



**NUCLEAR PROLIFERATION
PREVENTION PROJECT**



The University of Texas at Austin

Plutonium For Energy? Perspective on East Asia

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The NPPP engages in research, debate, and public education to ensure that civilian applications of nuclear technology do not foster the spread of nuclear weapons to states or terrorist groups.

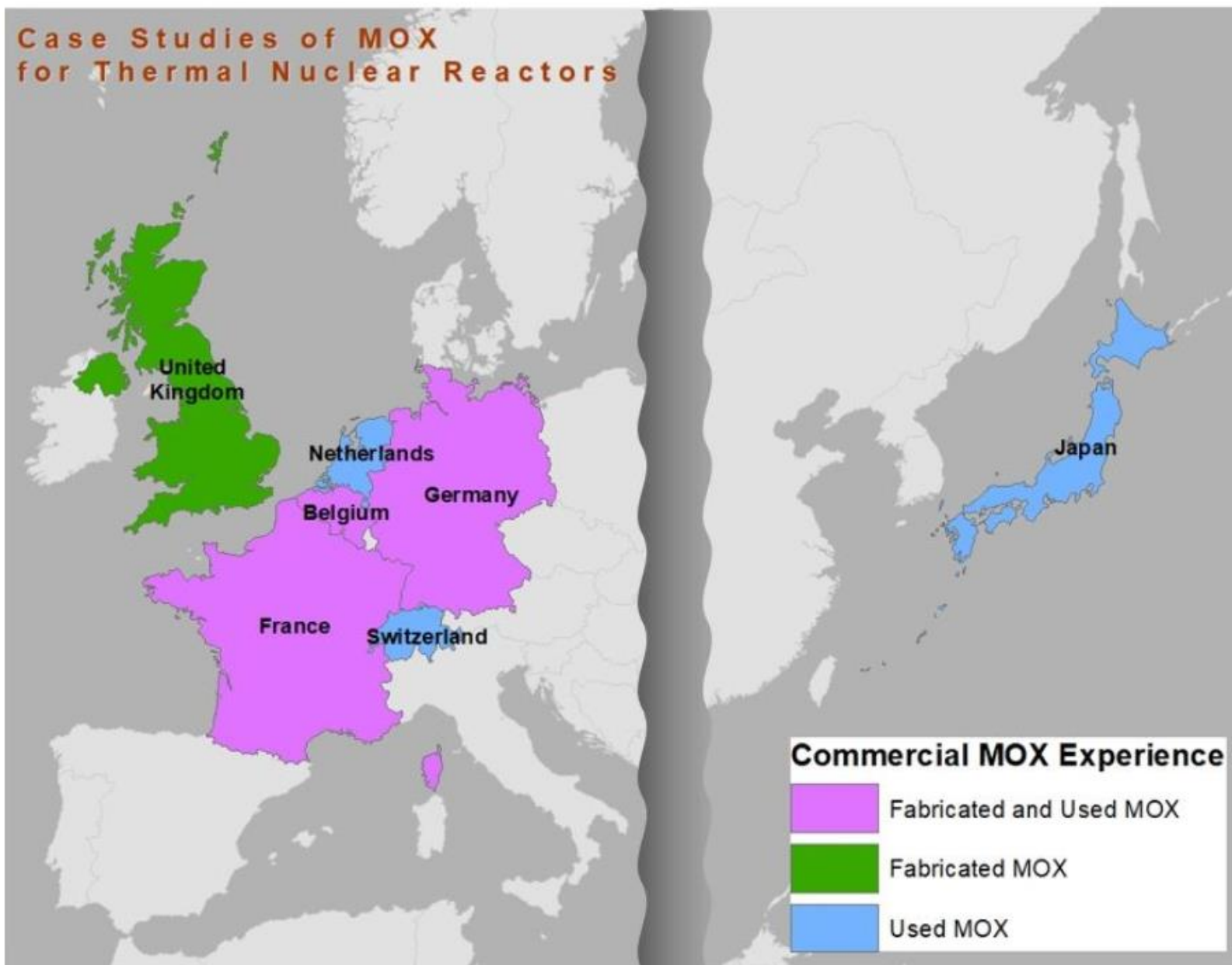
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Lessons About Plutonium Fuel

- The world's only commercial use of plutonium fuel has been as MOX in thermal reactors, so we studied all such production and use.
- Most of the lessons apply to any potential recycling of plutonium into fresh fuel, including with pyro-processing and fast reactors, as South Korea is exploring.



Case Studies of MOX for Thermal Nuclear Reactors



エネルギーのための プルトニウム?

[ホーム](#) [リサーチ](#) [リンク](#) [イベント](#) [お問い合わせ](#)

[今、本は出版されています：“エネルギーのためのプルトニウム?”. 無料のコピー (電子または紙) は[こちらをクリック](#)してください。]

[新しい記事が公開されました：“日本のプルトニウム政策が間違っている” .]

原子力発電の燃料として使われるプルトニウムは核兵器製造の有用性、発がん性、そして高コストという三つの理由で議論の余地がある燃料である。それにもかかわらず、伝統的な「熱」の原子力原子炉で、これを主燃料として使用することについて公に利用可能な情報は、比較的少ない。

에너지를 위한 플루토늄?

[홈](#) [연구참여자](#) [연구결과](#) [링크](#) [이벤트](#) [연락처](#)



[새 책 출판: “에너지를 위한 플루토늄?” 무료 사본 (전자 또는 용지)은 [여기를 클릭하십시오.](#)]

[게시된 새 기사: “일본의 플루토늄 정책이 잘못됐다”]

대한민국은 “파이로프로세싱” 기술을 이용하여 국내 원전에서 발생한 사용 후 핵연료 재처리를 고려하고 있다. “파이로프로세싱”은 사용 후 핵연료 속의 플루토늄과 다른 재생 가능한 물질들을 다시 원전의 연료로 활용하기 위하여 분리하여 처리하는 기술이다. 한국은 이와 관련한 중대한 결정을 내리기 전에 반드시 에너지 발전을 위해 플루토늄 재처리를 시도한 경험이 있는 다른 나라들의 사례들을 고려해보아야 할 것이다.

핵발전 연료로 쓰이는 플루토늄은 핵무기 제조의 유용성(有用性), 발암성, 그리고 고비

Plutonium for Energy?


Explaining the Global Decline of MOX



A Policy Research Project of the
LBJ School of Public Affairs
University of Texas at Austin



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Edited by Alan J. Kuperman



Decline of Commercial MOX for Thermal Reactors

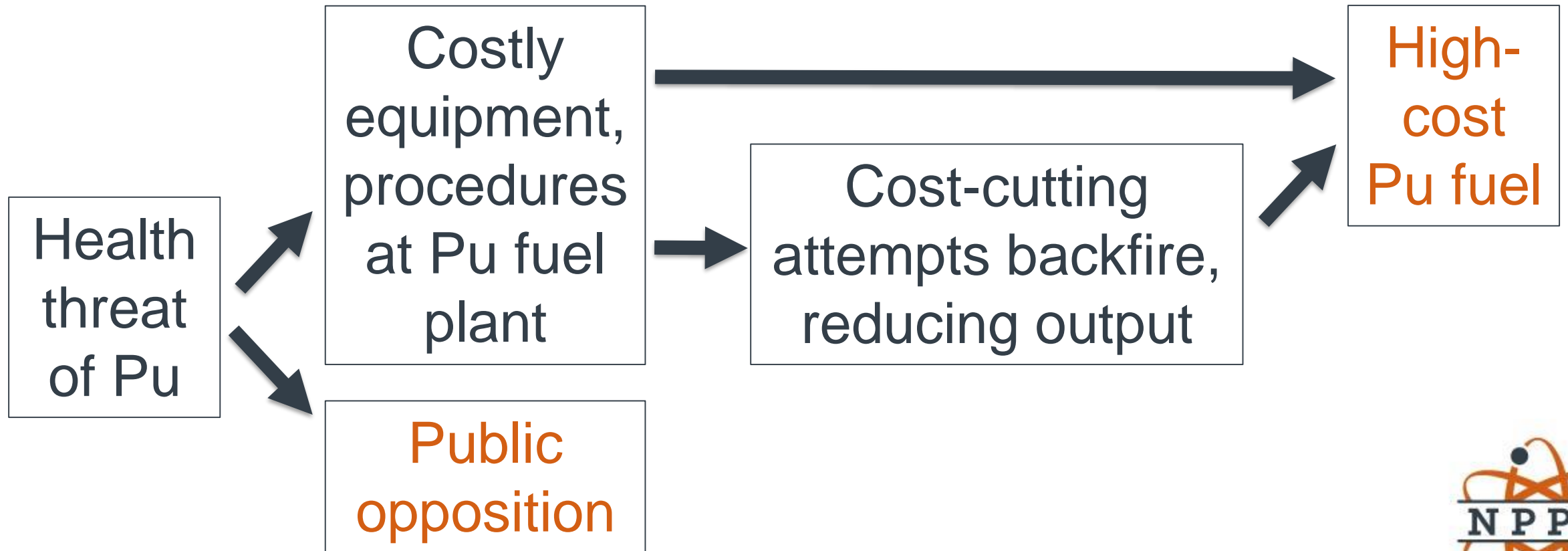
Country	Produce MOX?	Use MOX?
Belgium	✗	✗
France	✓	✓
Germany	✗	↘
Japan		✓
Netherlands		↘
Switzerland		✗
UK	✗	

Key:

- ✗ = Ended
- ↘ = Phasing out
- ✓ = Ongoing



Root Cause: Health Threat of Plutonium



Plutonium Fuel Costs Many Times More than LEU Fuel

- **Japan:** Currently pays 9 times as much for imported MOX fuel as LEU fuel.
 - Domestic production of MOX fuel would cost 12 times the price of LEU fuel, says JAEC.
- **The other countries** have paid 3 to 6 times as much for MOX fuel as LEU fuel.



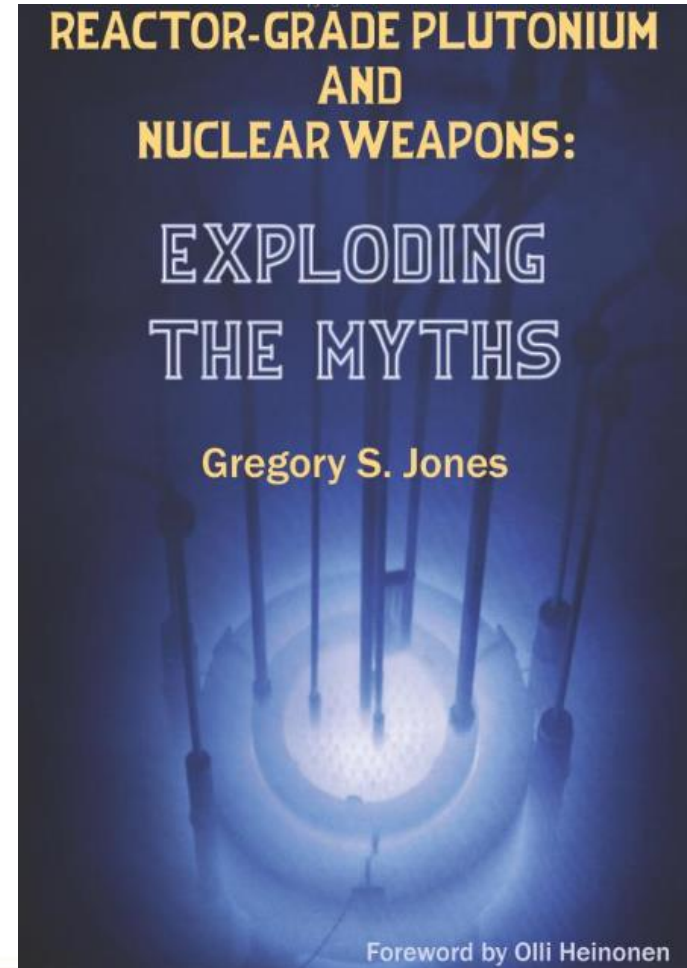
Closed Fuel Cycle is Less Popular than Nuclear Energy

- Switzerland
- Belgium
- Japan
- Germany



Security Risks

- Reactor-grade plutonium of any isotopic mix can make **reliable nuclear weapons**.
- Vulnerabilities:
 - Shipments of fresh MOX fuel and PuO_2 .
 - Fresh MOX fuel at power plants.



Japan's 47 Tonnes of Pu

JAEC's plan to expand MOX use would significantly increase:

- Pu stockpile in Japan
- Cost of electricity
- Safety and security risks



R_x for Japan's Pu

- **22 tonnes in UK:** Pay UK to take ownership.
- **10 tonnes in Japan:** Use 2t as MOX, dispose of 8t as waste.
- **15 tonnes in France:** Disposition as combo of MOX and waste.





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Thank you!

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