My comments are on question 1: What are your views on waste minimization? Should Canada continue to use the concept of the waste hierarchy?

Generally, waste minimization is an important dimension of radioactive waste management, and it makes sense to establish (and continue to use) a waste hierarchy (i.e. a hierarchy of waste management options/priorities: prevention, reduction, reuse, recycling, disposal), as conceptualized and defined by the IAEA and as already adopted by Canada. My comments relate mainly to two of the five levels of the hierarchy (waste re-use and waste recycling), how these two waste management options are characterized in NRCan's discussion paper vis-a-vis the way the IAEA has conceptualizes them, and how they should be addressed/reflected in Canada's revised National Radioactive Waste Management Policy.

The discussion paper's section on "Waste Minimization in Canada" (top of page 2, 1st bullet) mentions "reusing and recycling [waste] materials by separating radioactive components from non-radioactive components" as one of several waste management strategies that waste owners are expected to develop and implement, whereas the discussion paper's section entitled "International Context" (bottom of page 3, 3rd bullet) states "optimize possibilities for recycle and reuse of valuable components from existing and potential waste streams" as one of four "fundamental principles that the IAEA states should be considered when designing and implementing a waste minimization program". Thus, while (the scope for) "waste reuse and recycling" is first characterized in terms of "radioactivity levels" (the presence or absence of radioactivity), it is later characterized and justified in terms of the "value" of existing and potential waste stream components. That seems inconsistent and is confusing.

The IAEA ("Policies and Strategies for Radioactive Waste Management", Nuclear Energy Series, No. NW-G-1.1, 2009, section 6.4: "Waste Minimization", p.15) is clear: "The national [radioactive waste management] policy may address the need to minimize the generation of radioactive waste at the design (minimization at source), operation and decommissioning stages of facilities. In this regard, it may identify some of the main means of achieving waste minimization in the operational and decommissioning stages of facilities, including: a) the recycling and reuse of materials which are free of contamination or only slightly contaminated; and b) the use of the clearance concept for determining the materials that can be released safely from regulatory control." Here, waste minimization through reuse and recycling is conceptualized in terms of the absence (or sufficiently low level) of radioactivity (radioactive contamination), and the emphasis is on the safe release of waste from regulatory control based on a waste clearance concept.

This suggests that as one of the ways to encourage/achieve the minimization of radioactive waste volumes through waste reuse and recycling in a safe and responsible manner, Canada's revised National Radioactive Waste Management Policy should outline a waste clearance concept and approach and define waste clearance criteria (for further operationalization in the companion National Radioactive Waste Management Strategy), on the basis of which to restrict the reuse and recycling of waste materials to those waste components that meet the clearance criteria.

The NRCan discussion paper briefly describes some of the steps in the overall waste management process, starting from waste generation, via waste processing (pre-treatment, treatment, conditioning),

up to waste disposal. The discussion paper also mentions waste segregation activities based on the physical, chemical, biological and radiological properties of the waste, including both processes of separating radioactive waste from non-radioactive waste (to set the stage for possible waste reuse and recycling) and segregating different types of waste (for more efficient handling, processing and packaging and more effective disposal). But the discussion paper is silent on the critical need for characterizing and re-characterizing radioactive waste -- and on the methods and criteria to be used in this ongoing characterization process -- to determine the (changing) physical, chemical, biological and radiological properties of different waste streams along the different steps of the waste management process, so that radioactive waste can be managed more efficiently and effectively.

This need for an (ongoing) radioactive waste characterization process, as an integral part of the (ongoing) waste management process, and the methods and criteria to be used for characterizing different waste streams, as they arise and change as a result of different waste management steps, is an important area that needs to be highlighted by Canada's revised Radioactive Waste Management Policy (and elaborated on by its companion Radioactive Waste Management Strategy).

Finally, the revised National Radioactive Waste Management Policy should make it clear up-front in the section dealing with provisions for waste minimization that the idea of recovering fissile material (in particular plutonium) from existing spent nuclear fuel waste in order to ‘recycle’ it into (new nuclear fuel for) operating nuclear reactors, as proposed by proponents of small modular nuclear reactors (SMR) designs in Canada, falls outside the purview of Canada’s revised Radioactive Waste Management Policy. For, such fissile material recycling would differ fundamentally from radioactive waste recycling in that the former would not be undertaken primarily with the aim of waste minimization in mind and actually would increase the volume of radioactive waste, in particular low- and intermediate-level radioactive waste, per unit electricity generated, due to the required reprocessing of spent nuclear reactor fuel, a complex process that would result in high-level waste in lieu of spent fuel waste as well as a variety of new solid, liquid and gaseous low- and intermediate-level radioactive waste streams.