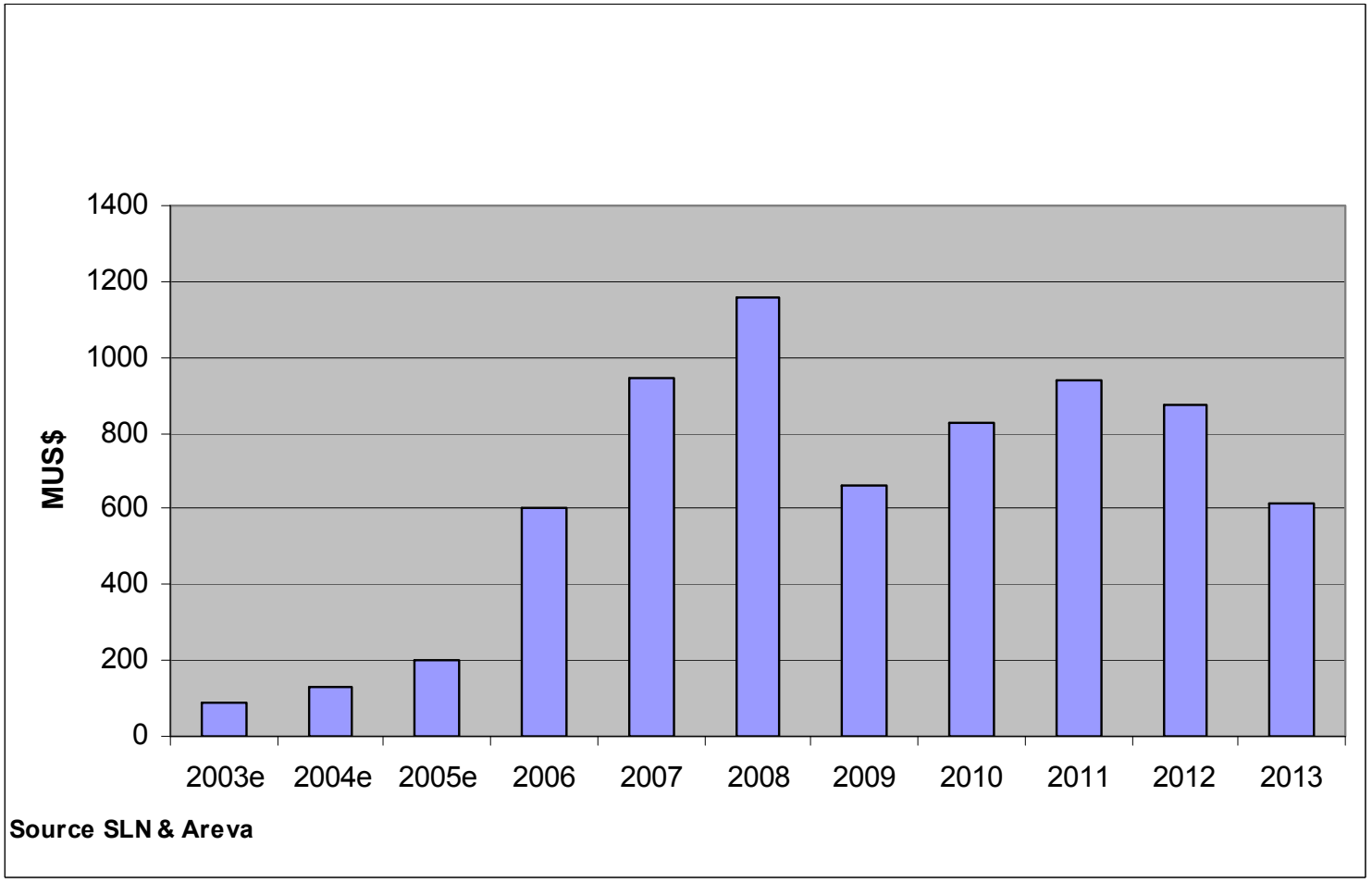


AREVA

Junior Mining Rush 2005-2013

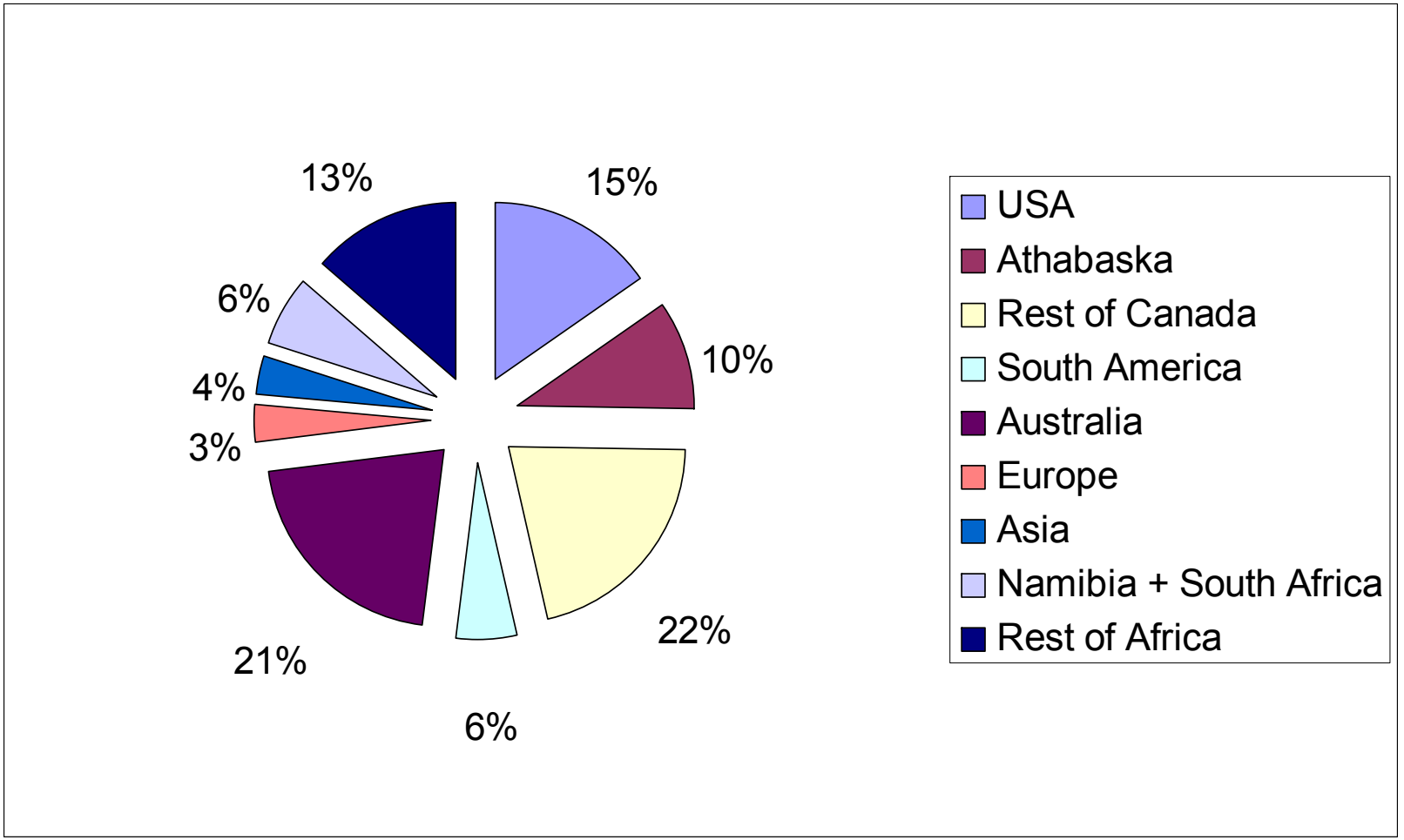


World Uranium Exploration Budget (2003-2013)



Source SLN & Areva

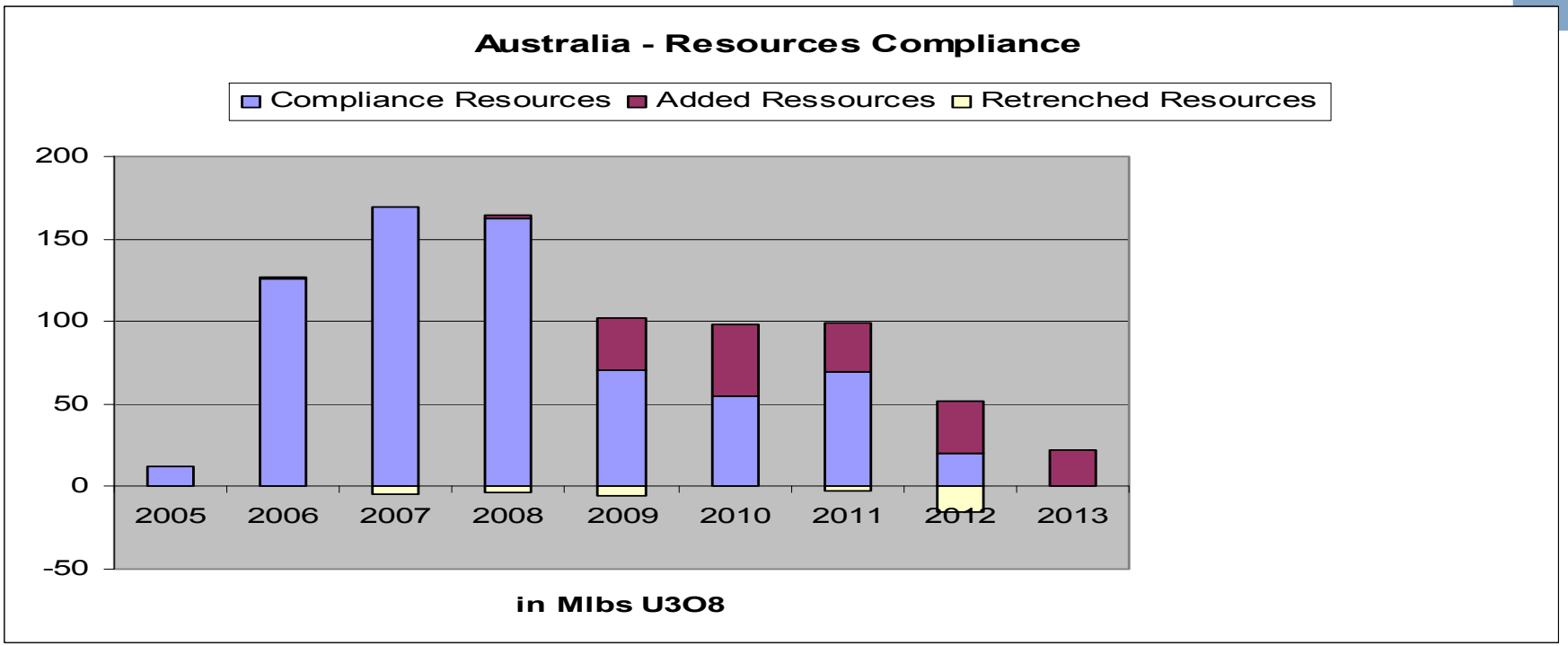
Junior Rush 2004-2014, where ?

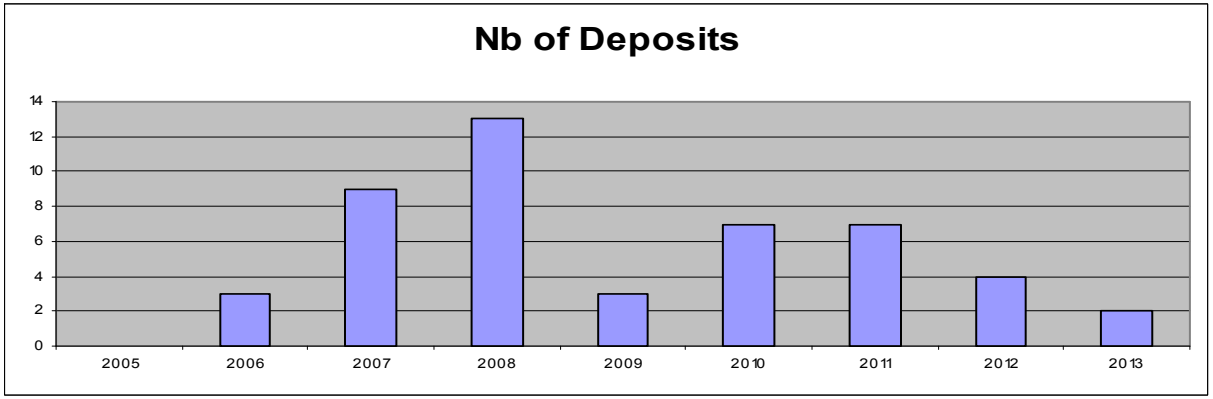


Junior Rush: 3 main areas

2005-2013	Junior Mining involved	Compliant Resources
Australia	203	314 ktU (816 Mlbs)
Canada	401	273 ktU (710 Mlbs)
Namibia	36	477 ktU (1240 Mlbs U3O8)

Exploration - Compliant Resources Definition 1/3: Australia

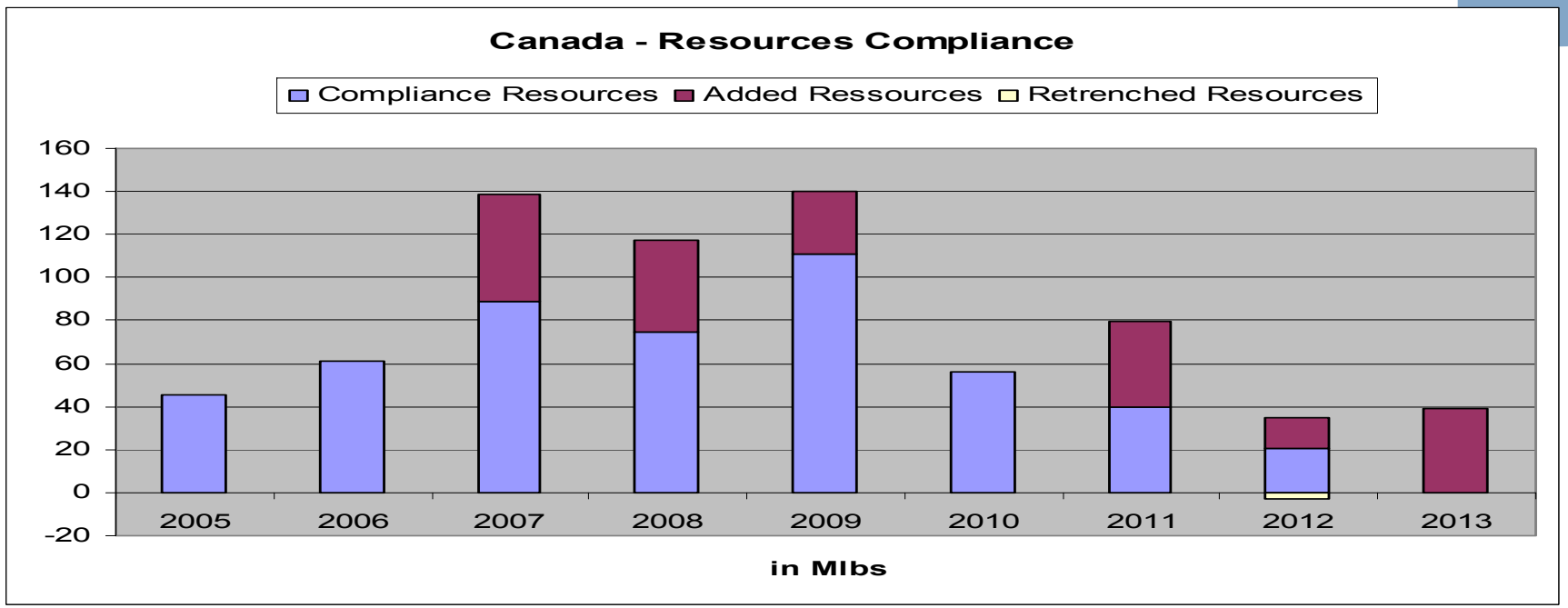


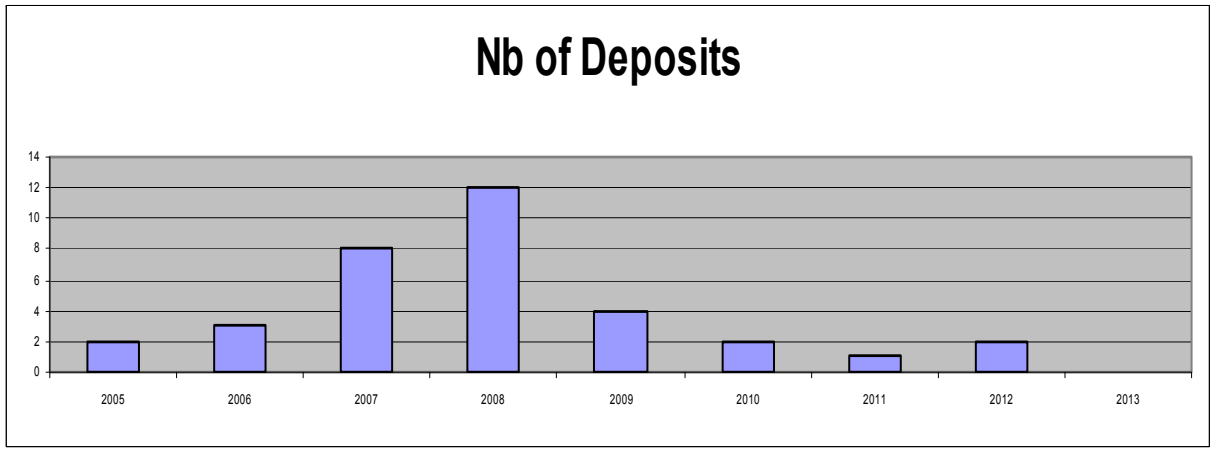


+ 314 ktU

AREVA

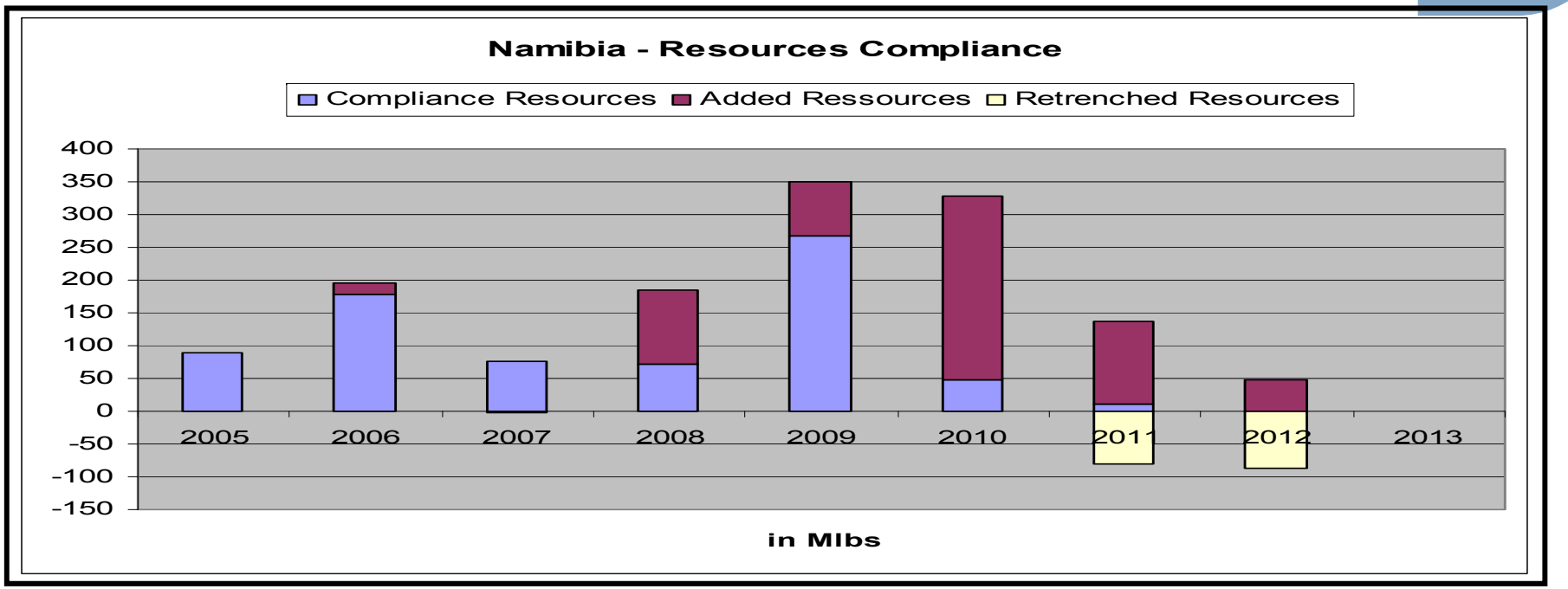
Exploration - Compliant Resources Definition 2/3: Canada

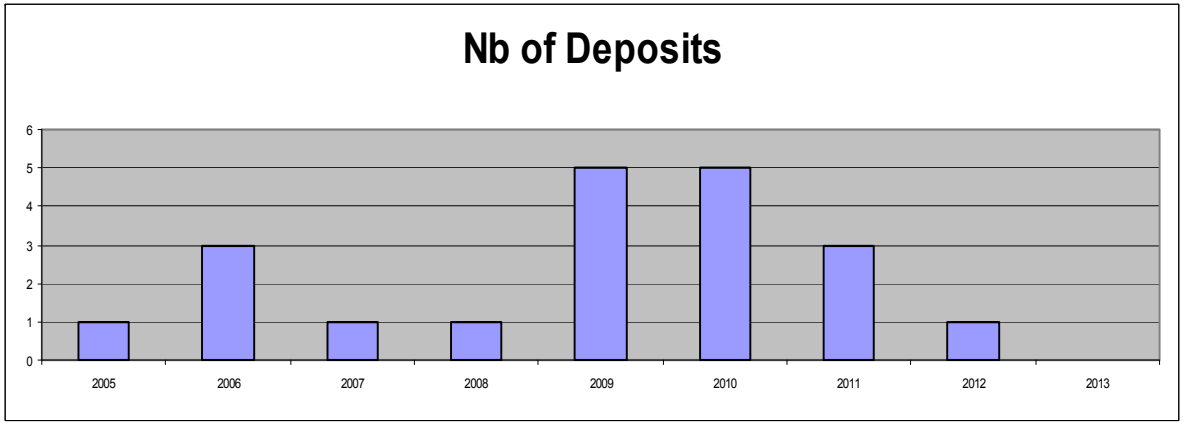




+ 273 ktU

Exploration Compliant Resources Definition 3/3: Namibia





+ 477 ktU

AREVA

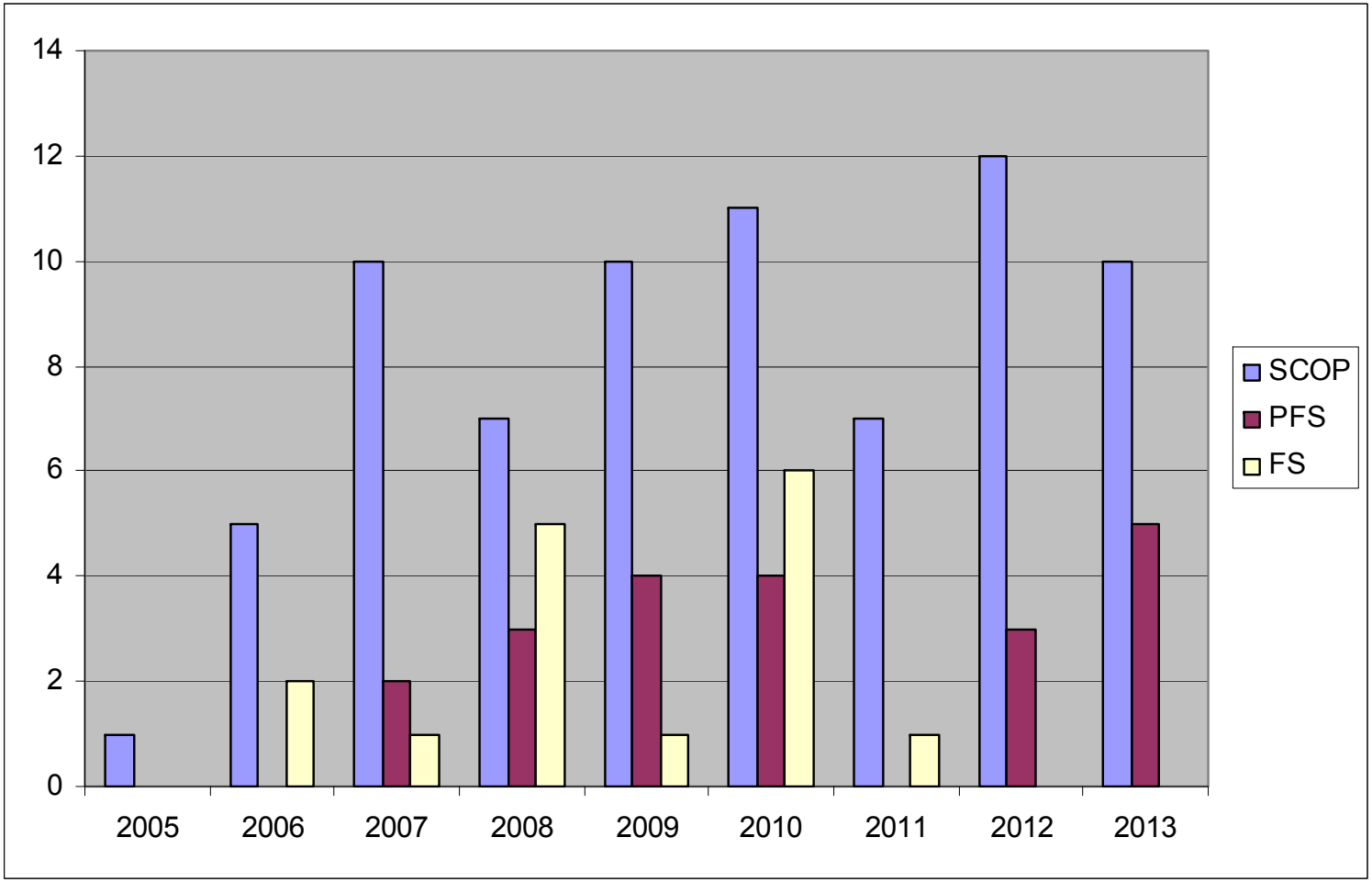
Resources Defined 2005-2013

- **Resources Compliant: 1.8 millions tU (> 100 Mlbs U_3O_8)**
  - Namibia: Husab (Extract@187 ktU), Etango (Bannerman@65ktU), Langer Heinrich(Paladin@71ktU)
  - Botswana: Lethlakane (A-Cap@135ktU)
  - Sweden: Viken (CMP@403ktU), Haggan (Aura@308ktU)
  - Tanzania: Mkuju (Mantra@52ktU)
  - Greenland: Kvanefjeld (GGG@221ktU)
  - South Africa: Ezulwini (First U@75ktU), Potchefstroom (Wits@63ktU), Springbok (Holgoun@82ktU)
  - Canada: Michelin (Aurora@ 52ktU)
  - USA: Coles Hill (Virginia U@46ktU)
  - Niger: Madaouela (Goviex@39ktU)

- **Other interesting development in:**
  - Spain (Salamanca@11ktU), Slovakia (Kuriskova@16ktU), Mali (Falea@17 ktU)

AREVA

Development Studies 2005-2013



SCOP: Scoping Study or Preliminary Economic Assessment

PFS: Prefeasibility Study

FS: Feasibility Study

Source: Areva

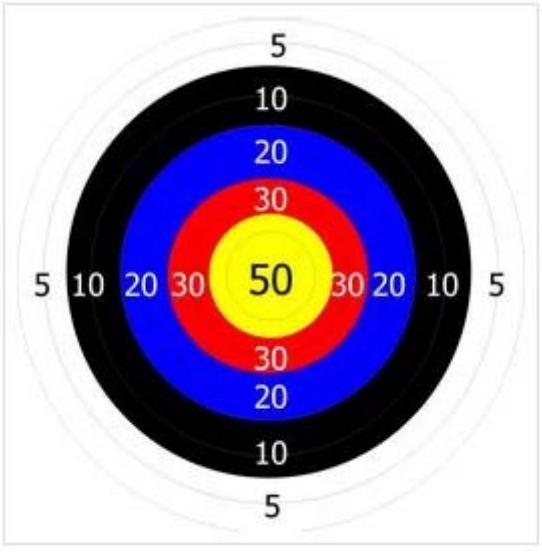
AREVA

Success Story Pathway 2004-2013

 # 850

Junior Mining Companies

160 Juniors produced new Resources data



73 Scoping Studies

21 Prefeasibility Studies

16 Feasibility Studies

AREVA

Consolidation

- **South America (Argentina, Paraguay, Peru (*Macusani # 37 ktU*))**
- **USA (*ISR*)**
- **Western Australia (*Grand Wiluna # 29 ktU*)**
- **Witswatersrand (*Tailings # 125 ktU, Underground # 345 ktU*)**

Uranium Players on the Rand 2011

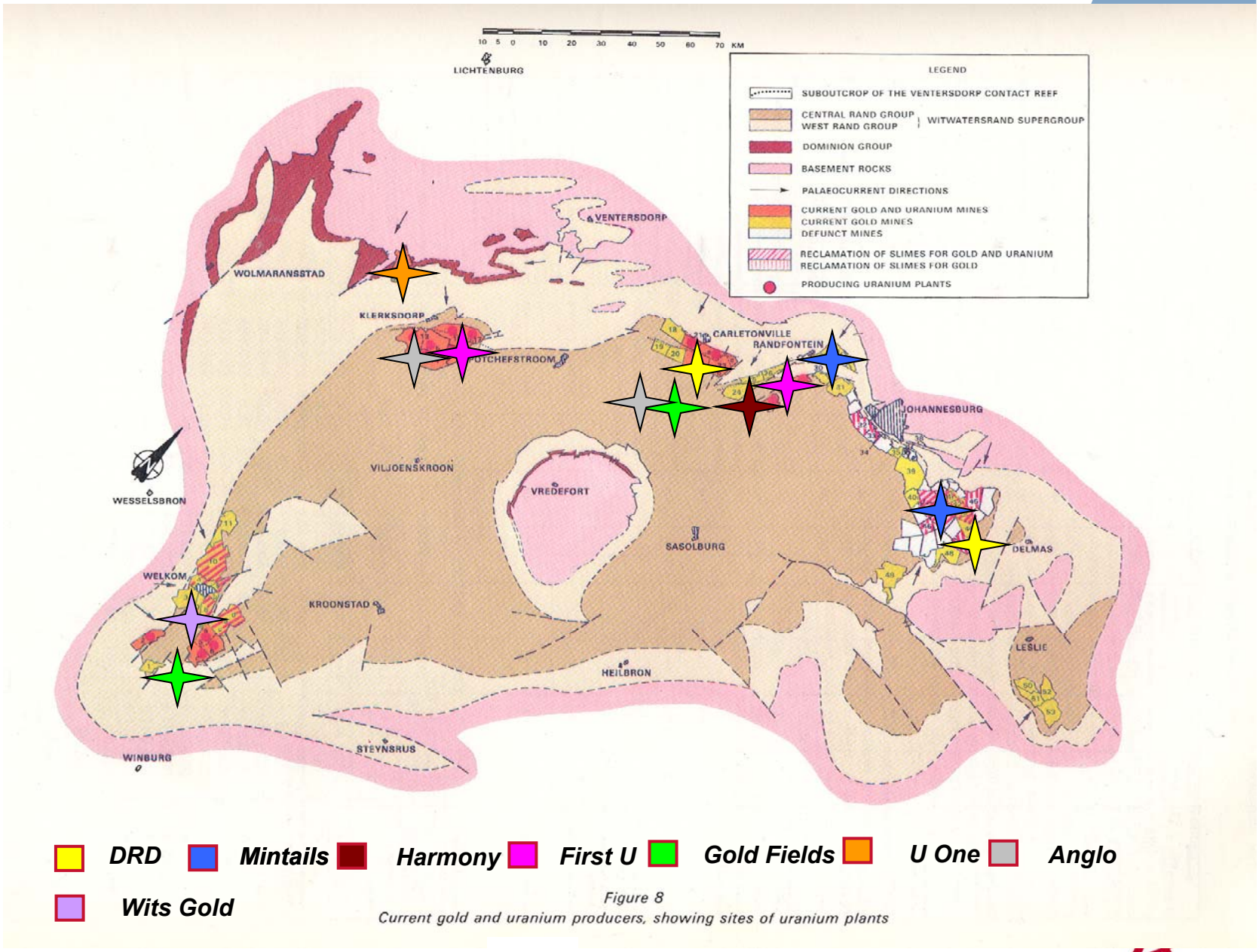
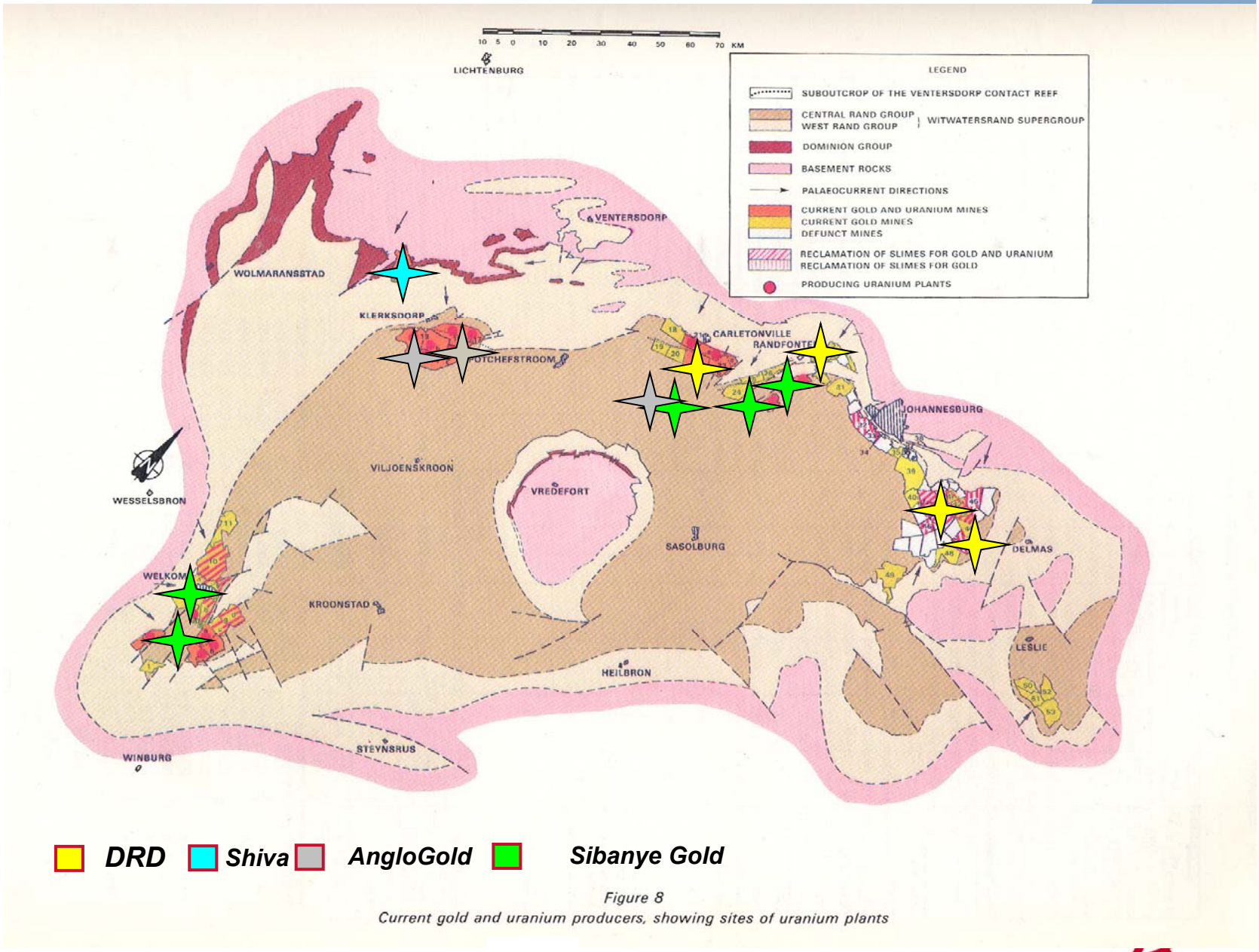


Figure 8
Current gold and uranium producers, showing sites of uranium plants

AREVA

Uranium Players on the Rand 2014



DRD ***Shiva*** ***AngloGold*** ***Sibanye Gold***

Figure 8
Current gold and uranium producers, showing sites of uranium plants

AREVA

Junior Mining in Production 2004-2014

- **Paladin (3,225 tU - 2013)**
- **USA « ISR Co » - (*UEC, Mestena*, *Ur-Energy, Uranerz, URI, Peninsula*) (1000-1500 tU/yr),**
- **Australia: Four Mile 725 tU/yr**

Juniors discoveries under construction/production

- **Trekkopje (2,500 tU/yr – postponed), Husab (5,800 tU/yr > 2015)**

AREVA

New Processes: a leverage for new resources

- **Low Grades ores (calcretes, sandstones, alaskites)**
  - Heap-Leaching (alkaline or acid)
  - Chlorine resistant Resin
  - Upgrading process (Schoenburg, U-pgrade, Ablation)
- **Blackshales:**
  - Columbia (8.2 ktU): Acetic leaching (P_2O_5, Ni, V, Y)
  - Sweden (711 ktU), Finland 350tU/yr: Bio-heap Leaching (Ni, Mo, Co)
- **Phosphates:**
  - Resins (PhosEnergy, K-tech)
  - New molecules for extraction
- **REE:**
  - Greenland: Acid stages leaching

AREVA

Conclusion: 10 years of discovery ?

- Large effort of exploration
- Large amount of compliant resources discovered or confirmed
- New process development for low cost and for low grade

- New production from this effort still limited < 10%
- Feasibilty studies must confirm viability of economic exploitation and therefore resources quality
- Consolidation to set up critical mass deposits

▶ To be ready for the coming decades 2020 +

AREVA

Merci