MAPW - Health Professionals Promoting Peace

Senator the Honourable Matthew Canavan
Minister for Resources
Ground Floor
34 East Street
Rockhampton, QLD, 4700

January 29th 2017

Dear Senator,

MAPW has serious concerns about the current National Radioactive Waste Management Facility (NRWMF) process and the expansion of production of nuclear medicine for export markets at the Lucas Heights facility.

REGARDING THE NATIONAL RADIOACTIVE WASTE MANAGEMENT FACILITY

1) The process is very divisive. Repeated, highly damaging processes imposed on previously cohesive communities are causing significant harms.

2) Considerable amounts of persistently misleading information have been and continues to be presented to communities. Incorrect and incomplete information does not result in genuine consent.

3) There is a failure to observe international best practice standards for the highly radioactive long lived intermediate level waste (ILW) management. There is no disposal plan whatsoever for ILW, leaving the problem for many future generations.

REGARDING THE EXPANSION OF NUCLEAR MEDICINE PRODUCTION FOR EXPORT

1) There is a lack of demonstrable “Net benefit”. The proposed 40 year-long expansion of medical isotope production needs genuine cost/benefit analysis to make sure this is not a heavily subsidised product being sold into the global market at the expense of the Australian community both now and in the future. Independent NEA/OECD economic modelling finds only 10-15% cost recovery of isotope manufacture when there is genuine inclusion of all costs.

2) The expansion will create 40 years of significantly increased production of ILW.

3) ANSTO has a narrative of global shortages, yet given falling demand and increasing global supply there is no shortage of Mo^{99}. The NEA/OECD predict a significant oversupply.

4) Again, there is no plan whatsoever for disposal of the additional ILW generated.

Both processes are unacceptably flawed.

There needs to be:

- A halt the current NRWMF process until such time as world's best practice is followed. There is sufficient capacity at the Lucas Heights facility, once regulatory approvals are met, to store LLW and ILW well into the next decade.

- Cessation of expansion of nuclear medicine for export, and a phase out of exports undertaken, until there is demonstrated, publicly available, clear analysis of cost/benefit and appropriate disposal of the substantial amount of ILW this process will generate.

- Transparent evaluation of "net benefit" of export sales to the Australian community. This as a whole must underpin the process, and be based on cradle to grave impacts of production.

- Recognition that currently the information provided to communities is riddled with so much misinformation it calls into question the underlying validity of any community consent process.

In closing, it is clear there is an urgent need for an independent inquiry into the production and management of Australia's nuclear waste.

Yours sincerely,

Sue Wareham OAM MBBS
President

Dr Margaret Beavis MBBS FRACGP MPH
Secretary

This is an open letter and will be circulated to the relevant shadow ministers, representatives in federal, state and local governments and community groups.

PART ONE

Regarding the NRWMF

1) THE NRWMF PROCESS IS VERY DIVISIVE OF COMMUNITIES

The repeated nominations are causing significant harm to the communities involved. Community members, both aboriginal and non-aboriginal, have publicly reported major levels of distress both to MAPW representatives and in the media. Families have been divided, and lifelong friends are no longer talking with each other. Town community members and farmers who have been harmoniously working together for generations are now in conflict. Depression and other significant psychological harms have been reported.

There needs to be better understanding of how genuine community participation and consent is generated, because the current imposed repetitive process is highly damaging.

2) MISLEADING INFORMATION TO COMMUNITIES.

To be meaningful, consent must be based on accurate information. Community consent that is based on incorrect information (both by commission and omission) is not genuine consent.

a) There has been consistent and ongoing provision of incorrect information. Nuclear medicine has been heavily promoted as the main reason communities should store current legacy nuclear waste.

The information regarding uses of nuclear medicine given to communities is exaggerated and incorrect. The department has been advised on a number of occasions both orally and in writing about this, but continues to provide distorted, incorrect and incomplete information. It also consistently fails to correct inaccuracies made by others advocating for the NRWMF.

Below are some quotes from the recent presentation to the Brewarrina shire council in NSW. These are typical of types of misinformation presented to communities throughout this process.

The council presentation (in Italics) describes an

> *"Industrial & Medical Waste Facility*
>
> *Have you ever had a CAT-Scan, X-RAY, cancer treatment, dental procedure or complex surgery and wondered about how the stuff that goes into those little vials is produced or how important it is today to have facilities that can produce nuclear medicines. "*

Plain CAT scans and X Rays do not use isotopes. The vast majority of cancers are treated by surgery, chemotherapy or radiotherapy (or a combination), and even in the case of radiotherapy, radio-isotopes are used in a very small percentage only. Dental treatments do not use isotopes and it is very rare to use isotopes in surgery.

> *"I personally have had radioactive iodine injected into my body several times during heart surgery, so that the doctor can see where to place life-saving heart stents.*

I am sure that many of you would have had friends or relatives who have had similar experiences."

Again this is factually incorrect. Iodine contrast used in cardiac surgery has nothing to do with nuclear medicine.

This level of misinformation and exaggeration is just a single example of many instances that have occurred for a number of years in all the communities that have nominated for hosting waste. The incorrect information has been provided by community speakers, media and NRWMF representatives themselves. Very little effort is made to correct wrong information.

When medical practitioners have pointed out this misleading information, a deliberate effort has been made to discredit us.

Last year a presentation on nuclear medicine was held in Kimba, in South Australia. It was called at very short notice. Dr Margaret Beavis offered to fly over so that information could be provided to communities about nuclear medicine that was not purely from the self-interested proponent, the Department of Industry Innovation and Science (DIIS) and their agents, given their poor track record. Accurate information being presented in communities directly is long overdue, and it would be good to have communities hear factually based information with both proponents present. Dr Beavis was told she could not speak at that forum.

Furthermore at that forum it was stated that Dr Peter Karamoskos and Dr Beavis were opposed to the use of nuclear medicine. This is not only defamatory professionally, but also ridiculous, particularly given Dr Karamoskos is a nuclear medicine specialist physician who works with nuclear medicine full time. Dr Beavis is a practising GP and for many years has been a senior examiner with the RACGP, and where appropriate refers patients for nuclear medicine procedures. To suggest that either would not use nuclear medicine when clinically indicated is deliberately dishonest and clearly designed to discredit any information they may provide.

The quality of information provided in communities has been so poor that any future claims of community consent could be subject to legal challenge.

b) No mention is made that provision of nuclear medicine in Australia will continue regardless of whether or not there is a new waste facility in the next few years.

Most countries import nuclear medicine isotopes and there are alternatives to ongoing production of radioactive waste in Australia.

From the recent presentation to the Brewarrina shire council again:

"Clearly, the need to produce radioactive Isotopes, the compounds that make such procedures possible, is a life-saving innovation.

From ANSTO

"ANSTO is central to Australia's nuclear medicine manufacturing capabilities. Each week ANSTO delivers over 10,000 patient doses of potentially lifesaving nuclear medicines to hospitals and medical practices across Australia"

This misleading narrative posits a false choice; that either we have domestic production of isotopes, with its attendant radioactive waste, or we compromise patient welfare and allow patients to die. However it is a policy choice for Australia to manufacture isotopes and produce radioactive waste - not a medical necessity.

Medical isotopes can be successfully imported, as we have done on occasions when the Lucas Heights reactor is not operating. Security of supply is not at increased risk with imports, given that Lucas Height manufacture is a linear supply chain, where a single point failure increases supply chain vulnerabilities.

NRWMF proponents fail to mention the falling demand for technetium, and that the fastest growing area of nuclear medicine uses non-reactor production of isotopes, which have almost no long term nuclear waste. Cyclotron production of technetium (which again has very little long term nuclear waste) has been commercially licensed in Canada, and there are alternative technologies being developed in a number of countries.

These alternative methods of production need to be acknowledged and given the difficulty Australia has with nuclear waste disposal, these should be researched for possible adoption here.

c) Intermediate level waste (ILW) is the main issue, with over 90 % of the radioactivity. It is seldom mentioned that ILW remains radioactive for 10,000 -100,000 years and needs to be isolated from the environment for millennia. The focus of presentations is much more on the low level waste which needs much simpler isolation facilities.

The fact that ILW waste needs formal proliferation safeguards due to the plutonium content of the waste is also rarely if ever mentioned.

In the communities, demonstration barrels filled with gloves and gowns are being used to convince people of the benign nature of this waste.

From the recent presentation to the Brewarrina shire council again:

> *"Some of that waste takes the form of cleaning cloths, personal protective equipment, empty containers and instruments. The waste that we are talking about has potentially been generated from manufacturing isotopes that are used in our bodies and are currently stored at Lucas Heights and in hospitals all around Australia. A small percentage of the waste that is produced, when manufacturing nuclear medicines and testing materials etc., about 10m3 per year, needs to be stored in a facility specifically designed for the storage of low level radioactive waste."*

d) There has been very little information about plans to markedly increase intermediate waste production. There is deliberate blurring of origins of legacy waste and future nuclear waste.

When the expansion of production is being justified it is couched in terms of international "shortages" and Australia being a "good global citizen".

Alternative countries to source isotopes are not referred to, nor are much more cost effective ways to be a good global citizen in the public health sphere, such as mosquito nets and immunisation programs. The latter options would not leave multiple generations of Australians dealing with the nuclear waste from other countries medical systems, and have much greater cost/benefit ratios.

e) Community benefits are vague and overstated.

From the recent presentation to the Brewarrina shire council again:

> *"There is an opportunity for this community to take the lead within Australia by hosting the storage of this nuclear medical & industrial waste. There are significant benefits for this community if such a facility is built.*
>
> *There is direct funding for community infrastructure and at least 15 permanent jobs and a host of service, transport and manufacturing opportunities."*
>
> *Councillors have undertaken a study tour of the waste storage facilities in Lucas Heights and stood in the room full of drums of low level nuclear waste, we have stood next to and leaned on the medium level nuclear waste container and we see this as a great opportunity for a long term sustainable employment future for our community."*

The number of long term jobs promised has varied from less than 10 to over 15 at different times in different regions. Precisely what these roles will be and for how long they will be funded needs to be clearly stated.

3) INTERNATIONAL BEST PRACTICE IS NOT BEING OBSERVED FOR INTERMEDIATE WASTE MANAGEMENT

We acknowledge the need for a waste management facility that meets international best practice for legacy wastes. Australia is currently in breach of its international obligations.

The current plans for management of intermediate level waste clearly do not meet international best practice, given they are for interim storage only and have no long term disposal proposal.

The ARPANSA website states

> *"Waste generation is part of the life cycle of many facilities and activities. The management of the waste should be planned before it arises."*
>
> *"A facility for disposal will be designed and constructed so that it isolates and contains the waste for the entire time the waste is considered a hazard. People and the environment should be protected in the future to the same level as they are protected today. Documentation of the disposal facility and of the disposed waste must be preserved in archives for the future."*

In this context it is clearly in contravention of international best practice to increase production of intermediate level waste when there is no plan whatsoever for its disposal. The management of this waste is clearly not “planned before it arises”.

This will leave many future generations of Australians with considerably more radioactive materials in need of isolation for millennia. This is both a public health and financial liability that is not acknowledged.

PART TWO

Regarding the expansion of Molybdenum^{99} production for export

There is a consistent and misleading narrative that we are entering into a period of medical isotope shortages and therefore require increased Australian production. Following these incorrect claims is the implication that those who oppose the waste facility are jeopardising lives and medical practice.

This expansion lacks a plan for disposal of waste, as noted above.

ANSTO does not acknowledge the major likelihood of a looming global glut of nuclear medicine production. Global projections from the Nuclear Energy Agency 2017 Medical Isotope Supply Review [1] show rapid increases in nuclear medicine production from both traditional and non-reactor sources.

It is important to note there has been a steady and significant fall of 25 % in global demand for Molybdenum^{99} in the five years up to 2015. The data for 2016 is incomplete, but the optimistic NEA have assumed a significant turnaround and used modest “growth in demand” scenarios in their modelling.

In the 2017 Review they modelled three scenarios:

- one using only existing capacity (A) ,
- a second with existing and new conventional capacity and only half of alternative capacity (B),
- a third set of models showingwhat would happen if there was a one or two year delay in new production coming on line(C).

In Appendix 1 we discuss the latter two models, as it is clear there is significant new capacity coming on line with new reactors are planned in Europe, North and South America and the Far East and the development of a number of alternative technologies to produce Molybdenum^{99} in several countries. Australian export production is far from essential.

It is clear planned new capacity is well in excess of global demand, even when an optimistic growth in demand model is assumed.

[1] 2017 Medical Isotope Supply Review: 99Mo/99mTc Market Demand and Production Capacity Projection 2017-2022 OECD NEA *https://www.oecd-nea.org/cen/docs/2017/sen-hlgmr2017-2.pdf*

To quote from the NEA review

> *"If all new potential projects proceed at the capacities and times as announced, there will be significant overcapacity of supply in the 99Mo/99mTc market by 2022, a capacity level which is unlikely to be sustainable by the market in the long term."*

How heavily subsidised is the Australian export product? There is no publicly available cost/benefit analysis.

We acknowledge that Australia has increased production of nuclear medicine for export in the last few years. Any current cost /benefit analysis would almost certainly not include waste disposal, given it is impossible to provide a cost for a disposal facility that is not planned for.

The Canadian Government Expert Review Panel on Medical Isotope Production in 2009 considered building a new reactor when examining options for future isotope supply, but concluded:

> *"Research reactors are shared facilities that have all the benefits associated with multi-use facilities, including the benefit of costs being spread over a large base of activities. However, this is the most expensive of the options, with high capital and operating costs. Costs associated with the processing facility, training, licensing requirements, security, and waste management are also very significant.*
>
> ***Revenue from isotope production would likely offset only approximately 10–15% of the costs of the reactor".***[2]

A highly detailed economic review was done in 2010 of the economics of 99Mo production, by the NEA/OECD.[3] . It found that once all aspects of the production cycle were factored in, costs of production were not recovered. The report noted:

> *"The previous chapters have provided a comprehensive look at the historical development of the 99Mo supply chain, pricing structure and market, as well as how this development has affected the current economic situation. Repeatedly in these chapters there has been the assertion that these effects have resulted in a situation where the incentives are not sufficient to justify the production of 99Mo, nor to develop new 99Mo infrastructure, on economic criteria alone.*
>
> ***…this is a subsidisation by one country's taxpayers of another country's health care system. Many governments have indicated that they are no longer willing to provide such subsidisation.***
>
> *There is also a clear market failure through imperfect information.* ***In many cases the full impact of 99Mo provision was not transparent to or appreciated by governments who were financially supporting research reactors' 99Mo***

[2] **Report of the Expert Review Panel on Medical Isotope Production** 2009 Presented to the Minister of Natural Resources Canada https://www.google.com.au/search?q=Canadian+review+nuclear+isoptope+production&ie=utf-8&oe=utf-8&gws_rd=cr&ei=SE-XVvHLFMbA0gSL4YrAAw accessed 14/1/16

[3] The Supply of Medical Radioisotopes **An Economic Study of the Molybdenum-99 Supply Chain** NUCLEAR ENERGY AGENCY ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT https://www.oecd-nea.org/med-radio/supply-series.html

> ***production.*** *The full costs of waste management, reactor operations, fuel consumption, etc. were not included in the price structure, thus providing a significant deficiency in the pricing mechanism."*

Any "profits" from the increased production of nuclear medicine are almost certain to be the result of future Australian governments heavily subsidising disposal of this waste. International best practice disposal facilities are extremely expensive.

Given the lack of a public cost/benefit analysis, it is also impossible to factor in many other potentially hidden subsidies, such as the Australian government paying for the construction of facilities, insurance and other costs such as decommissioning and remediation.

It is interesting to note that existing reactors elsewhere (not even new build reactors) are operating at reduced capacity as the commercial return does not justify their operation. To quote from the NEA 2017 supply review[1] again:

> "*Compared to the 2016 report, the overall irradiation capacity is slightly lower in the reference scenario (with no new irradiation) through the 2019 to 2022 period, because the Belgian Reactor-2 (BR-2) has reduced the number of planned cycles anticipated during that period. The BR-2 has returned from the extended refurbishment outage with a higher level of operating capability, but* ***the present commercial environment does not justify operating the additional cycles that could be made available****."* (MAPW emphasis)

Is ANSTO undercutting the market with product heavily subsidised by the taxpayer and also by future generations of Australians having to deal with the waste?

MAPW believes that there should be an independent inquiry into the production and management of Australia's nuclear waste.

Some would argue that an inquiry would cause shortages, if it delayed ANSTO's planned expansion of exports. However the NEA report also includes modelling with one and two year delays in new production coming on line, and in both scenarios there still are adequate supplies, even in assumptions of a growth market. It is also important to note that the most recent data has demonstrated not a growth market but a drop in demand of 25% over the last five years.

More information about this is supplied in Appendix 2.

We acknowledge Australia has increased export supply in the last few years. We are extremely concerned that his has been done thus far without considered review or analysis of overall costs and major long term impacts.

The graphs in Appendix 2 demonstrate that even with significant delays it is highly likely the market will be heavily oversupplied in coming years. It is not essential for Australia to continue to export nuclear medicine to the world market at potentially heavily subsidised rates. There is sufficient new production coming online that Australia has time to review the current arrangements.

To continue producing rapidly increasing amounts of intermediate level nuclear waste when we do not have either a genuine cost benefit analysis or a plan for disposal in unacceptable. Net benefit to the Australian community now and in the future has not been shown; on the contrary, a big problem is looming.

Appendix 1

FUTURE SUPPLY (with existing and new conventional capacity and only half of alternative capacity)

In the 2017 NEA OECD Review[1] they modelled three scenarios- one using only existing capacity (A) , a second with existing and new conventional capacity and only half of alternative capacity (B). The third set of models showed what would happen if there was a one or two year delay in new production coming on line(C).

Below we discuss the latter two models, as it is clear there is significant new capacity coming on line with new reactors are planned in Europe, North and South America and the Far East and the development of a number of alternative technologies to produce Molybdenum[99] in several countries. Australian export production is far from essential.

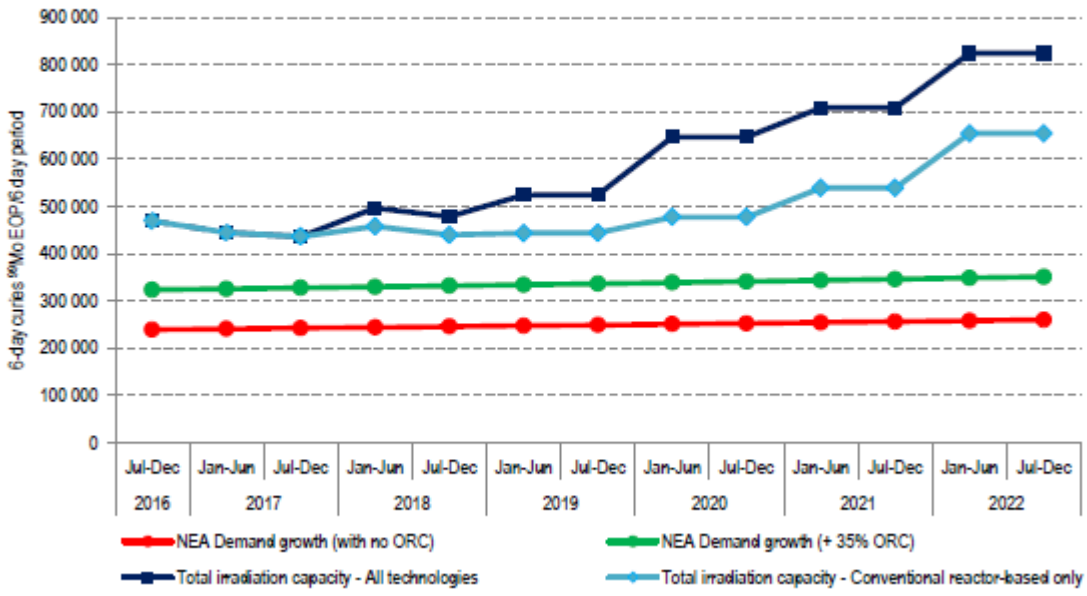
IRRADIATION

The graph below (Figure 5.1) includes only 50% of worldwide planned non-reactor production.

It presents the NEA projected demand, projected demand +35% Outage Reserve Capacity(ORC) and the irradiation capacity.

This shows both total capacity “all technologies” and capacity “conventional reactor-based only”. It can be seen that even without all planned new irradiation projects being fully included, the global capacity of both lines looks to be sufficient to meet projected demand +35% ORC throughout the six-year forecast period. Notwithstanding the end of the Canadian NRU reactor capacity, **the planned new capacity is well in excess of global demand, even when a growth model is assumed**.

Figure 5.1: Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. irradiation capacity – total and conventional reactor-based only, 2017-2022: Scenario B

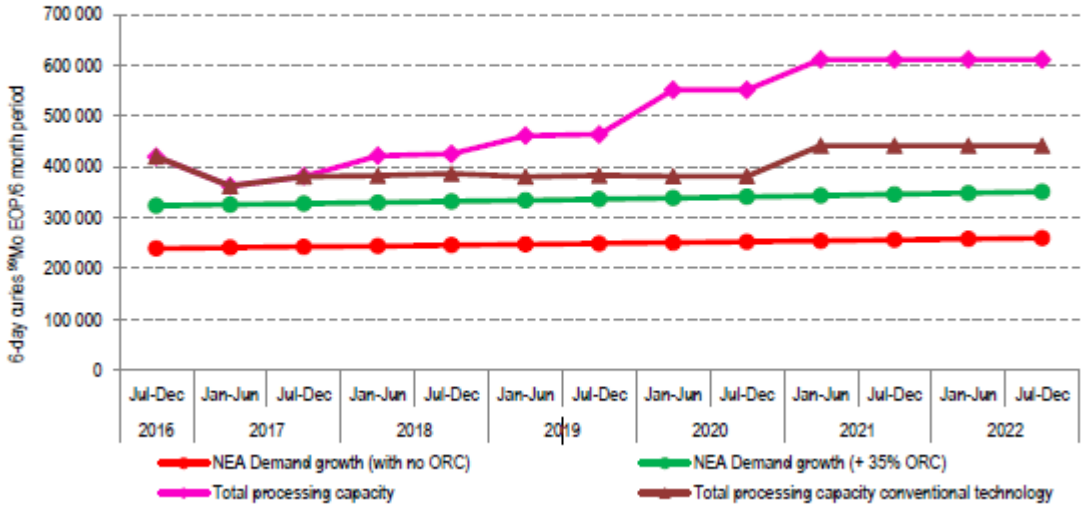


PROCESSING

Figure 5.2 presents the NEA projected demand, projected demand +35% ORC and the

processing capacity when again only 50% of alternative technologies have been added. This shows both total processing capacity "all technologies" and processing capacity "conventional technology only". It can be seen that even without all planned new processing projects being fully included, the global capacity of both lines look to be well in excess of meeting the projected (assumed growth) demand +35% ORC requirement, throughout the six-year forecast period.

Figure 5.2: Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. processing capacity – total and processing capacity – conventional only, 2017-2022: Scenario B



The NEA report commented

"It should be mentioned that not all new projects announced around the world have been included in the scenario above. Only those projects that have been "qualified" are included, those where adequate levels of data have been provided to the NEA and where the operational timeline is within the 2017-2022 forecast period. More specifically, the NEA has decided to consider only new projects that are likely to be commissioned and operational at least one year before the end of 2022. Excluded projects include those that have unspecified construction start and commissioning dates, or for which there is inconclusive information about likely operational dates.

"A so-called "all-in" scenario (where all the planned new/replacement projects are included at full projected capacity) is not reported in this projection. If all new potential projects proceed at the capacities and times as announced, there will be significant overcapacity of supply in the 99Mo/99mTc market by 2022, a capacity level which is unlikely to be sustainable by the market in the long term."

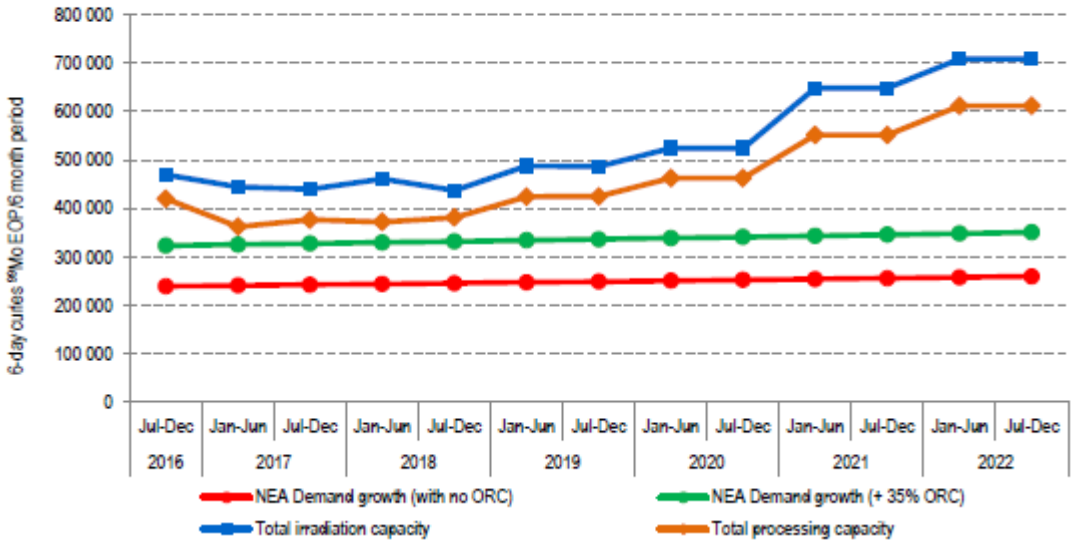
PROJECT DELAYS SCENARIO:

The project delays “scenario C” has been developed by modelling a delay of all new projects and LEU conversion by one year.

Irradiation and processing capacity

Figure 6.1 shows the projected global irradiation and processing capacity under the project delays scenario C. Under this scenario, delayed new capacity will have a negative effect on both irradiation and processing capacity, but at the same time, delayed LEU conversion will have some opposite effect in the early years, provided that sufficient inventories of high enriched uranium (HEU) for targets are available for the period of any delay.

Figure 6.1: Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. total irradiation capacity and total processing capacity – projects delayed, 2017 - 2022: Scenario C



To quote from the review:

> *“Compared to scenario B, irradiation and processing capacity under scenario C are almost identical in 2017. Both then remain relatively flat through 2018, increasing a little in 2019 and 2020 and then more significantly in 2021. In this report, the effects of scenario C are less marked than in the 2016 report, because a substantial amount of the additional irradiation and processing capacity coming from Australia has already been locked into the reference scenario A and a relatively lower proportion of the additional capacity is now planned from the new ANM facility. So the effect of a projected one-year delay in commissioning of the additional ANM capacity in this scenario while noticeable, it does not appear as critical as in the 2016 report. Total irradiation and processing capacity in the 2017 scenario C recovers to be above the July-December 2016 capacity level that included some Canadian capacity contribution from 2019*

onwards. The 2017 scenario C projection for both total irradiation capacity and total processing capacity stay well above the NEA demand +35% ORC line throughout the reference period. This improvement has been achieved because of the on-time introduction of additional capacity in Australia utilising existing facilities".

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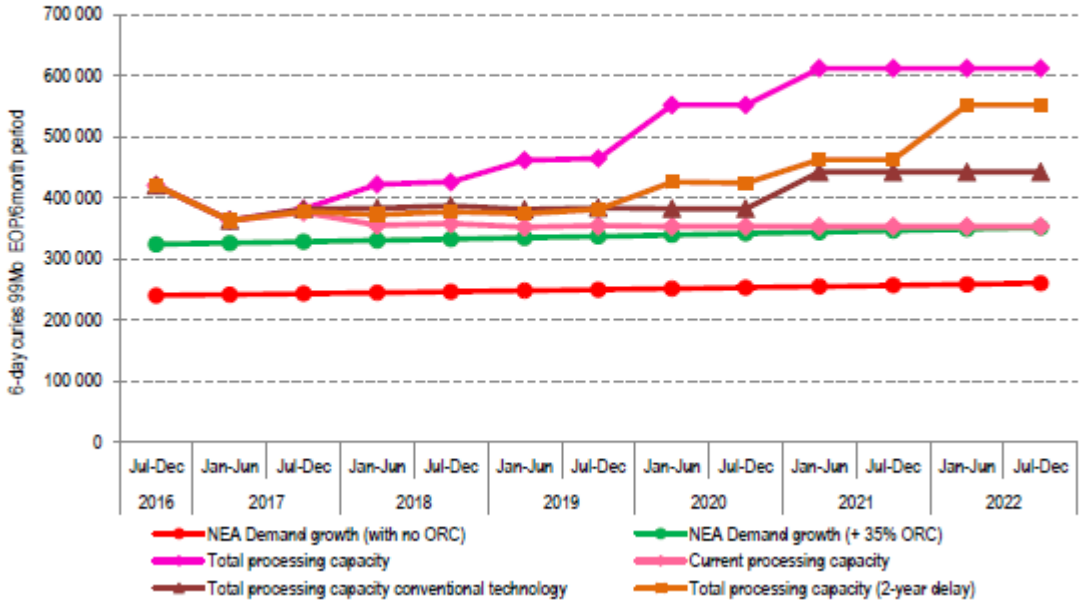
Figure 6.2 looks at the potential impact of further delays and concentrates only on processing capacity, because it has lower levels of reserve capacity. It shows the projected demand and projected demand +35% ORC lines compared to the current processing capacity, the total processing capacity and the conventional technologies only capacity (all with no project delay), and with a total processing capacity line with a two-year total project delay. The graph lines therefore represent the minimum, the maximum and two potential intermediary lines for processing capacity that represent different types of challenge.

Figure 6.2: Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. processing capacity – current, total, total conventional only and total two-year delay, 2017 - 2022: Scenarios A + B + C (two-year delay)



"In both cases, the capacity lines stay well above the NEA demand +35% ORC line throughout the reference period. This is an improvement compared to the 2016 report and has been achieved because of the on-time introduction in 2016 of the additional transitional capacity in Australia utilising existing facilities and also partially reflects the delay in LEU conversion losses in the delayed scenarios. Both of these intermediate projections confirm that a substantial reduction in overall processing capacity occurs when projects are severely delayed, but that the resulting processing capacity levels remain stable and above the reference scenario levels throughout the whole projection period."

These graphs show even with one and two year delays in development of irradiation and processing capacity, there will be well in excess of global demand.