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#### ▶ To cite this version:

A. Monnet, J. Percebois, S. Gabriel. Long-term availability of uranium resources a bivariate statistical approach. European Nuclear Young Generation Forum 2015, Jun 2015, Paris, France. cea-02489562

#### HAL Id: cea-02489562 https://cea.hal.science/cea-02489562

Submitted on 24 Feb 2020

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## Long-term availability of uranium resources: a bivariate statistical approach

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## Background and objectives – Uranium resources

The expansion of the world nuclear fleet depends on the uranium resource availability

Necessity to analyze the supply/demand equilibrium in the long term

Supply model

**Price formation** mechanism

What quantities? At what cost? (Cumulative supply curve)

**Long-term U price** 

**Exogenous demand** 

World nuclear power scenarios

# Methodology – Supply model



#### **IAEA uranium data: UDEPO**



**Regional statistical approach** 

Specific regional economics and geology



#### **Bivariate supply model Deposit cost and U content**

Functions of grade and tonnage

**WISE data** (Recent mining projects)

1 mining project 1 U quantity FRAM







#### Long-term cumulative supply curve

The other recent supply models are either very simplified (cost and cumulated quantities are functions of grade only, cf. Schneider, MIT) with world aggregated data and no regional specificity, or very detailed (multi-parametric, cf. USGS), allowing for precise regional appraisals but no systematic approach for the world due to unavailable data in many countries.

## Early results – Supply model: the case of the United States



### Further developments – Price formation mechanism

### From supply model to price formation mechanism:

- The application of the supply model to the US will be conducted for the world allowing the long-term resource depletion to be included in the mid-term dynamics of the price mechanism.
- Existing price formation mechanisms: generally limited to short/midterm applications with limited production rates but with no resource depletion.

### The **price formation mechanism** will take account of:

- Limited regional production rates, based on profitability
- Resource depletion through the supply model
- Discoveries as a function of exploration activities
- Mining development, potentially dependent on allocated profits, and individual strategies

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### European Nuclear Young Generation Forum 2015 – June 22<sup>nd</sup>-26<sup>th</sup> 2015