OECD NEA High Level Group on the Security of Supply of Medical Radioisotopes

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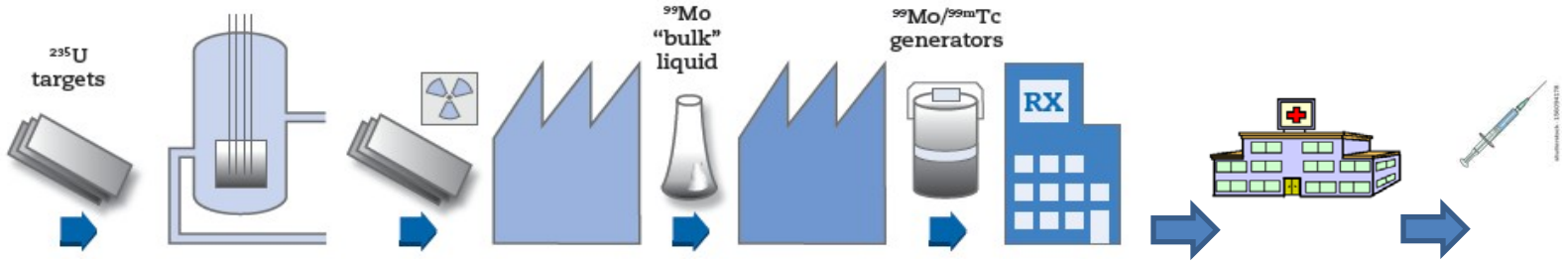
On behalf of the OECD Nuclear Energy Agency HLG-MR

- The Nuclear Energy Agency (NEA) is a specialist agency of the Organisation for Economic Co-operation and Development (OECD), an intergovernmental organisation of 31 industrialised countries based in Paris
- The NEA Mission - To assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal basis required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purpose

- The High Level Group on the Security of Supply of Medical Radioisotopes (HLG) was initiated in response to the global 2008-2009 Mo-99 supply crisis.
- The HLG exists under the auspices of the OECD Nuclear Energy Agency (NEA) Nuclear Development Committee; is funded by voluntary contributions and is comprised of both policy and decision makers, and industry participants.
- Its first mandate ran from June 2009 to June 2011



Under the 1st Mandate

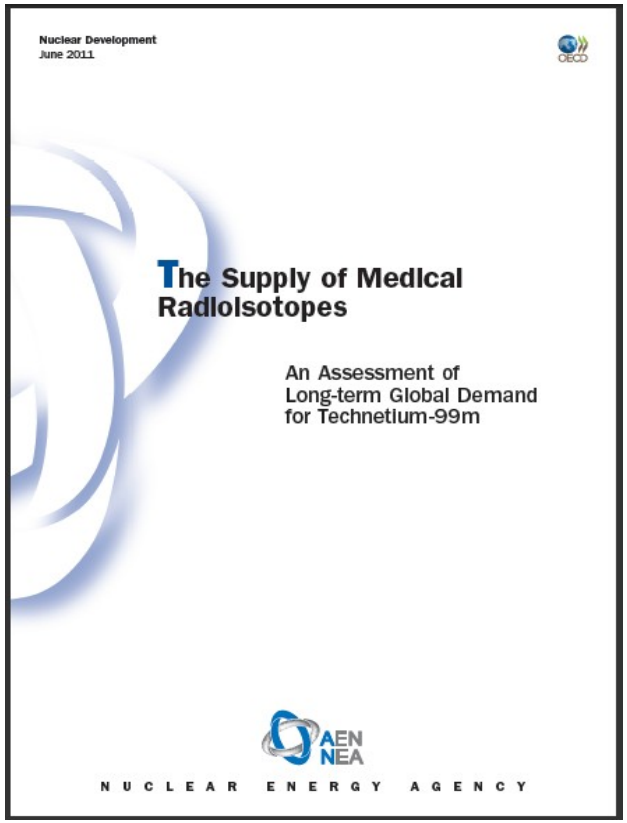
- An assessment was made of the factors which had made the supply chain vulnerable and
- supply and demand data collected and analysed

Some Key Findings

- Supply crisis was identified a classical “market failure” on multiple levels
- economic structure unsustainable: does not support investment
- future potential shortages as current infrastructure reaches end of life.

Output

- 6 policy principles



The HLG-MR 6-Principle Policy Approach

- 6 policy principles agreed to by all major ^{99}Mo-producing countries:
  - all ^{99}Mo/^{99m}Tc supply chain participants should implement full-cost recovery (FCR)
  - reserve production capacity (Outage Reserve Capacity - ORC) should be sourced and paid for by the supply chain
  - governments should establish a proper environment for efficient and safe market operations, without intervening directly
  - governments should help facilitate the conversion to low-enriched uranium (LEU) by reactors and processors
  - international collaboration should continue through a policy and information-sharing forum
  - periodically review the supply chain's progress towards economic sustainability and security (continuity) of supply

Recent Supply Performance

Existing supply chain participants have maintained supply, with only minor disruptions, despite significant changes to supply capacity in the past few years.

- OSIRIS (France) ceased operation in Dec 2015
- BR-2 (Belgium) had a major refurbishment, Feb 2015 - July 2016
- NRU (Canada) ended routine ^{99}Mo production in Oct 2016 and will remain in cold standby until Mar 2018

The current stability of supply has been achieved by:

- better co-ordination and planning (AIPES Security of Supply Workgroup)
- supply chain diversification and
- active risk management e.g. more paid ORC held in the supply chain

2017 Demand and Capacity Projection (2017-2022)

The NEA has just released the *2017 Medical Isotope Supply Review: $^{99}Mo/^{99m}Tc$ Market Demand and Production Capacity Projection (2017 – 2022)* (NEA/SEN/HLGMR(2017)2).

The report is based on data received from supply chain participants and customers and in particular data on:

- retrospective quarterly capacity usage data (as opposed to production) from 2012 to 2016 and
- updated assessments of projects to increase irradiation or processing capacity

Demand 2017-2022

Demand is expected to continue to remain essentially flat at 9,000 6-day Ci ^{99}Mo per week (at End of Processing, EOP) until 2022.

As per the practice of previous reports,

- The demand growth rate was set at 0.5 % for mature markets and 5% for developing markets and
- Outage Reserve Capacity goal line was set at: “Demand + 35%”

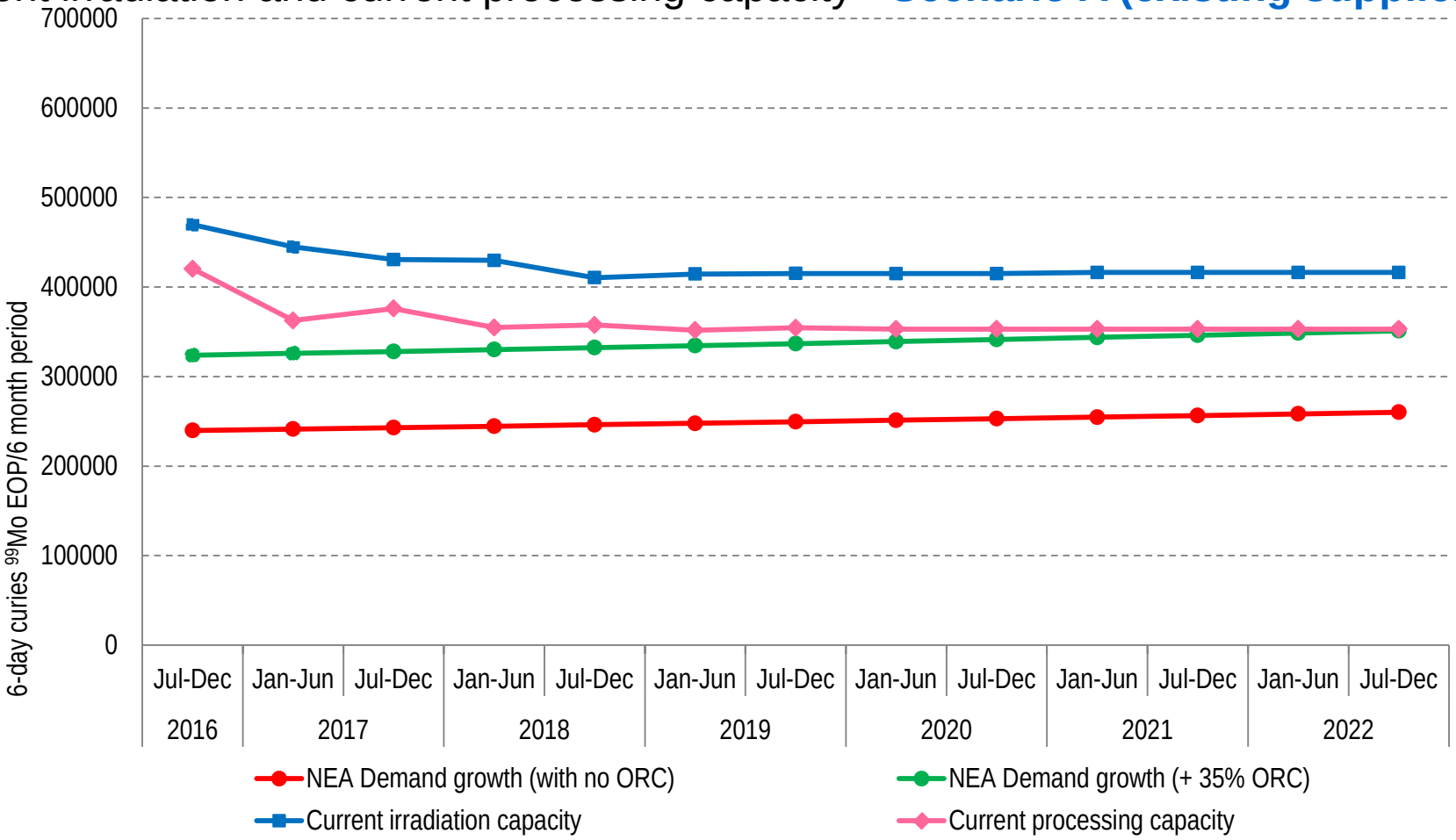
Capacity Projections 2017-2022

Irradiation and processing capacity projections from 2017-2022 were prepared for three scenarios

- Scenario A:- existing supply chain only
- Scenario B:- Scenario A + new projects (if project uses conventional technology, production capacity was taken to 100% anticipated output; if the project uses alternative technology, production capacity was taken to be 50% of anticipated output)
- Scenario C:- Scenario B + 1-year delay to all new projects (regardless of whether they use conventional or alternative technology)

Irrad. and Proc. Capacity 2017-2022 – Scenario A

Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. current irradiation and current processing capacity - **Scenario A (existing suppliers)**



Status Review 2017-2022

Scenario A: main observation

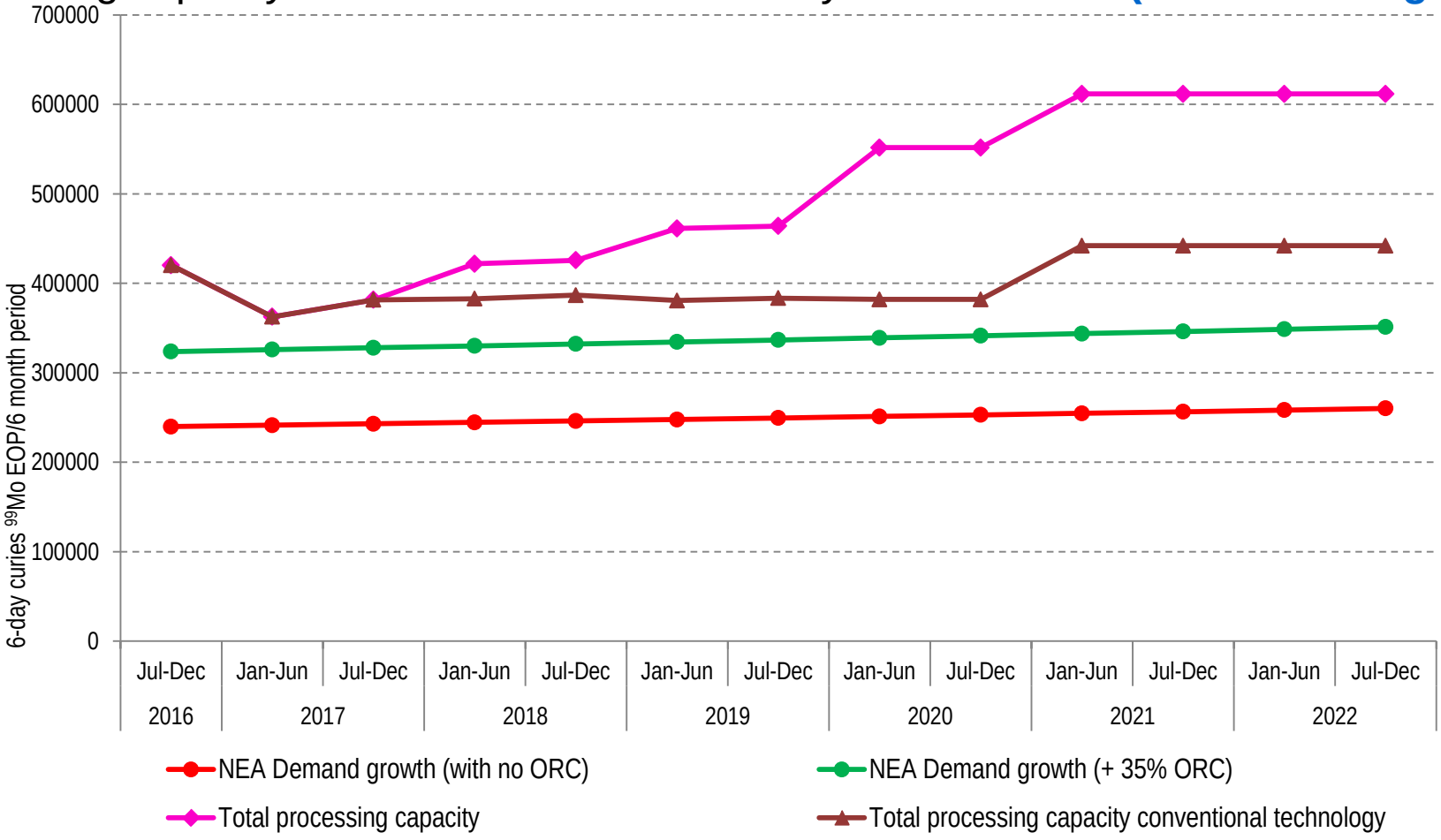
- At present and for the next few years, the Processing Capacity curve is higher than the Demand +35% ORC curve. The curves start to overlap in 2022.

Scenario A: other comments

- Slow decrease in irradiation and processing capacity to 2022 are mainly due to losses associated with conversion to LEU targets
- The steep(er) decrease in the initial sections of irradiation and production capacity projections are largely due to closure of NRU (Canada) which used to produce a substantial amount of global supply

Processing Capacity 2017-2022 – Scenario B

Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC vs. processing capacity "total" and "conventional only" - **Scenario B (Tech Challenges)**



Status Review 2017-2022

Scenario B: main observation

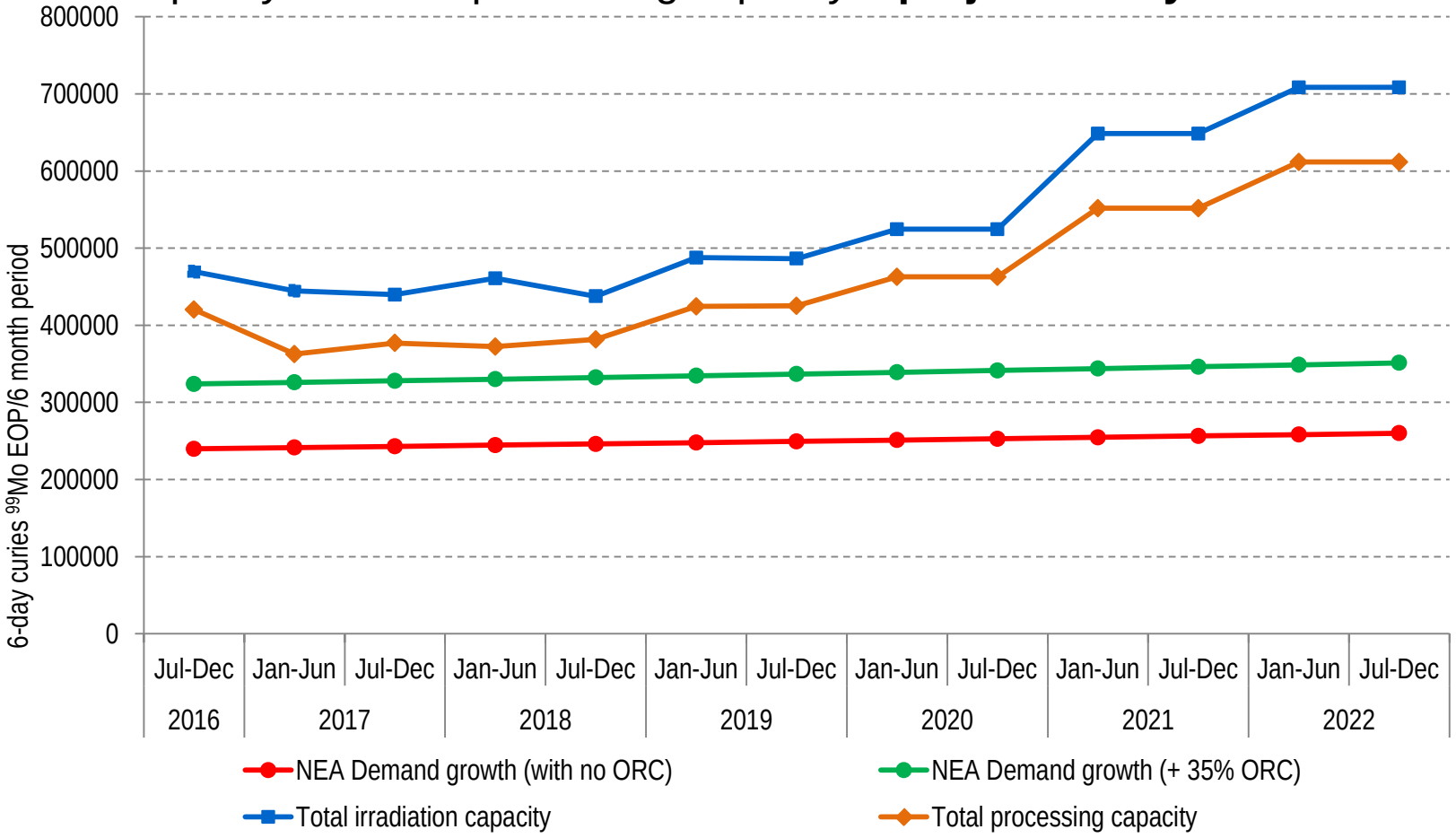
- Contribution from alternative technologies is expected to be substantial (the gap between the brown and pink lines)

Scenario B: other comments

- Since compilation of the 2016 report, many prospective processing projects have been delayed
- These delays have limited impact on projected production capacity for 2017-2018
- But result in a 10% decrease in projected production capacity for 2022

Irrad. & Proc Capacity 2017-2022 – Scenario C

Current demand (9 000 6-day Ci ^{99}Mo/week EOP) and demand +35% ORC v total irradiation capacity and total processing capacity – **projects delayed**: **Scenario C**



Status Review 2017-2022

Scenario C: main observation

- (Further) delays of all new projects by 1 year would have limited impact on projected capacity in 2017 and 2018 compared with Scenario B
  - This is partly because of Australian production capacity has already increased and their new plant is about to come on line.

Other comments on Scenario C compared with Scenario B

- The first full year of supply from alternative technologies would be delayed to 2019, with the full contribution from alternative technologies be delayed until 2021
- 1 year delays would only have limited impact for projections in 2021 and 2022, as Scenario B projections are already relatively flat in that period

Key Points: 2017 Demand and Capacity Projection

- Good progress increasing existing capacity level
  - baseline Scenario A projection raised for 2nd year in a row
- On-time introduction of the additional conventional processing capacity in Australia is important (early 2018)
- Alternative irradiation and processing technologies and some conventional technology projects delayed
  - some multi-year delays are a concern
  - alternative technology introduction in 2018 is important
- Supply situation will require careful and well considered planning to minimise risks
- Regular monitoring and review needed on the progress being made, especially in bringing new capacity to market

8 years of the HLG in a nutshell

- Governments and industry have taken positive steps and successfully improved the continuity of the global supply of Mo-99
- These actions combined with level demand have resulted in a stable situation and positive outlook out to 2022
- There have been and continue to be significant changes to supply: some suppliers have ceased operation; new suppliers are coming on line and some existing suppliers are increasing production
- And some uncertainties remain – fleet age, timelines for new/increased supplies
- So monitoring and review is still needed

The Future of the HLG-MR and/or its Activities #1

At the HLG meeting in February 2017, it was decided to request the OECD to allow extension of the current mandate until the end of 2018, in order to:

- bridge the date of the final closure of NRU (Mar 2018) and the transition of most of the world's supply to LEU targets;
- assess which HLG activities need to be continued;
- assess what new activities might be necessary;
- and decide in which forums all/any activities should be continued.

In June 2017, the OECD agreed to the extension, subject to the availability of voluntary contributions to cover costs.

The Future of the HLG-MR and/or its Activities #2

At the HLG meeting in July 2018, it was agreed that:

- The work of the HLG would be continued until the end of 2018.
- During this transition year, the NEA NDC and the Health Division in the OECD Directorate of Employment Labour and Social Affairs will conduct a horizontal scoping project and, if approvals given, lay the groundwork for a new project commencing in 2019.
- The topics to be addressed by the horizontal and potential 2019 projects will be allowed to evolve for some months so as to fully benefit from the experience of the Health Division
- Discussion continues on funding, timelines and the substance of the transition and any subsequent project.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Thank you for your attention