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# ASSESSING THE HEALTH IMPACTS OF A CIRCULAR ECONOMY





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# ABSTRACT

The extensive use of natural resources threatens to exceed the carrying capacity of the Earth. The concept of a circular economy (CE) offers an avenue to sustainable growth, good health and decent jobs, while reducing human pressure on the environment and natural resources. Further, the change from a linear economy (take, make, dispose) to a circular one (renew, remake, share) is expected to support significantly the attainment of the Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible consumption and production) and – if properly implemented – SDG 3 (Good health and well-being).

In 2018 the World Health Organization (WHO) launched its first evidence report, *Circular economy and health: opportunities and risks*, to facilitate and encourage the inclusion of positive and negative health effects in policy debates and to foster a proactive involvement of the health sector in these discussions.

This new report builds on the 2018 findings and expands its analysis and policy recommendations by (i) identifying existing and new approaches, methods and resources for health impact analysis; (ii) prioritizing policy recommendations to be used for CE proposals; and (iii) analysing available and additionally required materials and resources for awareness-raising on sustainable production and consumption in a health-friendly manner.

## KEYWORDS

CONSERVATION OF NATURAL RESOURCES  
ENVIRONMENTAL HEALTH, ECONOMICS – TRENDS, ECONOMICS  
ENVIRONMENTAL POLICY – TRENDS, ECONOMICS  
RECYCLING – TRENDS, ECONOMICS  
WASTE MANAGEMENT – TRENDS, ECONOMICS

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## ABBREVIATIONS

<b>ACES</b>	Alliance for Circular Economy Solutions
<b>BFR</b>	brominated flame retardant
<b>BPA</b>	bisphenol A
<b>CE</b>	circular economy
<b>DALY</b>	disability-adjusted life year
<b>EA</b>	environmental assessment
<b>EC</b>	European Commission
<b>EHP</b>	European Environment and Health Process
<b>EIA</b>	environmental impact assessment
<b>EMF</b>	Ellen MacArthur Foundation
<b>ESIA</b>	environmental and social impact assessment
<b>EU</b>	European Union
<b>GHG</b>	greenhouse gas
<b>HALY</b>	health-adjusted life year
<b>HIA</b>	health impact assessment
<b>HiAP</b>	Health in All Policies
<b>IA</b>	impact assessment
<b>IAIA</b>	International Association for Impact Assessment
<b>ILO</b>	International Labour Organization
<b>LCA</b>	life cycle assessment
<b>MCA</b>	multi-criteria analysis
<b>MCDA</b>	multi-criteria decision analysis
<b>NEPA</b>	National Environmental Policy Act
<b>NGO</b>	nongovernmental organization
<b>PFC</b>	perfluorinated chemical
<b>POP</b>	persistent organic pollutant
<b>PPPP</b>	policy, plan, programme and project
<b>QALY</b>	quality-adjusted life year
<b>SDG</b>	Sustainable Development Goal
<b>SEA</b>	strategic environmental assessment
<b>SESA</b>	strategic environmental and social assessment
<b>SIA</b>	social impact assessment
<b>UNECE</b>	United Nations Economic Commission for Europe
<b>UNEP</b>	United Nations Environment Programme
<b>WHO</b>	World Health Organization
<b>WTA</b>	willingness to accept
<b>WTP</b>	willingness to pay
<b>YLLs</b>	years of life lost



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# EXECUTIVE SUMMARY

The concept of the circular economy (CE) has gained increasing prominence in recent years in policy development at the international, European Union and national levels of governance, and in business practices and consumer behaviour. Until now, the main focus has been on the benefits of CE transition in terms of efficient and sustainable production and consumption, while coverage of the health implications has been relatively limited.

The first report on the CE published by the WHO Regional Office for Europe in 2018, *Circular economy and health: opportunities and risks*, concluded that CE transition presented a major opportunity, promising to yield potentially substantial health benefits while contributing to the attainment of a number of Sustainable Development Goals. However, it also concluded that there were risks of unintended adverse health effects in this transition.

This second report addresses some of the key recommendations of the first report – in particular, the need for (i) further understanding of the health impacts of CE transition and a more complete assessment of policy priorities for addressing the negative impacts and enhancing the positive ones; and (ii) increased coverage and integration of health benefits and risks in national, regional and global strategies and visions, as well as in associated CE implementation policies, plans, programmes and projects (PPPPs). It should be noted that consideration of health in addressing these recommendations is consistent with the WHO definition of health, which includes “hard” endpoints, such as mortality and morbidity, and “soft” endpoints, such as well-being and quality of life, and their economic, social and environmental determinants. The discussion in this report therefore recognizes that human health is greatly influenced by the numerous initiatives associated with CE transition that are beyond the health sector and affect health via a variety of pathways.

The overall aim of this report is to discuss the practicalities and provide recommendations on the integration of health into CE initiatives at both strategy and vision levels and CE-related PPPPs. In particular, it provides a discussion of appropriate impact assessment (IA) frameworks, methods, approaches and resources that can be useful in enabling the integration of health considerations into CE initiatives.

This discussion focuses on health impact assessment (HIA) as well as on other IAs that integrate health issues, including strategic environmental assessment (SEA), environmental impact assessment (EIA) and social impact assessment (SIA). It outlines the steps of such IAs, including scoping, methodologies for appraisal of changes in health exposures and effects, making policy recommendations, monitoring and evaluation, as well as wider stakeholder consultation and participation. This approach is intended to ensure that the health consequences of proposed actions are assessed in a logical, transparent way, based on the available evidence. The examples of the health care, built environment and food sectors are used to outline the types of health impacts, both positive and negative, that may arise in CE initiatives and suggest ways in which these impacts could be subject to further assessment.

Key messages from this report are as follows.

- There is great potential for use of IA methods, including HIA, to enable the integration of health and well-being considerations into CE strategies and visions as well as associated implementation PPPPs. These methods can assist understanding of their health implications and inform the development of actions to promote opportunities and manage risks. To this end, the involvement of health experts is required from the early stages in the development of such CE initiatives.

- While this report sets out possibilities for the use of such IA methods, there is a need for further exploration of their appropriate use in order to refine guidance on their applicability in the context of different CE initiatives and at different government levels.
- In the development of CE strategies and action plans, a first step to integration and further assessment of health implications would be routine health impact screening of proposed priority areas and related actions. This process could also include identification of additional health-related actions to be included within action plans, to boost opportunities and manage risk.
- The need for continuing research to fill significant knowledge gaps on the health implications of CE transition is also stressed, as this could be a key barrier to use of IA in some CE contexts.
- Assessments of health impacts need to recognize the importance of businesses and industries in implementing CE initiatives and thus their role in the context of undertaking IAs.



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# 1. Introduction and aims



The overall aim of this document is to discuss the practicalities and give recommendations on the integration of health into circular economy (CE) strategies and visions, and associated implementation policies, plans, programmes and projects (PPPPs). CE strategies and visions for a country, region or locality set the overall context and reference point by providing, for example, objectives, targets and actions, while PPPPs are at the heart of CE implementation. Health is brought into many PPPPs through impact assessments (IAs). Therefore, this document discusses IA frameworks, methods, approaches and resources that can be useful to enable integration of health considerations into CE initiatives and gives recommendations where practicable.

It should be noted that, while CE strategies, visions or roadmap documents may also include policy priorities and associated concrete actions, PPPPs that are of importance for the CE may also exist outside the context of these specific priorities. Thus, it is of key importance for those engaged in preparing these PPPPs to be aware of overall CE strategies and visions for the associated country, region or locality.

The WHO definition of health is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). Consideration of health in this report is consistent with this definition and includes “hard” endpoints (for example, mortality, morbidity) as well as “soft” ones (for example, well-being, quality of life), and their economic, social and environmental determinants. This report therefore recognizes that human health is greatly influenced by policies and actions, including the

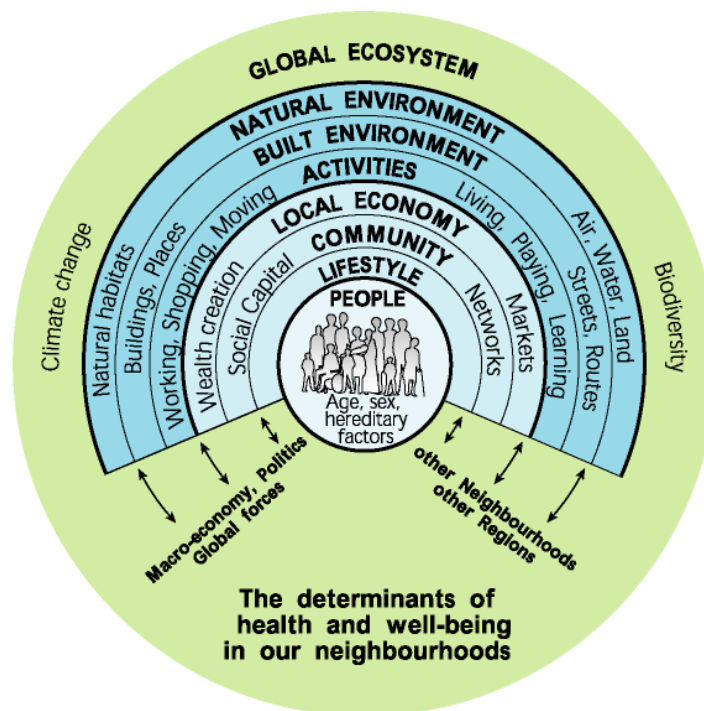
numerous actions associated with CEs, that are beyond the health sector and that affect health via a variety of pathways (see Fig. 1).

The main target readership for this document is the strategy/vision-setting and PPPP-making communities, in particular those with an interest in health, environmental and socioeconomic elements. In addition, research communities, civil society organizations, businesses and all stakeholders involved in CE development are addressed.

Specifically, the document aims to inform:

- those involved with the development of CE strategies and roadmaps at national, regional and local levels;
- policy-makers and planners at national, regional and local levels involved with the development and implementation of PPPPs that are important for the delivery of CE strategies and visions;
- public decision-makers, including politicians and public authorities, with responsibility for CE-related issues (for example, urban development, environmental management, and public and occupational health);
- the research community involved in building knowledge of the health implications of CE transition, including from health, environment and economic disciplines;
- civil society organizations, local initiatives and citizens concerned with CE-related health issues; and
- the business sector concerned with further understanding of the health implications of circular approaches to production and consumption.

Fig. 1. Determinants of health and well-being



Source: Barton & Grant (2006) based on Dahlgren & Whitehead (1991).

The structure of this document is as follows.

Section 2 provides a summary of concepts, actions and possible health implications of CE transition.

Section 3 focuses on relevant assessment frameworks, processes, methods and resources, and considers their use to enable the inclusion of human health considerations in a CE context, both in the development of CE strategies and visions and in PPPs that are at the heart of implementing CE strategies and visions. Particular attention is given to health impact assessment (HIA) as well as to other IAs that integrate health issues, including strategic environmental assessment (SEA), environmental impact assessment (EIA) and social impact assessment (SIA). In this context, suggestions and recommendations are provided, although further exploration of the appropriate use of IA in different CE contexts and at different levels (national, regional, local) is needed to provide more nuanced recommendations.

Annex 1 provides background on those documents that set the context, as well as the aims, objectives and actions, for the move towards a CE – namely, national, regional and city-level CE strategies, roadmaps and visions. Annex 2 gives examples of human health and welfare implications from CE implementation. Annex 3 outlines additional assessment frameworks. Annex 4 shows a draft template for screening potential human health impacts of a proposed CE PPP. Annex 5 provides descriptions and links to useful resources on methods, tools and databases.

This guidance document builds on the assessments, conclusions and recommendations of the report *Circular economy and health: opportunities and risks*, published by the WHO Regional Office for Europe (2018). Key messages from this report are given in Box 1. In particular, the current document starts to address the need for: (i) further understanding of the health impacts of CE transition and a more complete assessment of policy priorities for addressing the negative impacts and enhancing the positive ones; and

(ii) increased coverage and integration of health benefits and risks in national, regional and global strategies and visions as well as associated CE implementation PPPPs.

This document has also been informed by the discussions and input from the expert meeting

convened by WHO on 12–13 November 2018, “The Concept of Circular Economy and its Positive and Negative Implications on Health and Environment”. It has also greatly benefited from the comments of and consultations with other experts, as outlined in the Acknowledgements above.

**Box 1. Key messages from *Circular economy and health: opportunities and risks* (WHO Regional Office for Europe, 2018)**

- Extensive use of natural resources threatens to exceed the carrying capacity of the planet. The concept of CE offers an avenue to sustainable growth, good health and decent jobs, while protecting the environment and its natural resources. This concept has gained increasing prominence in recent years in policy development at the international, European Union (EU) and national levels of governance, and in business practices and consumer behaviour. Until now, the focus has been on the benefits of CE transition from the point of view of efficient and sustainable production and consumption. Coverage of the health implications has been relatively limited.
- The report *Circular economy and health: opportunities and risks* set out to address this gap by framing the concept of CE and its implementation in the context of health, to set the scene for further policy development, research and stakeholder engagement.
- CE transition presents a major opportunity, promising to yield potentially substantial health benefits while contributing to the attainment of a number of Sustainable Development Goals (SDGs). The benefits are both direct, such as savings in the health care sector, and indirect, such as decreasing health risks from reduced environmental impacts of production and consumption.
- There are also risks of unintended adverse health effects in this transition, particularly related to managing risks from exposures to hazardous materials. Where such risks have been identified, they frequently affect vulnerable groups disproportionately through, for example, informal work practices involving children and low-income groups.
- Understanding of the health impacts of CE transition – particularly in relation to chemicals of concern, water reuse, electrical and electronic waste, and distributional effects – shows significant gaps. Further research and evidence are essential to enable a more complete assessment of policy priorities for addressing the negative impacts and enhancing the positive ones.
- Both policy discussions and global, national and regional CE strategies and action plans need to increase their coverage of, and better integrate, health benefits and risks. The health sector should therefore be actively involved in the transition process.
- Policy priorities that have been identified for addressing areas of immediate concern include appropriate regulation, monitoring and evaluation of CE initiatives; support for research; improved management of informal waste sites; and measures to raise public awareness. These should be addressed so that no reductions in support from the public and the policy community undermine progress in CE implementation, including realizing potential health benefits.
- All key stakeholders have important roles in securing health benefits and minimizing health risks, including intergovernmental organizations, governments, the public sector, the business sector, nongovernmental and civil society organizations, the research community, the mass media and the general public. Dialogue and cooperation between stakeholders, through agreed partnerships and action plans, are vital to drive progress in promoting the health benefits and addressing the health risks of CE transition.

Finally, proposed guiding principles for promoting health, well-being and equity for stakeholders developing CE strategies, visions and roadmaps,

and implementing CE PPPPs, are given in Box 2. Key messages from the current report are summarized in Box 3.

## Box 2. Guiding principles for promoting health, well-being and equity in CE

The guiding principles are tailored for those who develop CE strategies, visions and roadmaps and for those who implement CE PPPPs.

- Health opportunities and risks should be integral to the development of **CE strategies, visions and roadmaps**.
- **Health should be defined in its broadest sense** as reflected in the WHO definition: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948).
- This broad definition is consistent with the conceptualization of **health as an outcome of multiple environmental and social determinants**. “Good health and well-being require a clean and harmonious environment in which physical, psychological, social and aesthetic factors are all given their due importance.” European Charter on Environment and Health (WHO Regional Office for Europe, 1990)
- Consideration of health and well-being within CE activities should be promoted in the context of contribution to health-relevant **targets for SDGs**.
- CE strategies and actions should be consistent with statements/vision for **occupational health and decent work** conceived by the International Labour Organization (ILO) and WHO. The ILO/WHO Joint Committee on Occupational Health’s comprehensive definition of the aim of occupational health is: “The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations” (ILO, 1995). Occupational safety and health is an integral part of the Decent Work Agenda of the ILO.
- PPPPs for CE implementation should consider health and well-being impacts through use of **HIA, EIA, SEA and other relevant IA methodologies** to the extent feasible. However, it is necessary to develop and tailor such IAs for further use in the context of CE and health.
- Assessment of CE PPPPs should include **public health and well-being implications** related to consumption of goods and services, and other direct or indirect public health implications resulting from CE actions, to the extent feasible.

**Box 3. Key messages from the current report**

- **Health and well-being should be mainstreamed** as a key consideration in CE strategies and visions as well as associated implementation PPPPs. This requires involvement of health experts from early stages, contributing substantive as well as methodological knowledge and experience.
- There is **great potential for further use of IA methods**, including HIA, in the process of understanding the health implications of CE transition and in developing actions to promote opportunities and manage risks.
- This report sets out possibilities for the use of such assessment methods, but there is **a need for further exploration of their appropriate use** in different contexts, at different government levels and for different activities (strategies and visions as well as associated PPPPs). The means to achieve this could include demonstration projects attached to real CE initiatives in order to further understand and disseminate advice on appropriate applicability in different contexts.
- It is necessary to consider how best to **integrate different forms of IA**. This requires optimizing the coverage of health in existing IAs including dedicated HIA, EIA, SEA and integrated forms of IA.
- There is a need to **build closer links between the health care sector and those engaged in developing CE strategies and visions as well as implementing actions** at all levels. Enabling and demonstrating use of health-related assessment methods, including HIA, can be part of this process.
- At the level of CE strategy/vision and implementation PPPPs, a first step to integration and further assessment of the health implications of CE transition is enabling routine **health impact screening** of proposed priority areas and related actions. This process could also include identification of additional health-related actions to be included within action plans, to boost opportunities and manage risk. This may include specific actions for the health care sector.
- There is **a need for continuing research** to fill significant knowledge gaps on the health implications of CE transition (for example, chemicals of concern, plastics) which could be a key barrier to IA in some contexts.
- Assessments of health impacts need to recognize that a large proportion of **practical CE activities are driven by businesses and industries**. It is therefore essential to understand specific business and industrial sector capacities (for example, for data provision) and their role in the context of IAs.
- Consideration should be given to creating a **repository for data**, specifically focused on the health implications of CE, that can be used for HIAs and other assessments.

## 2. Circular economy and health

This section provides a summary of the concept, actions and possible health implications of CE transition as necessary background to section 3, which provides an overview of assessment processes, methods and resources to integrate health issues into the development of CE strategies/visions and implementation PPPPs.

### 2.1 Outline of CE: concept and actions

The CE concept is generally understood as a transition from a linear (take, make, use, dispose) model to a circular (restorative and regenerative) model (Fig. 2). Although there is no single and universally accepted definition, the EU action plan for CE describes the transition as one “where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised” (EC, 2015). Summarized from *Circular economy and health: opportunities and risks* (WHO Regional Office for Europe, 2018), key aspects of the definition of CE are as follows.

- There is a focus on the need for closed loops of material flows and reduced consumption of virgin resources.
- Most definitions go beyond the management of material resources to incorporate additional dimensions, such as changing models of consumption.
- A key focus is on reducing the environmental pressures related to resource extraction, emissions and waste.

- It is often presented as enabling wider economic and social benefits, such as greater well-being, sustainable growth and employment.
- Although definitions do not in general explicitly mention health, this should be seen as integral to CE transition.

This CE model is at the heart of most current CE strategies and visions (a sample of which is presented in Annex 1). While preparation of those strategies and visions can be in the hands of one authority (for example, a city or regional administration), delivery will require the involvement of numerous public and private stakeholders, including, for example, (public) planners of different sectors, private businesses and economic development agencies, as well as the general public (which is significant, in particular, for the choices it makes).

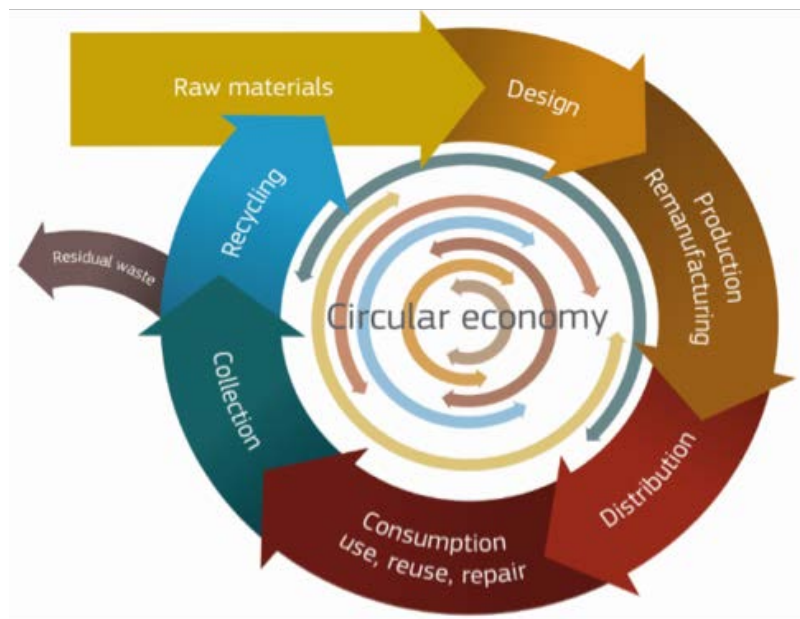
Fig. 3 provides an example of which stakeholders may be involved in the CE delivery process. Sectoral policy-makers and planners include those responsible for energy, waste, transport, food and health care.

Generally speaking, key aspects of the implementation of the CE concept are as follows (summarized from WHO Regional Office for Europe, 2018).

- It is characterized by (i) reducing the use of primary resources; (ii) maintaining the highest value of materials and products; and (iii) changing utilization patterns (Table 1).
- Actions needed to achieve this transition in the above categories include: recycling; efficient



Fig. 2. Simple CE model



Source: EC (2015).

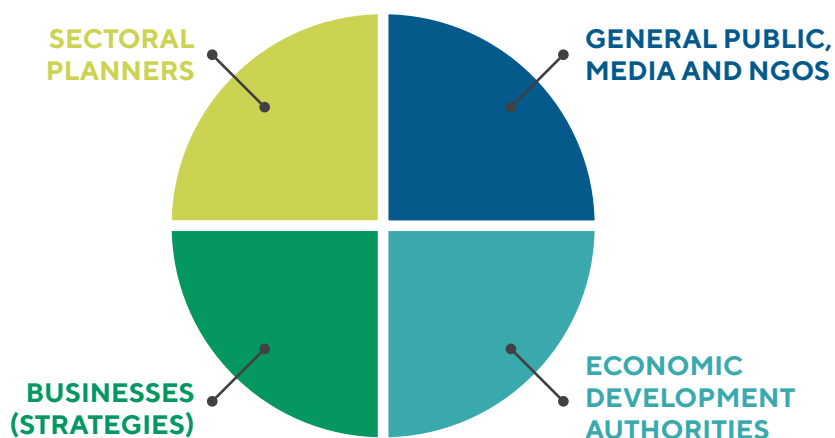
use of resources; utilization of renewable energy sources; remanufacturing, refurbishment, and reuse of products and components; extension of product life; treating products as services; sharing of products; prevention of waste, including designing out waste in products; and a shift in consumption patterns.

- To facilitate the actions and investments needed for a CE transition, changes in perception and behaviour are needed at all levels, from consumers to producers and policy-makers.
- A number of frameworks also set out processes and actions needed for a CE transition. For

example, the Ellen MacArthur Foundation uses the Regenerate, Share, Optimise, Loop, Virtualise, and Exchange (ReSOLVE) framework, which identifies six types of action that businesses and governments can take (EMF, 2015a).

- The transition requires an integrated effort by all stakeholders including the state, the business sector, nongovernmental organizations (NGOs) and civil society.
- CE transition is also connected to key global and WHO initiatives, as outlined in Box 4.

Fig. 3. Possible stakeholders in the delivery of CE processes



Source: EC (2015).

Table 1. Types of CE processes/actions

Category of CE process/action (consumption/production)							
Reduce use of primary resources (production)			Maintain the highest value of materials and products (production)			Change utilization patterns (consumption)	
Type of CE process/action							
Recycling	Efficient use of resources	Use of renewable energy sources	Remanufacturing, refurbishment, and reuse of products and components	Product life extension	Product as service	Sharing models	Shift in consumption patterns

Source: Rizos et al. (2017).

Box 4. Global initiatives connected to CE

A number of global and European initiatives are associated with the CE concept. In particular, CE principles have been identified as a means to address several of the SDGs, notably SDG 12: “achiev[ing] the sustainable management and efficient use of natural resources” (12.2) and “reduc[ing] waste generation through prevention, reduction, recycling and reuse” (12.5) (EC, 2015). The CE concept is also interlinked with and incorporated in the green economy concept, particularly in relation to its low-carbon and resource efficiency focus.

A number of key WHO initiatives and publications connect to CE aims and policies, primarily in the area of the green economy, environment and sustainable development. These include:

- The **European Environment and Health Process (EHP)**, and the associated *EHP Roadmap towards the Sixth Ministerial Conference on Environment and Health* (WHO Regional Office for Europe, 2015) and the declaration of the conference, include a focus on waste. The declaration states that progress on actions to improve the environment and health “can be accelerated and sustained by enhancing interdisciplinary research and supporting the transition to a green and circular economy as a guiding new political and economic framework” (WHO Regional Office for Europe, 2017a). Environmental and health effects, costs and inequalities related to waste management and contaminated sites need to be considered; furthermore, it is important to “support the transition to a circular economy using the waste hierarchy as a guiding framework to reduce and phase out waste production and its adverse health impacts”. The Consensus Statement on Industrially Contaminated Sites and Health by ICSHNet COST Action also includes, among proposals for further work and support for implementation, the goal to “increase public awareness of the importance of sustainable developments goals (SDGs) and circular economy” (ICSHNet, 2018).
- The strategic document on **environmentally sustainable health systems** (WHO Regional Office for Europe, 2017b) presents a vision for a health system that improves, maintains or restores health, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, to the benefit of the health and well-being of current and future generations.

CE principles have gained increasing prominence in strategy and policy development at the national, EU and global levels, and in business practices for the promotion of sustainable production and consumption. This encompasses a broad range of activities across the WHO European Region, although engagement with the concept is much greater in EU countries than in non-EU countries. Some key developments are:

- adoption of the EU action plan for CE (EC, 2015);
- establishment of CE networks of businesses and NGOs to promote gathering and sharing of knowledge, and experience in innovative circular approaches to production and consumption (such as the Ellen MacArthur Foundation (EMF) in the United Kingdom,<sup>1</sup> Alliance for Circular Economy Solutions (ACES),<sup>2</sup> Circle Economy in the Netherlands and Circular Change in Slovenia<sup>3</sup>); and
- development of national strategies, visions, actions plans and initiatives, as in (e.g.) Denmark, Finland, Luxembourg and the Netherlands; and regional and city-level initiatives, as in (e.g.) Amsterdam and Peterborough.<sup>4</sup>

## 2.2 Types of health impacts of CE transition

Up to now, coverage of the health implications of CE transition has been relatively limited in the development of any of the CE strategies and visions, action plans and policy initiatives. This lack of consideration of health, at the early stages of societal undertakings, is not uncommon: in other sectors – for example, transport, waste, energy and spatial planning – health implications were long dealt with in a more indirect way, with a focus on biophysical aspects only (based, for example, on

expected emissions). Only at later stages of their development did other aspects of health – for example, social and behavioural – become part of the policy debate. Nowadays, such considerations are much more prominent in decision-making processes (see, for example, Fischer et al., 2010). However, a proactive, early involvement of the health sector in all policies is the best way to prevent negative consequences for health and well-being, and in some cases this can be achieved through relatively simple policy provisions, giving rise to so-called “win-wins”. WHO, as well as many other health agencies, has been promoting intersectoral action for health since the 1980s, kickstarting the Health in All Policies (HiAP) agenda (WHO, 2014).

To start addressing this gap in connection with CE, *Circular economy and health: opportunities and risks* (WHO Regional Office for Europe, 2018) developed a framework to categorize pathways through which human health and well-being may be affected (see also Fig. 5 below). It used this framework to identify a number of real and potential positive and negative health implications of CE models and processes, along with the economic sectors affected and issues related to distribution, focusing especially on impacts on vulnerable groups. Annex 2 gives an overview of the health implications identified (focusing on health care, built environment and food sectors). It is stressed that the existence and extent of the identified impacts depend heavily on context, and research is limited in many cases. Therefore, much further work is needed to assess the quality and extent of the available evidence of impacts and to fill key knowledge gaps.

**General findings** on the implications for human health from the implementation of a CE approach were as follows.<sup>5</sup>

1 Circulate (<http://circulatenews.org>) is a CE information website curated by EMF.

2 ACES website: <https://www.green-alliance.org.uk/ACES.php>.

3 Circular Change website: <http://www.circularchange.com>.

4 Annex 1 provides some examples; it also shows how health implications are currently covered.

5 WHO Regional Office for Europe (2018) contains a number of case studies on these (positive and negative health issues), including for chemicals of concern, electrical and electronic waste (e-waste), food safety, the built environment and savings in the health care sector.

- There are potentially significant **positive health implications from reducing the use of primary resources, maintaining the highest value of materials and products** (through recycling and reuse of products, components and materials), and moving towards greater use of renewable energy and energy efficiency. In particular, direct and indirect benefits come from reducing the environmental impacts of manufacturing processes (by improving air, water and soil quality and reducing greenhouse gas (GHG) emissions) and making cost savings in the health sector.
- There is also potential for **health benefits from changing utilization patterns** – for example, through the health care system introducing performance models in the procurement of equipment.
- The potential **negative health impacts** identified relate to risks in the recycling and reuse of products, components and materials. These relate, in particular, to the management of chemicals of concern, such as bisphenol A (BPA) and brominated flame retardants (BFRs) in a variety of products.
- Where negative impacts have been identified, their effects frequently fall disproportionately on **vulnerable groups**. Conversely, the reduced

global environmental pollution resulting from CE will result in long-term health gains that may benefit disadvantaged groups, which are known to be disproportionately affected by environmental impacts.

- Significant **knowledge gaps** exist, particularly related to the nature of negative impacts (for example, in the case of hazardous chemicals). Thus, further research and evidence are essential for a more complete assessment of priorities for addressing negative impacts and enhancing positive impacts, in order to inform policy development.

A key **general conclusion** is therefore that the CE transition could provide a major opportunity to yield substantial health benefits that will contribute to achieving the SDGs. Nevertheless, the transition also carries risks of adverse unintended health effects – for example, in processes related to hazardous materials. CE strategies, action plans and other policy initiatives therefore need to better incorporate these health issues. This is the rationale for the discussion of appropriate assessment frameworks, methods and resources for including health in CE given in section 3.



### 3. Assessment frameworks, processes, methods and resources for including health in CE strategies and implementation

This section focuses on practical advice and information on relevant IA frameworks, processes, methods and resources, and considers their use to enable the inclusion of human health considerations in a CE context. First, assessment frameworks that are or could be used in CE strategies and visions are outlined. This is followed by a description of IA frameworks typically used in

PPPPs associated with CE implementation. Table 2 gives an overview of what is meant in this report by strategy/vision level and PPPP implementation level, accompanied by examples in the CE context. Explanations are provided of what IAs are used for and how they can be applied in this context. Resources for a more detailed explanation of their application are given in Annex 5.

**Table 2. Overview of CE-related activities at different levels**

Level	Visions/goals/ strategy	Policy	Plan	Programme	Project
International	International targets and goals – for example, EU recycling targets, European strategy for plastics in a CE, SDGs				
National	Country CE strategies and roadmaps; other related strategies on environment, resource efficiency, etc.	National policies supporting CE (includes regulation, incentives, investment) – for example, national policies for waste	Long-term actions in support of national policies – for example, sector plans to deliver waste policy	Fixed-term actions supporting, for example, national waste prevention programme	National-level projects on specific issues – for example, recycling networks
Local	City-level CE strategies and roadmaps – for example, an urban 5-year waste strategy	Local government policies in support of CE – for example, a policy to support reuse of plastics	Long-term actions in support of local CE strategies – for example, plans to deliver recycling targets	Fixed-term actions in support of local CE strategies – for example, appointment of a waste czar	Local initiatives – for example, recycling projects by local government, business, NGOs

**Table 3. Possible assessment methods for integrating health into CE**

Level	Possible assessment methods for understanding health impacts of CE	Contribution to understanding of health impacts of CE scenarios	
Strategy/vision/roadmap	Macroeconomic analysis and other estimates of aggregate impacts	Broad estimates of social and health changes in externalities for circular versus linear scenarios	
		Estimates of health care sector savings	
	Screening/scoping of impacts	Use of screening and scoping methods to identify potential types of health impacts (positive and negative) of strategic priorities/focus areas and targets	
PPPPs	HIA	Direct focus on PPPPs to enhance positive outcomes and assess potential (negative) health effects	
	EIA	EIA involves assessment of environmental impacts of projects and is triggered on the basis of expected significant negative impacts. Information and analysis routinely include human health. Approach can be human health in EIA or in HIA-inclusive EIA information.	
	SEA	SEA involves assessment of environmental impacts of policies, plans and programmes and is triggered on the basis of expected significant negative impacts. Information and analysis routinely include human health. Approach can be human health in SEA or in HIA-inclusive SEA information.	
	HIA (SIA)	Health impacts considered among other impacts on people and communities; may provide input to other assessments.	
	Life cycle assessment (LCA)	Informs on potential impacts of products and services on the environment and human health; may provide data for other IAs.	

The term “impact assessment” is used for a wide range of decision support instruments that seek to assess the consequences of PPPPs, to provide recommendations on how to mitigate negative impacts, and to enhance positive outcomes by looking at alternative actions.

An overview of possible assessment methods for integrating health into CE at strategic and implementation levels is given in Table 3. These methods are explained further in the following sections.

### 3.1 Assessment frameworks for CE strategies and visions

A review of a sample of existing CE strategies, visions and roadmaps (see Annex 1) found limited formal assessment of impacts, and when an assessment is conducted, there is no common approach. Some documents have broad quantitative estimates of economic and environmental impacts of a programme of

	Examples
	<ul style="list-style-type: none"> <li>EMF (2015b). EU 27-level estimates of health externalities on food, mobility and built environment for CE scenarios to 2050. Externalities include carbon dioxide (CO<sub>2</sub>) and opportunity costs related to obesity.</li> <li>Circle Economy (2015). Macroeconomic analysis for Circular Amsterdam vision and action agenda. Includes estimates for CO<sub>2</sub> emissions reductions for construction chain and organic residual streams in CE scenarios versus linear scenarios.</li> <li>EMF (2012). Analysis of opportunities for CE in Scottish context. Estimates cost savings across manufacturing subsectors and for consumer goods (including consumer health goods).</li> </ul>
	<ul style="list-style-type: none"> <li>EMF (2015a). Analysis of use of performance models in estimated procurement savings for hospitals in Denmark.</li> </ul>
	<ul style="list-style-type: none"> <li>GLA (2017). Broad scoping assessment of issues to be addressed in an integrated impact assessment of the London Plan; includes health and health inequalities issues.</li> <li>Green et al. (2019). Public health impact of Brexit in Wales; example of a broad assessment of implications for health of a key change in policy environment.</li> </ul>
	<ul style="list-style-type: none"> <li>Birley et al. (2008). HIA of Energy from Waste project proposal in Jersey.</li> <li>Winkler et al. (2017). HIA of business models for waste recovery and reuse in Hanoi, Vietnam.</li> </ul>
	<ul style="list-style-type: none"> <li>Fischer et al. (2018). Considers how urban green space contributes to improved human health.</li> </ul>
	<ul style="list-style-type: none"> <li>Fischer et al. (2010). How health can be better incorporated into strategic environmental assessment.</li> </ul>
	<ul style="list-style-type: none"> <li>Heikkinen &amp; Sairinen (2007). Three case studies of SIA in regional land use planning in Finland; includes health among themes.</li> <li>PRé Sustainability (2016). Includes pilot examples of use of product SIA, which include occupational and consumer health.</li> </ul>
	<ul style="list-style-type: none"> <li>IFEU (2017). A comparative LCA of canned food packaging; includes findings on photo-oxidant formation, which affects human health and ecosystems.</li> </ul>

proposed activities by sector. Examples of this are the Circular Amsterdam vision and action agenda (Circle Economy, 2015) and the report *Growth within: a circular economy vision for a competitive Europe* (EMF, 2015b). These highlight the projected economic benefits, such as value creation and employment, and environmental benefits, such as materials savings and reductions in CO<sub>2</sub> emissions, for circular versus linear scenarios. However, the methodology used is not generally stated in detail. Furthermore, although aggregate estimates for social (including health)

benefits are given in EMF (2015b), the health impacts associated with strategies, visions and roadmaps at national, regional or city level (in the examples given in Annex 1) have not generally been assessed in quantitative or qualitative terms.

The Luxembourg CE roadmap (EPEA, 2014) includes SWOT (strengths, weaknesses, opportunities, threats) analyses of pursuing circular principles for each sector and discusses elements of technical assessment without providing any concrete figures, suggesting that

existing assessment tools will need to be adapted to meet CE requirements. The report *Making things last: a circular economy strategy for Scotland* (Scottish Government, 2016) introduces targets for measuring progress, while the French *Roadmap for the circular economy* (MTES, 2018) includes overall quantitative objectives for resource consumption, waste, plastics recycling and job creation. These targets are useful for IAs of other policies, plans and programmes (see section 3.2). *New thinking: Canada's roadmap to smart prosperity* (Smart Prosperity, 2016) underlines the importance of looking at other strategies and visions that are not necessarily referred to as CE but which include important CE elements. Here it is “smart prosperity” that is the key message and is based on sustainable development principles.

As presented in Table 3 above, possible ways to enable integration of health issues into CE strategies, visions and roadmaps include the following. Decisions on whether and how to use these approaches will depend on context factors such as government level and available resources; these options should not, therefore, be taken as recommendations in all cases.

- *Inclusion of health externalities in macroeconomic analysis of impacts.* Further development and use of a common approach for broad quantitative estimates of economic impacts, which include estimates for impacts on social and health externalities for circular versus linear scenarios. Although such estimates are usually tentative, the inclusion of health externalities can highlight the scale of potential health benefits and help to establish the issue of health and well-being as a key element in a strategy; it can also promote its inclusion in IAs at implementation level. They also allow for inclusion of the many individual CE-related actions that can be taken by business (on products and processes) and consumers that are not part of any formal PPPP.
- *Direct focus on the health care sector.* For example, via assessment of potential savings resulting from a programme of CE actions in

hospitals (EMF, 2015a). However, it is important to remember that the determinants of health are much wider than the health care sector.

- *Impact identification and characterization.* Use of screening/scoping methods for identification of potential health impacts (as in the screening and scoping stages of IAs). Examples of studies that aim to identify and characterize pathways of potential health impacts (positive and negative) of strategic priorities/focus areas are given in Table 3. Although these examples are not all directly related to CE strategies, the methods can be used or adapted for a CE context. Key aims of such impact identification and characterization exercises would be:
  - i. to engage stakeholders in integrating health and well-being as part of the strategic development process;
  - ii. to aid inclusion of health as an essential element in CE strategies, roadmaps and visions;
  - iii. to demonstrate where identified possible health impacts are relevant for further analysis within IAs for PPPPs implementing CE approaches; and
  - iv. to allow identification of indirect health impacts (via social and behavioural determinants of health) that are not generally included in IAs.

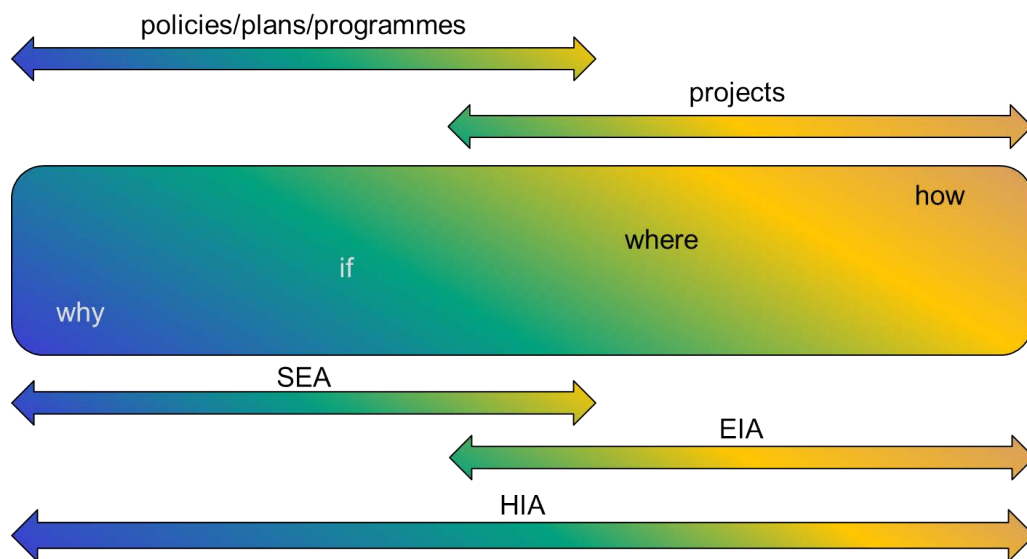
These suggested approaches to integrating health into CE strategies and visions will need further development and testing in collaboration with those currently developing strategy, roadmap and vision documents. The aim would be to provide a template for a common approach to the inclusion of health in such strategies and visions.

### 3.2 Assessment frameworks for PPPPs associated with CE implementation

While CE strategies and visions at times include technical, expert-based assessments as explained above, in many countries (including most countries in the WHO European Region), various



Fig. 4. Linkage of IAs in PPPPs



Source: Nowacki (2018).

PPPPs that are legally required and are associated with statutory as well as nonstatutory participatory assessment frameworks are key elements of CE implementation. These technical assessments are usually referred to as impact assessments. In the EU and many other countries, there are formal requirements for such assessments – for example, SEAs for policies, plans and programmes and EIAs for (big) projects. These routinely include aspects associated with human health, though mainly with a focus on biophysical aspects. Furthermore, at times – and especially if health implications are considered to be of particular importance in the area for which a PPPP is prepared – HIA may also be conducted.

HIA is ideally placed to assess the health impacts of PPPPs. However, there are other frameworks, such as EIA and SEA, that are included as (i) they have the potential to offer useful additional understanding and information on aspects of human health impacts, and if results are available, this may add value to decision-making; and (ii) there are circumstances where these other frameworks are formally required and HIA is not (then the use and scope of HIA depends on the extent to which health is integrated into one of the other frameworks). Fig. 4 summarizes the linkage between EIAs, SEAs and HIAs in terms of their application across the spectrum of PPPPs.

Finally, other types of assessment that may also be prepared can include elements that are of key importance for human health, including in particular SIA and LCA. Both these types of assessment may provide useful information on occupational and consumer health, including for new products and processes using circular principles, eco-designs, etc.

These assessments are introduced and described in Annex 3.

### 3.2.1 Health impact assessment (HIA)

A commonly cited definition of HIA is what is known as the Gothenburg consensus definition: HIA is “a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population” (WHO European Centre for Health Policy, 1999).

The International Association for Impact Assessment (IAIA) reproduces this definition and adds that “HIA identifies appropriate actions to manage those effects” (IAIA, 2006). This addition is rather important as it goes far beyond simply “judging” impacts; it is asking to actively deal

with them, reducing negative implications while enhancing positive outcomes.

HIA is a multidisciplinary approach that aims to protect and promote human health by informing decision-makers and others about the potential health impacts of proposed PPPs and recommending action for more healthy outcomes. Among other advantages, therefore, this approach gives an opportunity to design PPPs in ways that enhance health benefits and mitigate adverse health consequences.

However, it is important to note that in very few countries is HIA actually a legally required decision support tool. Exceptions include Thailand, Slovakia and Lithuania (Lee et al., 2013).<sup>6</sup> While HIA is widely applied, it is mostly on the basis of voluntary action.

Consistent with the definition of health given in section 1 above, HIA uses a comprehensive model of health which includes “hard” health endpoints (for example, mortality, morbidity) and “soft” ones (well-being, quality of life), and their economic, social and environmental determinants (as shown in Fig. 1). This fits well with WHO’s emphasis on HiAP (WHO, 2014).

HIA can be:

- used in a range of geographical contexts and at varying levels – local, regional, national and supranational (for example, EU level);
- used in a range of functional and sectoral contexts, including policy development and analysis; strategy development and planning; commissioning or providing services; resource allocation and capital investment; and community development and planning in, for example, transport, energy, waste and spatial planning;
- “light touch” or detailed and comprehensive; and

- primarily qualitative or primarily quantitative,<sup>7</sup> according to need, resources, timescale and availability of relevant evidence.

In HIA, the involvement of stakeholders, i.e. (representatives of) those involved in or significantly affected by the decision to be made, is essential. This is particularly so in “framing the question” and in discussing the outcomes of the assessment. “Framing the question” includes discussing and agreeing the boundaries of the analysis. This is related to the decision-making process which an HIA is intended to support. It is important that an HIA should at least identify and highlight the pathways for more distant or indirect health impacts, even if it is not practicable to follow them through in detail.

Stakeholder involvement in working out the implications of an HIA is also important. Indeed, rather than seeing HIA primarily as an expert-driven (technical) assessment of risks and impacts, there is a view that one of its main benefits is that it provides a forum for stakeholders to have a structured evidence-based discussion of health and health-related issues, including possible win-wins and trade-offs (Birley, 2011). As input to a decision process, a limited but timely HIA may be more useful than a comprehensive one that is too late – provided that the limitations are understood and acknowledged.

A core goal of HIA is also to address inequalities in health resulting from differing effects of the determinants of health upon various population groups. By ensuring that these differences are understood and acknowledged, HIA can be an important instrument to promote policies and practices that improve health equity and reduce health inequalities (in support of the Rio Political Declaration on Social Determinants of Health (WHO, 2011)). There is potential for an HIA to harmonize with other IAs (including those that are legally required), complementing them by

<sup>6</sup> Mandatory implementation of HIA in these countries applies to projects or major public policies. There are, however, differences between countries in terms of HIA requirements, methodology and responsibilities.

<sup>7</sup> Fehr et al. (2016) is a recent review of resources for quantification.

#### Box 5. Case study: assessing potential health impacts of waste recovery and reuse business models in Hanoi, Vietnam

This study used HIA methodology as an evidence-based decision support tool for identification and promotion of business models for waste recovery and reuse. It determined the range and magnitude of potential community health impacts of six solid and liquid waste recovery and reuse business models in Hanoi, Vietnam. The business models included were: (1) agrowaste to electricity; (2) on-site energy generation by sanitation service providers; (3) dry fuel manufacturing; (4) wastewater-duckweed-fish rearing system; (5) large-scale composting for revenue generation; and (6) compost production for sanitation service delivery.

An HIA approach was taken that comprised two main phases. In the first phase, secondary data were obtained from peer-reviewed literature relevant to health outcomes that are associated with the recovery and reuse of solid and liquid waste (i.e. soil-, water- and waste-related diseases, vector-related diseases, respiratory diseases and noncommunicable diseases) and underlying determinants (i.e. wastewater quality, access to sanitation and personal protective equipment used by farmers). The information was supplemented with primary data collected through a cross-sectional epidemiological survey.

In the second phase, a semi-quantitative IA was applied, combining the evidence base of the HIA with the detailed description provided for each of the business models to be tested. In this assessment the likelihood and impact level (ranging from major negative impact to major positive impact) were determined for each potential health impact. Next, the estimated number of people in all population groups affected was multiplied by the scores obtained for likelihood and impact level for each of the potential health impacts. The obtained magnitude provided a semi-quantitative description of the potential of a business model to have a positive overall impact (i.e. reducing adverse health outcomes compared to the baseline) or negative overall impact on the health of specific populations groups. Finally, the overall impact rating of the potential health impact of each business model was derived from the sum of the magnitudes and ranked according to the following categories: (1) major positive impact; (2) moderate positive impact; (3) minor positive impact; (4) insignificant; (5) minor negative impact; (6) moderate negative impact; and (7) major negative impact.

Key results from a public health perspective were that wastewater reuse for inland fish farming, coupled with on-site water treatment, has considerable potential for individual and community-level health benefits. One of the business models investigated (i.e. dry fuel manufacturing with agrowaste) resulted in net negative health impacts. Overall conclusions were that the reuse of liquid and solid waste – as a mean to recover water and nutrients and to produce energy – has considerable potential for health benefits if appropriately managed and tailored to local contexts.

*Source: Winkler et al. (2017).*

providing important additional information on health issues and by building on their assessment of health determinants. If a set of IAs is intended, it is essential that there is early discussion of the linkages between them because the modelling of pollution (for example) necessary for an EIA of a specific project may not provide what is needed for an HIA. Without such discussion, the HIA, which often comes relatively late in the overall process, may be disadvantaged, in that it has no option but

to work with inputs which, if anticipated, could have been more relevant.

Indeed, HIA is a highly integrated undertaking, in both its scientific and its collaborative aspects. It helps to work iteratively, deciding which aspects will most benefit from more detailed attention in light of what previous stages have indicated is important (Hurley & Vohra, 2010).

An example of an HIA undertaken for a CE-relevant project, on the potential health impacts of waste recovery and reuse business models, is given in Box 5.

### 3.2.2 Strategic environmental assessment (SEA)

The first legislation requiring assessment of the environmental impacts of what was referred to as “federal actions” is the US National Environmental Policy Act (NEPA), signed by then US president Richard Nixon on 1 January 1970. This included requirements for assessing impacts of PPPs. Subsequently, in practice, it was mostly projects that were assessed, as more certainty in predicting impacts is possible at this level than at levels higher up the decision hierarchy, i.e. at the levels of policies, plans and programmes. Most countries that subsequently introduced requirements included projects only in what became known as environmental impact assessment (EIA) (see section 3.2.3). Literally all countries globally now have requirements for some form of EIA for the development of “big” projects that have a high propensity to cause significant adverse environmental impacts. Human health plays a key role in most EIA systems, even if the focus tends to be on biophysical issues such as water and air pollution, noise and vibrations, and similar issues (Fischer, 2014). NEPA, for example, when explaining its purpose, mentions health several times, saying that it aims to “promote efforts which will ... stimulate the health and welfare of man”, “assure for all Americans ... healthful surroundings”, and “attain the widest range of beneficial uses of the environment without degradation, risk to health or safety” (NEPA §1 & 101, US EPA 1970).

The focus on projects in practice meant that key decisions leading to projects – i.e. decisions taken at the levels of policies, plans and programmes – frequently remained unassessed. This led to efforts to design environmental assessment requirements specifically for those strategic levels. Importantly in this context, in 2001 the EU published Directive 2001/42/EC on the assessment of environmental impacts of certain plans and programmes,

commonly referred to as the EU SEA Directive (EU, 2001), which had to be implemented by Member States by 2004. Subsequently, in 2003, the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (the Kiev Protocol) was also published, making SEA a formal requirement in some non-EU countries (UNECE, 2003).

The environment and health ministries of the WHO European Region recognized SEA by adopting the Declaration of the Fourth Ministerial Conference on Environment and Health in Budapest, Hungary, in 2004 (WHO Regional Office for Europe, 2004a). Furthermore, this declaration was endorsed by the WHO Regional Committee for Europe, the main governing body of the WHO Regional Office for Europe, through its resolution EUR/RC54/R3 on Environment and Health (WHO Regional Office for Europe, 2004b). This resolution calls on WHO Member States to continue addressing the links between health and the environment and to assess health impacts; to support capacity-building at technical and policy levels to facilitate Member States’ actions in establishing practical and institutional mechanisms for effective implementation that meets the legislative requirements for HIAs in the Kiev Protocol; and to advocate the inclusion of environment and health considerations in the policies and actions of other sectors.

The legal requirements for SEA routinely focus on introducing a process for the assessment of one specific policy, plan or programme, usually consisting of screening, scoping, analysis and report preparation, decision-making, follow-up, and consultation and participation stages (see section 3.3 below). Nevertheless, there is consensus that, in order to be effective, SEA needs to be approached within the context of an overall framework, which allocates certain tasks, associated options and substantive issues to be considered within an overall policy, plan and programmes system. SEA has therefore been defined as follows (Fischer, 2007).

- A systematic, objectives-led, evidence-based, proactive and participative decision-making support process for the formulation of sustainable policies, plans and programmes, leading to improved governance; it can function as:
  - a structured, rigorous and open project EIA-based administrative procedure in public and, at times, private plan and programme making situations;
  - a possibly more flexible assessment process:
    - in public and at times private policy-making situations;
    - in legislative proposals and other policies, plans and programmes, submitted to cabinet decision-making.
- A policy, plan and programme making support instrument that is supposed to add scientific rigour to decision-making, applying a range of suitable methods and techniques.
- A systematic decision-making framework, establishing a substantive focus, particularly in terms of alternatives and aspects to be considered, depending on the systematic tier (policy, plan or programme), administrative level (national, regional, local) and sector of application.

Human health is an issue that is normally included in SEA requirements. For example, the EU SEA Directive (EU, 2001) specifies in Annex 1 that “information ... be provided on ... the likely significant effects on ... human health” and that “criteria for determining the likely significance of effects” include “characteristics of the effects and of the area likely to be affected, having regard, in particular, to ... the risks to human health”.

In addition to that, the Kiev Protocol on SEA (UNECE, 2003) throughout its text calls for assessment of environmental and health impacts, and in Article 9 explicitly mentions consultation with designated health authorities.

However, as indicated above, what is covered in practice is frequently rather limited in scope. While biophysical, well-established determinants of health (for example, emissions and pollution) are usually considered, other health determinants, including social and behavioural aspects, are not

routinely covered (Fischer et al., 2010). Therefore, a comprehensive assessment covering all relevant health implications is rarely provided.

In the context of CE development, SEA can play a key role in ensuring environmental and health aspects are considered at all stages and decision tiers that contribute to it. Not addressing certain issues at the appropriate stage usually means they will be raised again later at a stage when they may be very difficult to deal with.

SEA may aid the inclusion of human health considerations in the context of CE development, in particular with regards to those policies, plans and programmes that are formally required and that play a key role in CE implementation. In this context, health may be either integrated fully into the SEA or considered in a dedicated HIA that is associated with the SEA.

#### 3.2.3 Environmental impact assessment (EIA)

As mentioned above, EIA is a process that runs alongside a project consent process for identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals and their alternatives at the project level prior to major decisions being taken and commitments made (IAIA, 1999). The purpose of EIA is (IAIA, 1999):

- to ensure that environmental considerations are explicitly addressed and incorporated into the development decision-making process;
- to anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposals;
- to protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and
- to promote development that is sustainable and optimizes resource use and management opportunities.

For EU countries, Council Directive 85/337/EEC on the assessment of the effects of certain public

and private projects on the environment – the so-called EU EIA Directive – has been in force since 1985 (EU, 1985).<sup>8</sup> It had to be ratified by Member States by 1988 and applies to a range of public and private projects. Mandatory EIA applies to projects (as listed in Annex I of the directive) that are considered to have significant effects on the environment – for example, installations for disposal of hazardous waste, larger non-hazardous waste installations and wastewater treatment plants. EIA is at the discretion of the national authorities of Member States for other projects (as listed in Annex II of the directive – for example, urban development projects) based on a “screening procedure” which determines the effects of projects on the basis of thresholds/criteria.

By 2017 the revised and amended EU EIA Directive 2014/52/EU (EU, 2014) had to be transposed by EU Member States into national legislation. Importantly, population and human health are now listed among the factors to be assessed through an EIA. In addition, further issues that are relevant to human health are included, such as climate change and vulnerability (exposure and resilience) to major accidents and/or disasters. These changes are not only relevant to all EU Member States; they also have an influence beyond EU borders – for example, on legal regulations of associated countries and through the development policies of the European Investment Bank and the European Bank for Reconstruction and Development.

EIA has been developed as a tool of assessment for a range of impacts, in principle including health and well-being. In current practice, while health is routinely considered, the focus is usually on disease and illness from risk factors in the physical environment (for example, air, water and soil pollution, noise and radiation), rather than seeking opportunities to promote health and well-being, or considering how the policy or programme

may affect health through social determinants. Consequently, health coverage in EIAs can be “underdeveloped in terms of pathways to outcomes or distribution of health in affected populations” (Fehr et al., 2014).

Consideration of EIA information and analysis is therefore of great importance to aid the inclusion of human health considerations in the context of projects that are associated with CE. Depending on the specific situation of application and the context within which a project is pursued, the approach taken can be either human health in EIA or HIA-inclusive EIA.

### 3.3 Processes and methods associated with IA frameworks

This section introduces processes and methods that are widely used in the different types of IAs applied to PPPPs associated with CE implementation. These relate to the IAs introduced above – i.e. HIA, SEA and EIA. The focus of these frameworks is on identification and assessment of possible positive and negative implications of different CE-related actions on public and occupational health, and distributional/equity effects. While biophysical determinants of health have been routinely used in the EU in implementation-oriented plans and programmes (and occasionally in policies) in SEAs based on Directive 2001/42/EC (EU, 2001) and in project EIAs based on Directive 85/337/EEC (EU, 1985) and Directive 2014/52/EU (EU, 2014), currently they are not generally considered in dedicated CE strategies and visions (for examples, see Annex 1). Furthermore, social and behavioural aspects are only rarely considered in either SEA or EIA. To date, these have been systematically addressed only in HIA and to some extent in SIA (Fischer et al., 2018).

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<sup>8</sup> The EIA Directive of 1985 has been amended three times, in 1997, 2003 and 2009. A newly amended EIA Directive (2014/52/EU) entered into force in May 2014 to simplify the rules for assessing the potential effects of projects on the environment (EU, 2014).

An overview of the key stages of IA, used similarly in SEA, EIA, HIA and SIA, with the purpose and range of methods used at each stage, is given in

Table 4. These stages are discussed in more detail in the context of CE in sections 3.3.1–3.3.6 below.

**Table 4. Stages of IA with relevance to health**

Stage	Purpose	Methods
Screening	Identifies potential hazards to the health status of a population associated with a proposed PPPP in order to establish whether a full IA should be conducted; this is usually triggered when significant adverse effects are possible.	May include literature searches, document analysis, database searches and interview processes. The result of the screening is a decision whether or not to conduct an HIA or other types of health-inclusive IAs.
Scoping	Establishes a steering group to determine how the IA will be conducted (terms of reference); decides on the scope of the assessment and the alternatives to be assessed.	Includes project management, communication, networking and negotiation. Scoping matrices showing important health determinants that may be affected and elements of a PPPP potentially affecting them are routinely produced for the different alternatives to be considered in the IA.
Appraisal of potential health effects (risks and benefits)	Identification and assessment of exposures and health outcomes of different options/alternatives.	Employs a variety of methods, both qualitative and quantitative. May include risk assessment techniques for defined exposures and demographic methods to inform on distribution of effects, as well as economic assessments if applicable.
Reporting/ decision-making	Reporting on outcomes of the appraisal and development of recommendations on how to deal with the PPPP subjected to assessment in order to support decision-making. This may include discussion and development of appropriate actions to manage health effects.	Writing, communication and presentation methods are important in conveying recommendations. This may include a nontechnical summary of findings of the appraisal.
Monitoring and evaluation	Monitoring of determinants of health and real impacts, including unforeseen impacts, on health parameters of implementation of the decision. Evaluation can focus on the outcomes of implementation in terms of changes in health status and health determinants, as well as the process of conducting the IA and the impact the IA has on the decision-making process.	Outcome indicators based on results of monitoring, including epidemiological, survey and demographic methods, as well as process indicators.
Stakeholder engagement	Stakeholder engagement is an important component at each stage of the IA but is sometimes presented as a separate continuous stage.	Includes questionnaires and surveys, public meetings, interviews and focus groups.

Source: adapted from Fehr et al. (2014).

While procedural stages are similar for all types of IA, the underlying rationale of different IA types differs. For example, in HIA a problem-driven approach is frequently applied, where human health is to be promoted through a planned intervention. In this context, it frequently adopts the role of guidance, enhancing communication and awareness among stakeholders. Furthermore, at times HIA also takes the role of a (health) promotional tool, with a tendency towards qualitative analysis and a focus on positive outcomes, rather than negative impacts. EIA and SEA, on the other hand, usually follow an impact-driven approach, which focuses on (often negative) impacts of a specific PPPP. Here, health will usually be only one of many aspects considered. Furthermore, it will often be difficult to isolate impacts on health, and thus subsequent health monitoring will be difficult (Fischer et al., 2018).

### 3.3.1 Screening

The screening stage identifies potential health impacts of a proposed PPPP and aims to establish whether a full IA or other types of health-inclusive assessment is needed. This stage may include literature reviews and stakeholder consultations. Table 5 summarizes key questions that should be asked for screening of potential human health hazards of a proposed PPPP associated with CE

implementation. The screening questions address the following key issues.

- i. Identification of possible pathways (direct and indirect) leading to human health impacts. A useful starting point for considering potential pathways is the framework shown in Fig. 5. For example, consider possible pathways resulting from CE actions promoting recycling of given materials; this should include the possibility of positive and negative health implications away from the location of the CE actions – for example, in relation to movement of wastes, including offshore movement – therefore going beyond what IAs currently normally consider.
- ii. The nature and likely significance of the possible health impacts of these pathways. At the screening stage, this would be a broad assessment based on expert judgement to give a first indication of likely significance.
- iii. The rationale for undertaking an HIA or health-inclusive IA, and how this may add value to the process of devising the PPPP.

A more detailed template for these screening questions is given in Annex 4. The answers to these questions can provide a basis to determine whether an HIA is needed and feasible or how to approach health-inclusive IAs, and to decide on the terms of reference.

**Table 5. Key questions for screening potential human health impacts of a CE-related PPPP**

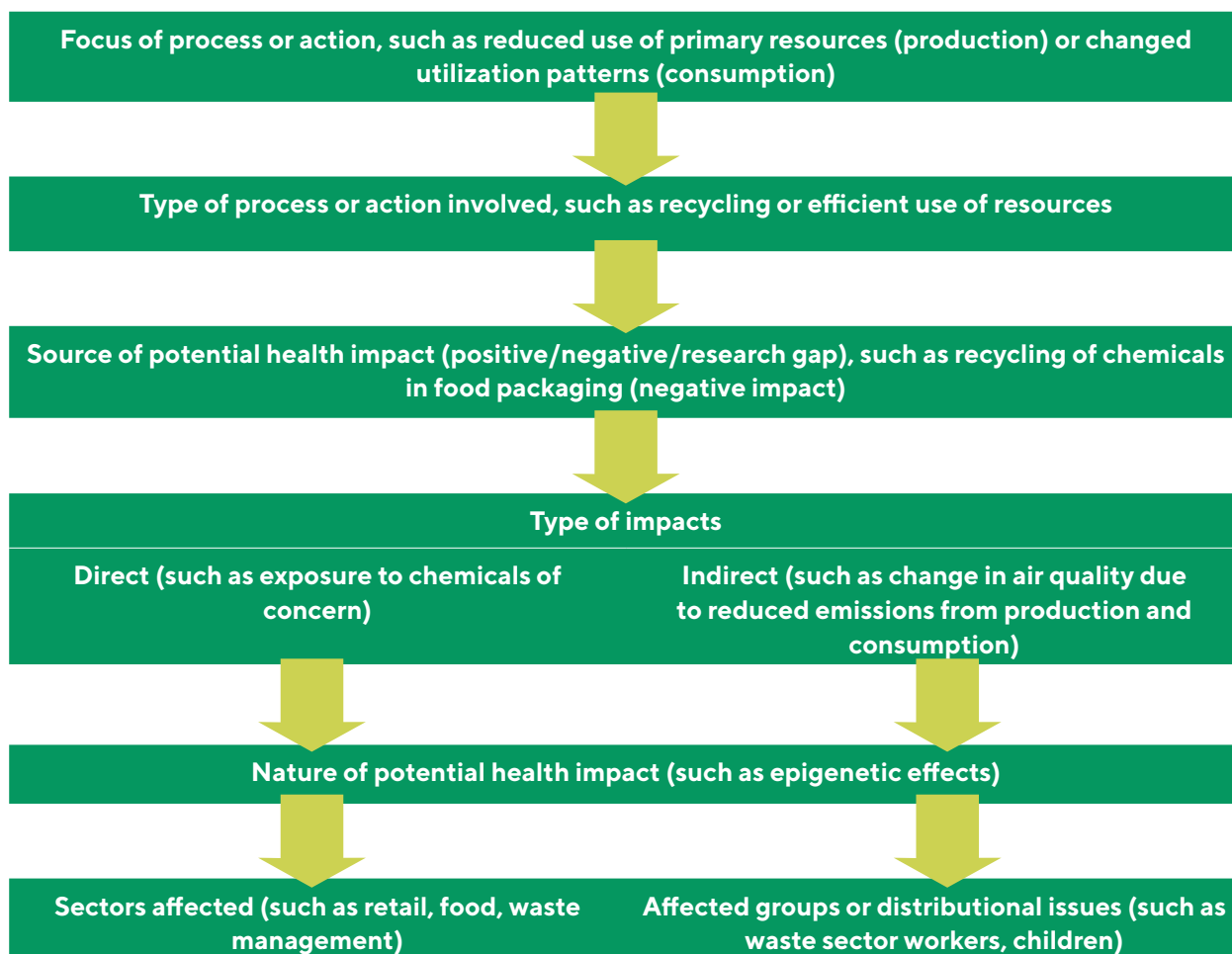
Screening question	Explanation
<b>1. Identification of possible human health impacts</b>	
Are there possible <u>direct</u> human health impacts of a CE action?	Includes direct positive or negative impacts on public and occupational health, mental health and well-being; for example, changes in exposure to chemicals of concern.
Are there possible <u>indirect</u> human health impacts of a CE action?	Includes indirect impacts via changes in social, economic and environmental conditions; for example, changes in air quality due to reduced emissions from production and consumption, improved food choices, or access to green space.
Are there possible direct impacts on the health care sector?	This may include changes in demand for or access to health and social care services, and savings or costs to the sector; for example, savings due to implementation of sharing platforms in the health care sector.



Table 5 contd.

2. Nature and likely significance of possible impacts (for each impact identified above)	
Will the health impact have differential impacts within the population?	How many people are likely to be affected and which socioeconomic groups? Any disproportionate impacts on vulnerable socioeconomic groups?
Will the negative health impacts be difficult to remedy or have an irreversible impact?	What types of health impacts are likely (acute, chronic, terminal)?
Will the health impacts be short-, medium- or long-term?	Linked to likely type of health impact stated above; includes consideration of length of time before positive or negative impacts become evident.
Are the negative health impacts likely to generate public concern?	Linked to answers to above questions on nature of possible impacts.
Are the positive health impacts likely to generate public support for the action?	Linked to answers to above questions on nature of possible impacts.
Are the health impacts likely to generate cumulative and/or synergistic impacts?	Cumulative impacts refer to those that individually might be insignificant but, when considered together, could amount to a significant effect.  Synergistic impacts refer to combined effects of different types – for example, noise, dust and visual effects.
3. Rationale for undertaking an HIA or health-inclusive IA (for each impact identified above)	
Will HIA or health-inclusive IA add value to the policy-making process?	For example, it provides information on health exposures and effects that will better inform policy decisions.
Are identified health issues already included and addressed sufficiently well in other forms of assessment?	For example, other health-inclusive assessments (EIA, SEA or SIA) may have been conducted for the actions in question.
Is IA feasible, and if so, what type?	Includes consideration of resources (time, finances, available expertise).

Fig. 5. Framework for identifying CE-related health impacts



Source: adapted from WHO Regional Office for Europe (2018).

### 3.3.2 Scoping

The scoping stage determines how either HIA or health-inclusive IA will be approached, what the focus will be, and what alternatives are to be considered. A key decision is the appropriate and feasible level of the assessment of health impacts – specifically, the level of detail of the analysis, the comprehensiveness of the literature review, and the breadth of stakeholder engagement. With regards to HIA, there are rapid, intermediate and comprehensive approaches. Other IAs can also include elements of rapid, intermediate and comprehensive assessments, whereby important causal pathways may be identified in a rapid analysis of the likely impacts, and these pathways are revisited with more in-depth (quantitative insofar as possible) analysis at the appraisal stage. It should also be noted that HIA can be an iterative process in which findings that emerge in later steps

can lead to earlier steps being revisited with the possibility of the scope and analysis being revised (Hurley & Vohra, 2010).

Rapid appraisal (using largely qualitative methods) can be used as an entry point where there is a broad range of potential health issues and/or limited resources to conduct the assessment of health impacts. There may be limited availability of quantitative data concerning identified human health risks on which to base assessment of exposures and outcomes (as noted in WHO Regional Office for Europe, 2018). In the first instance, therefore, a rapid appraisal may be needed to establish available knowledge of health impacts and acknowledge knowledge gaps. For example, for a waste reduction recycling programme, this process might establish the extent to which it is possible to include assessment

of indirect health benefits, such as those due to reduced landfilling and manufacturing extraction. In the case of the introduction of circular principles in urban planning, this would address the scope of possible occupational health and public health impacts for the local community that could be included in the assessment.

A key consideration in scoping is determining what alternatives should be considered. In this context, what a “reasonable” alternative is will depend on what issues are assessed elsewhere in the decision-making hierarchy (from policies over plans and programmes to projects). For example, if a project EIA assesses a new bypass, then it is likely that the location of the road (say, to the west or east of a new town) will be important. A transport policy SEA, on the other hand, is likely to consider issues such as overall modal split and/or taxation. Assessing different types of alternatives requires the use of different methods and data. All of this will need to be covered during scoping.

At the scoping stage, it is not only important to focus on the PPPP under assessment, to establish the terms of reference and to explain how the assessment fits into CE; it is also important to define clearly the “governance” arrangements of the proposed initiative, such as who decides what, including who decides how health is to be approached in the IA and whether there will be a specific HIA.

#### 3.3.3 Appraisal

Appraisal should include the following key elements.

- i. Identifying pathways linking the CE-associated PPPP with population health; this may be a more detailed consideration of possible pathways identified at the screening stage. This may include direct impacts, such as changes in exposures, e.g. to chemicals of concern in food packaging, and indirect impacts, such as changes in access, e.g. to green space and healthy food.
- ii. Identifying the population groups affected and how the CE-associated PPPP may change their exposures. Special attention should be paid to distributional aspects, especially exposures for vulnerable groups (e.g. distributional aspects in projects related to edible food waste redistribution); and it should be considered whether disparities with the general population may be reduced or increased.
- iii. Estimating as necessary the relevant background rates of morbidity and mortality.
- iv. Estimating changes in health exposures and consequent impacts resulting from each pathway.
- v. Iterations of the above stages; it can be beneficial to revisit estimates, focusing on the most important identified pathways until uncertainties have been reduced as much as practicable.

Methods used in IA of the nature and importance of health pathways in the above stages may include the following.

##### 3.3.3.1 Qualitative methods

Such methods include stakeholder participation in a range of tools that allow collection of stakeholders’ experiential knowledge and judgement, including surveys, questionnaires, interviews, focus groups, public meetings and working groups. Also covered is qualitative peer-reviewed scientific evidence (Kemmer, 2013; Hurley & Vohra, 2010).

##### 3.3.3.2 Quantitative methods

Making quantitative estimates of predicted health impacts first requires a logical, plausible model linking the PPPP decision to health outcomes (Bhatia & Seto, 2011). Then, evidence must be sufficient to be confident in the causal relationship(s) between the decision and the health status outcome. Quantification also requires data on affected populations and on exposures and changes in exposures, as well as valid effect measures, models, or exposure-response (E-R) functions or relationships to relate PPPP effects with health impacts.

Different health impacts can then be expressed using a common metric such as years of life lost (YLLs), disability-adjusted life years (DALYs) or quality-adjusted life years (QALYs). DALYs and QALYs are technically similar in that they both express health in time (life years) and give a weight to years lived with a disease. In the terminology of Gold et al. (2002), both measures are HALYs (health-adjusted life years).

### 3.3.3.3 Monetization methods

If a cost-benefit analysis is undertaken, health state is often expressed in a monetary value such as willingness to pay (WTP) to avoid a given health condition, or willingness to accept (WTA) a given health condition. These measures use existing market data, such as expenditures incurred to treat a health condition, or survey data – for example, where a population sample is asked for their WTP to avoid a health impact such as asthma. A general review of such metrics is provided by Wong et al. (2003).

In cases where there are limitations in evidence and data on the identified health effects (as is often the case with CE actions), it may be informative to use sensitivity analysis to test quantitative and monetized results. This requires making plausible assumptions (based on expert judgement) about health effects and seeing how robust or sensitive conclusions (about, for example, the monetary benefits/costs of a CE action) are to changes in these assumptions.

### 3.3.3.4 Overall appraisal

Multi-criteria analysis (MCA) can be a useful tool within IA. It can be used to assess the economic, social (including health) and environmental dimensions of policy options, including possible trade-offs between some of these dimensions (or subcriteria used in each dimension). MCA also allows assessment of impacts across different

types of stakeholders in order to take into account inequality or equity concerns.<sup>9</sup>

MCA can combine qualitative and quantitative results to provide an overall evaluation of outcomes to inform recommendations to decision-makers. It can include the use of expert scoring methods to assess the relative significance of different health impacts, based on the available qualitative and quantitative results, and thereby inform priorities in addressing health-related impacts of CE actions.

Multi-criteria decision analysis (MCDA) is a form of MCA that aims to provide an overall ordering of options, from most preferred to least preferred. This process can reflect the extent to which the options achieve set objectives and reveal trade-offs among options in achieving objectives.

Further resources giving detailed information on the use of the above appraisal methods are listed in Annex 5.

### 3.3.4 Policy recommendations

The appraisal stage should provide the basis for reporting of findings on the nature and importance of human health impacts resulting from the CE-related PPPP. This should inform the way in which recommendations to be presented to decision-makers are developed and outlined. Recommendations may include:

- requirements for mitigation and enhancement measures that can be made to a PPPP proposal to minimize its harmful health impacts and maximize the health gains;
- means of addressing any health and well-being inequalities that may be caused by a PPPP proposal;
- means of addressing any identified knowledge gaps on the impacts of the PPPP proposal (this may involve prioritizing research focused on

<sup>9</sup> For more details, see the European Commission (EC)'s Better Regulation Toolbox: Tool #63. Multi-criteria analysis ([https://ec.europa.eu/info/files/better-regulation-toolbox-63\\_en](https://ec.europa.eu/info/files/better-regulation-toolbox-63_en)).

- knowledge gaps that has the most potential to provide further information on health impacts);
- guidance on decision-making under conditions of incomplete knowledge and uncertainty (decisions may need to be informed by expert judgement, allowing health impact criteria to be scored – an established method used in MCA; the precautionary principle may also need to be applied to decision-making<sup>10</sup>);
  - means of monitoring and evaluating recommendations/measures once they have been introduced (see section 3.3.5); and
  - direct recommendations on whether or not to go ahead with a given PPPP, based on overall conclusions on the significance of known or potential health impacts (in the context of CE measures, if a separate HIA is prepared, it should give input to a wider consideration of overall impacts, including the results of EIA, SEA and SIA that have been undertaken, such as within MCA or MCDA (see section 3.3.3.4)).

In practical terms, recommendations need to be (NHS Wales, 2012):

- clear and concise
- realistic
- achievable
- manageable in number
- impartial
- reflective of all evidence and representatives' views
- agreed by consensus.

#### 3.3.5 Monitoring and evaluation

This stage focuses on the need to monitor and evaluate the real impacts on health parameters of implementation of CE-related policy decisions, plans and specific projects. A key tool for monitoring is the use of outcome indicators (based on results of epidemiological, survey, demographic and other methods) to measure the impact of CE actions and of any actions that promote

health benefits/reduce risks of CE actions. The parameters of these indicators should be agreed with stakeholders.

It should be acknowledged, however, that measuring outcomes is often not feasible if changes are not significant enough in a sufficiently concentrated population to make it possible to track reliably the effects of a policy decision on health parameters. It may only be feasible to track the effects on exposures and then infer their effects on health.

Evaluation can focus on:

- i. the outcomes of implementation in terms of changes in health status and health determinants (this includes assessing the accuracy of predictions made during appraisal);
- ii. the process of conducting the IA; and
- iii. the impact the IA has on the decision-making process.

#### 3.3.6 Stakeholder engagement and consultation

Stakeholder engagement and consultation are important components throughout the IA process and support the principles of equity, participation, accountability and transparency. Stakeholder engagement may be seen as the designing-in of involvement in the IA process (for example, stakeholder groups are represented on an advisory group and/or steering committee). Stakeholder consultation is a wider process, which might involve (for example) consulting on a draft report and public meetings. It is also key that these processes allow scope for real change in the PPPP under scrutiny. If engagement and consultation are kept to the end of the process, it may be too late for such change, especially since significant decisions may have been made implicitly at an early stage (for example, the terms of reference

10 The precautionary principle can be applied to decision-making where there is potential harm to human health, even though scientific research has not yet completely evaluated the risks, exposures and health endpoints, including distributional effects. The EC Communication on applying this principle (EC, 2000) highlights the need to find the correct balance so that “proportionate, non-discriminatory, transparent and coherent actions can be taken”.

may already have set the scope of health considerations and timeframes of health impacts).

Key reasons for stakeholder engagement include the following (Hurley & Vohra, 2010):

- fairness: affected stakeholders face the direct positive and negative health consequences of PPPP decisions;
- quality and completeness of evidence: stakeholders have valuable experiential knowledge that can inform the analysis of health impacts;
- legitimacy of decisions: addressing stakeholder concerns can reduce distrust and conflict, and can make an evidence-based decision more likely; and
- participation and ownership: allowing residents and others to have a voice and influence in decision-making processes reduces the sense of social exclusion, democratic deficit and inequity (in particular, this makes it possible to integrate normally “not heard” groups into the process).

The range of consultation and involvement tools outlined above under qualitative methods (section 3.3.3.1) can be used, from workshops and focus groups to one-to-one interviews and public meetings. It is essential to be clear about the purpose of the activities and to communicate to stakeholders how the consultation findings have been used to inform the IA (Hurley & Vohra, 2010). Sources on good practices for stakeholder engagement and consultation in HIA can be found in Annex 5 (section A5.4).

Stakeholder engagement/public consultation is a legal requirement in some IAs. This is the case for environmental assessment (EA) in many countries; see, for example, the United Nations Economic Commission for Europe (UNECE)’s Aarhus Convention (UNECE, 1998) and its good practice guidance (UNECE, 2016).

## 3.4 Sectoral case studies of how to integrate health into CE

This section provides discussion, for some key sectors, of how to integrate health issues into CE strategies and visions as well as into related PPPPs. Most CE strategy and roadmap documents outline overall aspirations (including targets) related to CE transition, such as aspirations for waste prevention, design, reuse, repair, remanufacture, recycling, energy recovery and landfill (see, for example, the CE strategy for Scotland (Scottish Government, 2016)). They also set out priority areas for action, which commonly include the construction/built environment sector as well as the food sector. The health care sector is also included here as it is highly relevant to the issue of integrating health into CE strategies and implementation actions. The sector examples given below draw out health issues (opportunities or risks) in CE activities that might be identified in a screening and scoping exercise and suggest ways in which some of these issues could be subject to further assessment.

### 3.4.1 Health care sector

The potential for further development of circularity principles in the health care sector does not appear to be specifically addressed either in most current CE strategies and visions or in other associated PPPPs. However, the need for this sector to be further developed – in terms of materials, jobs, cost savings and competitiveness – is highlighted in the Luxembourg CE roadmap (EPEA, 2014). The specific issues that should be considered include the following.

- **Direct cost savings** for hospitals and health care services from implementation of CE actions. There is great potential for hospitals to

use their scale and centralized management to maximize resource efficiency and minimize waste through prevention, reuse and recycling. It should be noted, however, that these health benefits are only realized to the extent that savings are reinvested into health care services or used to lower service charges. Among potential savings are those from:

- implementation of **performance models** in procurement in which the customer pays for use of a product (for example, leasing) rather than owning the product (the rationale for performance models is that they help to minimize total costs by reducing purchasing and maintenance costs and to maximize performance);
  - increased use of **sharing platforms** for health care organizations to trade surplus capacity, allowing more intensive use of goods and equipment, which results in more efficient use of raw materials and energy; and
  - **technology-driven resource savings** – for example, decisions on replacement of medical equipment based on sensor technology that reveals the actual condition rather than equipment age and utilization.
- **Potential indirect health benefits** from reduced environmental media impacts in the supply chain resulting from introduction of circular principles in the health care sector and across the economy. These indirect effects can potentially reduce the burden of pollution-related disease and related health care sector costs. The Lancet Commission report on pollution and health highlights that such impacts result in health care costs equivalent to about 1.7% of annual health spending in high-income countries and up to 7% in middle-income countries (Landrigan et al., 2018).

Assessment of the types of impacts from introducing circular principles in the health care

sector, as identified above, could include the following.

- Analysis of aggregate cost saving to health care services resulting from the application of circular principles. For example, a study by EMF calculates that implementation of performance models in procurement could save hospitals in Denmark around €70–90 million by 2035 (EMF, 2015a).
- If targets are set for CE-related goals – for example, on recycling and waste management as promoted by the Waste and Resources Action Programme (WRAP, [n.d.]) – then these can be used as a basis for estimates of potential cost savings and other health-related impacts that occur.
- Analysis of impacts of specific CE implementation initiatives. An example of cost savings from the FLOW2 Healthcare sharing platform for health care organizations is given in Box 6.
- Full HIAs of major health care sector infrastructure programmes and projects (for example, hospital construction, community health care facilities) with a focus on the impacts of those elements within plans that incorporate circular principles. An example is the HIA of the 3Ts programme at Royal Sussex County Hospital, Brighton, United Kingdom (Cave Associates, 2011).<sup>11</sup> This includes assessment of potential health effects of a range of aspects of the programme associated with CE principles for the built environment (for example, changes in access to green space, air quality, availability of natural sunlight, pedestrian and cycle routes, and the work environment of the new facilities).

#### 3.4.2 Built environment

CE literature includes broad visions of how the built environment could introduce circular principles into design, construction and urban planning (see, for example, ARUP, 2016). This ambition is also reflected in most of the national and local CE strategy and action plan documents

**Box 6. The FLOW2 Healthcare sharing platform**

Sharing platforms are promoted within the CE model as a way that organizations can make cost savings as well as providing sustainability and social benefits. An example of this is FLOW2 Healthcare, which has developed a sharing marketplace for health care organizations to trade surplus capacity. This allows more intensive use of goods and equipment, resulting in savings for health care organizations and more efficient use of raw materials and energy. This sharing platform has quantified the average financial value of asset-sharing for user organizations and gives examples of the potential benefits to health care sector organizations if such use is scaled up. The intention is to illustrate the savings opportunities of a well-implemented sharing marketplace.

The potential health benefits of such platforms are, therefore, improved health services, to the extent that savings are reinvested into health care services, as well as the indirect health benefits due to reduced environmental impacts of manufacturing, such as reduced pollutant emissions.

*Source: FLOW2 (2019).*

given in Annex 1, such as the strategies/roadmaps for Scotland (Scottish Government, 2016), the Netherlands (Government of the Netherlands, 2016) and Finland (Sitra, 2016 and 2018), which include construction and the built environment as a priority area for action. In the case of *Circular Amsterdam: a vision and action agenda* (Municipality of Amsterdam, 2015), focus areas to improve the circularity of the construction sector include: (i) a commitment to smart design of buildings to make them more suitable for repurposing and reuse of materials; (ii) efficient dismantling and separation of waste streams to enable high-value reuse; (iii) high-value recovery and reuse of materials and components; and (iv) marketplace and resource bank to enable exchange of commodities between market players.

Adopting such circular principles in the built environment has implications for human health and well-being that may be relevant for any screening exercises at CE strategy and PPPP level.

- Minimizing generation of construction and demolition waste, which currently accounts for 25–30% of all waste generated in the EU. Therefore, minimizing generation has implications for reducing associated health impacts at waste disposal/landfill and treatment sites.
- Use of nontoxic materials in new buildings and phasing out toxic materials (such as paints, adhesives, insulation materials, etc. that often con-

taminate waste). This will have eventual health benefits since much construction waste is hard to separate and contains toxic elements – for example, polyvinyl chloride (PVC) formulations, toxic heavy metals, volatile organic compounds, some suspected carcinogens and immune system disruptors (EMF, 2015a).

- Minimizing generation of construction and demolition waste and phasing out toxic waste generation will therefore reduce negative externalities including GHG emissions, water, soil, noise and air pollution, and their associated human health exposures.
- Circular building design and urban planning innovations may also bring wider health benefits. Improved air quality, for example, may result from reduced traffic congestion, while increased well-being may come from improvements in the quality of public, work and residential areas and their buildings, and expanding green infrastructure. Such societal outcomes are described in EMF (2015b) in terms of enhanced liveability, including reduced noise.

The health and well-being impacts resulting from introducing circular principles into construction and the built environment could be subject to a number of types of assessment.

- Broad assessment of the health implications of meeting proposed targets attached to sectoral objectives – for example, the Luxembourg National Plan for Construction Materials Manage-



ment includes a goal of 30% reduction in waste (quoted in EPEA, 2014). This would address how and the extent to which reaching such goals would impact occupational and public health.

- Full HIAs of programmes and large built environment projects (construction, urban planning, urban transport systems) which aim to implement elements of CE principles.
- Rapid HIAs (or health-inclusive IAs) of pilot projects and other local initiatives for CE in the built environment. Examples include *South Wales metro: rapid health impact assessment* (Mott MacDonald, 2017). Some “success stories” are also given in the French *Roadmap for the circular economy* (MTES, 2018) (see Box 7). Such assessments would consider how a project has impacted or will impact health and well-being to demonstrate the potential opportunities or risks of a wider implementation of the project approach.
- Product- and process-level assessment of health impacts due to introduction of specific ecodesign or other built environment-related

innovations. In these cases, use of approaches such as LCA or product SIA (see Annex 3) could focus on how health and well-being impacts compare with other existing design options.

#### 3.4.3 Food safety and health

The food sector commonly features as a focus area in current CE strategies and action plans. These tend to focus on the transition to sustainable food systems – for example, *Leading the cycle: Finnish road map to a circular economy 2016–2025* (Sitra, 2016) and *A circular economy in the Netherlands by 2050* (Government of Netherlands, 2016); and potential cost savings – for example, *Making things last: a circular economy strategy for Scotland* (Scottish Government, 2016). The new report by the Ellen MacArthur Foundation, *Cities and circular economy for food* (EMF, 2019), includes promotion of health benefits as a key issue. The need to promote a healthy diet within sustainable food systems is also underlined by the recent Lancet Commission (2019) report.

#### Box 7. Examples of CE projects for construction and built environment

- The French real estate development company **Bouygues Immobilier** is developing more virtuous management solutions for materials produced at demolition sites. Upstream assessment allowing classification of all materials and methodical on-site sorting and development of recovery and reuse channels has considerably reduced waste and pressure on resources. For example, the restructuring project for the former Sanofi headquarters and laboratories in Bagneux, in the southern outskirts of Paris, has achieved 97% recovery of structural and finishing materials.
- The **Brittany Public Land-management Institution** has developed the “marine evacuation and recovery of construction waste”. As part of the rehabilitation of a railway site in the development zone of the Lorient train station district, an evacuation of the site’s soil by sea was undertaken. Inert and non-hazardous soil was transported to a processing and recovery centre in the Gironde, where it was screened and sorted, before being reused in the construction and public works sector. This technique is an alternative to landfill without recovery and avoided the use of 450 trucks to transport the waste by road.

The health implications of such examples derive from the potential to reduce construction waste going to landfill and incineration, and the associated reduction in health impacts. They also derive from the potential to reduce health impacts from extraction and manufacturing processes by means of increased recovery and reuse of construction wastes.

Source: MTES (2018).

The health implications of CE transition in the food sector that should be considered in screening and for further assessment include the following.

- Potential health impacts of adherence to the food waste hierarchy – i.e. reducing food waste, redistributing edible food, use as animal feed, composting and anaerobic digestion and disposal. There are direct health benefits from, for example, redistributing food to vulnerable groups. However, such benefits are reliant on appropriate health and safety standards being respected. There are also potential indirect health benefits to the extent that environmental health impacts of food production and processing are reduced.
- Food safety issues have also been raised in connection with chemicals of concern present in recycled materials used in food packaging and kitchen items (for example, Søndergaard, 2015) and the potential for contamination of compost with harmful packaging components. However, there are significant knowledge gaps on the extent of health impacts from such contamination.
- Promotion of healthier food choices. The literature on CE proposes that – by promoting healthier food production, through addressing issues of food waste, environmental externalities (for example, in fertilizer use and GHG emissions from food production) and non-healthy outcomes – consumers can have ready access to fresh, high-quality food that would encourage healthier dietary choices (for example, EMF, 2015b). There is potential, therefore, for significant health benefits, such as decreased overweight and obese populations, to the extent that the CE model changes food consumption patterns towards healthier food choices.

#### Box 8. Food-related projects identified in CE strategies

##### **The Shared Table project to reduce food waste, Vantaa, Finland**

The Shared Table (Yhteinen Pöytä) project has created a network and model for community food aid activities in Vantaa and for more centralized distribution of waste food. The model combines greater use of surplus food and the development of food assistance with resident-oriented, networked and communal civic activity. The aim is to increase the well-being of people receiving food assistance while also increasing the high-quality use of surplus food. Moreover, the logistics involved in the prevention of food waste creates meaningful jobs. The model is currently being developed elsewhere in Finland. An evaluation assessment of the project highlighted that, compared to traditional food banks, the Shared Table network and its joint events offer social networks for the needy.

Source: Sitra (2016), Sitra (2017), 4Front (2018).

##### **SMICVAL Recycling Plant (Saint-Denis de Pile, Gironde)**

The example of SMICVAL, with its slogan “Biowaste is a resource”, is given in the French *Roadmap for the circular economy*. Since the 2000s, the company has highlighted the recycling of organic matter (including food waste) and in particular the separate collection of biowaste as a multi-sector management priority. Currently over 50 000 inhabitants benefit from this type of collection, and there is a plan to double the programme to cover 100 000 inhabitants in the near future. The collected biowaste is transformed by the facility into a certified compost that is usable in organic farming. This return to the land enriches soils and reduces landfills “without increasing costs”.

Such examples illustrate the potential health benefits from food waste redistribution in terms of well-being of vulnerable groups as well as indirect benefits from reduced landfilling and increased composting.

Source: MTES (2018).

Assessment of the types of health and well-being impacts given above could include the following, depending on the strategic or implementation-level context.

- Overall assessment of health implications of meeting proposed targets attached to sectoral objectives. EU countries are committed to meeting SDG 12.3: “by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains.” Such an assessment would address how and the extent to which CE-related action to reach such targets would impact occupational and public health.
- IA at policy level: the use of IA for policies to support healthy food environments and healthy diets is a developing area. Herforth (2016) explores how IA could be applied to policies promoting healthy food systems.
- HIA for programmes and large food-related projects implementing CE principles. Examples include the biowaste management operation of SMICVAL Recycling Plant (see Box 8), which could be subject to IA of the health-related impacts across food production and consumption.
- Rapid HIA (or health-inclusive IAs) of pilot projects and other local CE initiatives in the food sector. Examples of such projects are included in *Leading the cycle: Finnish road map to a circular economy 2016–2025* (Sitra, 2016) and could be the subject of IAs that include health impacts (Box 8). Where health and well-being benefits are identified, this will demonstrate the potential for upscaling.



# 4

## 4. Conclusions and recommendations

This section presents conclusions and recommendations on how to integrate health issues into CE strategies, visions and roadmaps, and associated PPPPs that are key for CE implementation. Also included are PPPPs that are routinely prepared and often legally required in sectoral planning.

### 4.1 Overall conclusions

The review of the literature for this report and its predecessor (WHO Regional Office for Europe, 2018) leads to the conclusion that there is a lack of current integration of health issues into CE strategies and visions, as well as PPPPs through which a CE is implemented. There are examples of HIAs of specific interventions that promote the shift from linear to circular economy. However, those studies that are available tend to focus on the negative health impacts of interventions, while coverage of potential positive effects of adopting CE policies and actions are more limited.

The current report starts to address this gap by proposing a general approach for screening of potential positive and negative health impacts that takes account of both direct and indirect pathways, and thus includes consideration of environmental and social determinants (see Table 5 and Annex 4 for proposed screening questions). It also outlines the steps in HIA and other health-inclusive IAs (EIA, SEA and SIA), including scoping, methodologies for appraisal of changes in health exposures and effects, making policy recommendations, monitoring and evaluation, as well as wider consultation and participation. This approach is intended to ensure that the health consequences of proposed actions are assessed in a logical, transparent way,

based on the available evidence. It also allows for development of policy recommendations where there are knowledge gaps and uncertainties.

### 4.2 Recommendations for using IA

- Essential steps prior to undertaking HIA or other health-inclusive IAs for PPPPs are (i) to clearly define the PPPP and its connection to CE, including to CE strategies and visions; and (ii) to clearly conceptualize health, including the physical, mental and social dimensions (Fehr et al., 2014).
- Ensure involvement of health experts from early stages, contributing substantive as well as methodological knowledge and experience (Fehr et al., 2014).
- It is necessary to consider how best to integrate different forms of IA. This requires optimizing the coverage of health in existing IAs other than dedicated HIAs and integrated forms of IA. Other types of assessments – in particular, EIA, SEA and SIA – have the potential to add value/information to HIA or at least to provide a partial assessment of health in the absence of an HIA. But their usefulness all depends on the specific context, so this needs to be assessed on a case-by-case basis.
- For CE strategies and actions plans covering a wide range of measures and a complex array of potential health pathways, it is probably not practical to undertake a full IA (for example, HIA, SEA, EIA and/or SIA) within time and resource constraints. In these cases, it can be highly beneficial to undertake:
  - a broad technical assessment of overall impacts, including social and health impacts (see Table 3); and

- identification of potential key health implications of pursuing the priorities of a CE strategy and roadmap.

In the latter, the approach adopted can be a broad screening and scoping exercise on health issues (such as that outlined in Annex 4), including stakeholder consultation, to identify the range of possible human health impacts and their likely nature and significance. This would be a first step in integrating health into strategies while recognizing the need for much more in-depth HIA and health-inclusive IAs at PPPP level (see recommendations above).

- Where there is limited availability of quantitative and monetized estimates for the identified potential health impacts of CE actions, it may be necessary to use expert scoring and order-of-magnitude estimates (as used in MCA) to assess the relative significance of different health impacts and thereby inform priorities for addressing health-related impacts.
- Assessment of health impacts also needs to recognize that the majority of practical CE activities are driven by businesses and industries. It is therefore essential to understand specific business and industrial sector interests, needs and capacities (for example, for data provision) and their role in the context of IAs. To achieve this, it is necessary to have good communication between the CE policy community and business stakeholders.
- Further work is needed in development of practical recommendations on use of IA that are more sensitive to the various contexts of CE actions. This includes more tailored messages on the most appropriate tools to be used at, for example, national, regional, local and sectoral levels. Demonstration projects attached to real CE initiatives would enable further understanding and tailored advice on appropriate applicability in different contexts.



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# ANNEX 1. EXAMPLES OF NATIONAL, REGIONAL AND CITY CIRCULAR ECONOMY (CE) STRATEGIES AND ACTION PLANS<sup>1</sup>

Country	Initiative	Description	
<b>European national level</b>			
Denmark	Denmark as a CE hub	White Paper by State of Green and Danish Ministry of Environment and Food. Gives description of issues and examples but not an action plan.	
Finland	Finnish road map to a circular economy 2016–2025	Initiative of Sitra (Finnish Innovation Fund) with wide government and stakeholder participation. Aims to clarify actions needed for government target of making Finland a global leader in CE by 2025. Focus areas: (i) a sustainable food system; (ii) forest-based loops; (iii) technical loops; (iv) transport and logistics; and (v) joint actions.	
France	Roadmap for the circular economy	Ministerial initiative including roadmaps for production, consumption and waste, with associated targets; 50 initiatives listed.	
Luxembourg <sup>14</sup>	CE roadmap commissioned by the Luxembourg Ministry of the Economy	Study covers CE-enabling mechanisms, commercial applications and potential roadmaps.	
Netherlands	A circular economy in the Netherlands by 2050	Government-wide programme with priorities for biomass and food, plastics, manufacturing, construction and consumer goods.	
Portugal	Leading the transition: action plan for circular economy in Portugal, 2017–2020	Proposal for action generated by the interministerial group with public consultation. Set out three levels of actions: macro, sectoral and micro (regional/local).	
Scotland	Making things last: a circular economy strategy for Scotland	Strategy sets out priorities for moving towards a more circular economy. These are: food and drink, and the broader bioeconomy; remanufacture; construction and the built environment; and energy infrastructure.	
Slovenia	Roadmap towards the circular economy in Slovenia	Commissioned by the Ministry of the Environment and Spatial Planning; includes four priority areas: food system, forest-based value chains, manufacturing industry, mobility.	

1 For more information and updates on national, regional and city CE strategies, visit the European Circular Economy Stakeholder Platform (<https://circulareconomy.europa.eu/platform/en/strategies>).

2 Luxembourg was the 2017 Circular Economy Hotspot, under an initiative of the Circle Economy network to exhibit progress over the past two years (<http://circularhotspot2017.lu>).

	Health-related aspects mentioned	Key reports
	No explicit focus on health	State of Green (2016)
	Guiding principles acknowledge need to manage any health and environmental risks associated with reuse and recycling. Diet issues included in sustainable food system focus area.	Sitra (2016) An updated version of the road map was released in 2019 (Sitra, 2019).
	No explicit focus on health.	MTES (2018)
	Several references to and examples of the need for healthy materials for CE. Includes section on health care and concludes: “so far none of the leading publications on the circular economy attempted to tackle the health care question despite the large implications for materials, jobs, cost savings and competitiveness” (EPEA, 2014: 306).	EPEA (2014)
	Includes reference to: (i) reduction in exposure to substances that damage health; (ii) saving costs of health care; and (iii) dietary benefits. But no specific actions on these.	Government of Netherlands (2016)
	Health referred to in context of actions for educating the public, eating without waste and regenerating resources (water and nutrients).	Ministry of Environment, Portugal (2017)
	No health focus, except for reference to health and safety in skills in a CE section.	Scottish Government (2016)
	No specific health focus.	Ministry of the Environment and Spatial Planning, Slovenia (2018)

Country	Initiative	Description	
<b>European regional/city level</b>			
Brussels region	Programme régional en économie circulaire, 2016–2020	Objectives to (i) transform environmental objectives into economic opportunities; (ii) anchor the economy to produce locally where possible; and (iii) help create employment.	
Amsterdam	Circular Amsterdam: a vision and action agenda for the city and metropolitan area	Vision and strategy for circular construction chain and circular organic residual streams chain.	
Peterborough	Circular Peterborough programme	Circular Peterborough Commitment supported by individuals, communities and businesses.	
<b>Non-European</b>			
China	Circular economy development strategy and near-term action plan	CE Promotion was passed in 2009, focusing on reducing resource use, reuse and recycling. There followed a CE development strategy and action plan.	
Canada	New thinking: Canada’s roadmap to smart prosperity	Broad vision and roadmap for transition, outlining goals and general actions.	

## References to Annex 1<sup>3</sup>

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MTES (2018). Roadmap for the circular economy. Paris: Ministry for the Ecological and Solidary Transition (<https://www.ecologique-solidaire.gouv.fr/sites/default/files/FREC%20anglais.pdf>).

3 Electronic references were accessed on 17 August 2019.

	Health-related aspects mentioned	Key reports
	No specific health focus.	be circular/be.brussels (2016)
	No specific health focus.	Municipality of Amsterdam (2015)
	No specific health focus.	Future Peterborough (2016)
	No specific health focus found in sources.	State Council of the People's Republic of China (2013)
	General statements promoting CE as enhancing environmental and human health and improving workforce health in Canada.	Smart Prosperity (2016)

Municipality of Amsterdam (2015). Circular Amsterdam: a vision and action agenda for the city and metropolitan area. Amsterdam: Circle Economy, FABRIC TNO, Municipality of Amsterdam (<https://www.amsterdam.nl/bestuur-organisatie/organisatie/ruimte-economie/ruimte-duurzaamheid/making-amsterdam/circular-economy/report-circular>).

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Smart Prosperity (2016). New thinking: Canada's roadmap to smart prosperity. Ottawa: Smart Prosperity (<http://institute.smartprosperity.ca/sites/default/files/newthinking.pdf>).

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## ANNEX 2. EXAMPLES OF HUMAN HEALTH AND WELFARE IMPLICATIONS FROM IMPLEMENTATION OF CIRCULAR ECONOMY (CE) MODELS

Process/action	Source of potential health implications (positive or negative)	Health impact (direct or indirect)	Nature of potential health endpoint	
<b>Reduced use of primary resources (production)</b>				
Recycling	Food waste: redistribution of edible food	Direct health effects	Reduced malnutrition and other poor diet-related endpoints	
	Food waste: composting	Direct health risks from inhalation of bioaerosols	Asthma or extrinsic allergic alveolitis	
	Food waste: risk if food safety is compromised	Direct health effects	Food poisoning including diarrhoeal diseases (public health)	
	Chemicals in food packaging – bisphenol A (BPA), phthalates, perfluorinated chemicals (PFCs)	Exposure to chemicals (direct)	Epigenetic effects	
	Waste reduction and recycling in health sector	Direct impact on health sector via reduced costs	Reduced costs allow improved health services across all endpoints.	
<b>Maintain the highest value of materials and products (production)</b>				
Remanufacturing, refurbishment, and reuse of products and components	“Circular buildings”	Improved indoor air quality and use of non-toxic materials	Various, including occupational health and safety issues, mental health and respiratory	
Product life extension	Resource savings through extension of product life in hospitals	Direct impact on health sector via reduced costs	Reduced costs allow improved health services across all endpoints.	



	Sectors affected	Groups affected or distributional issues	Notes	Example sources
	Community	Low-income and vulnerable groups	Positive impact depends on safeguards on contamination and distribution of unhealthy foods.	Mabelis et al. (2016)
	Waste management	Waste sector workers	–	Pearson et al. (2015)
	Various including retail, catering, waste management	Vulnerable groups and community	Safety guidelines are available for food waste collection.	HSE (2018), WRAP (2016)
	Retail, catering, waste management	Consumers, waste sector workers	CHEM Trust and the Health and Environment Alliance are working on this issue.	Chen et al. (2009), DiGangi & Strakova (2015), Genualdi et al. (2014), Rodgers et al. (2014), Rudel et al. (2011)
	Health, manufacturing	All health sector users	–	EC (2017), EMF (2015c), REBus (2016a–c)
	Commercial and residential construction	Potential impacts for a wide range of groups	“Circular buildings” involve buildings made for looping, using renewable or recyclable healthy materials.	EMF (2015b, 2017)
	Health	All health sector users	The health care case study (section 3.4.1) gives the example of sensor technology aiding replacement decisions.	EMF (2016)

Process/action	Source of potential health implications (positive or negative)	Health impact (direct or indirect)	Nature of potential health endpoint
<b>Change utilization patterns (consumption)</b>			
Product as service	Performance models in health care sector and other sectors	Direct impact on health sector via reduced costs  Indirect impact for various sectors (for example, transport) via reduced manufacturing	Reduced costs allow improved health services.  Conditions related to emissions from manufacturing are reduced.
Shift in consumption patterns	Shift to healthier diets	Direct impact on health	Reduction in poor diet-related conditions, obesity, cardiovascular diseases, cancers
<b>Combinations of actions</b>			
Efficient use of resources, shift in consumption, new approaches	Healthier food production	Direct impact on health  Potential for indirect health benefits from reduced greenhouse gas (GHG) and other emissions from changes in food production	Reduction in poor diet-related conditions, obesity, cancers  Reduction in harmful emissions
Efficient use of resources, ecodesign, use of renewable energy	Built environment	Improved indoor air quality and use of non-toxic materials	Various, including occupational health and safety issues, mental ill health and respiratory conditions

## References to Annex 2<sup>1</sup>

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EMF (2015b). Growth within: a circular economy vision for a competitive Europe. Cowes: Ellen

1 Electronic references were accessed on 17 August 2019.

	Sectors affected	Groups affected or distributional issues	Notes	Example sources
	Health, manufacturing	All health sector users	Potential for worse treatment of shared goods by users (compared to those owned) may limit health-related benefits and should be taken into account in overall impact assessment.	EMF (2015c), REBus (2016b)
	Agriculture, food production, consumers	Consumers Distributional issues may need further research.	See healthier food production (below).	EMF (2015b)
	Agriculture, food production, consumers	Consumers Distributional issues may need further research.	See also shift to healthier diets (above).	EMF (2015b)
	Commercial and residential Construction sector	Potential impacts for wide range of groups	-	EMF (2015b) gives a broad assessment of CE implications for the built environment.

MacArthur Foundation and McKinsey Center for Business and Environment ([https://www.ellenmacarthurfoundation.org/assets/downloads/publications/ElleMacArthurFoundation\\_Growth-Within\\_July15.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/publications/ElleMacArthurFoundation_Growth-Within_July15.pdf)).

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REBus (2016c). Service agreements – good for the health: pilot study of MUJO medical technology company for REBus project. Banbury: Waste and Resources Action Programme (<http://www.rebus.eu.com/wp-content/uploads/2017/05/REBus-case-study-MUJO.pdf>).

Rodgers KM, Rudel RA, Just AC (2014). Phthalates in food packaging, consumer products, and indoor environments. In: Snedeker S, editor. *Toxicants in food packaging and household plastics: exposure and health risks to consumers.* London: Springer.

Rudel RA, Gray JM, Engel CL, Rawsthorne TW, Dodson RE, Ackerman JM et al. (2011). Food packaging and bisphenol A and bis(2-ethyhexyl) phthalate exposure: findings from a dietary intervention. *Environ Health Perspect.* 119(7):914–20.

WRAP (2016). Household food waste collections guide. Banbury: Waste and Resources Action Programme (<http://www.wrap.org.uk/content/household-food-waste-collections-guide>).



## ANNEX 3. ADDITIONAL ASSESSMENT FRAMEWORKS

### A3.1 Social impact assessment (SIA)

SIA concerns the processes of managing the social issues associated with planned interventions. It has been defined as:

the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment (Vanclay, 2003).

Definitions of SIA include an emphasis on the differential distribution of impacts on different groups in society, and particularly the impact on vulnerable groups (see discussion of definition of SIA in IAIA, n.d.).

Health impacts are considered within SIA among a wide range of impacts on people and communities. However, SIA guidelines do not typically require a detailed analysis of the determinants or pathways of specific health impacts. In practice, the SIA approach used and the explicit linkage between health and social impacts depend on policy, legal and cultural context.

While SIA is not currently a separated legal requirement in any country, the need to consider social aspects has been acknowledged in many strategic environmental assessment (SEA) systems worldwide. Development agencies and banks, in particular, frequently call their strategic assessments *strategic environmental and social assessments (SESAs)* and routinely ask for environmental and social impact assessments (ESIAs) to be prepared.

As well as being a policy, plan, programme and project (PPPP) tool, SIA is now increasingly being used by corporations as an internal process for managing social issues. Thus, it may be useful to consider the role of SIA in assessing the implications of circular economy (CE) actions at the level of the business sector and by individual businesses, including the distribution of social impacts. The development of product-level SIA methodology is of relevance to assessment of CE innovations at product level, in particular for informing on occupational and consumer health (PRé Sustainability, 2016).

### A3.2 Life cycle assessment (LCA)

LCA is defined as:

a systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle (ISO, 2006).

Information from LCA can support public policy-making and business decision-making by aiding the evaluation of CE policies and actions in a number of contexts (for example, ecodesign criteria-setting and for energy-using products within the European Directive 2009/125/EC on energy-related products). Since it generally excludes economic and social impacts and more local environmental issues, it is necessary to use the results of LCA in combination with other tools in supporting policy, including environmental impact assessment (EIA). In this way, LCA can complement CE transition with robust analysis that helps to ensure sustainability of implementation at a product level. Thus, use

of LCA can help to inform the realization of the benefits of a CE model (Szita, 2017).

LCA can also help to give information on the potential negative impacts of products and services on the environment and human health, and therefore can provide essential input to health impact assessment (HIA), including in the context of CE. However, at present there are key gaps in linking LCA results with actual human and environmental disease burden and potential for further incorporation of human health effects in LCA methods (Gohlke, 2015).

## References to Annex 3<sup>1</sup>

Gohlke JM (2015). Life cycle analysis and global environmental health issues. *J Health Pollut.* 5(9):1-2.

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PRé Sustainability (2016). Handbook for product social impact assessment. Amersfoort: PRé Sustainability ([https://www.dsm.com/content/dam/dsm/cworld/en\\_US/documents/handbook-for-product-social-impact-assessment.pdf](https://www.dsm.com/content/dam/dsm/cworld/en_US/documents/handbook-for-product-social-impact-assessment.pdf)).

Szita K (2017). The application of life cycle assessment in circular economy. *Hungarian Agricultural Engineering.* 31:5–9. doi:10.17676/HAE.2017.31.5.

Vanclay F (2003). International principles for social impact assessment. *Impact Assessment and Project Appraisal.* 21(1):5–11 (<https://www.iaia.org/uploads/pdf/IAIA-SIA-International-Principles.pdf>).



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1 Electronic references were accessed on 17 August 2019.

## ANNEX 4. TEMPLATE FOR SCREENING POTENTIAL HUMAN HEALTH HAZARDS OF A POLICY, PLAN, PROGRAMME OR PROJECT (PPPP)

The aim of the screening phase of an impact assessment (IA) is to determine whether a “full” IA for a given PPPP proposal is needed and feasible. The process should document the rationale for undertaking or not undertaking an IA and ensure that decisions on the terms of reference of an IA are transparent.

A draft IA screening template is given below. Where this is used for an action plan or programme with a range of actions, the screening table should be completed for each key action or group of actions. **An essential step prior to consulting respondents is to clearly define the PPPP under question.** The respondents to the screening questions should represent key stakeholders (health experts, civil society, policy-makers, nongovernmental organizations).

The screening questions in the table address the key issues of (i) identification of possible human health impacts; (ii) the likely nature and significance of these possible impacts; and (iii) how an IA may add value to the policy-making process. Possible human health impacts to be considered include public and occupational health, mental health and well-being.

If a decision is made to go ahead with an IA (or other types of assessment) on the basis of the screening conclusions, these conclusions will inform the scoping stage. This stage establishes the Terms of Reference, including which key health impacts should be considered and the assessment methods to be used.

Screening question	Yes	No or negligible	Don't know
<b>1. Identification of possible human health impacts</b>			
Are there possible <u>direct</u> human health impacts of circular economy (CE) measure(s)?	Please provide a brief explanation of the nature of possible impacts (positive or negative). This should include direct impacts on public and occupational health, mental health and well-being – for example, changes in exposure to chemicals of concern that have direct impacts on public and occupational health.		If “don’t know”, please provide a brief explanation – for example, limited existing research, not known by respondent, etc.
Are there possible <u>indirect</u> human health impacts of CE measure(s)?	Provide a brief explanation of the nature of possible impacts. This should include impact on social, economic and environmental living conditions that would indirectly affect health – for example, impacts on health via housing, transport, food choices, employment opportunities and conditions, green space or climate change.		As above.
Are there possible direct impacts on the health care sector?	This may include changes in demand for or access to health and social care services, and savings or costs to the sector.		As above.

<b>2. Nature and likely significance of possible impacts</b>			
For each of the possible impacts (direct, indirect and on health care sector) identified in Section 1:	Yes	No or negligible	Don't know
Will the health impact have differential impacts within the population? In particular, this should consider any disproportionate impacts on vulnerable socioeconomic groups.	Provide a brief explanation. For example: how many people are likely to be affected and which socioeconomic groups?		
Will the negative health impacts be difficult to remedy or have an irreversible impact?	What types of health impact are likely (acute, chronic, terminal)?		
Will the health impacts be medium- to long-term (to be defined)?	Linked to likely type of health impact stated above; includes consideration of length of time before positive or negative impacts become evident.		
Are the negative health impacts likely to generate public concern?	Linked to answers to above questions on nature of possible impacts.		
Are the positive health impacts likely to generate public support for the action?	Linked to answers to above questions on nature of possible impacts.		
Are the health impacts likely to generate cumulative and/or synergistic impacts?	Cumulative impacts refer to those that individually might be insignificant but, when considered together, could amount to a significant effect.  Synergistic impacts refer to combined effects of different types – for example, noise, dust and visual effects.		
Combining the answers, on balance will the identified health impact be significant (positive or negative) in your judgement?			
<b>3. Rationale for undertaking a health impact assessment (HIA) or health-inclusive IA (for each impact identified above)</b>			
For each of the possible impacts (direct, indirect and on health care sector) identified in Section 1:	Yes		Don't know
Will HIA or health-inclusive IA add value to the policy-making process?	Provide an explanation – for example, by providing information on health exposures and effects, for identified potential impacts (in 1 and 2 above), that will better inform policy decisions.		
Are the identified health issues already included and addressed sufficiently well in other forms of assessment (environmental impact assessment, strategic environmental assessment, social impact assessment) undertaken for the actions in question?	Which other health-inclusive assessments have been made?		
Is IA feasible?		If no, please explain – for example, insufficient resources, time, expertise, etc.	



## ANNEX 5. RESOURCES ON IMPACT ASSESSMENT (IA) METHODS AND DATA<sup>1</sup>

In this section, resources are provided on IA methods and data. The following lists are generic, providing examples only. Nationally, regionally and locally relevant sources are not listed.

### A5.1 Sources for health impact assessment (HIA) and health-inclusive IAs

The following sources on HIA include those from Fehr et al. (2014) (Box 9. Key information sources on HIA) and other results from an internet search.

- HIA Connect. New South Wales, Australia ([www.hiaconnect.edu.au](http://www.hiaconnect.edu.au))
- Health impact assessment tools. UK Department of Health (<https://www.gov.uk/government/publications/health-impact-assessment-tools>)
- Health impact assessment blog. International Association for Impact Assessment (<http://healthimpactassessment.blogspot.com>)
- Health impact assessment of transportation and land use planning activities: guidebook. Metro Vancouver (<http://www.metrovancouver.org/services/regional-planning/PlanningPublications/HIA-Guidebook.pdf>)
- A short guide to health impact assessment: informing healthy decisions. London: NHS Executive; 2000
- Health and environmental impact assessment: guide for local teams. Public Health England (<https://www.gov.uk/government/publications/health-and-environmental-impact-assessment-guide-for-local-teams>)
- Spanish HIA information system (in Spanish). CREIS (Centro de Recursos de Evaluación de Impacto en Salud) (<http://www.creis.es>)
- UCLA health impact assessment (UCLA-HIA) project (<http://www.ph.ucla.edu/hs/health-impact/methodology.htm>)
- Wales Health Impact Assessment Support Unit (<https://whiasu.publichealthnetwork.cymru/en>)
- WHO web pages on HIA ([www.who.int/topics/health\\_impact\\_assessment/en](http://www.who.int/topics/health_impact_assessment/en), [www.who.int/hia/en](http://www.who.int/hia/en))
- Environment and Health Impacts Hub. WHO Collaborating Centre on Health in Impact Assessments, University of Liverpool (<https://www.impactshub.com>)
- A toolkit for cities. WHO Regional Office for Europe ([www.euro.who.int/en/health-topics/environment-and-health/urban-health/activities/health-impact-assessment](http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/activities/health-impact-assessment))

### A5.2 Sources for other IAs

- Environmental impact assessment of projects: guidance on the preparation of the environmental impact assessment report. European Commission ([ec.europa.eu/environment/eia/pdf/EIA\\_guidance\\_EIA\\_report\\_final.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf))
- Environmental impact assessment guide: delivering quality development. Institute of Environmental Management and Assessment (<https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf>)
- Impact assessment: directory of references/resources. Health and Environment Linkages Initiative (WHO/UNEP) (<http://www.who.int/heli/impacts/impactdirectory/en/index2.html>)
- Handbook for product social impact assessment. PRé Sustainability ([https://www.dsm.com/content/dam/dsm/cworld/en\\_US/documents/handbook-for-product-social-impact-assessment.pdf](https://www.dsm.com/content/dam/dsm/cworld/en_US/documents/handbook-for-product-social-impact-assessment.pdf))

<sup>1</sup> Electronic references were accessed on 18 August 2019.

## A5.3 Sources on specific methods

- Better Regulation Toolbox: Tool #63 (multi-criteria analysis). European Commission ([https://ec.europa.eu/info/files/better-regulation-toolbox-63\\_en](https://ec.europa.eu/info/files/better-regulation-toolbox-63_en))

## A5.4 Sources for stakeholder engagement and consultation

- Developing a citizen-participation strategy for health impact assessment: practical guide. National Collaborating Centre for Healthy Public Policy ([http://www.ncchpp.ca/docs/EIS\\_ParticipationCitoyenne\\_GuideAng.pdf](http://www.ncchpp.ca/docs/EIS_ParticipationCitoyenne_GuideAng.pdf)).
- Quality assurance standard for community and stakeholder engagement. International Association

for Public Participation (IAP2), Australasia ([https://www.iap2.org.au/Tenant/C0000004/00000001/files/IAP2\\_Quality\\_Assurance\\_Standard\\_2015.pdf](https://www.iap2.org.au/Tenant/C0000004/00000001/files/IAP2_Quality_Assurance_Standard_2015.pdf))

- Guidance and best practices for stakeholder participation in health impact assessments. Stakeholder Participation Working Group of the 2010 HIA in the Americas Workshop (<https://sophia.wildapricot.org/resources/Documents/guide-for-stakeholder-participation.pdf>)

## References to Annex 5

Fehr R, Viliani F, Nowacki J, Martuzzi M, editors (2014). Health in impact assessments: opportunities not to be missed. Copenhagen: WHO Regional Office for Europe ([http://www.euro.who.int/\\_data/assets/pdf\\_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf](http://www.euro.who.int/_data/assets/pdf_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf)).





## The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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The extensive use of natural resources threatens to exceed the carrying capacity of the Earth. The concept of a circular economy (CE) offers an avenue to sustainable growth, good health and decent jobs, while reducing human pressure on the environment and natural resources. Further, the change from a linear economy (take, make, dispose) to a circular one (renew, remake, share) is expected to support significantly the attainment of the Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible consumption and production) and – if properly implemented – SDG 3 (Good health and well-being).

In 2018 WHO launched its first evidence report, *Circular economy and health: opportunities and risks*, to facilitate and encourage the inclusion of positive and negative health effects in policy debates and to foster a proactive involvement of the health sector in these discussions.

This second report builds on the 2018 findings and expands its analysis and policy recommendations by (i) identifying existing and new approaches, methods and resources for health impact analysis; (ii) prioritizing policy recommendations to be used for CE proposals; and (iii) analysing available and additionally required materials and resources for awareness-raising on sustainable production and consumption in a health-friendly manner.

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