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Redefining resource management as a public good: The United Nations Resource Management System as a transition vehicle to the circular economy

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Summary

This concept note summarizes the current trends in governments and the industry to foster a new paradigm of resource efficiency where secondary resources are being prioritized. As secondary resources assume primacy, the current linear models of resource production and use will be rapidly replaced by new circular patterns. This note argues that the integrated management of the natural resource nexus of food, energy and water is critical to meeting universal needs. These resources must be classified and managed as a public good to achieve key Sustainable Development Goals. The concept note argues the essential role for free markets in that endeavour through enabling the principles of Environmental, Social, and Governance (ESG) finance, stakeholder capitalism and the commitment to the universal right to prosperity.

I. Introduction – The evolution of the step change paradigm

1. This document has its origins in the first of an occasional series of concept notes prepared in 2018 by the Sustainable Development Goals Delivery Working Group of the Expert Group on Resource Management (EGRM). It was published under the title "Transforming our world's natural resources: A step change for the United Nations Framework Classification for Resources?" (ECE/ENERGY/GE.3/2018/7).[1] It makes the case that the United Nations Framework Classification for Resources (UNFC) functionality needs either to undergo a step change to align it to the objectives of the Sustainable Development Goals (SDGs) or that a companion tool to UNFC is developed to achieve that objective. In short, the argument is that UNFC is "necessary but not sufficient" for the new task.

2. It is a mark of how fast the case has developed that shortly after its release, the Expert Group on Research Classification was renamed the Expert Group on Resource Management (EGRM). The scope of the purview of the Expert Group was extended to encompass all natural resources. A natural consequence of that decision, and to preserve the integrity of UNFC for current users of the system, was to opt for the second option, the development of a companion tool to UNFC, known as the United Nations Resource Management System (UNRMS). The specifications of UNRMS are now being developed.

A. Zero waste and the circular economy

3. It was however, already evident in February 2018 that one aspect of the step change would be to engage with the recovery, valorization and reuse of "wastes", a term that had casually developed in many extractive industries to describe tailings and residues which the industry discarded either because of no apparent commercial value or because disposal – often at or close to the site - was seen as inexpensive and straightforward. The step-change proposed was to reverse this long-established paradigm, to favouring the principle of "zero waste", and all that entails. The change includes the step of reclassifying such "wastes" as "anthropogenic" or secondary resources. Given its discrete status in UNFC, this category has a dedicated Anthropogenic Resource Working Group under the Expert Group on Resource Management and is supported by specifications[2] and guidelines.

4. Accordingly, Section A of the document (ECE/ENERGY/GE.3/2018/7), entitled Principles, 13 (d), states:

"Commitment to:

(i) *Comprehensive and integrated resource recovery;*

(ii) *Valorization (reuse, recycling) of secondary resources/residuals;*

(iii) *Zero waste".*

5. From this principle, the case is made to reposition anthropogenic (secondary) resource management within the circular economy framework as the bridge to achieving Zero Waste:

"In line with the transformative process from linear to circular natural resource management, several system properties change. Among the more significant are:

(i) *The system baseline is defined by the safe management of secondary, not primary resources, by which primary resources are conserved and – to the extent reasonably possible - only accessed to top up continuously "remade" secondary resources, hence tending to, or achieving "zero waste";*

[1] Transforming our world's natural resources: A step change for the United Nations Framework Classification for Resources? ECE/ENERGY/GE.3/2018/7, https://unece.org/fileadmin/DAM/env/documents/2019/WAT/10Oct_22-24_IWRM/ECE_ENERGY_GE.3_2018_7_ENG.pdf

[2] For UNFC Anthropogenic Resource Specifications see: https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/Anthropogenic_Resources/UNFC_Anthropogenic_Resource_Specifications.pdf

(ii) *All natural resources are equally "critical" in nature in respect of the imperative to manage them in an "as efficiently as reasonably possible" manner, not as a measure of their scarcity or insecurity of supply;*

(iii) *The concepts of food, energy and water security are assumed indivisibly to vest the attribute "security" with the co-attributes "accessibility" and "affordability"."*

B. Change drivers

6. The change drivers are that:

(a) "resource use efficiency" (RUE) is the default for the use of any resource, and hence in that sense, all resources should be understood as "critical";

(b) the recognition that "waste disposal" is not inexpensive but imposes an unwanted and unwarranted negative externality on future generations;

(c) that essential resources such as food, energy and water must be managed in an integrated and balanced way, as rightly demanded by the 2030 Agenda for Sustainable Development which the SDGs are designed to address.

7. The worked example regarding where the principles of RUE and the elimination of negative externalities imposed on future generations meet is a high-volume secondary resource, discarded in vast quantities in over 50 countries, phosphogypsum (PG). By relocating PG within a sustainable, circular economy, incentives can be aligned to require the use, not disposal, in the process of conserving large quantities of primary resources for which it can be substituted. Happily, in many jurisdictions still producing PG, a "step change" in that direction is taking place, some already having reached the magic target of 100 per cent use (the obverse of Zero Waste), and others approaching that goal.[3] Overall worldwide annual use has risen from close to zero to approximately 60 million tonnes per year, close to 30 per cent of annual production.

C. Artificial Intelligence and big data

8. Any "step change" Resource Management System will require leading-edge computing technologies and software at an operational level. Combined with other burgeoning digital resources such as satellite imaging, tools such as Artificial Intelligence (AI) and big data make it possible to process the quantity and complexity of data that will need to be managed in the system to provide decision and policymakers with the decision-support tools they need. Here the sustainability goal is to ensure that issues of "security", "accessibility", and "affordability" but equally "economic criticality" are addressed.

9. To start the process of scoping how this might be done, a second paper in the "step change" sequence was issued by the SDGs Working Group in 2020 under the title "Development of detailed specifications, guidelines and best practices on effective use of the United Nations Framework Classification for Resources and the United Nations Resource Management System for sustainable development: Global values, regional circumstances, priorities and needs for resource management in the age of big data and artificial intelligence" (ECE/ENERGY/GE.3/2020/7).[4]

[3] International Fertilizer Association, Phosphogypsum: Leadership Innovation Partnership – Core Principles of Management and Use, Julian Hilton, General Editor, Paris 2020. https://www.fertilizer.org/public/resources/publication_detail.aspx?SEQN=6057&PUBKEY=BEB5A80B-5DAF-4DF8-93AE-E0D8F6D0D5BB

[4] See Development of detailed specifications, guidelines and best practices on effective use of the United Nations Framework Classification for Resources and the United Nations Resource Management System for sustainable development: Global values, regional circumstances, priorities and needs for resource management in the age of big data and artificial intelligence ECE/ENERGY/GE.3/2020/7 https://unece.org/fileadmin/DAM/energy/se/pdfs/egrm/egrm11_apr2020/ECE_ENERGY_GE.3_2020_7.pdf

D. Resource stress and threats to public health

10. It was purely coincidental, but perhaps also serendipitous, that the issue date of ECE/ENERGY/GE.3/2020/7 should be only five weeks after the 11 March 2020 declaration of the COVID-19 pandemic by the World Health Organization. A reference is made in the paper to the COVID-19 outbreak. When the draft was finalized in January 2020, COVID-19 was still understood as an acute but local crisis focused on Wuhan, China. But a link was proposed between the possible causes of such events and intense resource stress in urban and peri-urban settings, often associated with energy and mineral resources:

> *"One quality of places where resource intensity is very high in terms of both production and consumption, such as large cities, is that chronic and acute stress may both be equally observed in the natural and the engineered systems which characterize them. This quality is a crucial indicator that they can give rise to catastrophic public health events. Some examples are the acute events such as the COVID-19 in Wuhan, the People's Republic of China, and the chronic events such as the outbreak of HIV-AIDS, origins of which can be traced back to the 1920s in Kinshasa, Democratic Republic of Congo, then a Belgian colony, with its economy based on mining. Common attributes of such places are high levels of population density, connectivity, biodiversity hotspots, waste and air pollution."*

11. What we now know, which less than a year ago we did not, is the extent to which confusion has grown up in the linear economy between "resource intensity" and "resource efficiency", which can have, and, in the case of the COVID-19 pandemic, is having devastating and fatal consequences on a global scale. These consequences are all the more devastating in that much of the damage caused is avoidable if the necessary evidence to understand, prevent or mitigate the causes – systemic failures in the management of critical resources – is not readily to hand or if it is ignored or trashed.

12. The document also references AI's potential role in analyzing and meeting such acute crises, including developing new clinical responses: *"The first influenza vaccine created entirely by AI was reported in July 2019".*[5] Of course, the astonishing rapidity with which a range of highly efficacious COVID-19 vaccines have been designed, manufactured and administered is a triumph more of human capabilities than machine intelligence. But the fact that such vaccines can now be rapidly created and continuously modified to account for mutations and related challenges is based on information technologies of many kinds, including bioinformatics and AI. This emerging synergy of human and machine intelligence now makes rapid responses to acute crises a challenge of weeks and months, not years and decades, for example, in polio.

E. Build Back Better

13. As the world starts to grapple with how to recover from (or perhaps to live with) COVID-19, a process that will be far from linear or predictable in nature, the step change objective must be not to Build Back but to Build Back Better. One of the ethical imperatives behind the concept of "better" is brought into sharp focus by the question raised by the slower-burning crisis of AIDS/HIV. Its origins in Kinshasa in the 1920s is "why there?". Of course, then Kinshasa was a mining capital in the Belgian Congo. The reason for the presence of Belgium, along with all the other European colonial powers across Africa and much of the rest of the then "South", was to extract the country's natural resources and ship them to Europe or other destinations in the North, e.g., the United States, for value-add processing ("exploitation").

[5] See Human Vaccine Created Solely by Artificial Intelligence https://www.docwirenews.com/docwire-pick/human-vaccine-created-solely-by-artificial-intelligence/ (July 2019).

F. The linear resource economy and linkage to slavery

14. It is likely not a coincidence that an event triggering as significant an ethical step change as the necessary realization that COVID-19 and climate change have one prominent attribute that both are "one-world" or global village problems from which no one and nowhere is entirely immune also happened during the COVID-19 pandemic, the police killing of George Floyd in Minneapolis. This single event gave rise to the Black Lives Matter movement, the impact of which, among many "aha" moments,[6] was to cement the deep connection between the linear economic model of resource extraction and slavery or abundant cheap labour. Such a model is both physically and conceptually linear. Resources are mined in one location and then, raw or partially beneficiated, shipped to, value-add processed and profitably sold for use in another. The critical dependency that the source country provides is either outright slavery or expendable and inexpensive labour as the vital source of cheap energy for the first stages in the extractive process.

15. What George Floyd's death also brought home so powerfully is that, whether intentionally or not, the linear economic model all too often has failed and fails the economic test for sustainability set by John Nash that its transactions should be equitable "win/win" in which both parties equally benefit. How long the coat-tail of damage can be from being on the losing side of the "lose/win" linear transaction of resource management and use is well illustrated both in low-income countries acting as resource provinces for high-income ones, but also in high-income societies where the descendants of the slaves still live in pockets of exclusion and suffer from poverty, discrimination and injustice. This is a partly intangible negative externality where the costs imposed on subsequent generations without their knowledge or consent can be measured both in emotional and social damage as well as severe financial disadvantage or exclusion. This may be considered a case of severe negative double materiality in more contemporary economic terms. People are treated with the same disregard and disrespect, effectively with a status similar to natural resource "wastes" (discarded tailings and residues).

16. In Building Back Better, the proposed reset to the "better," i.e. more sustainable circular economy, creates a system within which equitable access to and enjoyment of all natural resources, especially food, energy and water, is available to all. Food, energy and water are prioritized because of their role in meeting fundamental needs, as Brundtland, Our Common Future[7] and Maslow, The Hierarchy of Needs[8] both in different ways made fundamental to the vision of sustainability. In that context, the reclassification of the resources in this "fundamentals needs" nexus as Public Good must be at the heart of the proposition as to what in real terms is meant by "better" when we build back.

II. Ensuring sustainability and resources for the future – The double materiality vision

17. A vital outcome of the reset to a circular economy will be negotiating a new Nash equilibrium for inclusive development where resource provision for critical needs becomes a public good (see Figure[9]).

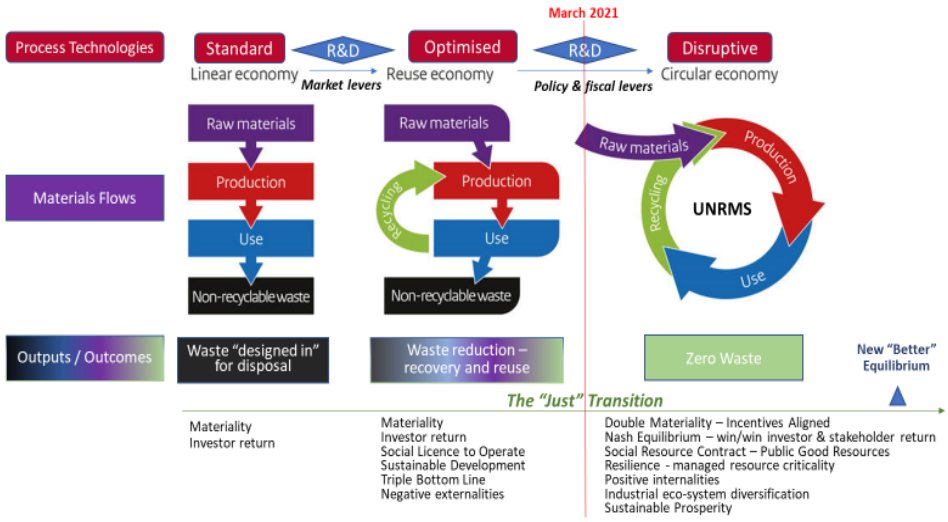
[6] See UN action on "Let's fight racism" - https://www.un.org/en/letsfightracism/

[7] Gro Harlem Brundtland, Our Common Future: The World Commission on Environment and Development (The Brundtland Report), 1987. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

[8] Abraham Maslow, "A theory of Human Motivation" Psychological Review, 50, 370-396, 1943. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.318.2317&rep=rep1&type=pdf

[9] Figure reproduced courtesy of Aleff Group.

Figure
The "Just Transition" – From Linear to Circular Economy



18. Against that background, significant initiatives such as the project on Sustainability Reporting announced by the International Financial Reporting Standards (IFRS) Foundation are very much to be welcomed.[10] As the IFRS Foundation itself points out, as a private sector organization, there is a risk of either conflict of interest or friction during the just transition. A premise will be that profit is not always the desired outcome. This is the space into which the concept of double materiality necessarily fits:

> *"After years of debate over the definition of materiality, 2020 has brought a consensus that materiality is double—meaning that businesses should report on financially material topics that influence enterprise value as well as topics material to the economy, environment, and people".*[11]

19. The transition must negotiate a new point of alignment with the Nash equilibrium in which markets continue to function. However, with full provision for meeting critical needs, of which zero hunger, SDG 2, is perhaps the most obvious but to which access to clean water, SDG 6, and affordable and clean energy, SDG 7 belong with equal importance, double materiality encapsulates both "necessary" and "sufficient" conditions for measuring impact and progress.

A. The currencies of money and molecules

20. A feature of this economic transformation to circularity will be in effect to fuse two "currencies" in the linear resource economy, those of money and molecules, into a single coinage where money is "heads" and molecules "tails". The System of Environmental-Economic Accounting inherently proposes a similar fusion.[12] The hyphenation in the title fuses natural capital with natural resources. Cryptocurrencies already appear to be based on a similar unifying proposition of electrons and currency units. More widely, the internet, in which such cryptocurrencies exist, shows a worked example of how there is the potential for co-existence of the free market with public goods. That is, market-makers can make vast profits from the internet without losing the public good premise of open and free access to it.

[10] See IFRS Sustainability Reporting https://www.ifrs.org/projects/work-plan/sustainability-reporting/

[11] See BSR accessed March 31 2021, https://www.bsr.org/en/our-insights/blog-view/why-companies-should-assess-double-materiality#:~:text=After%20years%20of%20debate%20over,economy%2C%20environment%2C%20and%20people. See also the Sustainability Accounting Standards Board, https://www.sasb.org/blog/double-and-dynamic-understanding-the-changing-perspectives-on-materiality/, Blog September 2, 2020.

[12] System of Environmental-Economic Accounting, https://seea.un.org/ecosystem-accounting.

The market makers are so successful the problem now is reining them in. This demonstrates, though not yet in complete equilibrium form, that the "free rider" problem of the public good can be resolved, at least in high-priority target instances such as climate action and zero hunger, and in a way that invokes a double materiality solution because in the essential resource nexus – food-water-energy – the two aspects are indivisible, i.e. in equilibrium.

B. The attributes of public good

21. Already in 2017, the then Executive Secretary of the United Nations Economic Commission for Europe (ECE) made the connection between UNFC and resources as a public good:

> *"The Executive Secretary of ECE welcomed the participants to the meeting. He drew attention to the importance of the 2030 Agenda for Sustainable Development and the key challenges in attaining it. He noted the need to change the narrative on resources from one of unbalanced production, which leaves behind significant externalities, to one where more value will be created. Should the global population reach 9.6 billion by 2050, the equivalent of almost three planets could be required to provide the natural resources needed to sustain current lifestyles with current consumption patterns. He further noted with appreciation the work undertaken to broaden the application of the United Nations Framework Classification for Resources (UNFC) including to renewable energy as well as the development of bridging documents.* ***In closing, he underlined the importance of the work being undertaken on resource classification and the value of UNFC as a public good****".*[13]

22. The two classical attributes of the public good are non-rivalry and non-excludability. These classical free-market operations are sensitive to "free-rider" access where the services or goods offered are paid for by the advantaged but available at no charge to the disadvantaged. In that context, taxation becomes the primary instrument for protecting universal access to critical resources. Yet as emerging branches of economics show, such as behavioural and development economics, both of which sit on the Nash equilibrium, the level of global resource stress now reached whether acute or chronic (see cited companion document ECE/ENERGY/GE.3/2020/7[14]) means that economies which do not find solutions that include provision for renegotiating the relation between public good and free markets are at risk of catastrophic systemic failure. There was an early warning indicator of this problem during the 2007-2008 financial crisis. But an even more severe impact has already been caused by the COVID-19 pandemic, for which there is no ready-made playbook for working our way out. Hence Build Back Better is not idealistic or philanthropic in nature; it is an existential necessity. That is why agreeing on the metrics for double materiality decision-making is extremely important. Risk assessment is such an urgent priority, which has perhaps been one of the keys drivers towards the welcome, voluntary surge of the private sector. Free-market funds now being earmarked for or already managed as Environmental, Social and Governance (ESG) investments.

[13] See Report of the Expert Group on Resource Classification (2017) https://unece.org/fileadmin/DAM/energy/se/pp/unfc_egrm/egrc8_apr_2017/ece.energy.ge.3.2017.2_e.pdf

[14] See Development of detailed specifications, guidelines and best practices on effective use of the United Nations Framework Classification for Resources and the United Nations Resource Management System for sustainable development: Global values, regional circumstances, priorities and needs for resource management in the age of big data and artificial intelligence ECE/ENERGY/GE.3/2020/7 https://unece.org/fileadmin/DAM/energy/se/pdfs/egrm/egrm11_apr2020/ECE_ENERGY_GE.3_2020_7.pdf

III. The social contract: A people perspective of a comprehensive socio-environmental-economic contract to operate

23. An equally welcome step-change is the uptake of the long-established concept of Stakeholder Capitalism by leaders of major free-market enterprises. This occurred in the United States when on 19 August 2019, Jamie Dimon, then Chair of the Business Round Table (BRT), and 180 CEO colleagues signed a BRT Statement affirming commitment to stakeholder capitalism,[15] affirming *"the essential role corporations can play in improving our society when CEOs are truly committed to meeting the needs of all stakeholders"*. What the COVID-19 pandemic has done since is to inject existential urgency into holding good on that commitment.

24. This concept significantly predates the emergence of the COVID-19 pandemic but is almost eerily anticipative of its systemic impact and will be an essential factor in the Build Back Better solution. As identified by one of the leading advocates of stakeholder capitalism since the 1970s and now Chairman of the Davos World Economic Forum, Klaus Schwab points out stakeholder capitalism is a crucial mechanism for aligning free markets and the public good rising universal prosperity.[16] Prosperity as a universal right as espoused by Schwab is a concept fully adopted by the SDGs as a whole in the summary SDG triad "People, Planet, Prosperity". This: *"is a form of capitalism in which companies do not only optimize short-term profits for shareholders, but seek long term value creation, by taking into account the needs of all their stakeholders, and society at large".*[17] As with ESG investing, the BRT August 2019 statement and its growing number of adherents in the global business community were voluntary in nature. It reflects the trends observed in Behavioural Economics that suggest accommodation can be found between free markets and the public good.

IV. There is no Planet B: A sustainable resource management framework to support circularity

25. The global use of natural resources such as minerals, fossil fuel, and biomass has more than tripled from 1970. It is continuing to grow at about 3 per cent per annum, which means that the current consumption of about 100 billion tonnes per year will double in the next 20 years. Population growth of about 1 per cent per year is not sufficient to account for a 3 per cent demand growth for resources. Current resource consumption is highly skewed, with the high-income groups using up to 20 tonnes per person per year. In comparison, the lower-income bracket uses as low as 2 tonnes per person per year. However, social development is rapidly catching up, and the world is witnessing a continued increase in global abundance. While some analyses such as the Gates Foundation Goalkeeper Reports see sustainable development as "*set back by twenty-five years in twenty-five weeks*",[18] others believe that despite the setbacks of the COVID-19 pandemic, more and more people are coming out of poverty and consuming more resources.

26. The COVID-19 pandemic may have accelerated the trend towards prosperity, as governments and investors are more concerned about the population's overall prosperity than ever. Instead of taking the easy way of "brown recovery," the COVID-19 pandemic reset has brought about the acceleration towards a green future. But this means more resources are

[15] See Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans' https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans

[16] See K. Schwab, P. Vanham, A Global Economy that Works for Progress, People and Planet, London, January 2021. See https://www.wiley.com/en us/Stakeholder+Capitalism%3A+A+Global+Economy+that+Works+for+Progress%2C+People+and+Planet-p-9781119756132

[17] See What is stakeholder capitalism? https://www.weforum.org/agenda/2021/01/klaus-schwab-on-what-is-stakeholder-capitalism-history-relevance/ accessed March 30, 2021.

[18] See Gates Foundation Goalkeeper Report 2020 https://www.gatesfoundation.org/goalkeepers/downloads/2020-report/report_a4_en.pdf

required than previously imagined. The exponential increase in resource requirement and how it will be met has not been fully penetrated in the global discourse on sustainable development. The current linear models of resource production and use need fundamental rethinking.

27. Resource production and use of a scale we foresee will entail ever-increasing impacts on the environment, human health and biodiversity. A decoupling of development and resource use is required. Fossil fuels are linear resources, non-recoverable and lost on consumption. This may not seem to be the case for renewable energy or raw materials. Resources of this type remain continuously in the system, except for marginal losses and leakages. In the case of raw materials, it could be used and reused. However, even with fossil fuels and renewable energy, circularity could be achieved by increasing efficiencies. But this easier said than done. The global average of recycling remains below 10 per cent, even though some materials have higher recycling rates. These are exceptions rather than the norm.

28. For the past 100 years or more, global trends are constantly reducing raw material prices. So, if the circular economy has to take off, two requirements are essential:

- Secondary resource reuse is the system default, while primary production should restock the system as needed
- Recycling should become cost-competitive, eliminating the "moral hazard" risk of constantly increasing primary resource production just because it is more convenient.

29. Achieving a balance of the two requirements as above is not an easy task. As long as there will be cheap primary production, recycling will have difficulty in competing. Unfortunately, years of accumulated experience continues to make direct production cost-competitive. Hence there is little incentive to adopt recycling. In Building Back Better breaking this vicious cycle is a central tenet. How to implement this?

30. As demand rises, resources are not constrained by their availability. Raw materials are available in plenty, and so do renewable energies. However, resource availability is constrained by external factors such as land and water availability and social opposition. These factors limit the supply of resources. The root cause is, therefore, the large and unwanted footprint of resource production. Looking from this angle, circularity is not necessarily the outcome of sustainable methodology but a tool to overcome resource production constraints.

31. The emphasis on circular economy as an endpoint of its own is a misplaced one. It is like putting pressure on an opposing force that adds to the resistance. Instead, the emphasis must be redirected in re-framing circularity as the driver to achieve not just the production of raw materials or energy but the utility that raw materials or energy delivers. For example, the utility could be lighting, heating or vehicle propulsion.

32. A modern sustainable resource management system such as UNRMS will be the fulcrum of the Build Back Better reset. There are countless tools available to support the current linear business models. There is no need for a new system that replicates what is currently available. Therefore, UNRMS should be designed and applied with a refocus that has not been attempted before. Such a system should also provide key performance indicators (KPIs) to measure performance against specific objectives or set values on delivering the utility or service to the society, the sustainability assessment.

V. Resources as a Service: Acting on the circular economy challenges

33. Decoupling resource use and economic growth will positively impact the environment and the carbon footprint. As such, innovative approaches are finding new ways to reduce resource intensity, energy intensity or carbon intensity of most of the products and services. This "dematerialization" will have far-reaching consequences. More and more utility will be squeezed out of less and fewer resources.

34. The trend towards "dematerialization" also will make Resource as a Service (RaaS) viable. Rather than producing and selling a commodity, an industry can sell the service that

the utilization of that commodity delivers. The raw materials can remain in the company's custody through the lifecycle of the product or service. The company will have an incentive to be more resource-efficient and recycle the materials as much as possible. The stewardship of the material will remain with the company. It will have access to the material at the end of the life of the product. The material can thus be efficiently put back into indefinite service of the society.

35. RaaS models currently exist in CRM space, such as platinum and uranium. Platinum and uranium are often leased to customers. After its productive use, it reprocessed and recycled back into the system again. Similar approaches can be used mainly for CRMs, especially when the products' lifecycle is measured in a few years. Certain materials such as iron, steel or copper are locked up in use for a longer-term. By business models could be developed for scenarios spanning over an extended period.

36. A significant challenge in achieving full recycling of materials is the quality issue with some recycled materials. Design for recycling could become viable in RaaS operations, making it easier to assure the quality of recycled materials. The design can include modularity of devices, plan for collecting discarded products, classification, storage, and transport to recycling centres. Above all, information about the material flow should be available in real-time. Such information availability is being made more accessible by the new Internet of Things (IoT), blockchain and Digital Ledger Technologies (DLT).

37. The development measure in the past was dominated by per capita energy or raw material consumption. As energy and material use efficiency replaces (or will be replacing) this metric, the reverse, the declining per capita consumption will be the measure of development and technological advancement. Materials and energy as commodities will diminish in the share of the value they represent in a product. The value will be influenced by the knowledge embedded into products, another indicator of double materiality's economic impact. Such approaches will not only be cost competitive but also will have significant social returns.

38. UNRMS system should support the RaaS model as it is inevitable that resource use patterns will change. For example, several major car or electronic manufacturers are moving into securing raw material supply. Some major car manufacturers have adopted a strategy of prioritizing the use of secondary resources. The vertically integrated industries will be more interested in resource efficiency than in the unwanted overuse of materials. If this trend becomes widespread, the current commodity models will become insignificant over time. Such changes could make the management of resource much more complex. The industry ecosystem will become more information-hungry. Along with primary resource information, data on secondary resources will be essential. UNRMS could be the platform that could provide the necessary information to manage such complex scenarios.

39. The experience of the sharing economy is worth mentioning here. Business models such as car-sharing or space sharing happened because of mobile technology advances and their wide use. Digital connectivity promoted quick online money transactions. Sellers and buyers could come into instant contact and transact deals. When the computer industry ventured into mobile music devices, which got transformed into smartphones, nobody imagined that this could fuel a sharing economy boom. Yet all this happened without centralized planning within a couple of years.

40. Similarly, RaaS is a possibility that could be foreseen if we scan the horizon and consider the digital transformation happening today. It is the nature of such transformations to happen rather quickly. It pays rich dividends to be aware of the changes and be early adopters as opportunities open.

VI. Seeking the strengths and positive attributes of resources in sustainable development

41. Even though resources are essential for sustainable development and have a significant role in the various green transition underway, the public perception of resource production has not been positive. There is mounting opposition to several resource sector

activities such as mining, petroleum production, nuclear fuel production, and even generating renewable energies. Many waste recycling plants generate adverse public reactions.

42. Every system or project will have pros and cons. Usually, a cost-benefit analysis, careful weighing of consequences and considerations for trade-offs is done before a decision is taken. An understanding of the negative impacts is necessary. In the best-case scenario, an awareness of this fact can lead to a determined pursuit of perfection. But in many cases, focusing too strongly on the flaws of an idea or project stifles the open and positive approach that is essential for good working practices. The basic principle is to take an idea that is not yet fully developed and continue developing it instead of prematurely abandoning it.

43. The appreciative inquiry method involves concentrating on the strengths, positive attributes and potential of a project rather than weaknesses. The underlying assumption of appreciative inquiry is that projects constantly evolve, grow, and move toward the future. Appreciative inquiry focuses on the whole organization on identifying its greatest assets, capacities, capabilities, resources, and strengths – to create new possibilities for change, action, and innovation. Instead of searching for problems, it focuses on strengths and the future.

44. While considering all the risks, it is also essential to spent time and efforts to reinforce the positive contribution a resource project provides to society. Such an inquiry can focus on how the project contributes to the quality of life, environment, and the economy – the people, planet, and prosperity triad. A resource project does not exist in isolation – it is a network of people. Local communities, workers, suppliers, investors and regulators could have a clear view of a shared future. The collective inquiry leads to change, adds a positive image and a sense of urgency.

45. Moving away from the traditional models of problem-solving could be advantageous to resource management programmes. The risk in traditional approaches tends to accept a solution, which may not be optimal. Frameworks such as UNRMS will have to support alternative methods of problem-solving. Seeking positive attributes can promote innovation and engage stakeholders in self-determined change.

VII. Playing the long game

46. Short-termism is the greatest threat faced by humanity.[19] The ‘now’ commands more attention. Short term actions seem to get things done. The negative impacts are less visible initially. But its downsides accumulate over time, weighing down the whole system. All the challenges we face today, such as global warming, air, water and land pollution, social disaffection, etc., are the negative externalities of short-term thinking.

47. It is the present bias that favours short-term payoffs over long-term rewards. If the negative aspects are invisible in the short-term, some positive benefits are more visible. The tiny differences of long-term positive benefits are hardly noticeable. However, such benefits do have a compounding effect, something not duly appreciated from the current vantage point. Long-term benefits have an exponential effect rather than a linear or additive effect. Compounding also leads to the time value of money, which underlies all of modern finance.

48. Usually, a discount rate is applied to future benefits. That means the present is valued more than the future. A social discount rate is a technique that policymakers use in their cost-benefit analyses to gauge whether to make investments with a long-term impact. There are two reasons for discounting the future. The first is because it is assumed that societies will grow wealthier over time due to economic growth. Therefore, a dollar today is worth more than a dollar in the future when we will enjoy higher incomes. The second and more controversial reason is to take account of pure time preference (or impatience).

49. Social discount rates are essential in calculating the benefits and costs of limiting future climate change because carbon dioxide has a very long residence time in the atmosphere, which means that we must value the impacts of today’s emissions centuries into

[19] See The perils of short-termism: Civilization’s greatest threat - https://www.bbc.com/future/article/20190109-the-perils-of-short-termism-civilisations-greatest-threat

the future. It is now widely accepted that there is a need to use social discount rates that decline over time, increasingly giving more weight to future generations. The use of a low discount rate is one way to apply the double materiality principle while reducing the risk of imposing costly negative externalities on future generations. This change of emphasis supports the view that we should act now to protect those as yet unborn from climate change impacts, perhaps of all the most critical stakeholders making future-proofing central to cost-benefit analyses. Accepting resources as a public good greatly facilitates future-proofing. Today, several governments already foster long-term planning. Some have appointed ombudspersons as stewards of future generations' interests.

50. UNRMS should support resource management practices that support long-term planning. The world faces several obstacles in achieving sustainability, such as reducing the environmental impact, waste minimization, and maximizing the benefits to society, which stem from a lack of long-term thinking.

VIII. Conclusions

51. Many of the principles and tools needed to realize the Build Back Better vision for the post- (or living with-) COVID-19 world predate the pandemic. Many of the positive economic and social trends such as circularity, double materiality, sustainability accounting and reporting, ESG investment and stakeholder capitalism predate the pandemic. But catalyzed by COVID-19's impact, they are now rapidly gaining acceptance to the point of critical mass, even in some cases to a reset when even existing investments and loans are being reassessed to take them into account.

52. But at the heart of the concept of "better", the primary challenge set out in the SDGs remains to be met. This is to meet universal and inclusive goals such as no poverty and zero hunger. Global attention to this fact was drawn by the Brundtland Report in 1987, well before the SDGs were adopted in 2015.

53. This concept note has argued that the integrated management of the natural resource nexus of food, energy and water is critical to meeting universal needs. These resources must be classified and managed as a public good to achieve key SDGs. It has also argued that there remains an essential role for free markets in that endeavour if those free markets stand by the principles of ESG finance, stakeholder capitalism and the commitment shared by the SDGs and the World Economic Forum to honour the universal right to prosperity.