Redesign the uranium resource pathway
Case study: Argentina
Nuclear Power Generation

- Installed capacity of 1.7 Gwe
- 10% share in the national electricity matrix
- Natural uranium requirements of about 220–250 tU per year

Source: CNEA, NA-SA, 2017
Nuclear Power Generation

SMD – CAREM

- 27 MWe net/32 MWe gross
- To come into operation in 2020–2022
- Unit to a higher capacity of possibly 120 MWe

Source: CNEA, 2017
Nuclear Power Generation
Committed/Planned NPPs

➢ China and Argentina signed an agreement

➢ 4th NPP: CANDU

➢ 5th NPP: Hualong One

Source: WNA, 2017; NA-SA, 2017; CNEA, 2017
Nuclear Power Generation
Perspectives

- Generation capacity by 2030:
  3.470 Gwe (low) – 4.070 Gwe (high)

- Raw material needs by 2030:
  525 tU (low) - 620 tU (high)

Source: NA-SA, 2017; CNEA, 2017
Main uranium projects
Uranium exploration projects
Other potential sources of uranium

Source: UNECE, 2017
Social and Economic Viability
Uranium Prices

➢ Uranium Production of Argentina: 2,600 tU (1952 – 1997)

Price 04/2018 = USD 21/lb U3O8 = USD 55/kg U

Source: UxC, 2018; CNEA, 2014
Social and Economic Viability
FOB Vs. Uranium Prices

Source: Ministerio de Energía y Minería, 2016
Mineral resources belong to provincial states

Mining activities are regulated at provincial level

8 of the 23 Argentine provinces have legislations in place that restrict metal mining
Technical Feasibility
Main Uranium Projects

- Cerro Solo (U, Mo)
- Laguna Salada (U, V)
- Sierra Pintada (U)
- Meseta Central (U)
- Don Otto (U, V)

Resource Knowledge
Uranium Exploration Projects

Geological types of U deposits:
- Intrusive
- Granite-related
- Volcanic-related
- Sandstone
- Surficial
- Phosphate

Source: CNEA, 2014-2017
Resource Knowledge
Uranium Exploration Projects

- To advance the delineation of resources
- To raise the level of confidence of resources
- To carry out Preliminary Economic Assessments
- To focus on In Situ Leaching projects
REE is widely accepted as a critical material required for renewable energy technologies.

Uranium & Thorium could be used as fuel for low-carbon nuclear power generation.

Source: Kelly, 2011; Thor Energy, 2013; Van Gosen et al., 2014; WNA, 2017
Innovate Perspective
Other Potential Sources of Uranium

- IAEA project CRP on neutral uses of HTGRs

P + U Comprehensive Projects
Food Security & Energy Security

Social Acceptance
Sustainability

Source: IAEA, 2015-2018; CNEA, 2016
Other Potential Sources of Uranium

- Improved adsorbent materials for recovery of uranium from sea/lake water
- R+D projects in Japan, the USA and China

Source: Tamada, 2009; Kung et al., 2014; CNUC, 2017
 Argentine Continental Shelf: 2,800,000 Km$^2$!

Sovereign rights for commercial exploitation:

- metallic-ore
- non-metallic ore
- hydrocarbon extraction
- so on …
## Uranium Projects of Argentina Classified Under the UNFC Scheme

### Final Results

<table>
<thead>
<tr>
<th>Project</th>
<th>UNFC Class</th>
<th>UNFC Sub-class</th>
<th>UNFC Category</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerro Solo (U)</td>
<td>Potentially Commercial Projects</td>
<td>Development Pending</td>
<td>E2, F2.1, G1</td>
<td>2,420 tU</td>
</tr>
<tr>
<td>Cerro Solo (Mo)</td>
<td>Non-Commercial Projects</td>
<td>Development Pending</td>
<td>E3, F2.2, G3</td>
<td>870 tMo</td>
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<tr>
<td>Laguna Salada (U-V)</td>
<td>Potentially Commercial Projects</td>
<td>Development Pending</td>
<td>E2, F2.1, G2</td>
<td>14,500 tU</td>
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<tr>
<td>Sierra Pintada (U)</td>
<td>Potentially Commercial Projects</td>
<td>Development Hold</td>
<td>E2, F2.2, G1</td>
<td>2,700 tU</td>
</tr>
<tr>
<td>Meseta Central (U)</td>
<td>Non Commercial Projects</td>
<td>Development Unclarified</td>
<td>E3, F2.2, G3</td>
<td>7,350 tU</td>
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<tr>
<td>Don Otto (U)</td>
<td>Non Commercial Projects</td>
<td>Non Commercial Projects</td>
<td>E3, F2.2, G1</td>
<td>100 tU</td>
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<tr>
<td>Laguna Colorada (U)</td>
<td>Non Commercial Projects</td>
<td>Development not Viable</td>
<td>E3, F2.3, G1</td>
<td>80 tU</td>
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<tr>
<td>San Jorge Basin (U)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G2</td>
<td>20 tU</td>
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<tr>
<td>Neuquen Basin (U)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G3</td>
<td>60 tU</td>
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<tr>
<td>Alipan (U)</td>
<td>Exploration Project</td>
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<td>E3, F2.3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Mina Franca (U-V)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Laguna Sirven (U,V)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Amapolitano Grande (U)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Achala Batholith (U)</td>
<td>Exploration Project</td>
<td>---</td>
<td>E3, F2.3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Rodeo de los Molles (REE-U)</td>
<td>Potentially Commercial Project</td>
<td>Development On Hold</td>
<td>E2, F2.2, G2</td>
<td>2,270 tREO</td>
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<tr>
<td>Uranium from phosphates</td>
<td>Additional Quantities In Place</td>
<td>---</td>
<td>E3, F3, G4</td>
<td>Not Available</td>
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<tr>
<td>Uranium from porphyry copper</td>
<td>Additional Quantities In Place</td>
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<td>E3, F3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Uranium from coal</td>
<td>Additional Quantities In Place</td>
<td>---</td>
<td>E3, F3, G4</td>
<td>Not Available</td>
</tr>
<tr>
<td>Uranium from sea/lake water</td>
<td>Additional Quantities In Place</td>
<td>---</td>
<td>E3, F3, G4</td>
<td>Not Available</td>
</tr>
</tbody>
</table>
Currently, uranium is imported for domestic use in Argentina, which has implications for supply and energy security.

For this reason, this report has tried to outline different possibilities for the sustainable domestic production of uranium, especially considering the world situation of the uranium market where the commodity-driven model seems to be weakening.

In this general context, the application of UNFC contributes to both a better understanding of the availability of reliable resources in Argentina as well as demonstrate how these resources can contribute to the national nuclear energy programme and the mining sector.
Thank you!

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Date 26I 04 I 2018, Geneva