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'Thorium nuclear power and non-proliferation'

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This conference on the use of thorium in nuclear power generation is most welcome. The aim is **not to downgrade uranium** that has served the world well and long dominated our thinking. It has been the feed of the **nuclear work horses** of the last 50 years. An enormous experience has been accumulated and it has helped us to refine the technology and also to gradually develop a nuclear safety culture.

Even though designers and operators are **by no means at the end of the uranium road**, it is desirable today that they use their skill and imagination to explore and test **other avenues as well**.

The propeller plane that served us long and still serves well gave way to the jet plane that now dominates. Diesel engines have migrated from their traditional home in trucks to a growing number of cars and cars with electric engines are now entering the market. **Nuclear power should also not be stuck in one box**. I have no doubt that the current uranium fuelled reactors will get brothers and sisters.

Although we live in an era when fear of radiation is sufficiently widespread to lead after the accident in **Fukushima** to snap decisions snuffing out nuclear power in Germany, there is still room for **long term** thinking and financing of innovation in the nuclear sector. The international **fusion** project in Cadarache (ITER) is pursued despite its long term perspective and high costs. **Breeder reactors** continue to be built in a few countries – like Russia and India -- and practical experience is gathered that can help us to extract dramatically more energy from the uranium fuel.

In my view, the lively research and development work that is pursued in a number of countries and that aims at **Generation IV** reactors shows that there remains much vitality, curiosity and expectation in the nuclear sphere. The work on **thorium** is part of this dynamism and it is attracting increasing attention around the world. Rightly so, as the thorium line has some particularly attractive features. The participants in this conference are very familiar with them. I only briefly note that

- **global thorium resources** are assessed to be three to four times greater than those of uranium. We do not, of course, accept the populist cry that only **renewable** sources of energy are viable. By such logic we should not rely on iron, copper, tin etc. Nevertheless, it is a merit that a valuable resource is plentiful and can be relied on for a very long time; further,
- thorium fuel gives rise to **waste** that is smaller in volume, less toxic and much less long lived than the wastes that result from uranium fuel.

Seen from the viewpoints of the environment and global security and environment two other features should be highly appealing. The first is that the use of thorium fuel can offer us a way to **burn** up large stocks of **plutonium** that now sit idle but require expensive care and protection. **The other** is that the thorium fuel does not give rise to material that can be used for **bombs**. How important are these features?

The risk of proliferation of ‘**weapons of mass destruction**’ -- WMD – is declared by some to be **the** greatest threat to security in today’s world. The question deserves a serious and sober consideration. Let me first explain **what is generally meant by the term** WMD and begin with some readings in the lighter vein.

Shortly after the invasion Iraq in 2003, US groups of experts arrived to eradicate the **WMD** that 700 UN inspections had failed to locate. When the weapons continued to be elusive, it became common to talk about them as ‘**weapons of mass disappearance**’.

Personally, I encountered **another reading** of WMD. After my return to Sweden in 2003 I one day had a mail from a lady who asked me if I had any objection if she gave her **CAT** my name – Blix. I replied that my wife and I loved cats. We would be honoured, but we wanted to know whether the cat accepted the name. The answer came that the cat seemed very pleased and worked beautifully as a WMD -- a ‘**weapon of mice destruction**’. Actually, that came close to the essential common feature of WMD – that **of causing terror**.

Unlike mice, men are not terrorized by cats but we **are urged** by governments and media and led by our own feelings to **focus on three categories of terror weapons that we term WMD: Nuclear, Chemical and Biological**.

There is general support for the **eradication of these three types** of weapons but the world community has so far succeeded only in concluding conventions under which vast number of states – including the great military powers -- have legally committed themselves not to use, nor to possess chemical and biological weapons. For **nuclear weapons** there is the **non-proliferation treaty** (NPT). It aims to prevent **a further spread** of these weapons **and to achieve nuclear disarmament** – but does not prohibit the states which still have nuclear weapons to use them.

When we discuss these weapons that are expressly branded as WMD, we should not forget that there are many **other weapons** that are particularly odious or likely to be indiscriminate, e.g. incendiary weapons, cluster bombs and antipersonnel mines. We should also be **mindful that the real mass killers** of people today are the **small caliber weapons**. Despite the efforts made in most states to largely disarm the civilian population, many people are killed by small arms. **In areas of conflict or civil strife** the numbers of deaths from these weapons become horrendous. It is only recently that a treaty – the Arms Trade Treaty – has been concluded under UN auspices with the modest aim of at least **preventing uncontrolled international trade** in some conventional weapons.

Among the three categories of weapons that we do term WMD, **biological and chemical**, being of less strategic importance, have received less attention than nuclear. Although concerns have been voiced that some **deranged scientist** could use a high tech lab to develop a devastating **biological weapon** we have only once experienced such a character in operation. In 2002 **anthrax in powder** form was sent by letter and killed a number of persons in the US.

Saddam Hussein did have a biological weapons program, including anthrax – but never used it.

Chemical weapons – notably chlorine and mustard gas – by contrast, were used extensively with horrible effects in the First World War. Although they were **prohibited for use** in war already in the Geneva Protocol of 1925 we must shamefully note that there was not much international reaction when Saddam Hussein used **sarin** in the war against Iran in the 1980s and against his own citizens at Hallabja.

The reaction to the recent use of **sarin in Syria** was different. After nearly triggering a US punitive military strike it led to a **US-Russian agreement** that prompted Syrian government to accede to the Chemical Weapons

Convention and now to cooperate in verified elimination of its Syria's chemical weapons.

The Syrian drama has **much to tell us**. **First**, that although the number of people killed by the chemical weapons in Syria was very small compared to the number killed by other weapons, the global reaction to this use was the stronger by far. **Second**, while the Geneva Protocol of 1925 and the Chemical Weapons Convention of 1993 have regard to international armed conflicts, governments around whole world took the view that the use of gas was prohibited **under any circumstance – also in a civil war**. What we could see 25 years after the use of gas in the Iran-Iraq war was that **chemical weapons** have become subject to a **taboo**.

Since the fateful time when **nuclear weapons** were dropped on Hiroshima and Nagasaki their numbers and explosive power grew exponentially. During the peak of the Cold War there were more than 50 000 nuclear weapons in the world – most of them in the US and the Soviet Union. We learnt at that time that **a nuclear war** could have resulted in a nuclear winter causing the end of human civilization. **Einstein** said famously that he did not know how the third world war would be fought, but the fourth, he predicted, would be fought by stones and sticks...

Gradually, I believe, a **taboo** has developed also against the use of nuclear weapons. **But is it unbreakable?** Nuclear weapon states assure the world that the purpose of the weapons is **to deter attacks** and the **International Court of Justice** has declared the use of nuclear weapons illegal in all but the very limited case of securing a state's survival. Even so, it has not proved possible to persuade the nuclear weapon states to commit themselves by treaty to **non first use**. They condemn the Syrian use of CW as illegal, but they do not accept to make a first use of NW illegal.

Unlike the Biological Weapons Convention (**BWC**) and the Chemical Weapons Convention (**CWC**) the non-proliferation treaty – **NPT** -- that entered into force in 1970, did not prohibit **the use** of the weapon. The treaty may be said rather to have **aimed at preventing a use of nuclear weapons by eradicating them**. It reflected the ambition that

- all then **NNWS** should become parties, should **stay away** from nuclear weapons and should accept **safeguards** verification of all their nuclear programs, and that

- all then **NW capable states – the P5** -- should also become parties and through disarmament **do away** with their nuclear weapons and facilitate NNWS parties' access to their peaceful nuclear technology.

How did it work out?

- Almost all states that were without nuclear weapons in 1970 did adhere.
- Three states – **Israel, India and Pakistan** – did not and they all developed nuclear weapons.
- Two of the states that adhered – **Iraq and Libya** – tried to breach the treaty and move secretly to nuclear weapons, but **were stopped**.
- One state– **North Korea** – withdrew from the treaty and has developed nuclear weapons.
- One state– **Iran** – is suspected by many to move to a weapon, but denies any such intention and there are now talks that may or may not lead to agreement.

So, all in all over the near 45 years of the treaty there has been an **addition of only four new NNWS in the world**. And, we may note that during the same period four states have **walked back** from a nuclear weapon status: **Ukraine, Byelorussia, Kazakhstan and South Africa**.

This is **far better than** President Kennedy's fears that in the 1970s there could be 15 or 20 nuclear weapon states by 1975.

Even with the relative success that we can note, **any further spread** of nuclear weapons would raise new risks -- risks that some even hold are the gravest to world security. We are warned that the **NPT could unravel**, if Iran and North Korea were not brought in line. Ideas are explored how to raise obstacles to any **withdrawal** from the NPT and how to prevent or at least discourage states from developing their own **enrichment capacity** – as Iran has done – and as Japan, Brazil, Argentina and South Africa did long before Iran.

I fully agree with the ambition to avoid a spread of nuclear weapons to further countries or – indeed – to **terrorist** groups. Retention of a nuclear weapon capacity in **North Korea** and development of one in **Iran** could lead to **dramatic risks** in the regions. Having said that about these two cases, I **think** some of the general concerns we hear are **exaggerated** and perhaps consciously or unconsciously advanced to draw attention away from

the dismaying reality that the nuclear weapon states are much more interested in **keeping other states away** from nuclear weapons than in **doing away** with their own nuclear weapons. It should not have to be that way.'

With the **end of the Cold War** the severe **military tensions** in the world drastically subsided. All the landmasses of the **southern hemisphere** are within zonal agreements that exclude nuclear weapons. Many states in the Northern hemisphere feel adequately protected by **nuclear umbrellas** held over them **or** by membership in **alliances or both**.

Countries like my own, Sweden or Switzerland or Austria that fall into neither category show not the slightest tendency to move to nuclear weapons. We should be aware that **it is not the NPT per se that keeps states away from nuclear weapons**. For various reasons – and I mentioned some of them -- the vast majority of states in the world **do not feel a need** to have the weapons. Some may reject the weapons as abhorrent and as an expensive burden that might be more dangerous to have than not to have. Adherence to the NPT registers this rejection and adds what we might term a **legal threshold** that gives a measure of stability.

Rather than fixing our eyes almost exclusively at the large number of states that do not have nuclear weapons **as potential dangers**, perhaps we should **focus on the nuclear weapon states** that still possess nearly 20 000 nuclear weapons and that, even 25 years after the end of the Cold War, are not reducing their arsenals – except for reasons of costly redundance.

When we also see that the military expenditures of the world remain at some 1.600 billion dollars a year -- as high as during the Cold War – we may wonder if the security establishments have not noticed that the Cold War is over.

It took a famous **US quartet of elder statesmen** to put the reduction of the existing stock of nuclear weapons on the world's agenda. In an article in the Wall Street Journal in **2007** George Shultz, Henry Kissinger, Bill Perry and Sam Nunn urged that the US and Russia with the largest nuclear arsenals should **initiate nuclear disarmament**. The Cold War was over long ago and if the behaviour of these countries continued to suggest that they considered nuclear weapons **indispensable**, it would be difficult, they argued, to avoid

that other states emulate that view. They were given much support at all levels in the US and in the world and if their advice had been followed, the US, Russia, China, France and the UK would now be on a somewhat higher moral ground when dealing with North Korea and Iran.

Regrettably the drive for **nuclear disarmament** that President Obama initiated in 2009 and that had a positive echo from President Medvedev, ran into a wall, when the chief result of the drive, the START was submitted for the consent of the US Senate and obtained this consent only with the greatest difficulty. Since then there has been progress regarding the security of nuclear material and equipment, which is welcome to prevent any attempts by terror groups or others to make ‘dirty’ bombs that do not produce nuclear explosions but spread radioactivity and terror.

For the rest there is stagnation. The Geneva Conference on Disarmament is going into its second decade of **coma**, the comprehensive **nuclear test ban treaty** that was adopted in 1996 is not ratified by the US, China and others and not even tactical nuclear weapons have been removed by NATO and Russia from the European sphere although they appear to have no military significance.

Are there no rays of hope? Yes. The framework agreement that Foreign Ministers Kerry and Lavrov recently attained in this city was not only highly constructive in itself but could also inject some hope that the US and Russia will seek to partner further to end the civil war in Syria. Let us hope it was also a **mini reset** to get them to a road starting significant nuclear weapons reductions. Perhaps the ministers of finance around the world should unite and tell their governments that there are better ways of using 1600 billion dollars a year than buying and maintaining hardware that is obsolete in 20 years. For instance, to counter budget deficits and defending the planet

I conclude: the civilian nuclear community must do what it can to help reduce the risk that more nuclear weapons are made from uranium or plutonium. Although it is **enrichment plants and plutonium producing installations** rather than power reactors that are **key concern, this community** can and should use its considerable brain power to **design reactors** that can be easily safeguarded **and fuel** and a fuel supply organizations that do **not lend themselves to proliferation**. I think in these regards **the thorium community may have important contributions to make.**