

Will future plutonium recycling
surf on the wave of negative
phantasms ?

Alain MICHEL

SCK-CEN, March 25, 2014

Let us start with
a short history

Belgium receives plutonium (around 1960)

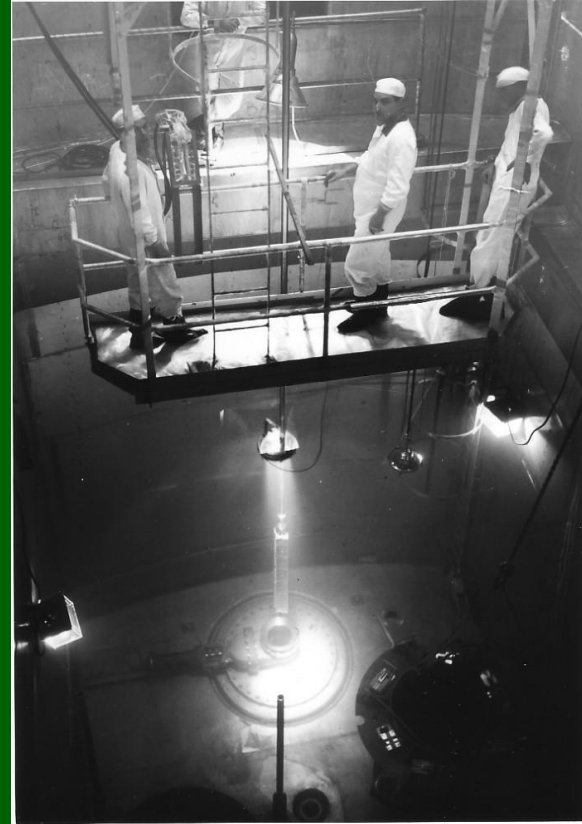


Transport of one of the first delivery of american Pu from Antwerp harbour to SCK-CEN

A common group SCK-CEN with BN (the sixties)



Laboratories and pilot plant at
SCK-CEN



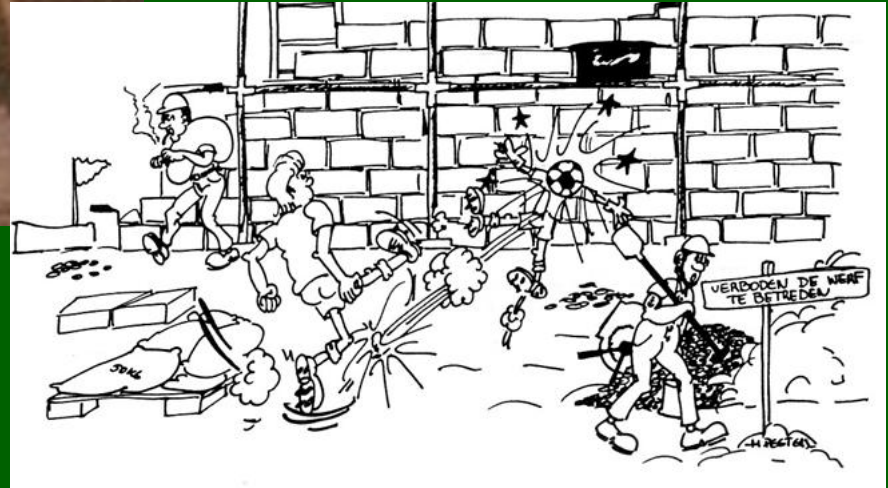
World première : MOX in BR3
(1963)

BN builds an industrial plant (the seventies)



The Dessel BN plant
in its first years

From Pluto,
the plant magazine



Political support during the first years of activity



(Photo F. Hamon)
Présentation de l'assemblage expérimental Rapsodie Fortissimo (à droite) en regard
des assemblages prototypes de cœur (à gauche) et de couverture (au centre) du réacteur SNR 30



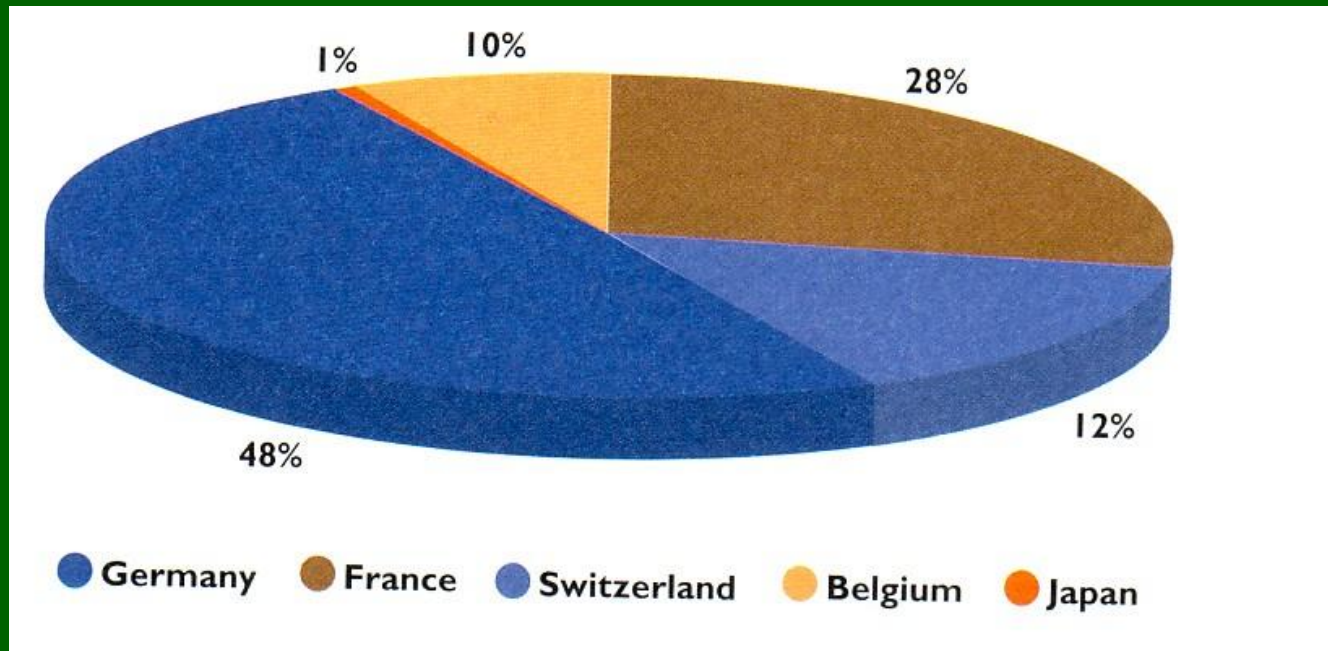
King Baudouin

Minister Cools



SNR MkI core and irradiations
with Governments financing

Industrial maturity (the eighties)



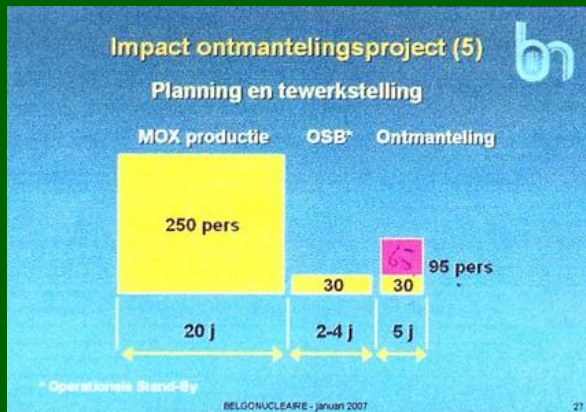
Manufacturing MOX fuel for LWR in France, Germany, Switzerland, Japan and Belgium but also smaller amounts for Italy, Netherland, Sweden (situation end of 2005)

Full capacity until 2005



Belgonucleaire ,
world leader in MOX fuel,
has fabricated 657 tonnes
of MOX fuel in more than
20 years operation.
Thus dozens of tonnes of
Pu have been recycled.

Dismantling now



Ontmantelingsproject (2) 

Versnijding van de HK'n

- montage van de tent
- binnenbrengen van de HK in de tent

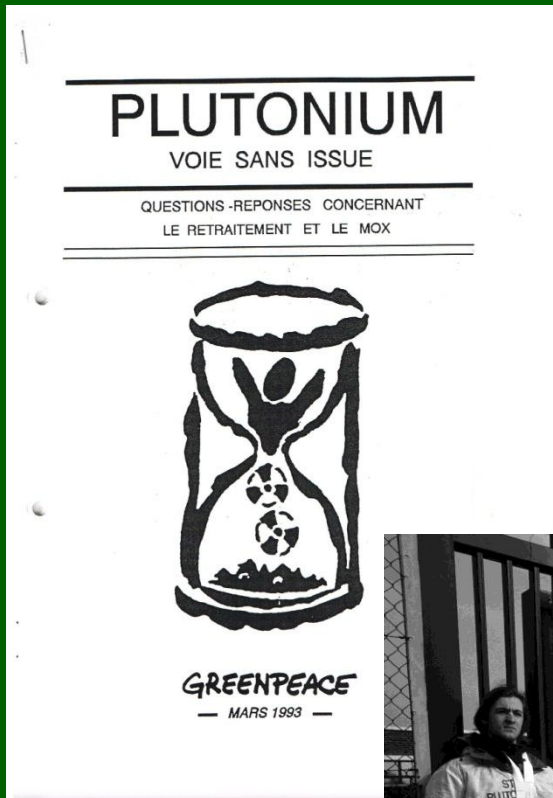


BELGONUCLEAIRE - januari 2007 17

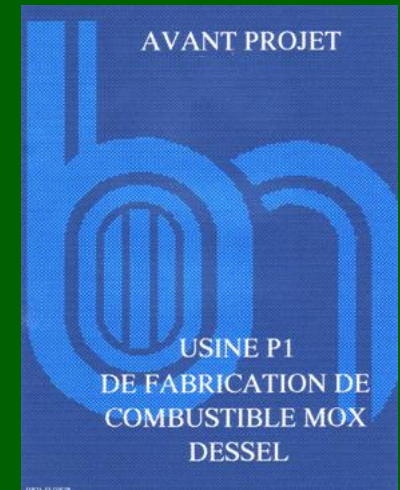
First procedures in 2006, dismantling until 2015

Political obstacles

Failure of the extension



BN, in cooperation with
COGEMA, obtains the
licence to double its
plant capacity (1991)



But a small fault
in the procedure
detected by
Greenpeace,
ruins the project

Weapons-grade plutonium to MOX : Stop and go

After Belgians early proposal, BN participates in designing plants but finally MFFP is build in the USA with Areva after heavy local objection actions. Presently it is not certain that it will be operated ...



Conference on International Security and Disarmament: the Role of the Scientific Academies

Accademia Nazionale dei Lincei

6-9 June 1989

TUESDAY 6 JUNE

- Edoardo Amaldi (President of the Accademia Nazia)
- W. K. H. Panofsky: *The role of scientific Academie*

1) Deep cuts of nuclear weapons

- M. M. May: *How many nuclear weapons?*
- R. Sagdeev and A. A. Kokoshin: *Radical reduction stability*

WEDNESDAY 7 JUNE

General discussion: S. Kapitza, F. Calogero, R. Garwin, S
2) *Military stability in Europe: prospects of reducing an forces*

2.1) Conventional forces

- O. Amirov: *Conventional arms reductions approach*
- J. Steinbruner
- R. Pellat: *Watch of disarmament by civil satellites*
- General discussion: A Kountsevitch, F. Calogero

2.2) Nuclear forces

- F. Calogero: *Nuclear forces in Europe*
- I. Sourbès: *Role of independent nuclear forces*
- K. Gottstein: *Prospects for Reducing and Restruct. German point of view*
- Panel: K. Gottstein, S. Kapitza, S. Keeny
- Interventions from the floor: P. Germain, F. Mauit

http://www.lincei.it/rapporti/amaldi/prog_1989.php

THURSDAY 8 JUNE

3) Conversion of weapon grade fissionable material

- E. Amaldi, U. Farinelli, C. Sili: *Conversion of weapon grade nuclear materials to civilian purposes*
- A. Jaumeite, J. van Dievoet, A. Michel: *Max facts: the best utilization of plutonium now*
- W. K. H. Panofsky: *The regime of control on fissionable materials*

4) Prospects of a total ban of chemical and biological weapons

- G. B. Mathis-Bethelin: *Towards the ban of chemical weapons*
- A. Kountsevitch: *The perspectives for a ban of chemical weapons*
- E. Inacchi
- S. Kapitza: *The main stages of development of chemical weapons*
- J. Mitchell
- C. G. Holden: *The biological weapons treaty as a catalyst for international cooperation*
- General discussion: J. Steinbruner, S. Kapitza, C. G. Holden

FRIDAY 9 JUNE

5) Role of academic institutions in the quest for peace and disarmament

- R. Peters: *made a paper by M. Rees on Environmental Control*
- S. Kapitza: *The role of Academies*
- E. Loschekovska: *The role of Academies*
- General discussion on the opportunity of a future conference: E. Amaldi, W. K. Panofsky, C. Schaefer, A. Diderovski, R. Peters, R. Garwin, P. Germain, M. M. May, F. Calogero, K. Gottstein, W. K. H. Panofsky, E. Loschekovska

Papers tabled during the conference:

- Extract from SIPRI yearbook 1989: world armament and disarmament
- Report by Prof. J. P. Holden on occasion of the 17th Pugwash Workshop on Nuclear Forces



Lack of support by Belgium's federal government

Anxieties in fictions and demonstrations

Plutonium : notions that have a strong emotional impact

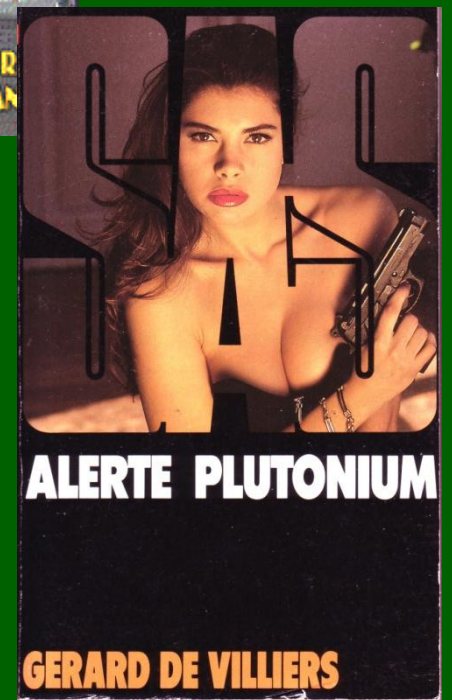
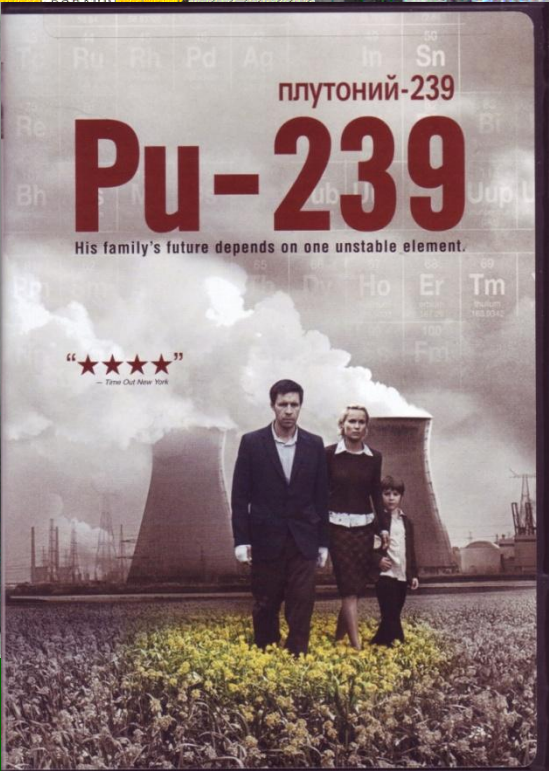
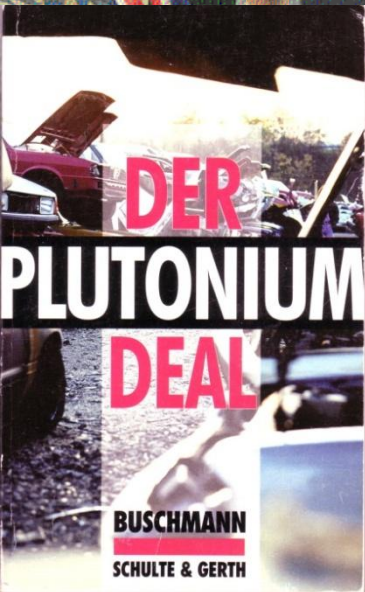
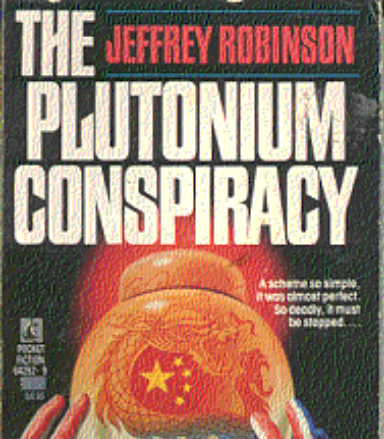
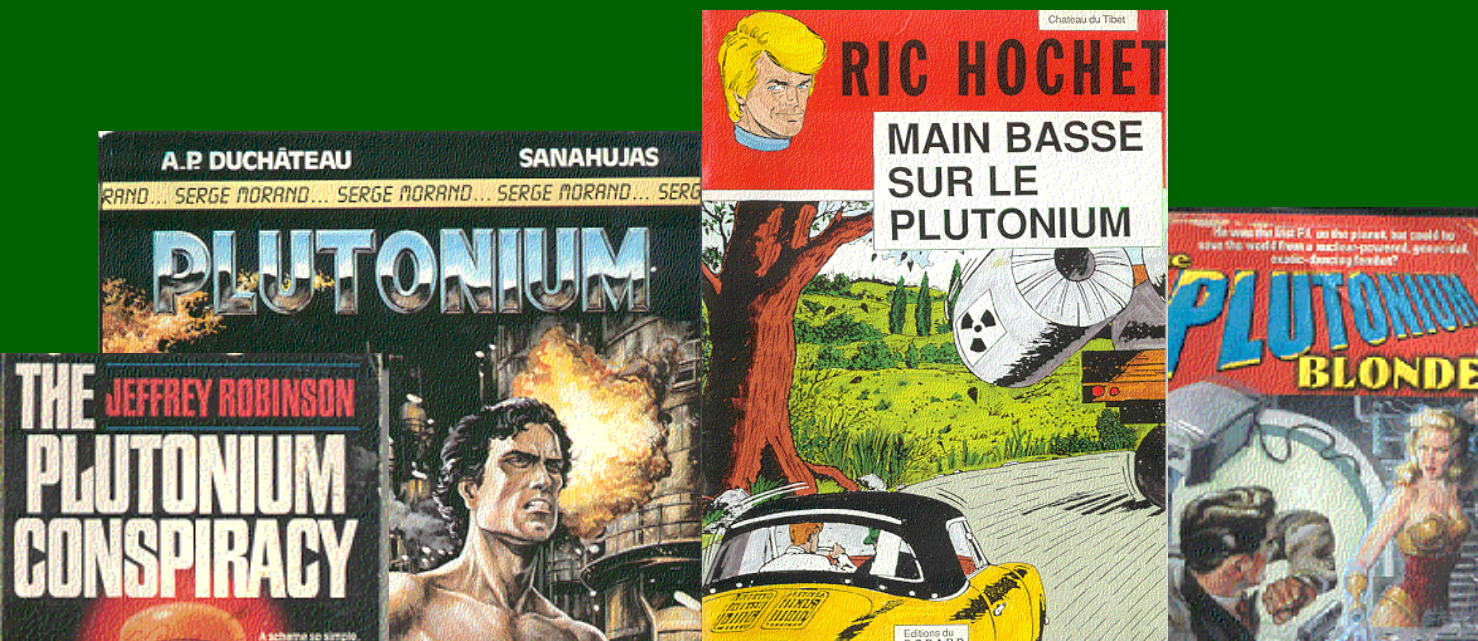
- Plutonium is an infernal name
- Nagasaki was a sin against mankind
- 24,000 years half-life looks very much like eternity
- All types of plutonium are weapon usable
- Internet technology allows every terrorist to build a bomb in his garage, so plutonium is the essence of nuclear proliferation
- 1 millionth of a gram is sufficient to cause a death by cancer

Plutonium : the myths



- Pluto, god of inferno although he was god of underground's wealth and his name means "the rich"
- Apocalypse due to a strong association in people's mind with the bomb, stronger than uranium
- Dragons and phoenix underground energy, perpetual rebirth, impossible to exterminate

Scary stories sell



Green Actions : Greenpeace in Dessel



- Plutonium branded as the most dangerous substance in the world represents a considerable propaganda coup for the green movement

(Gordon Adam, MEP, at Pu 2000)

Green Actions : Mother Earth



- Cancer and death, the utmost scares ... (road blockade in Dessel, 1993)

Misinformation and distortion of facts



The Philip C. Jessup
International Law Moot Court
Competition

Extracts from the « case study », a transport of fresh MOX:

A storm alters the course of the Mairi Maru, which runs aground on a sandbar (...) The ship's (double) hull rupture, as does the secure compartment holding the MOX canisters. The canisters, also damaged, leak over 50 kg of highly radioactive MOX pellets (...) Several members of the crew die and others exhibit acute radiation syndrome. (...) presence of dead fish and sea birds in an area of up to 15 km from the wreck three days later.

February 2005

How can we react ?

Fundamental messages:

- plutonium is not a waste : it is a by-product of nuclear energy
- plutonium can be managed in a safe and secure way with available technology and facilities, by burning it in existing reactors where it belongs

To be memorized, a message
requires :

- To charm
- To stir
- To convince

In this order, already according to Cicero ...

BN actions the nineties

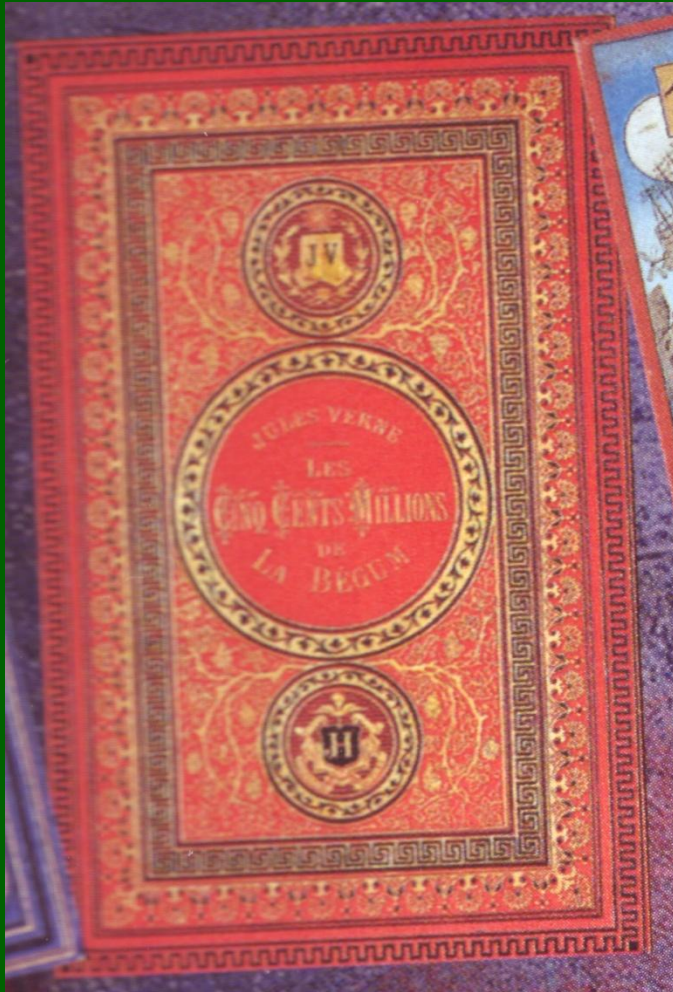


Intensify the contacts with the local population and its representatives



And now ?

Probably lacking today



« Aujourd’hui, pour vivifier l’interface entre science et société, il nous manque un Jules Verne. Les angoisses contemporaines au sujet du rationnel et des techniques associées tiennent en partie à ce manque. »

Michel Serres (Préface de Jules Verne, *De la science à l’imaginaire*)

Dreams are needed to be creative



« To demonstrate the importance of new technologies in the sustainable development but also to bring back dreams and emotions at the heart of the scientific undertakings »

**Project Solar Impulse
of Bertrand Piccard**

The message should be:
plutonium means abundance ...

Opponents insisted that Pluto was the god of hell. True.

But fundamentally he was the god of all ground and underground resources. His name in greek means the Rich.

Abundant energy brings wealth;
plutonium use brings sustainable
nuclear energy!

Thank you