# Circular Economy as a Cornerstone for Meeting the Goals of the Paris Agreement

A roadmap towards CE-smart NDCs

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# Executive Summary

To successfully implement the Paris Agreement in practice, a circular economy is a key lever, as

- parties are currently **not on track** to meet the goals of the Paris Agreement,
- parties are challenged to raise their **level of ambition**, both individually and collectively,
- circular economy offers **great mitigation potential**, as well as synergies with adaptation goals,
- circular economy opens up new opportunities for a **transformational change** in our production and consumption patterns – a pre-condition for persistent change also in our greenhouse gas emission profile,
- circular economy action contributes significantly towards greenhouse gas mitigation action, and is thus eligible for **climate finance**,
- circular economy offers **economic and social benefits**, and can open up new investment opportunities, and
- beyond climate change, circular economy triggers many **co-benefits** on other United Nations Sustainable Development Goals, supports a green recovery, and can help to build back better our economies.

Integrating circular economy action into **Nationally Determined Contributions** (NDCs) under the Paris Agreement is viable, yet shows several **challenges** that need to be overcome, including:

- **estimation of greenhouse gas mitigation effects of circular economy action is challenging** and requires complex and data-intensive modelling methods,
- only a fraction of the global circular economy mitigation effect becomes visible in the NDCs, due to established **accounting rules** under the United Nations Climate Convention and its Paris Agreement,
- effective circular economy action needs **vertical integration** of national and sub-national actors, which is a complex multi-stakeholder process, and
- circular economy action is **not a low-hanging fruit**, generally needs upfront investment and preparation time whereas mitigation effects become visible in national greenhouse gas inventories only by mid-term perspective.

These **challenges can be tackled** by a set of dedicated preparation and action, including

- request **methodological support** on quantification of circular economy action (e.g. through technical assistance, university cooperation, or call for tenders),
- follow the established accounting rules for NDCs and amend it with **supplemental information** on the full effect of a country-specific circular economy action,
- **incentivize circular economy action** at the local, regional, and national levels, also for the private sector, through climate finance, co-developed investment plans, and other policy instruments for vertical integration ('localizing NDCs'),
- **align NDCs with mid- and long-term strategies**, in order to show the benefits of circular economy action beyond the limited time horizon of NDCs.

Parties that wish to make their NDCs 'circular economy-smart' should consider the following seven steps of the **Roadmap towards Circular Economy-smart NDCs:**

1. embark on a **multi-stakeholder process** for circular economy and climate policy on a national level,
2. train NDCs coordinators and others about **circular economy opportunities** in the country under consideration,
3. **integrate all relevant stakeholders** in the design process for a circular economy-smart NDC,
4. **design a circular economy-smart NDC** by taking into account the above-mentioned challenges and hurdles,
5. cooperate with banks, investors, and service providers on **climate finance,**
6. **implement, monitor, and evaluate** circular economy action included in the country-specific circular economy-smart NDC, and
7. collect, share, and disseminate **knowledge** and **experiences** gained on circular economy-smart NDCs.

» Go to Roadmap

# Introduction

Circular economy (CE) as a means to support climate mitigation efforts is becoming increasingly important as the urgency to raise climate ambitions grows. While current climate action pledges are not sufficient to meet agreed goals and targets, the concept of CE could help to bridge this target gap. This concept thereby goes beyond the idea of shifting energy supply from fossil to renewable energy: basically, all product cycles need to become more efficient and closed in order to reach climate neutrality. This restructuring of our economy would offer considerable advantages beyond climate mitigation: it would reduce the pressure on natural resources, create jobs and innovation, and help to protect biodiversity. Furthermore, CE will also become more economically beneficial when climate-relevant taxes and laws, such as carbon pricing instruments, increasingly come into force and the linear economy will become less profitable. Even though ample sector- and product-specific studies exist to quantify the mitigation potential of CE measures, little has been published on their potential to help raise the ambition level of Nationally Determined Contributions (NDCs).

Basically, all product cycles need to become more efficient and closed in order to reach climate neutrality.

Under the Paris Agreement (PA), the objective of limiting global warming to well below 2°C by the end of the 21st century became the benchmark for global climate mitigation ambition. NDCs represent the parties' national climate goals; they become binding once the country ratifies the PA. NDCs are subject to regular review and update, with the aim of enhanced ambitions in each cycle of five years.[1] The European Union (EU), for example, has set itself the goal to reduce its emissions by 55% by 2030 (against 1990 levels) and to reach climate neutrality by 2050.[2] The EU Green Deal, including its 'fit for 55' package, is a policy designed to reach these goals. Next to several sectoral initiatives, the Green Deal also contains the EU CE Action Plan, which targets the design, production, and use of products in the EU, aims to lead the global effort on CE, and promotes sustainable growth and jobs.[3] Literature such as the Circularity Gap Report has long shown the need for CE action to close the gap between GHG mitigation feasible under current climate pledges and needed ambition.[4]

For international cooperation on climate change to succeed, it is important to fully understand the importance and contributions of individual sectors to accomplish development and climate goals, how sectoral policies and measures can be prioritized, and how the ambition level and contributions can be raised over time. In this context it is emphasized that CE is in the unique position to connect various sectors and to generate additional mitigation potentials and co-benefits.

**LINKS**

» EU CE Action Plan

» Circularity Gap

## What this practical guide is about

This practical guide is written for NDC coordinators and policymakers at national and sub-national levels who wish to design and implement ambitious climate action by including CE in their NDCs and long-term strategies (LTS). In order to do so, policymakers need to understand the current international set-up for NDCs and its opportunities and challenges for CE inclusion. Therefore, this guide focusses on the link between CE and climate action.

**Circular economy contributes to reduce the pressure on natural resources, to create jobs and innovation, and helps to protect biodiversity.**

This guide firstly introduces the concept of CE as a central element for climate action. It then elaborates on methodologies to quantify mitigation potentials of CE measures and explains the differences of contribution and attribution-based climate action. From this base, the design and implementation process of CE-smart NDCs and sub-national policies is introduced. Lastly, a comprehensive yet pragmatic Roadmap towards CE-smart NDCs is drawn.

# 1

# The circular economy as key lever on the path towards decarbonization

## 1.1 The relevance of the circular economy in climate action

**Box 1**
**Defining the concept of circular economy**

Since CE as concept is still evolving, there is no universally agreed definition.

The EU, one of the most vocal public CE players globally, defines CE as follows:

» In a circular economy, the value of products and materials is maintained for as long as possible and waste and resource use are minimised.« [5]

This definition underlines the general principle of an economy that decouples economic activities from finite primary resource consumption. This cyclical model offers an advancement to the traditional linear model and clearly reaches beyond mere waste management: its elements encompass eco-design, repair, reuse, refurbishment, remanufacturing, product sharing, waste prevention and waste recycling, including safe waste recovery and disposal.[6]

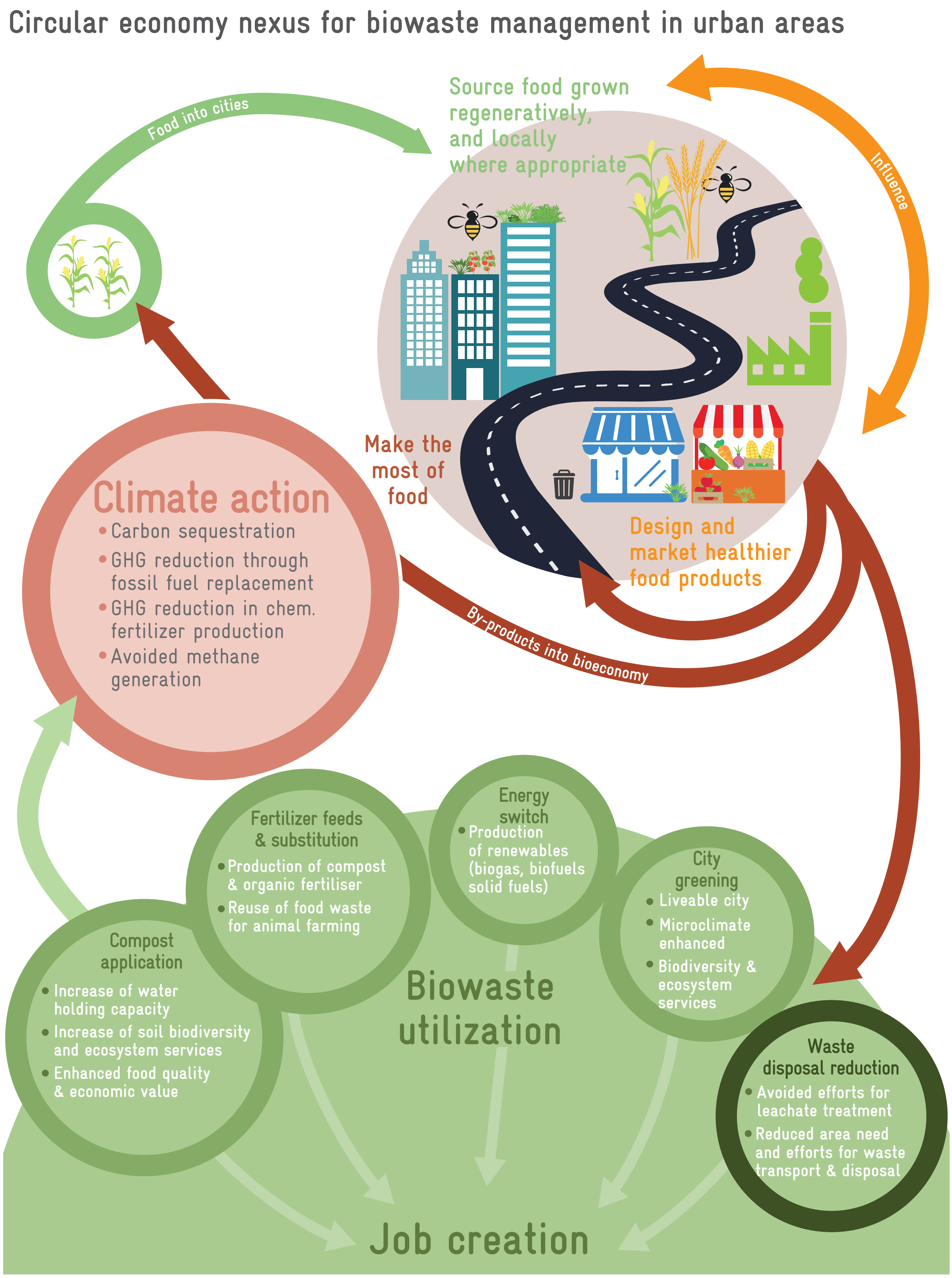
The concept is therefore related to the concept of the green economy. It respects planetary boundaries through circularity while still enabling economic development.

Over the last decade, the urgent need to switch from the prevailing linear business models to CE has gained momentum as expressed by numerous initiatives, governmental programs, new legislations or law amendments and publications. Resource-efficient climate mitigation pathways are of paramount importance.[7] The German government, for example, has committed itself to support the development and establishment of CE systems through multi- and bilateral development cooperation as early as 2018.[8] With its **2030 Reform Strategy** (published in 2020), the German Federal Ministry for Economic Cooperation and Development (BMZ) aligns development measures and financing with the United Nations Sustainable Development Goals (SDGs) and the climate targets.[9]

Through the effect of the material economy on greenhouse gas (GHG) emissions, CE actions have a positive impact on climate change mitigation action.[10] It is a common misunderstanding that CE action can only reduce emissions from the waste sector, which, by itself, accounts for less than 5% of anthropogenic GHG emissions on a global scale.[11] Moreover, due to their cross-sectoral nature, CE activities bear the potential for far greater mitigation effects. This can be illustrated on the example of food production and biowaste utilization: A CE generates less food waste but uses the unavoidable biowaste for energy production (see Figure 1). This has many positive effects on various sectors, including energy (shift to renewable energy), industry (less fertilizer production), agriculture (less energy and fertilizer use), and waste sector (less methane emissions from landfills).[12] Furthermore, biowaste utilization creates new jobs and supports city greening and nature-based solutions. Hence, CE actions show positive effects on climate change mitigation and adaptation, as well as on other sustainable development goals.

**LINK**
» 2030 Reform Strategy

Figure 1 Nexus of food production and biowaste utilization in urban areas



Closing material loops, the prevention of uncontrolled waste disposal and incineration, and the usage of renewable energy and material sources are all crucial steps to be taken towards climate neutrality. However, so far only around 10% of all resources used globally can be accounted circular[13], whereas the industrial sector contributes 21% of all anthropogenic GHG emissions[14]. By applying circular economy principles, GHG emission savings of a total of 40% by 2050 could be realized alone in the combined prduction of steel, aluminum, cement and plastic[15] (compare Figure 4). Hence, integrating CE measures with climate change mitigation measures can help to raise the NDC ambitions of all countries.

An assessment of the mitigation potential of CE measures is based on the differentiation and classification of CE activities, as provided in the following sub-chapter.

## 1.2 Classification of CE activities

Various approaches and indicators to classify CE activities exist. Originating from the '3 Rs approach' – reduce, reuse, recycle – extended versions such as the '9 Rs approach' have also been introduced.[16] These 9 Rs stand for refuse, reduce, reuse, repair, refurbish, remanufacture, re-purpose, recycle, and recover. These Rs create a hierarchy; the first term 'refuse' signals the highest level of CE action. The three to nine 'X-Rs' approaches are extended frameworks of the waste hierarchy.

The Ellen MacArthur Foundation (EMF) proposed an advancement to the R Framework. In its RESOLVE Framework, it thus offers guidance on how to accomplish each of the Rs (Source: **EMF 2015**[17]):

To seek a common ground between product-based classifications and advanced indicator models as proposed in various academic studies, this practical guide applies the RESOLVE classification framework of the EMF to identify CE activities.

**1 Regenerate** » shifting to the use of more renewable (biological) resources; reclaiming, retaining, and restoring the health of ecosystems; as well as returning recovered biological resources to the biosphere.

**2 Share** » maximizing the use of products during the use phase by sharing and reusing assets.

**3 Optimize** » Optimizing resource use throughout the lifecycle, including resource efficient input in production, design out energy loss and waste, as well as prolonging the use phase through proper product operation and maintenance.[1]

**4 Loop** » cycling materials and products back into earlier lifecycle stages, including many of the 9 Rs.

**5 Virtualise** » replacing physical goods by digital services and virtual products (e.g. replacing CDs by music streaming services, based on net-zero emission digital technology).

**6 Exchange** » shifting to different materials with lower scarcity, a lower environmental impact or better performance, but also replacing old-fashioned manufacturing processes by new innovative techniques.

LINK

» EMF 2015

[1] This last aspect 'prolonging the use phase through good proper product operation and maintenance' is categorized by EMF under the 'share' aspect. However, since not only shared goods should be maintained properly, this study diverges from the original source and categorizes this aspect as 'optimize'.

## 1.3 Economic benefits and climate finance as an opportunity for catalyzing a transition towards a CE

Beyond its considerable mitigation potential, CE action furthermore has the potential to create economic and social benefits also in the short run. For example, it is projected that CE can decrease the EU's $CO_2$ emissions drastically and can also stimulate economic growth and create job opportunities. The EU CE Action Plan could create up to 700.000 jobs within the EU by 2030, and the EU GDP Growth is estimated to rise by 0.5% if the planned actions will be implemented.[18] The CE could underpin the further digitalization of the global society and in private businesses, it could increase performance and reduce costs.[19] Furthermore, the climate mitigation and adaptation impacts will benefit both individual countries and the global community. Ultimately, the challenge of sustainability will be a paramount task for societies to prevail in the long run. Hence, the dependency on linear business models should be much costlier than shifting to a CE model.

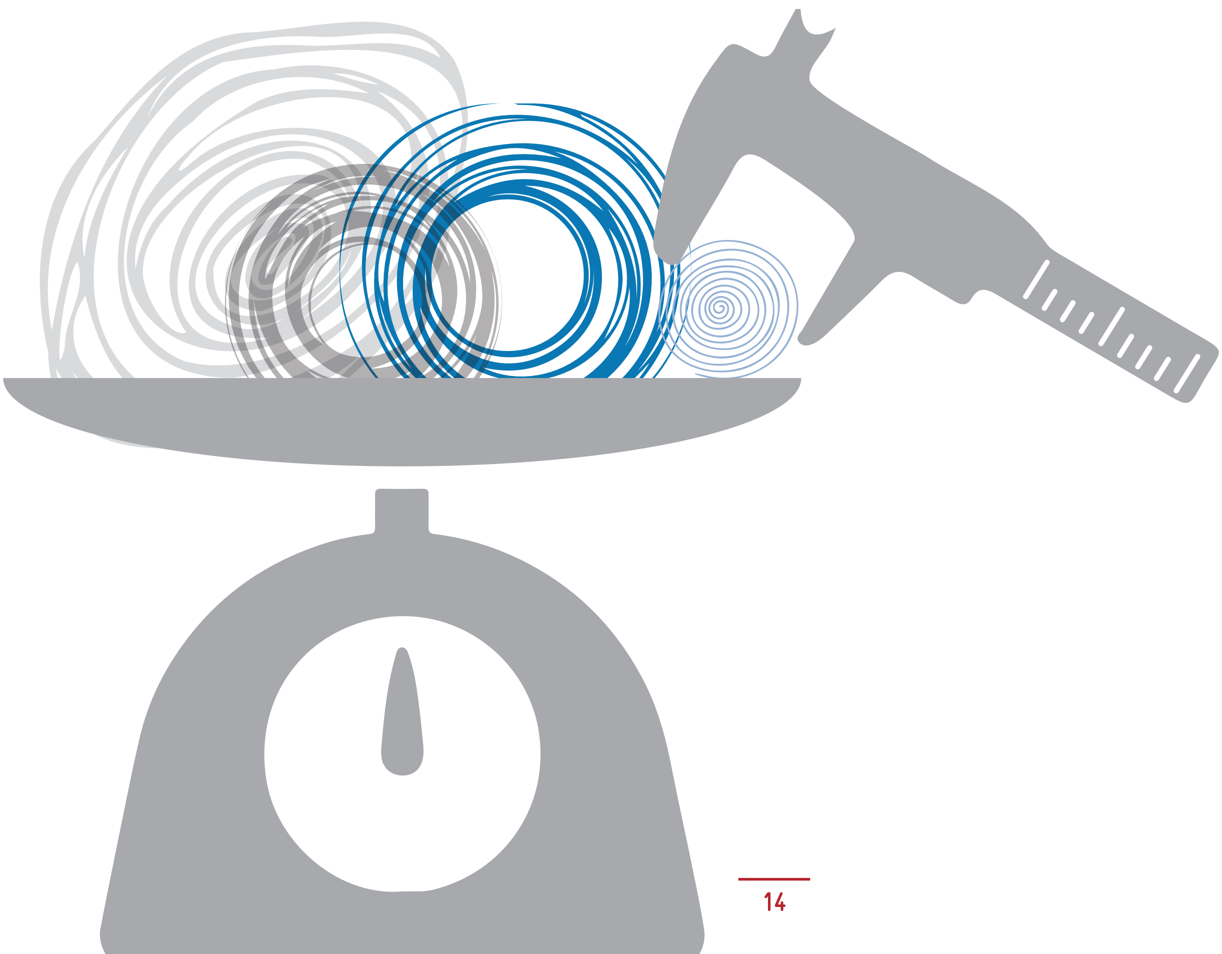
CE, through its cross-sectoral nature and considerable mitigation potential, makes a strong case for accessing already existing climate finance flows. It is estimated that the annual issuance of corporate and sovereign bonds with CE focus has increased from USD 4.5 bn to USD 21.0 bn between the years 2019 and 2021.[20] Furthermore, the number of private market funds with CE focus has risen from 3 in 2016 to 30 in 2020.[21] In addition, the climate finance mechanism of the PA could create returns as high as USD 4 for every USD 1 invested.[22] However, despite constant progress, so far, countries have fallen short of delivering sufficient amounts of climate finance. Raising ambition in this regard thus remains crucial.[23]

For CE actors to access climate finance, the link between CE and climate action must be established, and their mitigation and adaptation effects need to be quantified. Even though CE action matches the requirements for climate finance *in principle*, this quantification helps CE projects in proving their climate action effect. As Chapter 2 will show, this quantification goes beyond national contributions determined in the NDC process.

The following chapter provides a quantification approach towards the cross-sectoral climate change impacts of CE activities. Based on these approaches, holistic NDCs can be designed to align CE, climate change, and sustainable development agendas. This design will allow for identifying co-benefits and challenges for the integration of these frameworks.

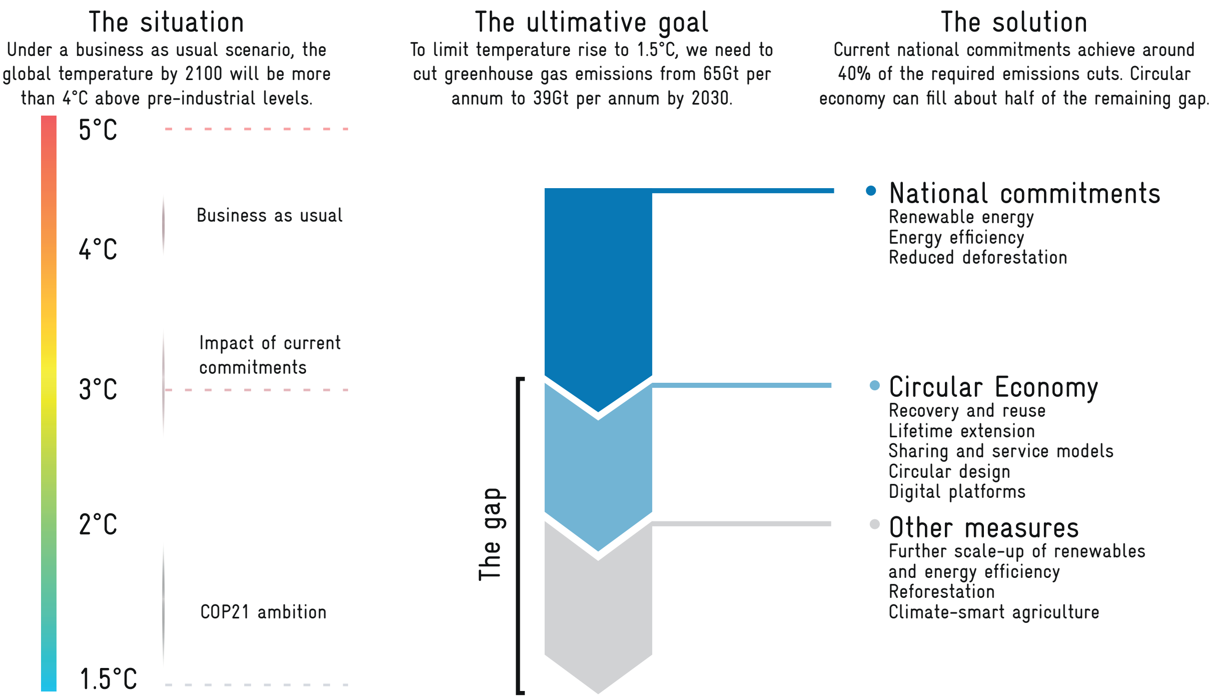
# 2

# Quantifying the mitigation potential of a CE transition



The climate targets under the PA cannot be achieved by shifting to renewable energy or increasing energy efficiency alone. It requires a fundamental shift in the way we produce, use, and recover materials on a global scale. CE action helps to phase out linear business models as well as unsustainable production and consumption patterns. According to a **technical paper by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat**, CE measures could reduce 33% of the $CO_2$ emissions embedded in our products and could reduce the current emission gap by half.[24]

## Figure 2 Contribution of CE towards meeting the temperature goal of the PA




*Source: adapted from Ecofys & Circle Economy, 2016*[25]

A **more recent report by Circle Economy** shows that, if enacted globally, the CE even had the potential to close this gap entirely: while the current NDC pledges close 15% of the gap, the remaining 85% could be delivered by the CE.[26]

**LINKS**

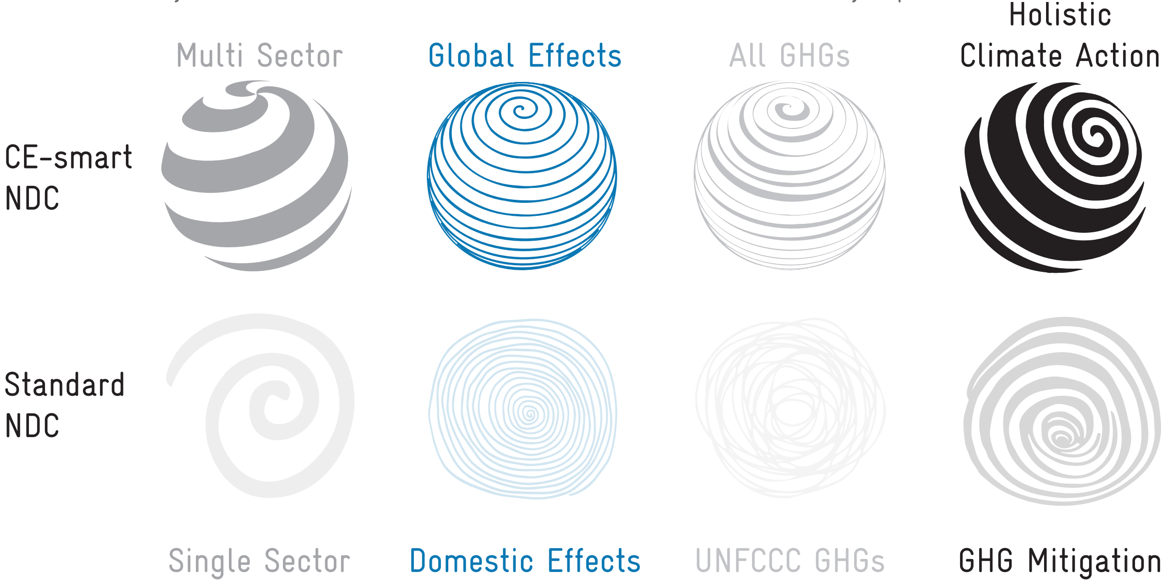
» Technical paper by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat

» More recent report by Circle Economy

## 2.1 Guidance and orientation for sectoral activities and cross-sectoral coordination

The CE concept and the classifications of CE activities (see Chapter 1) derive from a different conceptual framework than the PA and its NDCs. These differences affect definitions of sectors, territories, greenhouse gases and types of climate actions, and need to be understood well in order to design a CE-smart NDC (see Figure 3). Thus, to quantify the potential of CE action and design CE-smart NDCs, a look beyond the current NDC framework is needed. Even though the current framework does not incentivize holistic policies on material efficiency, it still allows for CE-smart NDC design. This chapter shows the differences in its four key aspects between standard NDCs, as defined by the PA, and CE-smart NDCs.

**Figure 3 Differences between CE-smart NDCs and standard NDCs**
Circular economy-smart NDCs deviate from business-as-usual NDCs in four key aspects




### 1 First aspect: Sectoral activity: single versus multi-sector

Under the UNFCCC, parties to the PA are required to report their GHG emissions on an annual basis, following UNFCCC guidelines and Intergovernmental Panel on Climate Change (IPCC) guidance. The IPCC took a plain statistical approach to define sectors for quantifying national GHG emissions. UNFCCC uses these sector definitions for the **UNFCCC Reporting Guidelines on GHG Emission Inventories**[27] but has its own sector definitions in the **UNFCCC Reporting Guidelines on National Communications** (e.g. also including transport and buildings sectors).[28] The latter aim to capture the estimated mitigation effects and therefore follow the logic of a policy analysis approach.

The CE-RESOLVE framework by EMF uses another set of sector definitions that deviates from the above. It can be described as multi-sectoral or cross-sectoral when compared to IPCC and UNFCCC sector definitions. Table 1 illustrates these differences using the case of the Netherlands.

LINKS
- » UNFCCC Reporting Guidelines on GHG Emission Inventories
- » UNFCCC Reporting Guidelines on National Communications
- » CE-RESOLVE framework

Any country can translate these IPCC sectors into 'commonly used' sectors by identifying the sources of the different GHG and multiplying these by their domestic share (see Table 1, light grey part). These sector-specific mitigation potentials are then translated into the different RESOLVE action potentials (compare Chapter 1.2, see Table 1, dark grey part). The CE category Share, for example, affects emissions from four different IPCC (sub-)sectors, including manufacturing industries (IPCC 1.A.2 – see left table), transport (IPCC 1.A.3), industrial processes and product use (IPCC 2), and waste (IPCC 5). This results in a maximum mitigation potential of

$$15\%+17\%+5\%+2\% \approx 38\%$$

in the Netherlands. The CE category Virtualize in the Netherlands, in contrast, does not affect manufacturing industries and therefore shows a 15%-points lower mitigation potential of ≈ 24%.

**Table 1** Matrix of GHG emission inventories and maximum mitigation potential (IPCC, non-IPCC and CE-RESOLVE Framework), example of Netherlands 2019*

| Greenhouse gas source and sink categories | Total | | Shares of sectors not included in the IPCC nomenclature | | | | | CE-RESOLVE Framework: Maximum mitigation potentials | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Buildings | Transport | Aviation | Industries | Land Use | Regenerate | Share | Optimize | Loop | Virtualize | Exchange |
| Total (net emissions)[(1)] | 184831,17 | | 13% | 18% | 34% | 50% | 21% | 75% | 38% | 69% | 34% | 24% | 34% |
| 1. Energy | 149977,88 | 81% | | | | | | | | | | | |
| A. Fuel combustion (sectoral approach) | 148455,50 | 80% | | | | | | | | | | | |
| 1. Energy industries | 57085,29 | 31% | | | | 31% | | 31% | | 31% | | | |
| 2. Manufacturing industries and construction | 26897,87 | 15% | | | | 15% | | 15% | 15% | 15% | 15% | | 15% |
| 3. Transport | 31004,80 | 17% | | 17% | | | | 17% | 17% | 17% | | 17% | |
| 4. Other sectors | 33305,57 | 18% | 13% | | | | 9% | 13% | | | 13% | | 13% |
| 5. Other | 161,97 | 0% | | | | | | | | | | | |
| B. Fugitive emissions from fuels | 1522,38 | 1% | | | | | | | | | | | |
| 1. Solid fuels | 77,63 | | | | | | | | | | | | |
| 2. Oil and natural gas | 1444,76 | 1% | | | | | | | | | | | |
| C. $CO_2$ transport and storage | NO | | | | | | | | | | | | |
| 2. Industrial processes and product use | 9794,60 | 5% | | 1% | | 4% | | | 5% | 5% | 5% | 5% | 5% |
| 3. Agriculture | 17650,73 | 10% | | | | | 10% | | | | | | |
| 4. Land use, land-use change and forestry(1) | 4522,08 | 2% | | | | | 2% | | | | | | |
| 5. Waste | 2885,89 | 2% | | | | | | | 2% | 2% | 2% | 2% | 2% |

** On the left side, UNFCCC sectors are displayed (blue), which are then translated to commonly used sectors (light grey) and mitigation potentials according to the different RESOLVE CE actions (darker grey). Discrepancies between total and individual mitigation potential stem from mathematical rounding of displayed figures.*

*Source: adapted from UNFCCC 2021* [29]

For historical and statistical reasons, the IPCC allocated all GHG emissions from activities reflected in the traditional and well-defined national energy balances (e.g. burning of oil, coal and gas) to the IPCC sector '1. Energy'. All other GHG emissions are categorized in four additional sectors (blue). These IPCC sector definitions thus do not necessarily correspond to common-sense sector definitions, along the division of labor among ministries within a government (light grey). Therefore, some 'commonly used' sectors, e.g. transport or buildings, are only sub-categories in this IPCC nomenclature. Industrial production, on the contrary, is split over three different IPCC sub-categories: '1.A.1 Energy industries', '1.A.2 Manufacturing industries and construction' and '2. Industrial processes and product use'.

A CE-smart NDC clearly distinguishes between these different set of sector definitions, as provided by IPCC, UNFCCC, and the CE RESOLVE Framework.

## 2 Second aspect: National territory mitigation effects versus global mitigation effects

Article 4 of the PA asks every party to relate its individual NDC to the global effort of achieving the temperature goal by mitigating its domestic GHG emissions. This follows standard practice of multilateral treaties under the United Nations (UN). However, in a globalized world, production chains cross national borders frequently. Accordingly, the **GHG Protocol**, as the standard used by the **Carbon Disclosure Project** (CDP) for private business entities, asks for the total global GHG emissions that are attributed to a certain product or service, irrespective of geographical territories.

Table 2 illustrates the stark contrast of the territorial principle of national inventories (contribution, column 2) versus the global effect (attribution, column 3) for each of the six CE categories, on the example of the Netherlands.

CE-smart NDCs quantify both, domestic and global mitigation effects of climate policies and measures. The table demonstrates how the global mitigation effect (through indirect emissions) can have higher effects compared to the domestic mitigation effect. For example, the CE category Exchange has a relatively low mitigation effect on domestic, thus Dutch, emissions but a high mitigation effect on global emissions as many material-intensive products in the Netherlands are imported. Sharing reduces domestic emissions particularly in the transport and building sectors. However, the indirect effects reach far beyond these sectors through decreased demand, and hence production, of end-user products that are imported into the Netherlands.

**LINKS**

» GHG Protocol

» Carbon Disclosure Project

## 3 Third aspect: GHG as regulated under different treaties

The greenhouse effect is not only caused by Carbon Dioxide ($CO_2$), but by a set of different gases and substances. To identify the GHG mitigation potential of CE action, the different international regulations for GHG emissions need to be considered. A common practice in international law is to avoid confusion among regulatory bodies through clearly allocating distinct subjects, including gases and substances, to different treaties.

- Convention on Long-Range Transboundary Air Pollution (1979): Nitrogen Oxid (NOx), Volatile Organic Compounds (VOC), and ground-level ozone
- Montreal Protocol (1987): Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs)
- UNFCCC (1992)/ Kyoto Protocol (1997): Carbon Dioxide ($CO_2$), Methane ($CH_4$), Nitrous Oxide ($N_20$), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur hexafluoride ($SF_6$)

As the PA is a treaty for the enhanced implementation of the UNFCCC, standard NDCs are limited to the accounting of GHG emissions covered by this treaty. However, CE-smart NDCs take into account that CE activities have a mitigation effect also beyond the list of UNFCCC GHGs. Hence, acknowledging the existence of and including further potent GHGs in CE-smart NDCs, through supplementary information, will allow for the design of comprehensive mitigation action.

Furthermore, uncontrolled burning of waste in open dumpsites is a significant source of air pollutants, including suspended particulate matter (SPM).[30] Dark SPM is also called ‘black carbon’ and has a significant impact on accelerated global ice melting (both polar ice and glaciers) due to its strong absorption of solar radiation.[31] As black carbon is not controlled by any international treaty, national GHG emission inventories do not cover these emissions. A CE-smart NDC provides these emission reduction effects as supplementary information.

Table 2 **Comparison of domestic versus global GHG mitigation potential in the Netherlands**

| CE-category, RESOLVE framework | Domestic GHG emission mitigation effect (contribution)* | Global GHG emission mitigation effect (attribution) |
|---|---|---|
| **REGENERATE** | | |
| Shifting towards more renewable (biological) resources | **High:** decreased domestic combustion of heating oil, gasoline, and diesel fuel | **High:** less imported electricity generated from coal; production of fossil fuel products |
| **SHARE** | | |
| Maximising the use of products during the use phase, by sharing and reusing assets | **Medium:** vehicle-, building-, and product sharing | **High:** decrease in import of end-user products |
| **OPTIMISE** | | |
| Optimizing resource use throughout the lifecycle, including resource efficient input in production, design out energy loss and waste, prolonging the use phase through proper product operation and maintenance | **Medium:** decreased domestic production of end-user goods and single-use products | **Medium-high:** decreased demand for imported goods |
| **LOOP** | | |
| Cycling back materials and products into earlier lifecycle stages, including many of the 9 Rs | **Medium-low:** domestic waste reduction, decreased domestic production of single-use products | **High:** waste reduction at production site, decreased production of imported single-use products |
| **VIRTUALISE** | | |
| Replacing physical goods by digital services and products | **Medium-low:** domestic production of physical goods to be substituted | **High:** decreased production of imported physical goods |
| **EXCHANGE** | | |
| Shifting to different materials with lower scarcity, a lower environmental impact or better performance, replacing old-fashioned manufacturing processes by innovative technology | **Low:** decreased domestic production materials | **High:** decreased materials from imported products |

** This column corresponds to Table 1: The different actions show different domestic mitigation effects which in most cases reach only lower levels than global interventions.*

## Fourth aspect: 4 Mitigation action versus holistic climate action

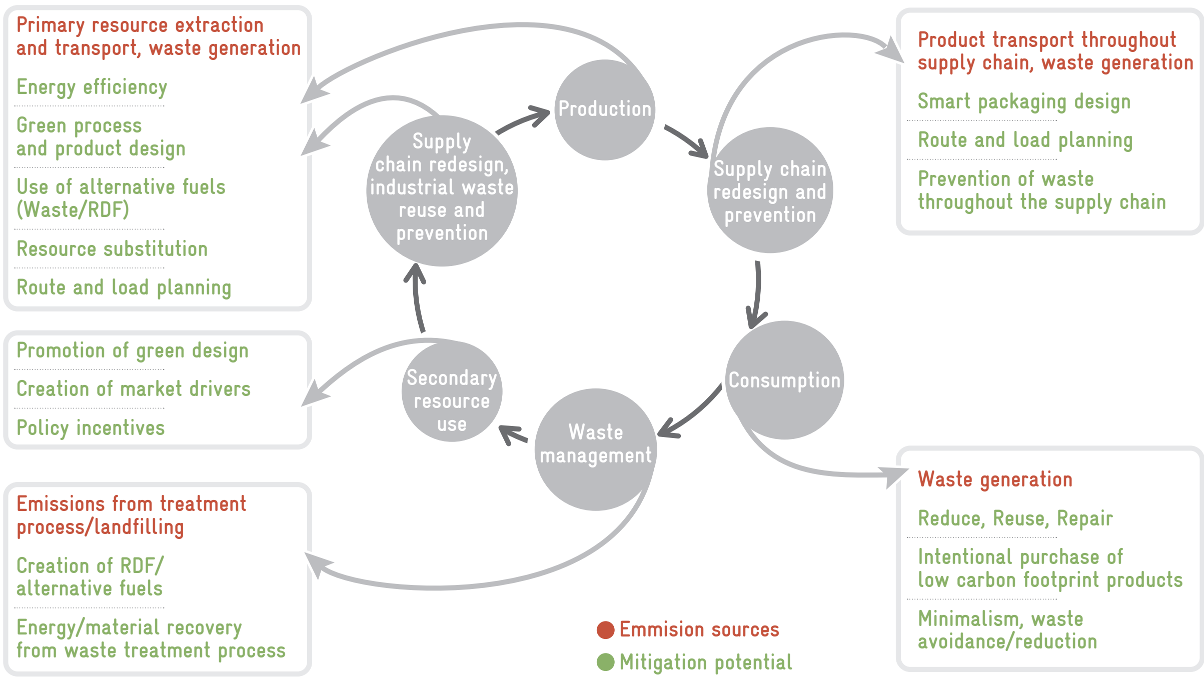
NDCs cover both mitigation and adaptation – in separate silos. When asked for the contribution towards achieving the global temperature goal, standard NDCs only ask for the mitigation effect of climate policies and measures. CE activities, however, have multiple benefits and profit from both mitigation and adaption action and thus overcome this silo thinking. As one example, Laos, a pioneer, has developed a circular strategy in accordance with its national plan to develop the tourism sector. Circular strategies, such as increased cultivation of algae to produce bio-based materials, reduce the dependence on fossil fuel imports and increase both climate mitigation and resilience.[32]

A CE-smart NDC provides both mitigation and adaptation effects of CE actions in the relevant sections of the NDC as well as in supplemental information.

## 2.2 Accounting methodologies for CE activities

Figure 4 illustrates the differences in GHG emissions by sources (as contained in national GHG emission inventories, marked in red) and mitigation potentials (marked in green) on the example of waste-management initiatives and supply chain redesign, industrial waste reuse, and prevention solutions. Not all possible CE strategies are depicted as the sharing economy, for example, is missing. It is this consideration of different accounting methodologies for levels of emissions (red) and mitigation potentials (green) in the waste management sector that leads to different estimates of the relative importance of waste management and the transition towards a CE. CE-smart NDCs acknowledge these differences during the design phase.

**Figure 4** Sources of GHG emissions and mitigation potential in the focus of waste management initiatives and supply chain redesign, industrial waste reuse and prevention solutions




*Source: adapted from: UNFCCC 2018*[33]

## 2.3 Methodological frameworks for ex-ante estimating the effect of CE activities on GHG emissions

Various methodological frameworks are discussed at scientific level for quantifying the effect of CE activities on GHG emissions.[34] These are based on life cycle assessments (LCA) methods, computable general equilibrium (CGE) models, and/or Input-Output models (all further described below). The frameworks are quite diverse in terms of their purpose, level of detail (granularity level), baseline, ambition level, and output format (see Table 3). Such modelling frameworks are often used to assess multiple impacts, including on employment, economic output, sector impacts as well as resource impacts. Therefore, such complex models can also provide results on co-benefits of CE action, such as effects on the labour market.

**Table 3** Key differences of methodological frameworks for estimating the effect of CE activities on GHG emissions

| Purpose | Granularity level | Baseline | Ambition level | Output format |
|---|---|---|---|---|
| Assessing employment impacts | | | | |
| Assessing economic impacts | Action level | Current situation | Policy targets | Relative reduction compared to baseline |
| Assessing sectoral impacts | Sector level | Baseline trend | Realistic potential | Annual emission reduction |
| Assessing resource impacts | Economy level | Baseline trend + existing policies | Maximum potential/ potential required to reach international climate targets | Cumulative emission reduction over a modelled period |
| Assessing GHG impacts | | | | |

*Source: adapted from Trinomics 2018*[35]

The application of such methodological frameworks is complex and data intensive. Therefore, NDC coordinators may wish to request methodological support on quantification of CE action, e.g. through technical assistance, university cooperation, or open tenders. Box 2 provides a brief overview of quantification methodologies from current literature compiled by Trinomics.

### Box 2
### Quantification methodologies from current scientific literature
*(Source: Trinomics 2018[36])*

**LCA-based methods**

LCA is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service. LCA also covers multiple CE actions. For instance, PBL (2015), Nordic Council of Ministers (2017) and Eunomia (2014) analysed the environmental impacts of specific CE activities by using the LCA method.[37] All three studies have in common that they had a specific narrow focus on (a) certain economic activity or activities. For example, Eunomia (2014) has a focus on waste management practices.

**Computable General Equilibrium (CGE) models**

CGE models are a class of economic models that use actual economic data to estimate how an economy might react to changes in policy, technology or other external factors, ceteris paribus. The EMF (2015) and The Netherlands Organisation for Applied Scientific Research (TNO) (2018) have used a broad range of CE actions into modelling inputs for a CGE model.[38] Covered CE actions include 'the bio-based sectors (e.g. increase nutrient recycling, lower consumption of animal-based products, improved use of organic waste), increased recycling of plastics, implementation of CE strategies in the construction sector e.g. (increased reuse of materials, lighter constructions) and increased recycling of municipal waste'.

**Input Output models**

Input Output models are quantitative economic models that reflect the interdependencies between different (sub-)sectors of a national economy. Waste & Resources Action Programme (WRAP) (2016), Cambridge Econometrics (2018) and Deloitte Sustainability (2016) are three recent studies with sufficiently detailed methodologies that assessed GHG impacts of CE actions by Input Output modelling.[39] CE actions covered include 'closed and open loop recycling, repair of machinery & electronics, reuse, renting & leasing activities, remanufacturing'.

CE-smart NDCs should use at least one of the abovementioned methodologies to quantify the GHG mitigation effects of CE activities, such as sharing or recycling. There is no one-size-fits-all method that can be used for each type of CE activity. Instead, the appropriate methodology should be chosen based on the concrete case under consideration. However, due to the high-level analysis needed to design country-wide NDCs, high-level assessments such as Input-Output models may be more appropriate for policy planning than products-specific LCA.

Trinomics further concluded that hybrid methodologies that combine LCA and macroeconomic modelling in prioritised sectors can deliver promising results. Product-specific LCAs are deemed to be too detailed for the purpose of GHG impact assessments, as this would give an almost endless list of methodologies on how the life cycle resource use of specific products or product groups could be improved. Design of CE-smart NDCs focuses on higher-level methodologies with larger granularity. However, LCAs that cover actions or product groups that are broad enough to enable upscaling as well as combined methods may be considered.

'There is a gap in the level of detail between the product-level LCAs that are commonly used to assess the carbon footprint, and the macroeconomic methods that take a very aggregated sector approach. The former is too detailed and an analysis of all products available in a consistent way at this granularity level would require a vast amount of resources. The latter often lacks a sufficient level of detail to accurately reflect the dynamics of particular circular actions.' For the design of CE-smart NDCs, hence, the limitations of all methodologies should be known, and a middle ground has to be sought. Product group LCAs in combination with Input-Output models, for example, represent a compatible match of methods.

As can be seen from the above analysis by Trinomics, trade-offs need to be made when developing a framework to quantify the GHG impacts of CE actions and if possible, link them to GHG emission inventories. Impact assessments will require significant modelling resources.

Trinomics furthermore concluded that some choices need to be made regarding the selection of CE actions to be included, as covering all CE actions in one approach is not feasible. In case of substantial data limitations, in particular from official statistics, considerable resources would need to be allocated to data collation before any modelling can be done. Investment in data generation and modelling efforts should therefore proceed nationwide policy formulation and needs to be integrated in measurement, reporting and verification (MRV) systems.

**There is no one-size-fits-all method that can be used for each type of circular economy activity.**

### Box 3
### Scenario building for a low-carbon economy: example of Colombia
*(Source: GIZ, UNDP 2019[40])*

'The Colombian Low Carbon Development Strategy (CLCDS) is a short, medium and long-term planning initiative that aims to identify the greenhouse gas (GHG) mitigation potential and the appropriate measures and projects without affecting the long-term growth of the Colombian economy.'

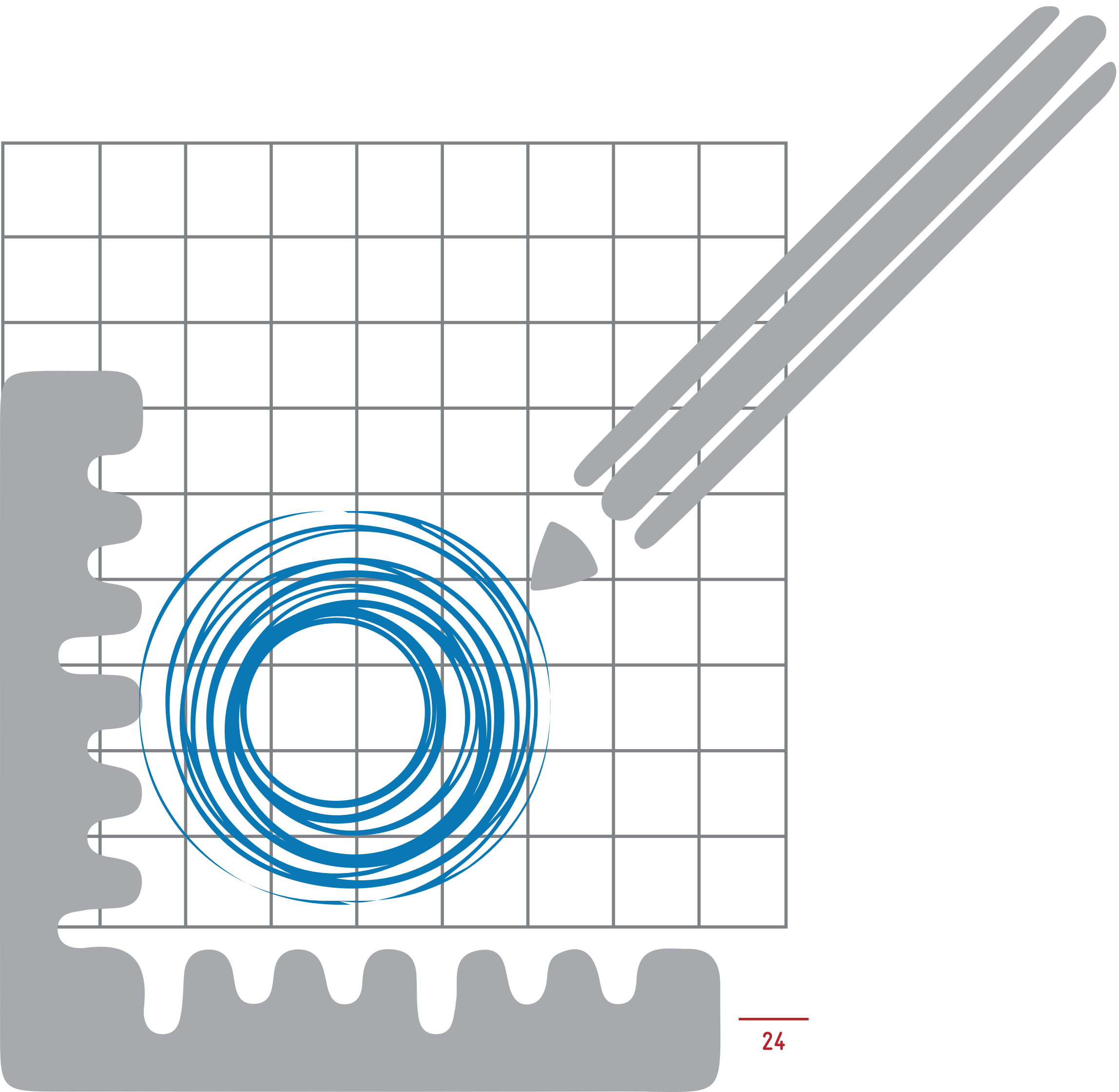
Through strategic cooperation with academia, comprehensive modelling was possible:

'Thanks to studies carried out by the Universidad de los Andes (a Colombian university), several low-carbon development alternatives at the sectoral level were identified and formulated through mathematical models, including:

- Modelling of a baseline scenario;
- Identifying mitigation measures, their GHG reduction potentials and abatement cost curves;
- Developing various scenarios to determine the NDC, and analysis of co-benefits of the measures.'

# 3

# Designing CE-smart NDCs



The PA has established a five-year cycle, after which all parties shall update their NDCs. Beginning in 2023, a global stocktake will take place every five years to review the collective progress. These outcomes are expected to inform policy makers and enhance ambitions for the next cycle of NDCs. Hence, from 2023 onwards, there will be a biennial cycle of update reports (so called 'biennial transparency reports') and a five-year cycle of global stocktakes.[41] The last update was to be submitted by 2020. However out of 195 parties, so far only 117 have submitted their updated NDC (as of 09/2021).[42]

## 3.1 Cross-sectoral and sub-national cooperation in the planning process of CE-smart NDCs

As identified in Chapter 2, the international reporting structure does not incentivize countries to look beyond domestic GHG emissions as such. This focus on country-specific contributions poses the risk of overlooking a large share of the economically feasible mitigation potential. The EU constitutes a prime example: domestic emissions in the EU have decreased whilst its global carbon footprint has increased by 11% since 1990.[43] This can be the case since the domestic and the global footprint is calculated differently: The global footprint also includes emissions caused through the consumption of imported goods. This outsourcing of GHG emissions makes it increasingly hard for exporting countries to reduce their territorial emissions.[44] Amending NDCs through CE, however, has considerable benefits. Beyond the climate-proofing of the own economy by reducing reliance on natural resources and stimulating economic growth and innovation, the international nature of emission reductions allows for cooperation with export- and $CO_2$ intensive countries. Closing material loops, for example, must happen both locally and transnationally. Trade of circularly manufactured goods, biobased products and eco-design standards can create important economic opportunities.

> **Focus on domestic contributions poses the risk of over-looking a large share of the economically feasible mitigation potential.**

The suggested expansion of the NDC design process can bring considerable change in emission reductions that reach beyond the territorial approach. It can result in both economic and social benefits and can avoid rebound and outsourcing effects. Carbon pricing instruments and new business models that follow the RESOLVE framework reflect the growing interest of the public and private sector. Furthermore, framing CE activities increasingly through their climate mitigation potentials, will open up new investment and financing opportunities.

The NDC Support Programme by UNDP offers an extensive guide on domestic NDC enhancement.[45] However, transnational activities in the private sector will require international support and regulations. At the same time, many CE solutions will be implemented at a sub-national level. Therefore, to include CE considerations into NDC design, both a transnational view and a sub-national view must be included in the design process.

Building on the suggested elements of NDC enhancement by the NDC Support Programme, we propose additional steps and integration mechanisms to account for indirect emissions that occur in the upstream and downstream value chain of companies, similar to GHG-reporting by companies. The latter constitute indirect emissions that, for example, occur in the upstream and downstream value chain of companies. Scope 3 emissions are therefore crucial to determine carbon footprints in addition to scope 1 and 2 emissions.

Box 4

**Scope 1, 2, and 3 emissions**

*(Source: GHG Protocol Corporate Accounting and Reporting Standard 2004[46])*

'**Scope 1**: direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment. Direct $CO_2$ emissions from the combustion of biomass shall not be included in scope 1 but reported separately (see chapter 9). GHG emissions not covered by the Kyoto Protocol, e.g. CFCs, NOx, etc. shall not be included in scope 1 but may be reported separately.

**Scope 2** accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.

**Scope 3** is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.'

In many industries, Scope 3 emissions account for the biggest amount of GHG emissions. This is due to the fact that in today's economy, many tasks are outsourced, and few companies own the entire value chain of their products.

An integrated approach to stakeholder engagement could therefore look like this:

Table 4 **Stepwise procedure to establish a CE-smart NDC enhancement process**

| Leading process | Actors | CE-smart Activities |
|---|---|---|
| 1. SECURE HIGH-LEVEL BUY-IN | ◎ Prime minister's or president's office<br>◎ Key ministries | (No need for additional amendment) |
| 2. ESTABLISH INSTITUTIONAL ARRANGEMENTS | ◎ Lead institution | Ensure horizontal and vertical integration:<br>◎ Establish an intra-ministerial coordination mechanism (to ensure cross-sectoral coverage)<br>◎ Sub-national coordination mechanism to ensure localization of solution-finding processes<br>◎ Alignment with economic and climate mitigation agendas |
| 3. PLAN FOR STAKEHOLDER ENGAGEMENT SUCH AS | ◎ Civil society<br>◎ Academia<br>◎ Private sector<br>◎ Sub-national actors (e.g. provincial and local governments)<br>◎ Trade unions<br>◎ Vulnerable populations | Establish international cooperation:<br>◎ Partner with foreign governments with existing trade agreements and frameworks<br>◎ Identify core domestic sectors depending on import and export<br>◎ Engage private actors from core sectors to identify potential upstream and downstream emission collaboration |
| 4. DEFINE DOMESTIC OBJECTIVES | ◎ All involved key stakeholders<br>◎ Lead institution | ◎ Engage internationally to define a CE taxonomy to ensure PA alignment<br>◎ Identify CE actions (see below Table 5) together with stakeholders |
| 5. DESIGN A WORK PLAN | ◎ All involved key stakeholders<br>◎ Lead institution | ◎ Regulate domestic economic activities<br>◎ Incentivize players with considerable scope 3 emissions outside domestic jurisdiction to decrease emissions |

## 3.2 Amending NDC design through CE-smart planning

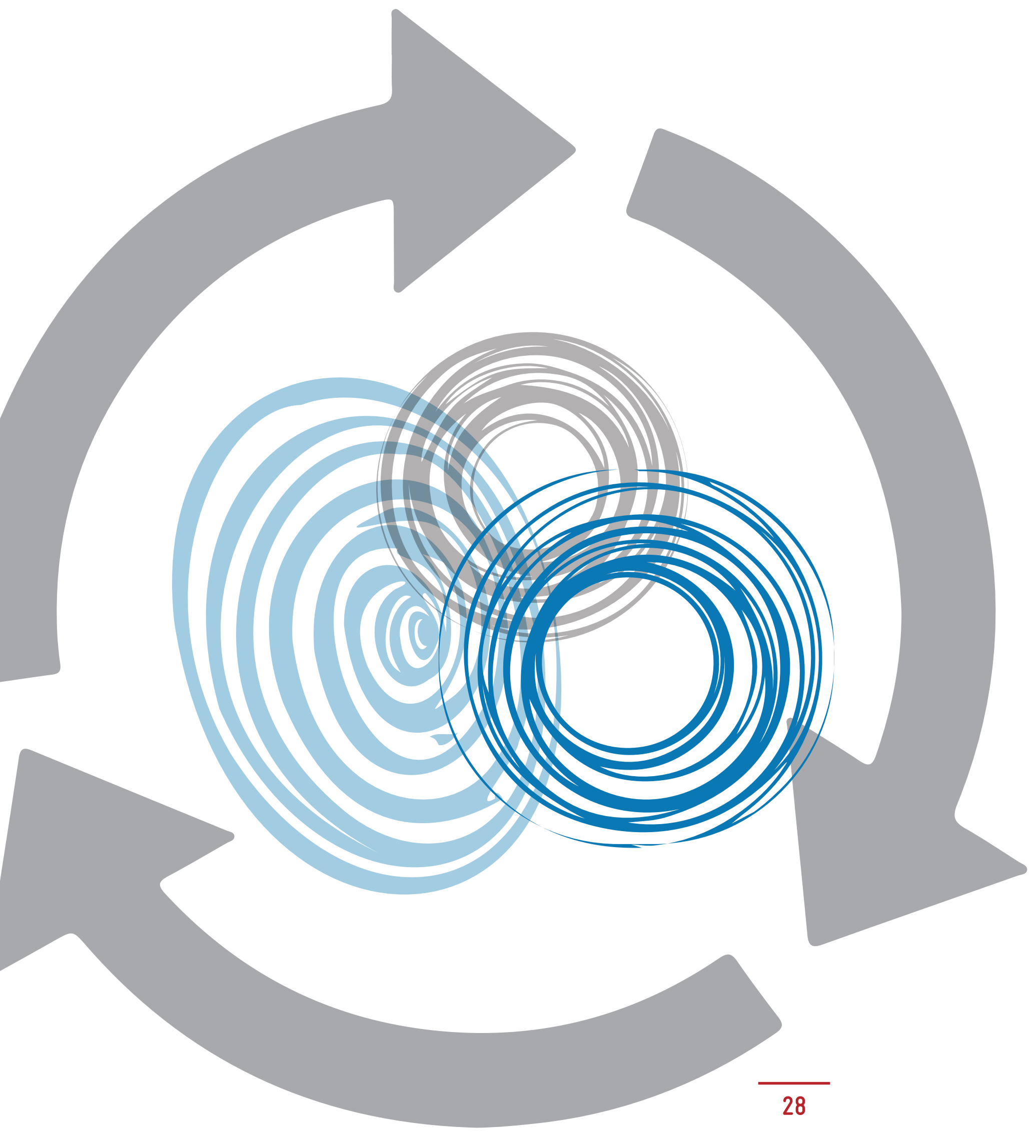
Once important actors and processes have been identified, CE-smart planning follows. An integrated approach to mitigation planning could look like this:

### Table 5 Integrated approach for designing CE-smart NDCs

| Leading process | CE-smart amendment |
|---|---|
| TAKE STOCK OF PROGRESS TO DATE | |
| Analyze:<br>• GHG, sectoral, and socioeconomic projections<br>• National policies<br>• Sub-national and non-state commitments<br>• Development objectives<br>• Mitigation finance | • Include a consumption-based footprint assessment to identify hotspots of hidden GHG emissions<br>• Looking at flows, stocks, conversions, imports and exports of materials and products with enhanced digital tech (e.g. digital product passports) |
| TAKE STOCK OF LONG-TERM OBJECTIVES | |
| • Global and sectoral mitigation benchmarks<br>• SDGs and other global frameworks<br>• Long-term, low-GHG emission development strategies<br>• Long-term national development plans | • Develop long-term scenarios for CE visions in identified hotspots<br>• Develop long-term strategies to align human development priorities, climate action, and CE objectives |
| IDENTIFY OPTIONS FOR ENHANCEMENT | |
| • Improve alignment with PA<br>• Reflect new developments, innovation, and best practice<br>• Maximize benefits<br>• Fill gaps<br>• Address finance and implementation issues | • Identify RESOLVE actions in relevant sectors<br>• Identify sub-national actors<br>• Make use of international cooperation as suggested in the PA to facilitate cooperation on value chains<br>• Identify PA-aligned CE finance |
| AGGREGATE, ITERATE AND REFINE | |
| • Aggregate impact on GHG emissions and other selected indicators<br>• Iterate to refine list of enhancement options | • Quantify the GHG impact of RESOLVE actions both domestically and for scope 3 type emissions |
| REFLECT ENHANCEMENTS IN NDC | |
| • GHG target<br>• Sectoral, non-GHG target(s)<br>• Policies and measures<br>• Alignment with long-term goals | • Where possible: reflect RESOLVE actions in NDC. Where dependent on transnational cooperation & private sector engagement: reflect cooperation process in NDC |

# 4

# Implementing CE-smart NDCs



## 4.1 Currently available and possible future policy instruments

Common climate policy instruments can be classified in four broad categories:

1. Economic and fiscal instruments,
2. Research and development,
3. Regulatory instruments and standards,
4. Education, training and public awareness raising.

Many of these instruments tend to be applied in national policies, and their transnational character is often acknowledged. A rigid domestic carbon pricing scheme, for example, only works when equipped with a carbon border adjustment mechanism such as trade tariffs, duties and levies. However, many climate policies have not been explicitly linked to their impact on the CE and vice versa. Table 6 provides examples of CE-smart climate policies as suggested by different reports[47]. They follow the common UNFCCC categories of climate policy instruments.

**NDC coordinators should be embedded in an institutional process that brings together actors across government as well as different levels of government.**

## 4.2 Role and tasks of NDC coordinators with a view to sector implementation of the NDCs

A lesson learned for the NDC implementation process is the relevance of climate policy or of NDC coordinators. These coordinators serve as brokers between different sectors and lead experts within their own sectors. Given the cross-cutting nature of NDC implementation, the NDC coordinators ensure the alignment of sectoral agendas with the climate agenda. The coordinators, however, should be embedded in an institutional process that brings together actors across government as well as the different levels of government.[48] For CE-smart NDCs, the challenge is even stronger due to the intersectoral nature of CE actions. Hence, NDC coordinators are crucial for CE-smart NDC design and implementation as they take on the roles as policy entrepreneurs. They are not only in the best position to coordinate and moderate the ongoing climate planning process, but would also benefit from feedbacks, cooperation and enhanced data available through monitoring and reporting by relevant stakeholders. Those responsible for CE actions, spanning across sectors and government levels, should therefore closely cooperate with these coordinators to ensure alignment and coordination.

International partnerships and platforms, such as the NDC Partnership, may be appropriate forums to support NDC coordinators in their endeavor to activate the mitigation potential of CE action and to advance the work on CE-smart NDCs.

**Table 6** Examples of climate policy instruments relevant to CE

| Type of CE action/ type of instrument | Economic and fiscal instruments | Research and development | Regulatory and standards | Education, training and public awareness |
|---|---|---|---|---|
| **REGENERATE**<br>Shifting to the use of more renewable (biological) resources | • Carbon market and carbon border adjustments<br>• $CO_2$ tax with revenue distribution to prevent social hardship<br>• Feed-in tariffs on renewables | • Funding research on alternative materials that could substitute climate-harming materials and products, e.g. plant-based packaging<br>• Funding research on recycling of solar panels and batteries | • Solar mandate for new buildings<br>• Standards on renewable energy usage in production and buildings<br>• Standards on usage of renewable materials (i.a. wood) in buildings | • Campaigns on renewable production systems (biogas/ electricity production systems, hydropower)<br>• Strengthening private sector networks in their advocacy role<br>• Vocational training on renewable energy technology (maintenance etc.) |
| **SHARE**<br>Maximising the use of products during the life cycle by sharing and reusing assets | • Tax reliefs for usage of public transport and sharing economy services | • Funding spatial analysis on local sharing economies<br>• Enhancing resource efficient and shared maker/repair spaces and laboratories | • Communal reduction of parking space per housing unit<br>• Digital product passports to monitor life spans of products | • Establishments of sharing and service schemes<br>• Exchange and investment platforms<br>• Business model accelerators<br>• Campaigns on benefits of sharing |
| **OPTIMISE**<br>Optimizing resource use throughout the lifecycle, including resource efficient input in production, design out energy loss and waste, prolonging the use phase through proper product operation and maintenance | • Subsidizing CE activities, e.g. by reducing Value Added Tax (VAT) on repair services[49]<br>• Pay-as-you-throw instruments<br>• Taxes on export and import of raw, resource-intensive materials[50]<br>• Incentives for circular procurement practices<br>• Reduced labour taxes on repair and maintenance activities | • Funding research on re-use and upgradability of products<br>• Incentivizing research on material-efficient products | • Extended producer responsibility (EPR) regulation with eco-modulation of fees<br>• Restrictions on packaging materials<br>• Standards on limiting food waste<br>• Digital product passports to monitor life spans of products | • Consumer information campaigns[51][52]<br>• Information campaigns on energy efficiency in buildings |

| Type of CE action/ type of instrument | Economic and fiscal instruments | Research and development | Regulatory and standards | Education, training and public awareness |
|---|---|---|---|---|
| **LOOP**<br>Cycling back materials and products into earlier lifecycle stages, including many of the 9 Rs | Subsidies based on recycled content in product<br>Reduced VAT on low-carbon footprints and/or recycled products | Funding LCA<br>Funding pilot projects on municipal recycling strategies | Mandatory share of recycled material in new products<br>Regulation on usage of mono-materials<br>Implement efficient waste collection and recycling systems and technologies<br>Phasing out/increasing levies on non-recyclable products [53]<br>Standards on design of eco-industrial parks and retrofitting factories | Facilitating industrial symbiosis nationally and regionally<br>Enhancing cooperation along value chains<br>Introducing verification schemes and certification marks [54]<br>Training schemes to design, repair and recycle products |
| **VIRTUALISE**<br>Replacing physical goods by digital services and products | Creation of digital marketplaces for increasing the use of unused/sleeping resources<br>Creating economic incentives on digitalizing the sharing economy | Funding digital and service-based solutions and pilots<br>Funding innovative solutions in the digital economy through impact hubs for start-ups | Smart city frameworks<br>Mandatory corporate digitalization strategies<br>Acceleration program for digital and climate-related business models | Virtual awareness raising campaigns<br>School programs on digitalization<br>Educational programs on product-as-service solutions |
| **EXCHANGE**<br>Shifting to different materials with lower scarcity, a lower environmental impact or better performance, replacing old-fashioned manufacturing processes by innovative technology | Subsidizing energy efficiency/renewable energy upgrades<br>Subsidizing retrofitting of production sites on circular product design | Funding research on renewable and recyclable/recycled materials<br>Funding resource-efficient manufacturing technology including M2M-communication | Product design standards<br>Mandatory carbon-/ and water footprint | Corporate trainings on material and process optimization<br>Value chain assessment |

## 4.3 Involvement of sub-national stakeholders in the implementation process

As it has been outlined in Chapter 3, the role of cities as major production and consumption centers is central to achieving CE-smart NDC implementation. 70 per cent of global energy-related $CO_2$ emissions and around two thirds of resource and energy use can be attributed to cities.[55] Depending on the country, local governments have crucial decision-making power for some sectors such as waste management, industry and transport. In other sectors, such as energy, cities are main consumers, but lack decision-making power (unless power generation is decentralized).

Bringing NDCs to the sub-national level and including sub-national governments in target setting and implementation, is a central process to bridge these gaps. The 'Policy Brief: Localising NDCs with inspiration from the 2030 Agenda' published by the GIZ project Climate policy meets urban development identifies the following key steps for vertical integration of climate ambition[56]:

**Table 7** Vertical integration of climate ambition

| National governments | Regional and local governments | Cooperation between all levels |
|---|---|---|
| Provide access to national or international finance or funding for sub-national implementation | Compare local/regional plans with national targets and align themselves accordingly – or even exceed these targets | Co-develop investment plans that address regional and/or local needs |
| Support capacity development and provide technical expertise and data | Develop implementation plans at local/regional level | Develop project pipelines for sub-national implementation |
| Provide local climate managers | Regional and local contributions – scaled down versions of NDCs | |
| Facilitate urban planning processes through higher-level governments where local governance is limited | Develop cross-national sub-national networks or join these (ICLEI, C40) | |

These elements will vary from country to country depending on the legal and institutional frameworks. However, identifying the policy leeway of sub-national actors is a key step towards CE-smart NDC implementation. Cities can, for example, report emissions to national governments according to GHG Protocol standards or incentivize local businesses in their circularity efforts through progressive fees and taxes. Furthermore, the local level can, for example through waste management, make a decisive contribution to the downstream potential of the CE:

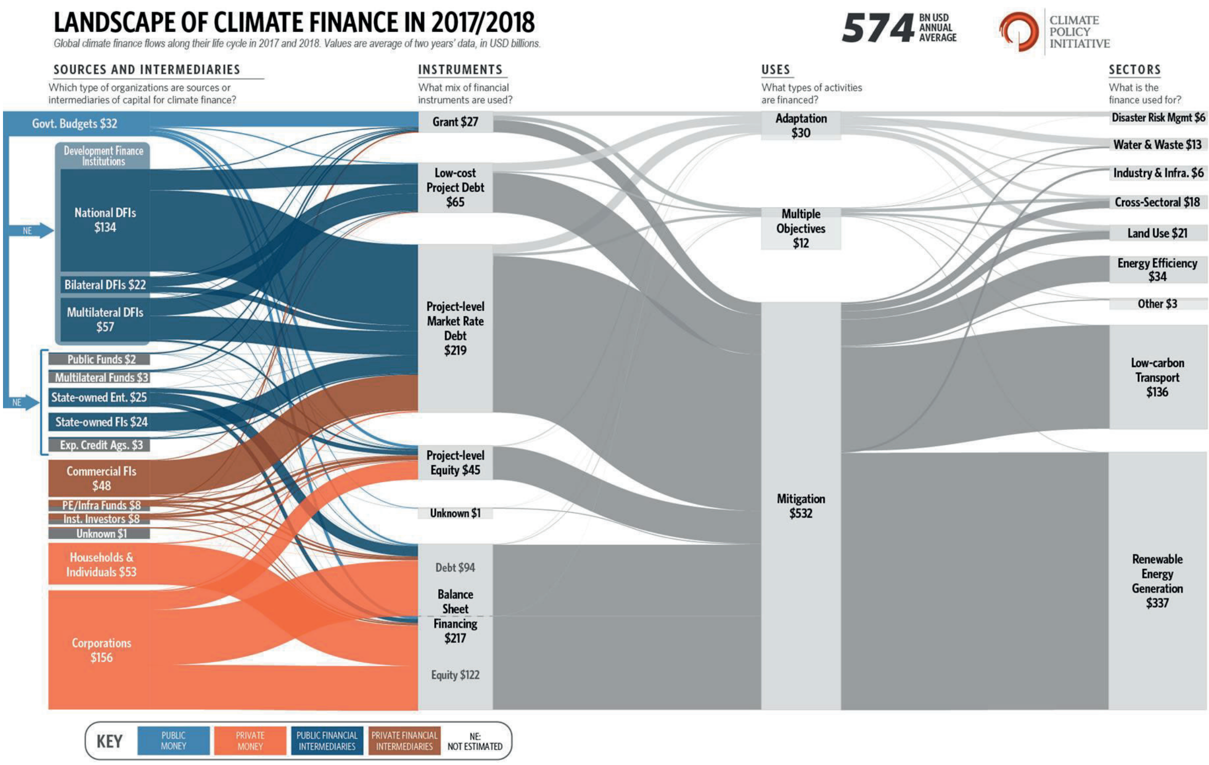
- Waste reduction (e.g. food waste) and measures to increase reuse and sharing of products; support options that enable a switch from products to services, establishment of exchange banks for used materials and products and for bring-back & deposit-refund systems supported by EPR,
- Recycling options (including waste from electrical and electronic equipment (WEEE) and Ozone Depleting Substances (ODS), plastics, paper, organic waste, construction and demolition waste),
- Waste-to-Energy options (anaerobic digestion, refuse-derived fuel from waste (for co-processing in cement plants), collection and energetic use of methane from landfills, to a limited extent waste incineration).

These benefits to cities and regions are being increasingly recognized by international policy makers. The New Urban Agenda, for example, is a central piece of guidance by the UN on sustainable urban development, aiming to guide the international and regional decision-makers on sustainability.

## 4.4 Climate financing instruments for CE activities

The landscape of climate finance is differentiated by sources, instruments, and sectors. In total, climate finance flows account for more than half a trillion US Dollars per year.[57] Climate finance sources are national, bilateral, and multilateral spending. In the 2017/2018 average, public development finance institutions (bilateral, multilateral and national in sum: USD 213 bn), and private corporations (USD 156 bn) were the main sources of climate financing, while project-level market rate debt (USD 219 bn) was the key instrument. The lion share of climate finance flows into renewable energy generation (USD 336 bn) and low-carbon transport projects (USD 135 bn).[58] This snapshot on climate finance flows might change in the near future due to both increases in climate finance flows and changes in priorities of donors and recipients.

Figure 5 Map of Key Climate Finance Services




Source: Climate Policy Institute (CPI) 2020[59]

As Figure 5 shows, actions in the CE category Regenerate already benefit from climate finance flows into renewable energy generation. Similarly, low-carbon transport finance would fall under CE actions such as Optimize and Share. However, the EMF has noted that enabling framework conditions may be just as crucial as direct finance. Setting directions through pricing externalities, introducing standards and enhancing transparency will incentivize the private sector in enhancing circularity. This way, though upfront investment remains a necessity, CE can demonstrate its potential of creating high rates of return on investment in the future.[60]

Funding opportunities are, for instance, provided by the Green Climate Fund (GCF) and the Global Environment Facility (GEF). 'Chemicals and waste' are one of the focal areas of the latter.[61] Sub-national stakeholders, such as private actors, cities, and regional governments, can access climate finance through additional instruments such as the City Climate Finance Gap Fund or the Green Cities Facilities. City networks and coalitions such as the Cities Climate Finance Leadership Alliance (CCFLA), C40, or International Council for Local Environmental Initiatives (ICLEI) support local level actors to access climate finance. The EU offers support to city networks for their CE strategies, too. ICLEI even specifically lists circular development as one of their five pillars of sustainable development.[62] The projects supported under this pillar specifically aim at increasing the role of cities in the CE. Examples include the increase of value from existing buildings in cities, use of local renewable resources for bio-based products, and waste management enhancement.

Lastly, local and regional governments have own financing instruments at their disposal to initiate climate action through CE measures beyond government support as shown in Table 8.

### Box 5
### Private Sector Stakeholder Involvement in Morocco

*(Source: NDC Partnership 2020[63])*

'The Moroccan government designed policy tools to accelerate the involvement of private companies in climate projects. This approach is anchored in the NDC. An important instrument is the Build, Operate and Transfer (BOT) model, whereby private companies can receive state concessions that will allow them to invest in power production facilities and to sell the energy for a certain period against an agreed price. Another important tool is the Power-purchase agreement (PPA).

A PPA is concluded between a private entity and the government, so that the private company has guaranteed incomes, and this can be used as a key to unlock the necessary investments to finance their own power-generating projects, without further government involvement (see below the example of Maghreb Steel). BTOs and PPAs are the basis to produce 45% of Morocco's renewable energy.'

Table 8 **Types and examples of local own-source revenue instruments**

| | |
|---|---|
| Charges and fees | In **Amsterdam**, an increase in parking fees contributed to a reduction in car trips by 14 percent and an increase in cycling by 36 percent.<br><br>**Taipei** city's local government has implemented a per-bag trash collection fee programme to encourage households and businesses to recycle packaging. Waste production has been reduced by one-third since its introduction in 2000.<br><br>User fees are often levied in the transport sector. For example, **Singapore** introduced an electronic road pricing system to manage road congestion through a 'pay-as-you-use' system. Motorists are charged for using roads during peak hours.<br><br>The U.S. states **Oregon** and **California** are testing 'vehicle mile travelled' fees as a mechanism to pay for transportation. |
| Taxes | In the **Netherlands**, local governments have been 'reforming property tax provisions that favour single-family dwellings or otherwise contribute to sprawl'.<br><br>In 2007, **Boulder** became the first city to implement a carbon tax at the municipal level –the Climate Action Plan Tax. The tax is levied on electricity consumption by the residential, commercial, and industrial sectors. |
| Bonds | In December 2016, **Mexico City** issued its first green bond. The bond is intended to pay for measures related to energy efficiency, transport, and infrastructure. Other cities that have issued climate bonds or green bonds include **San Francisco** (low carbon transport) and **Cape Town** (water and low carbon transport). In some cases, specific sectors within a city issue such bonds. For example, in the metropolitan areas of **Los Angeles** and **New York** the Metropolitan Transit Authorities have issued climate bonds to finance investments in low-carbon transport. |
| Energy-Saving Partnerships | The contracting scheme of energy-saving partnerships was developed in 1996 by the **Berlin** Energy Agency and the Berlin Senate to allow partnerships between public sector agencies and contractors in order to conduct energy savings measures for public sector buildings (e.g. town halls, schools, and administrative office buildings). Through the partnership, investments in energy-saving measures are made in the selected public buildings by a contractor and the investment is refinanced by using the energy savings. The energy savings are shared by both partners.<br><br>Similarly, internal contracting (or 'intracting') is a financing scheme where – in the case of intracting for energy measures – a municipal department or municipally-owned company may submit an idea for an energy efficiency or renewable energy measure (Energy Cities 2018). If the measure is cost-effective, the municipality signs an agreement with the applicant and finances the measure (ibid.). The applying municipal department or company must then begin repayments starting the following year (ibid.). Examples of cities that have successfully applied intracting include **Stuttgart** (Germany), **Agueda** (Portugal), **Koprivnica** (Croatia), and **Udine** (Italy). |

*Source: GIZ 2018*[64]

# Conclusion: A Roadmap towards CE-smart NDCs

Integrating the perspective of CE into NDCs is paramount to raise the level of ambition of global climate action. Not only does the CE present a major step towards climate neutrality, it also shows significant economic and social benefits as outlined by this practical guide. However, the design of CE-smart NDCs requires commitments beyond the current international framework for NDCs.

For NDCs to integrate CE actions, challenges can be overcome by NDC coordinators through:

A) Requesting **methodological support** on quantification of CE action (e.g. through technical assistance, university cooperation, open tenders)

- As Chapter 2 demonstrates, the quantification of CE action requires investment and knowledge. The quantification of CE-action, however, will allow for targeted policies and holistic solutions, which will make long-term planning feasible.

B) Following the established UNFCCC accounting rules for NDCs and amend the NDC with **supplemental information** on the full effect of the considered CE action.

- Demonstrating supplemental information (for example, international benefits of domestic mitigation policies) will demonstrate a high level of ambition. It will further signal other countries to join in on transforming the global economy in a joint effort.

C) **Incentivizing CE action** at the local, regional, and national levels, also for the private sector, through climate finance, co-developed investment plans, and other policy instruments for vertical integration ('localizing NDCs').

- A considerable share of downstream CE potential takes place at the municipal level. Furthermore, much of the CE's upstream potential can be realized among private businesses that operate transnationally. Hence, incentives such as a national $CO_2$ price will be paramount to the success of CE action.

D) **Aligning NDCs with mid- and long-term strategies,** in order to show the benefits of CE action beyond the limited time horizon of NDCs

- This alignment will also ensure that co-benefits with other agendas are made transparent to all stakeholders and synergies can be explored to their full extent.

In order to ensure the integration of CE activities into NDCs, a **Roadmap towards CE-smart NDCs** should consider the following seven concrete steps:

1 **Strategy**
Organize a multi-stakeholder process on synergies between climate policy and CE at national level.

2 **Learning**
Capacitation of NDC coordinators through analysis and strengthening of institutional capacities on CE at the national level. Capacitation can also be enabled through requesting international technical support and by sharing best practices and lessons learnt. The NDC Partnership, for example, provides economic advisors to countries which seek to initiate a Green Recovery.[65]

3 **Process**
Integration of sub-national stakeholders (cities and regions), including civil society and academia, as well as private sector players, into the process of developing CE-smart NDCs. There is no one-size-fits-all approach to vertical integration due to different jurisdictions and intranational governance structures. This phase includes an outline of data-driven analyses of national consumption-based carbon footprints and scenario exercises.

4 **Design of a CE-smart NDC**
(see Chapter 3), including the identification of conditional and unconditional policy interventions at national and sub-national levels. The NDC of the Dominican Republic, for example, considers climate action as a pathway for economic transformation.

5 **Cooperation**
Identify domestic sources of financial support and investment (e.g. through private sector engagement) and request for international technical and financial support for the implementation of the conditional policy interventions, e.g. through the City Climate Finance Gap Fund or the Green Climate Fund.

6 **Action**
Implement integrated policy interventions towards a CE-smart and climate neutral economy, ensure sound monitoring and evaluation. Reiterate stakeholder integration processes to ensure societal consensus throughout the implementation phase.

7 **Knowledge management and dissemination**
Participate in international knowledge sharing platforms to disseminate practical information on CE-smart NDCs, e.g. the NDC Support Cluster (Good Practice Database).[66] This will both enable knowledge sharing and fast learning from good practices.

# Glossary of used acronyms

BOT ........ Build, Operate and Transfer
BMZ ........ German Federal Ministry for Economic Cooperation and Development
C40 ........ C40 Cities Climate Leadership Group
CCFLA ........ Cities Climate Finance Leadership Alliance
CDP ........ Carbon Disclosure Project
CE ........ Circular Economy
CFCs ........ Chlorofluorocarbons
CLCDS ........ Colombian Low Carbon Development Strategy
CGE ........ Computable General Equilibrium
$CH_4$ ........ Methane
$CO_2$ ........ Carbon Dioxide
CPI ........ Climate Policy Institute
CPMUD ........ Climate Policy Meets Urban Development
EBP ........ Ernst Basler und Partner
EMF ........ Ellen MacArthur Foundation
EPR ........ Extended Producer Responsibility
EU ........ European Union
GCF ........ Green Climate Fund
GEF ........ Global Environment Facility
GHG ........ Greenhouse Gas
GIZ ........ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
HCFCs ........ Hydrochlorofluorocarbons
HFCs ........ Hydrofluorocarbons
ICLEI ........ International Council for Local Environmental Initiatives
IPCC ........ Intergovernmental Panel on Climate Change
LCA ........ Lifecycle Assessment
LTS ........ Long-term Strategy
MRV ........ Measurement, Reporting and Verification
$N_2O$ ........ Nitrous Oxide
NDC ........ Nationally Determined Contribution
NOx ........ Nitrogen Oxides
ODS ........ Ozone Depleting Substances
PA ........ Paris Agreement
PFCs ........ Perfluorocarbons
PPA ........ Power-Purchase Agreement
SDG ........ Sustainable Development Goal
$SF_6$ ........ Sulphur hexafluoride
SPM ........ Suspended Particulate Matter
TNO ........ The Netherlands Organisation for Applied Scientific Research
UN ........ United Nations
UNDP ........ United Nations Development Programme
UNFCCC ........ United Nations Framework Convention on Climate Change
US ........ United States
VAT ........ Value Added Tax
VOC ........ Volatile Organic Compounds
WEEE ........ Waste Electrical and Electronic Equipment
WRAP ........ Waste & Resources Action Programme
WRI ........ World Resources Institute

# Endnotes


1 UNFCCC (2021). Nationally Determined Contributions (NDCs). Available at: unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/nationally-determined-contributions-ndcs

2 Bundesregierung (2021). Press release: Deutschland und Europa sind weiter auf Klimaschutzkurs. Available at: www.bundesregierung.de/breg-de/aktuelles/merkel-leaders-summit-on-climate-1895578

3 European Commission (2020). A New Circular Economy Action Plan. Available at: ec.europa.eu/environment/strategy/circular-economy-action-plan_en and eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

4 Circle Economy (2021). The circularity gap report 2021. Available at: www.circularity-gap.world/2021

5 European Commission (2020). Sustainability. Available at: ec.europa.eu/growth/industry/sustainability_en

6 European Environment Agency (2016). Circular Economy in Europe: Developing the Knowledge Base. Publications Office of the European Union, Luxemburg. Available at: www.eea.europa.eu/publications/circular-economy-in-europe

7 Umweltbundesamt (2019). Resource-Efficient Pathways towards Greenhouse-Gas Neutrality – RESCUE Summary Report. Available at: www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/rescue_kurzfassung_eng.pdf

8 Bundesregierung (2018), Koalitionsvertrag zwischen CDU, CSU und SPD. Available at: www.bundesregierung.de/resource/blob/974430/847984/5b8bc23590d4cb2892b31c987ad672b7/2018-03-14-koalitionsvertrag-data.pdf?download=1

9 BMZ (2020). Reform Strategy 'BMZ 2030'. Available at: www.bmz.de/en/development-policy/reform-strategy-bmz-2030

10 Durán-Romero, G., López, A. M., Beliaeva, T., Ferasso, M., Garonne, C., & Jones, P. (2020). Bridging the gap between circular economy and climate change mitigation policies through eco-innovations and Quintuple Helix Model. Technological Forecasting and Social Change, 160, 120246.

11 The World Bank (2018). What A Waste 2.0. Available at: openknowledge.worldbank.org/bitstream/handle/10986/30317/9781464813290.pdf

12 Ellen MacArthur Foundation (2019). Completing the picture: How circular economy tackles climate change. Available at: ellenmacarthurfoundation.org/completing-the-picture

13 Circle Economy, The Circularity Gap Report 2020, Available at: assets.website-files.com/5e185aa4d27bcf348400ed82/5e26ead616b6d1d157ff4293_20200120%20-%20CGR%20Global%20-%20Report%20web%20single%20page%20-%20210x297mm%20-%20compressed.pdf and The Circularity Gap Report 2021. Available at: www.circularity-gap.world/2021

14 IPCC (2014). Climate Change 2014. Mitigation of climate change, WG3, 5th Assessment report of Intergovernmental Panel on Climate Change. Available at: www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf

15 Ellen MacArthur Foundation (2019). Completing the picture: How circular economy tackles climate change. Available at: ellenmacarthurfoundation.org/completing-the-picture

16 Trinomics (2018). Quantifying the benefits of circular economy action on the decarbonization of EU economy. Final Report. Available at: trinomics.eu/wp-content/uploads/2020/04/Trinomics-2018-Quantifying-the-benefits-of-circular-economy-actions-on-the-decarbonisation-of-EU-economy_final-report.pdf

17 Ellen MacArthur Foundation, Sun, and McKinsey Center for Business and Environment (2015). Growth Within: A Circular Economy Vision for a Competitive Europe. Available at: emf.thirdlight.com/link/8izw1qhml4ga-404tsz/@/preview/1?o

18 European Parliament (2020). Draft Report on the New Circular Economy Action Plan. Available at: www.europarl.europa.eu/doceo/document/ENVI-PR-652387_EN.pdf

19 McKinsey Quarterly (2017). Mapping the benefits of a circular economy. Available at: www.mckinsey.com/business-functions/sustainability/our-insights/mapping-the-benefits-of-a-circular-economy

20 Bocconi University, Ellen MacArthur Foundation, Intesa Sanpaolo (2021). The circular economy as a de-risking strategy and driver of superior risk-adjusted returns. Available at: emf.thirdlight.com/link/29wifcw68gx1-yw31dj/@/preview/1?o

21 Ellen MacArthur Foundation (2020). Financing the circular economy. Capturing the opportunity. Available at: www.ellenmacarthurfoundation.org/assets/downloads/Financing-the-circular-economy.pdf

22 The United Nations. Financing Climate Action. Available at: www.un.org/en/climatechange/raising-ambition/climate-finance

23 The Independent Expert Group on Climate Finance (2020). Delivering on the $100 Billion Climate Finance Commitment and Transforming Climate Finance. Available at: www.un.org/sites/un2.un.org/files/100_billion_climate_finance_report.pdf

24 UNFCCC (2018). Mitigation benefits and co-benefits of policies, practices and actions for enhancing mitigation ambition: implementation of circular economies with a focus on waste-to-energy technologies and on industrial waste reuse and prevention solutions. Available at: unfccc.int/sites/default/files/resource/tpMitigation.pdf

25 Ecofys & Circle Economy (2016). Circular Economy: A Key Lever in Bridging the Emissions Gap to a 1.5 °C Pathway. Available at: www.circle-economy.com/news/circular-economy-a-key-lever-in-bridging-the-emissions-gap-to-a-1-5-degc-pathway-2<?>

26 Circle Economy (2021). The circularity gap report 2021. Available at: www.circularity-gap.world/2021

27 UNFCCC (2013). Reporting requirements. Available at: unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/reporting-requirements

28 UNFCCC (2021). Preparation of NCs and BRs. Available at: unfccc.int/preparation-of-ncs-and-brs

UNFCCC (2019). Revision of the UNFCCC reporting guidelines on national communications for Parties included in Annex I to the Convention. Available at: unfccc.int/sites/default/files/resource/l05_4.pdf

29 UNFCCC (2021). Netherlands. 2021 Common Reporting Format (CRF) Table. Available at: unfccc.int/documents/273458

30 Reyna-Bensusan et al. (2019). Experimental measurements of black carbon emission factors to estimate the global impact of uncontrolled burning of waste. Atmospheric Environment, Volume 213, 2019, Pages 629-639, ISSN 1352-2310, doi.org/10.1016/j.atmosenv.2019.06.047

31 IPCC (2007). Climate Change 2007: Working Group I: The Physical Science Basis. 2.4.4.3 Black Carbon Aerosol from Fossil Fuels. Available at: archive.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-4-4-3.html

32 Shifting Paradigms (2017). Circular economy strategies for Lao PDR. A metabolic approach to redefine resource efficient and low-carbon development. Available at: www.shiftingparadigms.nl/projects/a-circular-economy-quick-scan-to-improve-resource-efficiency-in-lao-pdr

33 UNFCCC (2018). Mitigation benefits and co-benefits of policies, practices and actions for enhancing mitigation ambition: implementation of circular economies with a focus on waste-to-energy technologies and on industrial waste reuse and prevention solutions. Available at: unfccc.int/sites/default/files/resource/tpMitigation.pdf

34 Trinomics (2018). Quantifying the benefits of circular economy action on the decarbonization of EU economy. Final Report. Available at: trinomics.eu/wp-content/uploads/2020/04/Trinomics-2018-Quantifying-the-benefits-of-circular-economy-actions-on-the-decarbonisation-of-EU-economy_final-report.pdf

35 Trinomics (2018). Quantifying the benefits of circular economy action on the decarbonization of EU economy. Final Report. Available at: trinomics.eu/wp-content/uploads/2020/04/Trinomics-2018-Quantifying-the-benefits-of-circular-economy-actions-on-the-decarbonisation-of-EU-economy_final-report.pdf

36 Trinomics (2018). Quantifying the benefits of circular economy action on the decarbonization of EU economy. Final Report. Available at: trinomics.eu/wp-content/uploads/2020/04/Trinomics-2018-Quantifying-the-benefits-of-circular-economy-actions-on-the-decarbonisation-of-EU-economy_final-report.pdf

37 PBL (2015) Effecten van autodelen op de mobiliteit en $CO_2$-uitstoot. Available at: www.pbl.nl/sites/default/files/downloads/PBL_2015_Effecten_van_autodelen_2_1789_0.pdf

Eunomia (2014). Impact Assessment on Options Reviewing Targets in the Waste Framework Directive, Landfill Directive and Packaging and Packaging Waste Directive. Final Report for the European Commission DG Environment. Available at: www.eunomia.co.uk/reports-tools/impact-assessment-on-options-reviewing-targets-in-the-waste-framework-directive-landfill-directive-and-packaging-and-packaging-waste-directive

Nordic Council of Ministers (2017): Environmental impacts and potential of the sharing economy. Available at: www.norden.org/en/publication/environmental-impacts-and-potential-sharing-economy

38 Ellen MacArthur Foundation (2015). Potential for Denmark as a Circular Economy - A case study from: Delivering the Circular Economy – A Toolkit for Policy Makers. Available at: emf.thirdlight.com/link/kewgovk138d6-k5kszv/@/preview/1?o

TNO (2018). Effecten van het Rijksbrede Programma Circulaire Economie en de Transitieagenda' s op de emissie van Broeikasgassen. Available at: zoek.officielebekendmakingen.nl/blg-843683.pdf

39 Cambridge Econometrics, Trinomics and ICF (2018). Impacts of the circular economy on the labour market. For the European Commission, Luxembourg: Publications Office of the European Union. Available at: circulareconomy.europa.eu/platform/sites/default/files/ec_2018_-_impacts_of_circular_economy_policies_on_the_labour_market.pdf

Deloitte Sustainability (2016) Circular economy potential for climate change mitigation. Available at: www2.deloitte.com/content/dam/Deloitte/fi/Documents/risk/Deloitte%20-%20Circular%20economy%20and%20Global%20Warming.pdf

WRAP (2016). Extrapolating resource efficient business models across Europe. Available at: www.rebus.eu.com/wp-content/uploads/2017/07/Extrapolating-resource-efficient-business-models-across-Europe.pdf

40 GIZ, UNDP (2019). Strategising to Decouple Economic Growth from GHG Emissions: The Colombian Low Carbon Development Strategy. Available at: api.knack.com/v1/applications/5b23f04fd240aa37e01fa362/download/asset/5def95eaa2c516001658b4f1/191203_gpd_colombiafinaldraft_rz.pdf

41 UNFCCC (2021). Global Stocktake. Available at: unfccc.int/topics/science/workstreams/global-stocktake

42 Climate Action Tracker (2021). CAT Climate Target Update Tracker. Available at: climateactiontracker.org/climate-target-update-tracker

43 ClimateWorks Foundation (2017). Europe's Carbon Loophole. Draft report for consultation. Available at: www.climateworks.org/wp-content/uploads/2017/09/EU-carbon-loophole_final-draft-for-consultation.pdf#:~:text=Executive%20Summary%3A%20Europe%E2%80%99s%20Carbon%20Loophole%20The%20European%20Union,in%20GHGs%20in%202020%20compared%20to%201990%20levels

44 UNDP (2019). Circular Economy and a New Generation of NDCs. Available at: www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/ideas-and-insights/20190/circular-economy-new-ndc-generation-.html

45 WRI, UNDP (2019). Enhancing NDCs: A Guide to Strengthening National Climate Plans by 2020. Available at: www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/ndc-enhancement-guide0.html?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=EAIaIQobChMIkIvA16S98gIVSemyCh0QMQlVEAAYASAAEgLRvvD_BwE

46 WRI, World Business Council for Sustainable Development (2004). The Greenhouse Protocol. A Corporate Accounting and Reporting Standard. Revised Edition. Available at: ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

47 UNDP, UNEP (2020). A 1.5°C World Requires a Circular and Low Carbon Economy. First Edition. Available at: www.ndcs.undp.org/content/dam/LECB/docs/pubs-reports/unpd-ndcsp-circular-economy-guicance.pdf?download

Hoogzaad, J.A., et al. (2020). Climate change mitigation through the circular economy. Amsterdam, the Netherlands: Circle Economy & Shifting Paradigms. Available at: www.circle-economy.com/resources/circular-economy-interventions-to-go-beyond-the-existing-climate-action-in-developing-countries

GIZ (2017). Briefing Series: Sectoral implementation of nationally determined contributions (NDCs). Available at: www.giz.de/de/downloads/giz2017-en-ndc-waste-management.pdf

48 European Commission (2020). A New Circular Economy Action Plan. Available at: ec.europa.eu/environment/strategy/circular-economy-action-plan_en and eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

49 Ellen MacArthur Foundation (2015). Delivering the Circular Economy – A Toolkit for Policy Makers. Available at: emf.thirdlight.com/link/kewgovk138d6-k5kszv/@/preview/1?o

50 Ellen MacArthur Foundation (2015). Delivering the Circular Economy – A Toolkit for Policy Makers. Available at: emf.thirdlight.com/link/kewgovk138d6-k5kszv/@/preview/1?o

51 Ellen MacArthur Foundation, Sun, and McKinsey Center for Business and Environment (2015). Growth Within: A Circular Economy Vision for a Competitive Europe. Available at: emf.thirdlight.com/link/8izw1qhml4ga-404tsz/@/preview/1?o

52 European Commission (2020). A New Circular Economy Action Plan. Available at: ec.europa.eu/environment/strategy/circular-economy-action-plan_en and eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

53 European Commission (2020). A New Circular Economy Action Plan. Available at: ec.europa.eu/environment/strategy/circular-economy-action-plan_en and eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

[54] WRI, UNDP (2019). Enhancing NDCs: A Guide to Strengthening National Climate Plans by 2020. Available at: www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/ndc-enhancement-guide0.html?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=EAIaIQobChMIkIvA16S98gIVSemyCh0QMQlVEAAYASAAEgLRvvD_BwE

[55] GIZ (2021). Policy Brief. Localising NDCs with inspiration from the 2030 Agenda. A closer look at Voluntary Local Reviews (VLRs) and Voluntary National Reviews (VNRs). Available at: collaborative-climate-action.org/wp-content/uploads/Localising-NDCs-with-inspiration-from-the-2030-Agenda-Policy-Brief-GIZ.pdf

[56] GIZ (2021). Policy Brief. Localising NDCs with inspiration from the 2030 Agenda. A closer look at Voluntary Local Reviews (VLRs) and Voluntary National Reviews (VNRs). Available at: collaborative-climate-action.org/wp-content/uploads/Localising-NDCs-with-inspiration-from-the-2030-Agenda-Policy-Brief-GIZ.pdf

[57] Climate Policy Initiative (2019). Global Landscape of Climate Finance 2019. Available at: www.climatepolicyinitiative.org/wp-content/uploads/2019/11/2019-Global-Landscape-of-Climate-Finance.pdf

[58] Climate Policy Initiative (2020). Updated view on the Global Landscape of Climate Finance 2019 – Presentation. Available at: www.climatepolicyinitiative.org/wp-content/uploads/2020/12/Updated-View-on-the-2019-Global-Landscape-of-Climate-Finance-1.pdf

[59] Climate Policy Initiative (2020). Updated view on the Global Landscape of Climate Finance 2019 – Presentation. Available at: www.climatepolicyinitiative.org/wp-content/uploads/2020/12/Updated-View-on-the-2019-Global-Landscape-of-Climate-Finance-1.pdf

[60] Ellen MacArthur Foundation (2020). Financing the circular economy. Capturing the opportunity. Available at: www.ellenmacarthurfoundation.org/assets/downloads/Financing-the-circular-economy.pdf

[61] GEF (2021). Chemicals and Waste. Available at: www.thegef.org/topics/chemicals-and-waste

[62] ICLEI (2021). Activities. Available at: iclei.org/en/activities_database.html?pathway=Clz

[63] NDCP (2020). Climate Change: an opportunity to transform the private sector? Country Brief. An insight on Morocco's Experience. Available at: ndcpartnership.org/sites/default/files/Insight%20Brief%20Energy%20Morocco%20Final.pdf

[64] GIZ (2018). Multi-Level Climate Governance Supporting Local Action. Instruments enhancing climate change mitigation and adaptation at the local level. Available at: www.citiesalliance.org/sites/default/files/giz2018-0318en-cpmud-multi-level-climate-governance.pdf

[65] NDC Partnership (2021). Economic Advisory Initiative. Available at: ndcpartnership.org/economic-advisory-support

[66] NDC Cluster (2021). Global Good Database. Available at: www.ndc-cluster.net/good-practices

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