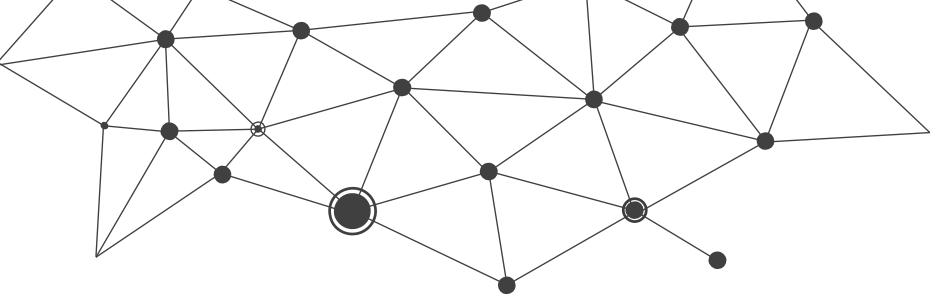


CONNECTIVE CITIES

Connective Cities Dialogue Event:

# Climate protection through circular waste management

Hamburg, Germany, 27th-29th November 2017

# Background Paper

On behalf of:

Federal Ministry for Economic Cooperation and Development

Implemented by:

Deutscher Städtetag

ENGAGEMENT GLOBAL Service für Entwicklungsinitiativen

SERVICE AGENCY COMMUNITIES IN ONE WORLD

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with:

STADTREINIGUNG HAMBURG

# Connective Cities – Methodology and work process

As a methodological approach for the implementation of international dialogue events, Connective Cities has opted for a strategy that is highly participatory and practice-oriented. This is meant to ensure that practitioners participating in these events share their respective practical context and receive feedback, leading to joint learning. In addition, the events give the opportunity to lay the foundations for future project activities that build on the ideas generated and implement and disseminate solutions for sustainable urban development processes further.

The first part of the current text explains the necessary preparation as well as the work process during the dialogue event. The second part includes a short presentation of the most relevant fields of work within the topic of circular waste management and climate protection. These subtopics will be discussed extensively during the dialogue event and will also form the framework for all good practice examples presented by participating practitioners.

## Preparation

The participants already take an active role in the preparation of the Connective Cities dialogues. We give particular importance to active participants who take part in shaping the design, process and course as well as the desired goals of a Connective Cities dialogue event.

The selection of topics is correspondingly oriented on demand and reflects both the personal interests and the challenges with which the municipal practitioners see themselves faced. Experience has shown that a contingency of 20-30 participants enables an interactive approach and ensures that concrete results are achieved.

Fitting in with the chosen topic, in the case of the event in Hamburg “Climate protection through circular waste management”, the participants prepare for the event by developing a “Good Practice” (method, procedure, solution model, etc.) of sustainable urban development or a concrete challenge from their direct practical environment. The “Good Practice” is then presented in the form of a poster at the event.

In accordance with the project objective, the Connective Cities dialogue events feature an international structure of participants. This allows local as well as international challenges to be addressed with a focus on solutions. The dialogue event creates a world-wide platform for municipal practitioners to learn together.

## Dialogue event

### Phase I Thematic introduction

The dialogue starts with a scientific introduction, during which the theme is also contextually categorised and its different aspects further explored and analysed. Here, keynote speakers assume a central role.

### Phase II Exchanging good practices

“Good practices” serve as process initiators, lay the foundations for discussions and serve as idea stimulators. The “good practices” are brought in by the practitioners from their immediate professional or work environment and are structured along key questions: basic issue,

institutional background, approach, conclusion and transferability. Rather than being presented through a Power Point presentation, the good practices are illustrated with posters on pin boards. This enables core elements to be visible throughout the event, showcased in an easy-to-understand way and oriented around practice. The idea is not to present so-called “best practices” (universally accepted and adopted) but to give an insight into a “good practice”. A “good practice” is one approach to a specific issue of a local or regional reality, presenting successes as well as challenges that are still to be overcome. An excursion that will provide insights into local practice is an additional element of this phase.

**Phase III Peer Consultation**

Peer consultation forms the core of each Connective Cities dialogue event. In addition to the challenges resulting from the presentation of good practices, concrete problems are gathered in the plenary or proposed by individual participants in advance. This enables to address real-life challenges emerging from the immediate environment of the practitioners with a focus on solutions in peer consulting. The aim is to jointly develop practice-oriented solutions for very concrete issues.

**Phase IV Joint project development**

The fourth phase of the dialogue event deals with the development of new project ideas. Setting out from common interests, queries and existing expertise, participants get together and work out new project ideas that are then discussed, put into concrete terms and elaborated upon. The participants provide input on the specific topic, analyse the prerequisites and specific framework conditions or jointly develop a proposal on the approach to be applied. The result of this step is the joint development of ideas and proposals for measures. At this point, participants agree on next steps to be undertaken beyond the conclusion of the event. After the dialogue event, Connective Cities continues to support the municipal experts in developing further networks and promotes cooperation by, for example, offering learning programmes, virtual project workshops or further project expert exchanges.
The Connective Cities dialogue events are the first step towards supporting the municipal practitioners in establishing projects of their own in their respective cities.

## Introduction & Background: Circular Waste Management and Climate Change

### Overview

Climate change is a global challenge and a concern for cities worldwide. Waste management is not only an important responsibility and a core service municipalities offer their citizens, but it also has a high impact on local climate protection. If managed poorly, waste has tremendous negative consequences for cities, their inhabitants, the environment and climate. Thus, waste management is a crucial factor in local climate protection. Setting up a local waste management which minimises negative effects on climate change and the environment, which is energy and resource efficient, is a local challenge all cities face on different levels – in industrialised regions as well as in emerging and developing countries. German cities and their municipal companies like the Stadtreinigung Hamburg are already working towards an innovative circular waste economy and contributing with waste management to climate protection.

**Definition: Circular Waste Management / Circular Economy**

The fundamental notion of the concept of a circular economy is to see waste as a resource that is being reintegrated in the economy. As such it is opposed to the concept of linear economy, described as the "take, make, dispose" model. The German law simply defines Circular Economy as "avoidance and reutilisation of waste".[1]

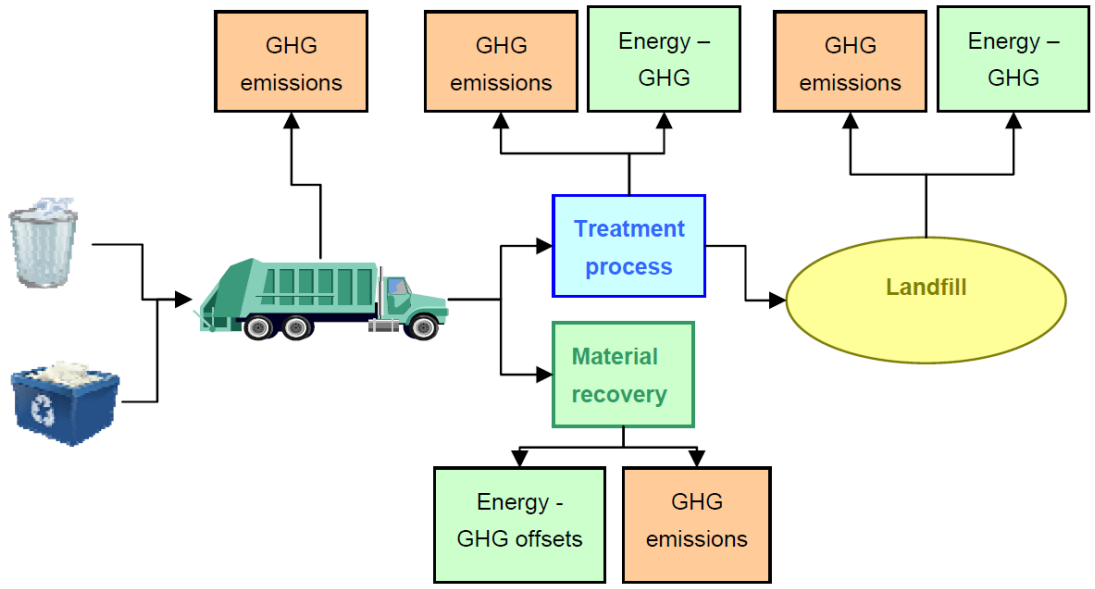
The definition of waste applied to this background paper refers to municipal solid waste, as defined by UN-Habitat: "Wastes generated by households and wastes of a similar nature generated by commercial and industrial premises, by institutions and from public spaces." (UN-Habitat, 2010, p. 6). The working definition excludes other specific wastes, such as sewage, non-household hazardous waste, industrial waste, construction and demolition waste, automobile bodies, and implies that parallel waste management systems for theses wastes should be put in place.

### The waste-climate nexus

Municipal solid waste contributes directly to global warming through the emission of anthropogenic greenhouse gases (GHG). The main contributors to global warming resulting from the sector are carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Especially methane, which is 21-times more harmful to climate than CO2 and is being produced by the decomposition of organic waste e.g. in open waste dumps, is a challenge to local waste management systems.

[1] Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen (Kreislaufwirtschaftsgesetz - KrWG), § 3 Begriffsbestimmungen http://www.gesetze-im-internet.de/krwg/__3.html

According to the Intergovernmental Panel on Climate Change (IPCC), **solid waste and wastewater management generates about 2,7% of the global greenhouse gas emissions**.[2] However, the potential for reducing greenhouse gas emissions is much higher than that, because the IPCC's calculation only accounts for waste disposal or treatment strategies, such as landfill/waste dumping, composting, waste incineration (in case the generated heat energy is not utilised), sewage disposal. Other ways to reduce greenhouse gas emissions, such as reducing, recycling, re-using (the 3Rs), or waste-to-energy strategies, are not taken into account in this calculation.




Source: UNEP 2010, p. 8

That is why circular waste management, which covers the 3Rs and other strategies, is crucial when analysing the waste-climate nexus. **Circular waste management multiplies the potential for reducing GHG emissions.** In Germany, for example, circular waste management accounted for more than 25% of the reductions in GHG emissions between 1990 and 2006, although the waste management itself accounted for only 1,3% (2009) of the GHG emissions.[3]
According to a study conducted on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), **developing and emerging countries can reduce the total amount of GHG emissions by 5% by adopting municipal waste management systems and even 10% when biodegradable organic matter (e.g. from agriculture) is included**.

> *"Although the waste management sector makes a relatively minor contribution to greenhouse gas (GHG) emissions, it is in a unique position to move from being a minor*

[2] IFEU 2009
[3] DIFU 2012

*source of global emissions to becoming a major saver of emissions. While minor levels of emissions are released through waste treatment and disposal, the prevention and recovery of wastes (i.e. as secondary materials or energy) avoids emissions in all other sectors of the economy".*[4]
UNEP

## Challenges on the local level

*"Managing solid waste well and affordably is one of the key challenges of the 21st century, and one of the key responsibilities of a city government. It may not be the biggest vote-winner, but it has the capacity to become a full-scale crisis, and a definite vote-loser, if things go wrong."*
UN Habitat, Solid Waste Management in the World's Cities, 2010

While the need for a climate sensitive waste management is widely acknowledged, its implementation is complex where municipalities lack both financial and human capacities to successfully manage the city's waste and struggle to introduce climate friendly methods or techniques. German municipal companies face numerous challenges in reducing the climate impact of solid waste management, too. For example, if taking into account the energy and secondary raw material produced, the carbon footprint of municipal waste management companies in Hamburg and elsewhere in Germany is improving, but there are still many challenges. Especially the quality of waste collected for reuse, recycling and recovery is not yet as expected. This is especially the case with organic kitchen waste from dense urban environments. Many households and waste generators still use separate collection systems in wrong ways, for example by dumping also mixed waste in them.

## Strategies for a climate-friendly waste management

The focus of an effective waste management in Germany, Europe and in other world regions lies mostly on safe disposal of all produced waste. Paradoxically, a better waste management can lead to an increased GHG generation in the first place: In contexts where municipalities still struggle to set up a fully functioning integrated waste management for their cities, priorities lie on the complete collection of the locally produced waste and on its regulated and safe disposal. This means, in many cases, the implementation of landfills where more methane is produced in anaerobic conditions than in the aerobic conditions without centralized landfills.[5] That is one of the reasons why most European countries have implemented restrictions, taxes or bans on landfills for untreated municipal solid waste. In Germany, landfills are banned since 2005.

[4] https://www.unep.org/gpwm/what-we-do/waste-and-climate-change
[5] UNEP 2010, p. 1.

In this context, waste avoidance, reuse and recycling techniques and the lifecycle of materials become crucial factors on the way to a more sustainable integrated waste management. Enhancing the sustainability of solid waste management applies to all levels in the hierarchy of waste management:

1. Avoidance / Prevention / Reduction
2. Preparing for Re-Use
3. Reuse / Recycling / Recovery
4. Other recovery, such as waste-to-energy
5. Disposal

### 1. Avoidance / Prevention / Reduction

There is a general global consensus that avoidance of waste, on the top of the hierarchy, is more effective that any waste treatment method.
These practices need to take into account the whole value creation chain – not only the waste management – and therefore focus on consumers and producers. They aim at preventing the generation of waste in the first place and include two dimensions: 1) the reduction of consumed materials (consumer side) and 2) the reduction of materials and energy used in production (production side). Instruments to foster both are, for example, awareness campaigns, bans or restrictions on certain types of products or packaging, taxes, responsible municipal procurement, or commitments by the industry. In the case of Germany, however, the total amount of waste generated has been nearly constant in the last decade.[6]

### 2. Preparing for Re-Use

Preparing waste for recycling or re-use includes activities like waste collection, waste segregation, cleaning, shredding, sorting, repairing, refurbishing, etc.
Waste collection is the collection of solid waste from the point of production to the point of treatment or disposal. It is a very important aspect in maintaining public health in cities. Collection can be organised in many different ways, for example from door-to-door, kerbside collection (primary collection), from collection points on community or block level (secondary collection). In addition to waste produced in private spaces, municipal waste collection also comprises street sweeping and collection of waste from public spaces. Depending on local regulations, waste generators can be required to separate their waste at source, e.g. into “wet”

[6] DIFU 2012, p. 17.

(food waste, organic matter) and “dry” (recyclables). The collected waste is either directly transported to a final disposal or recycling site or may at first be brought to a transfer station for consolidation and possibly separation. From the transport perspective there is a variety of different technical and operational solutions, from purpose-built vehicles to carriages or pushcarts; from formalised municipal or private enterprises to micro-service providers or informal waste picking.[7]

An effective collection of waste can help avoid negative effects on the climate. A notorious example is the collection of defective fridges: If not collected and treated adequately, older devices will liberate CFCs (chlorofluorocarbons) which are more than 10000 times more harmful than CO2.[8]

An optimized collection of waste is also the condition for recycling: Separate collection systems (e.g. organic / glass / paper / etc.) allow for a specific and cost-effective treatment of the different waste streams.

### 3. Reuse / Recycling / Recovery

The **reuse** of waste is the use of a component of waste in its original form more than once in order to preserve some or all of the energy and materials that went into making an item. It can either be an item which was designed to be used repeatedly in the same form (for example glass bottles for refilling) or an item which is given a new purpose, e.g. using empty food containers to store leftovers or plastic grocery sacks to line trash containers.

It can also refer to the reuse of products which passed their lifespan. On a municipal level, examples for instruments are swap markets (where used articles can be exchanged or given away), municipal stores for secondhand articles, repair shops, etc.

**Recycling** is the physical or mechanical process by which secondary raw materials are obtained from solid waste. Items that are commonly recycled include glass, plastic, paper and metal. The process can be accomplished by simple and/or sophisticated mechanical equipment.

The recycling of materials helps to reduce the need for new raw materials and the energy to produce, transport and transform them.

| |
|---|
| Reduction of GHG emissions through recycling according to material (in comparison with production):<br>Glass: ~35%<br>Paper: ~50%<br>Steel: ~50%<br>Plastic: ~70% |

[7] Soós, Whiteman, Wilson, Briciu, & Schwehn, 2013b; The World Bank, 2011

[8] DIFU 2012

| |
|---|
| Aluminium: ~90% |

In Germany, more than half of the MSW is being recycled, especially paper, glass, plastics and organic waste.[9] This share can of course still be optimized.

It is important to assess the national and regional recycling options. Waste separation only makes sense if there is a current or potential future market for the secondary raw materials. Further, it is necessary to ensure a good quality of the separately collected materials to avoid concentration of harmful substances during the recycling process which would harm the environment.

**Recovery** can be applied as umbrella term for the above described strategies in which solid waste otherwise destined for disposal are collected, re-processed or re-manufactured. In its narrower definition, it describes a chemical or biological processes recovering energy or nutrients from the waste material, for example in biogas (methane) generation and composting. In controlled anaerobic situations, organic waste can be used to produce biogas (methane) which can be used to generate energy. In this sense, the production of substitute fuels for the cement industry is an interesting new trend in the Arab region.[10]

### 4. Other recovery, such as waste-to-energy

Incineration is a treatment technology before final disposal. Specific waste compositions/materials are burned in a controlled manner at high temperatures to reduce volumes. The process produces ash (which can be disposed of safely on land), flue gas and heat. It requires high technological levels of equipment, infrastructure and trained personnel.
As incineration can be used to produce energy in the form of heat and/or electricity (waste-to-energy), it can also be included in recovery technologies.[11] The energy-to-waste approach replaces fossil fuels for energy generation and, even more importantly in terms of climate impact, it prevents the production of methane in open dumps.

### 5. Disposal

Disposal describes the ultimate action by which solid waste, that is not salvaged or recycled, is finally placed. Since 2005, waste disposal is in Germany only allowed for handled relicts of pre-handled inert waste.

[9] http://www.umweltbundesamt.de/themen/abfall-ressourcen/abfallwirtschaft/klimaschutz-in-der-abfallwirtschaft
[10] Nassour, Elnaas, Hemidat, Nelles (2016)
[11] Hoornweg & Bhada-Tata, 2012; Soós et al., 2013b

The most common disposal strategy is placement in a landfill with and/or without previous treatment/processing and/or recycling. Environmental standards and engineering manners for landfills range from uncontrolled dumps to engineered and sanitary landfills. For example, through the application of methane-oxidation layers, GHG emissions from open waste dumps can be reduced by up to 50%.

**BIBLIOGRAPHY**


- Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung. (2012). Ressource Abfall (No. 03/2012) (pp. 1–28). Bonn, Berlin.
- Connective Cities (2015), *From Waste to Resource - Planning for Integrated Solid Waste Management in Sub-Saharan African Cities.* From http://www.connective-cities.net/fileStorage/Veranstaltungen/Projektwerkstatt_Tansania/Dokumente/Documentation_Practitioners_Workshop_SWM_Tanzania.pdf
- Deutsches Institut für Urbanistik (DIFU) (2012), „Klimaschutz und Abfallwirtschaft. Aktivitäten und Potenziale der kommunalen Abfallwirtschaft im Klimaschutz“
- Hoornweg, D., & Bhada-Tata, P. (2012). What a Waste. A Global Review of Solid Waste Management. Washington DC.
- IFEU (Institut für Energie- und Umweltforschung Heidelberg GmbH) (2009). Tool for calculating greenhouse gases (GHG) in solid wast e management (SWM), Frankfurt am Main.
- Nassour, A., Elnaas, A., Hemidat, S., Nelles, M. (2016), Development of waste management in the Arab Region. Rostock: University of Rostock, Department Waste Management and Material Flow.
- Soós, R., Whiteman, A., Wilson, D. C., Briciu, C., & Schwehn, E. (2013b). Operator Models. Respecting Diversity. Concepts for Sustainable Waste Management. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
- The World Bank. (2011). Urban Solid Waste Management. Glossary. Retrieved December 20, 2014, from http://go.worldbank.org/A4E2DT0380
- UNEP (United Nations Environment Programme) (2010), Waste and Climate Change. Global Trends and Strategy Framework
- UN-Habitat. (2010). Solid Waste Management in the World’s Cities. London, Washington DC.