

Waste-to-Energy in Europe

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La termovalorizzazione dei rifiuti per una strategia della sostenibilità
Milan, 27th March 2014

CEWEP is the umbrella association of the owners and operators of Waste-to-Energy Plants across Europe.

They thermally treat household and similar waste that remains after waste prevention, reuse and recycling by generating energy from it.

This is how they replace fossil fuels, such as coal, gas and oil, used by conventional power plants.

At the same time Waste-to-Energy Plants help to reduce Greenhouse gas emissions by diverting waste from landfills.



Alkmaar WtE plant, the Netherlands

Waste-to-Energy

*Creating reliable,
cost-effective, local energy
from citizens' waste*

Waste-to-Energy Plants (in 2011)

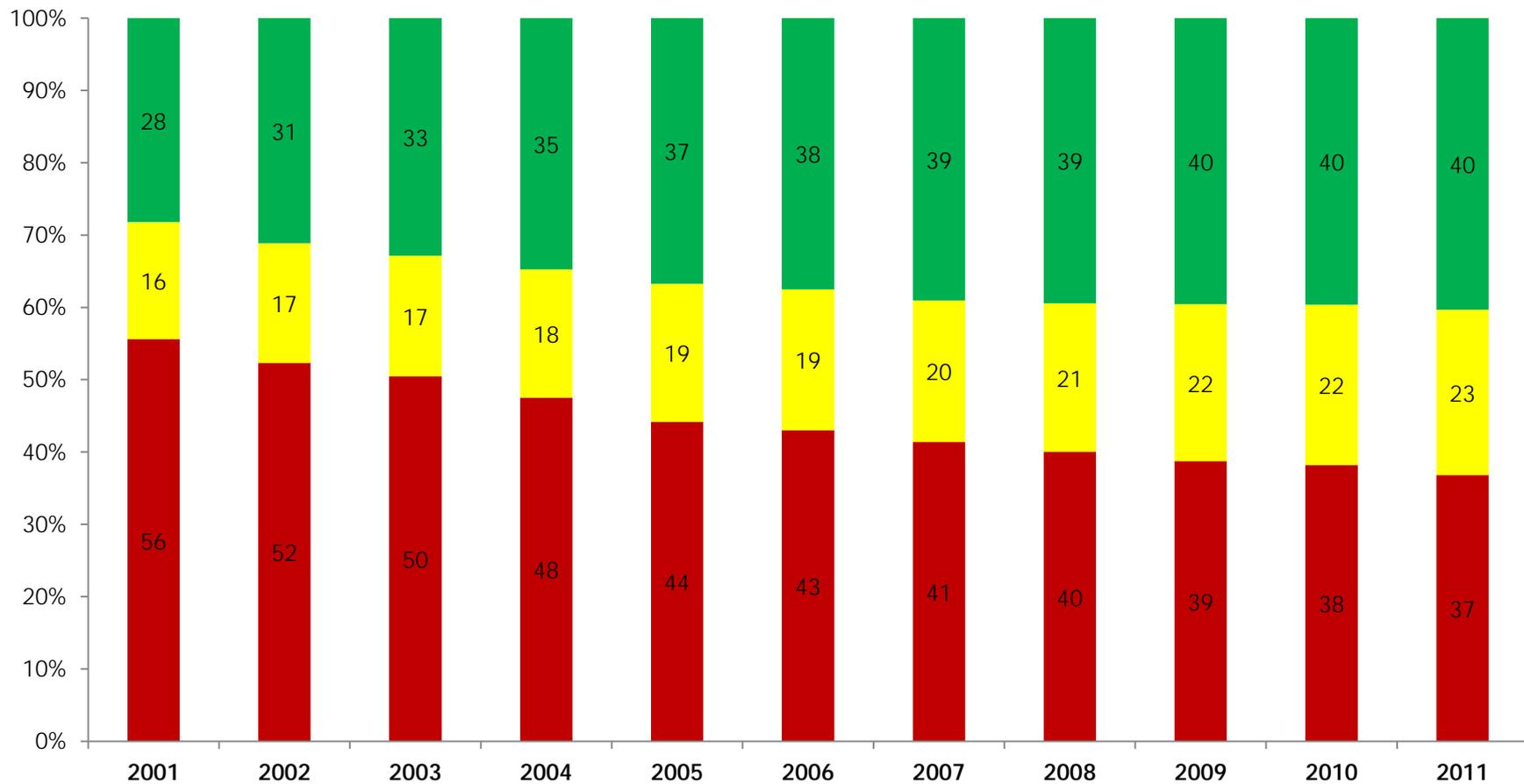
CEWEP Members : **66 Mio. tonnes (85%); 378 plants**

Capacity Europe: **78 Mio. Tonnes; 454 plants**

Past and future paths for WtE in Europe

MSW treatment in EU 27 between 2001 and 2011

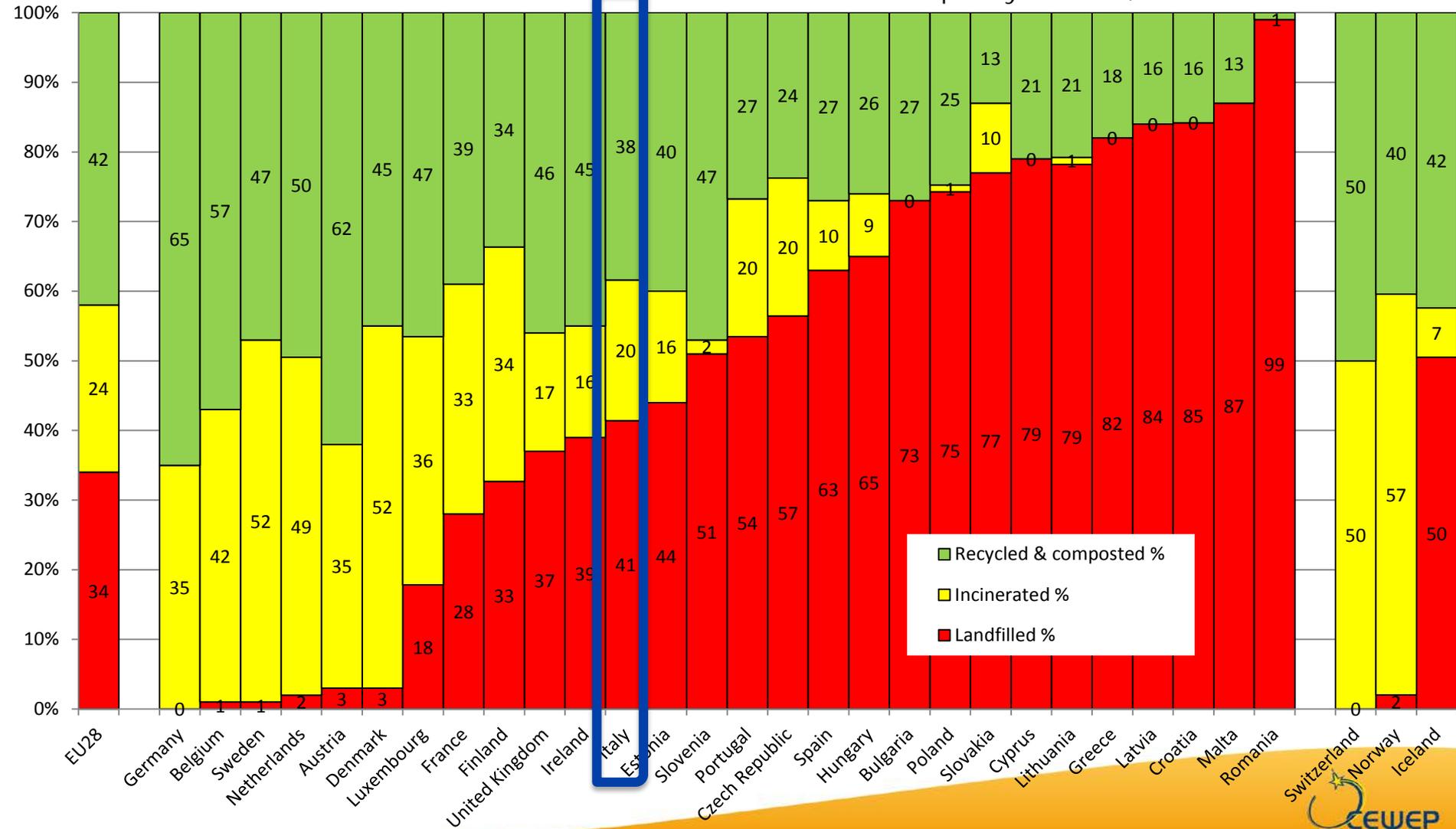
■ Landfill ■ Incineration ■ Recycling and composting



MSW treatment in 2012

EU 28 + Switzerland, Norway and Iceland

Graph by CEWEP, Source: EUROSTAT 2012



Moving up the Waste Hierarchy

The 6 countries which practically eliminated landfilling (AT, BE, DE, DK, NL, SE) have all introduced landfill bans.

- ▶ Most effective means to divert waste from landfills = **Bans**
- ▶ **WtE & Recycling are complementary to divert waste from landfills**

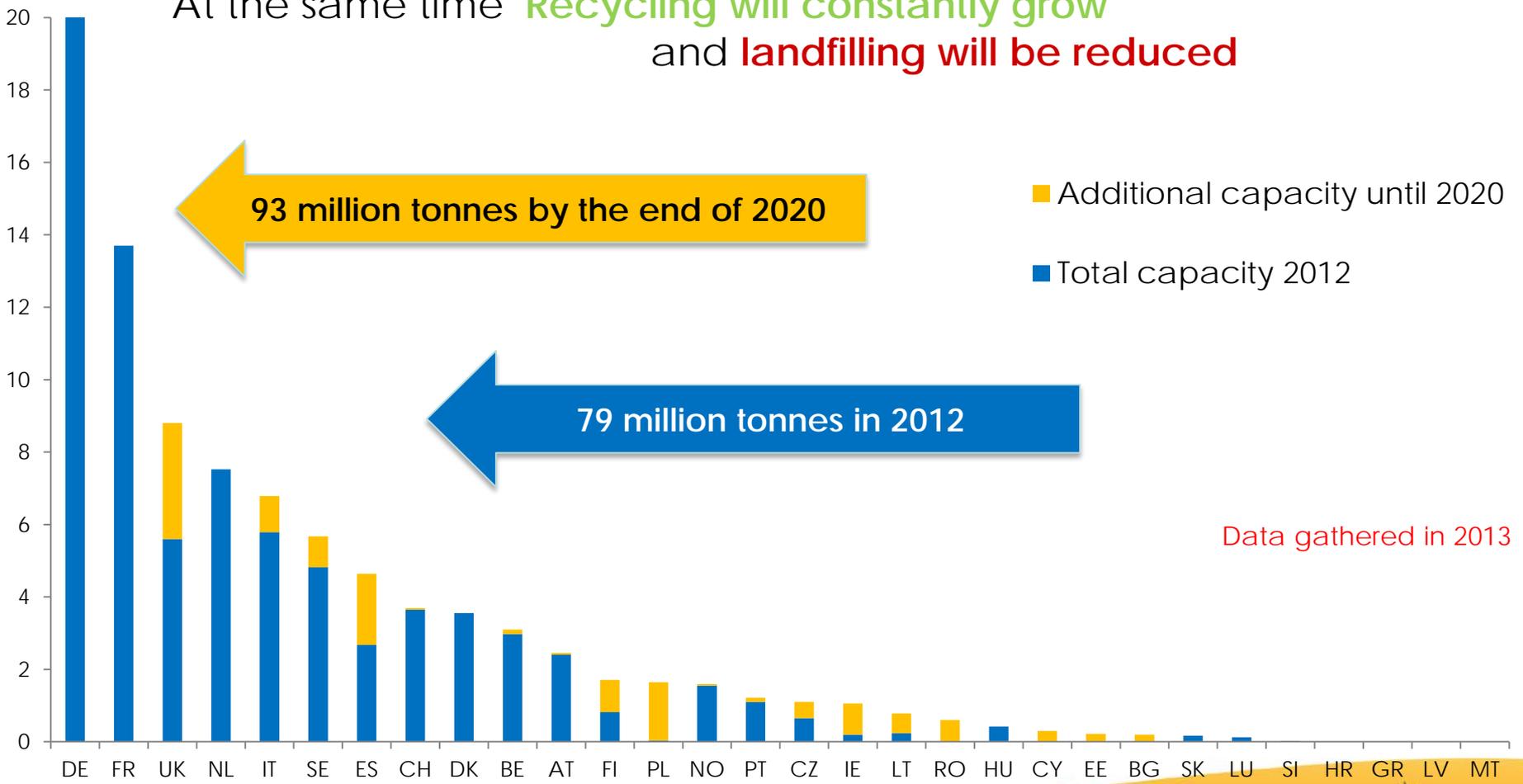
With WtE also treating residues from recycling activities

- ➔ Turning the waste not suitable for recycling into local + affordable energy
- ➔ Contributing to energy + resource efficiency

Estimation of WtE capacity* development in EU

* refers to both WtE and dedicated RDF plants and includes treatment of MSW and commercial waste similar to MSW

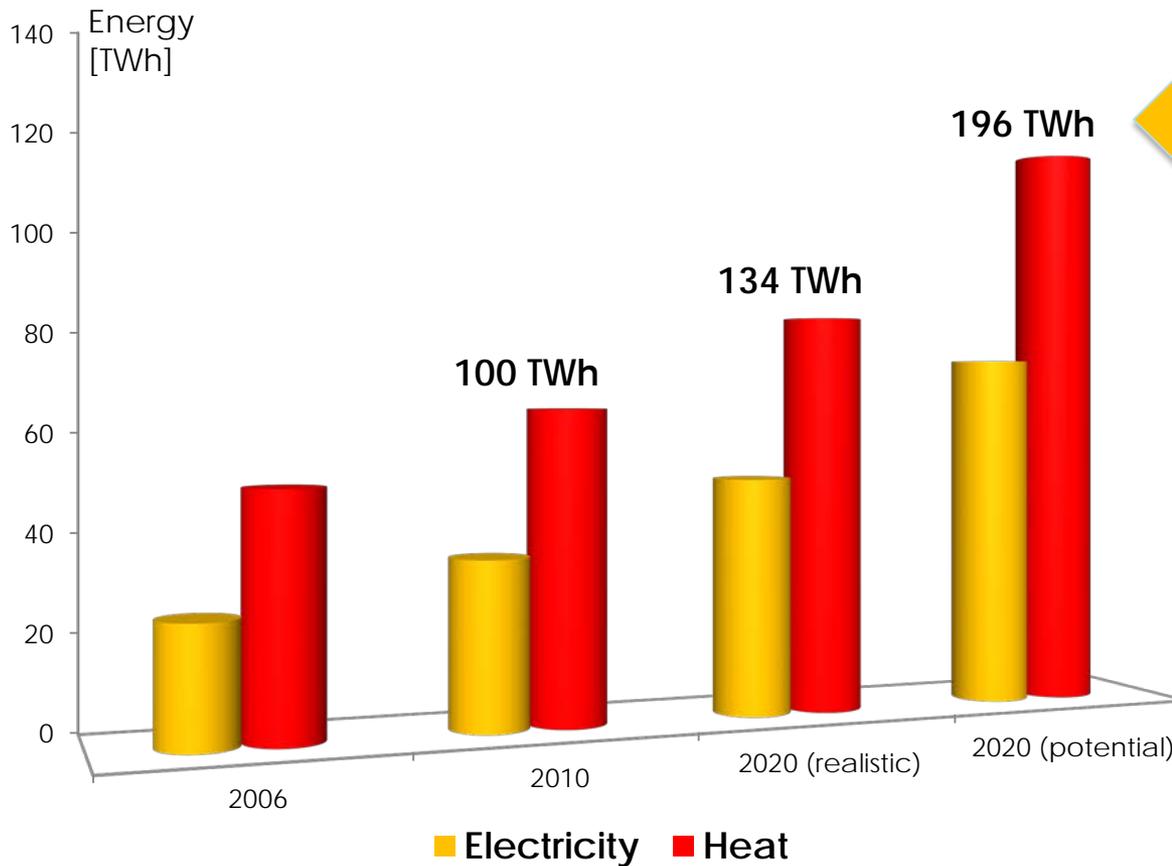
At the same time **Recycling will constantly grow**
and **landfilling will be reduced**



Data gathered in 2013



Energy projections from WtE



Equivalent amount produced by 6-9 nuclear power stations or 25 coal power plants

Enough to supply 70 million inhabitants

Half of this energy is renewable

1 TWh is equal to 1 billion kWh.

Includes both renewable and fossil components.

Where is Waste-to-Energy going to?



Developments in **Northern Europe** (DE, AT, NL, BE, CH), where the market is mature, tend to involve upgrading/ retrofitting of existing WtE facilities.

- ▶ Copenhagen: innovative project for the new Amager Bakke plant replacing the old Amagerforbraending plant nearby - where a ski-slope will be placed on the roof.
- ▶ Investment in projects to improve energy efficiency and to connect existing WtE plants to district heating networks to supply heat to nearby homes and industry has been undertaken, e.g. at the AEB Amsterdam and TWENCE plants, that received the Global District Energy Climate Award 2013

Where is Waste-to-Energy going to?

Projects **elsewhere in Europe** are focusing on meeting the EU Landfill Directive target of diverting waste from landfills.

- ▶ In 2011 Ireland's first WtE plant came on-line in Meath, and a second plant in Dublin is planned.
- ▶ In the UK some 11 plants, currently authorised or in construction, are likely to come into fruition by 2016. In the meantime, the remaining waste is sent as RDF to Northern Europe, in order to avoid the high landfill tax in the country (£80/t from April 2014).
- ▶ In 2013 one plant came into operation in Lithuania and another one in Estonia.
- ▶ In Poland 6 plants are planned and are due to be constructed by 2020.
- ▶ In Southern Europe the impact of the economic slow-down of the last few years can be seen, as a number of WtE projects in the planning stages have been put on hold.

Import/Export of MSW

	Import	Export
Denmark	18,000 t (2011) 150,000 t (2012)	82,500 t (2011)
Estonia	Planned about 20,000 t from Ireland and Finland	
Germany	763,000 t (2012)	
Italy		52,000 t RDF (2010) 11,000 t mixed MSW (2010)
Netherlands	1,000,000 t (2012) – 80% from the UK	
Norway	80,000 – 100,000 t RDF (2013) – from the UK to the city of Oslo	
Sweden	800,000 t (2012) – most from Norway, rest from the UK	
UK + Ireland		1,586,946 t (2013) RDF to NL, DE and DK 2,500 t (2013) - Irish mixed MSW to Estonia SRF to cement plants in Estonia and Latvia

Austria from September 2013:
ca. 60,000 t from Italy

Can't everything be recycled?

New recycled materials depend on the quality of the sorted waste:

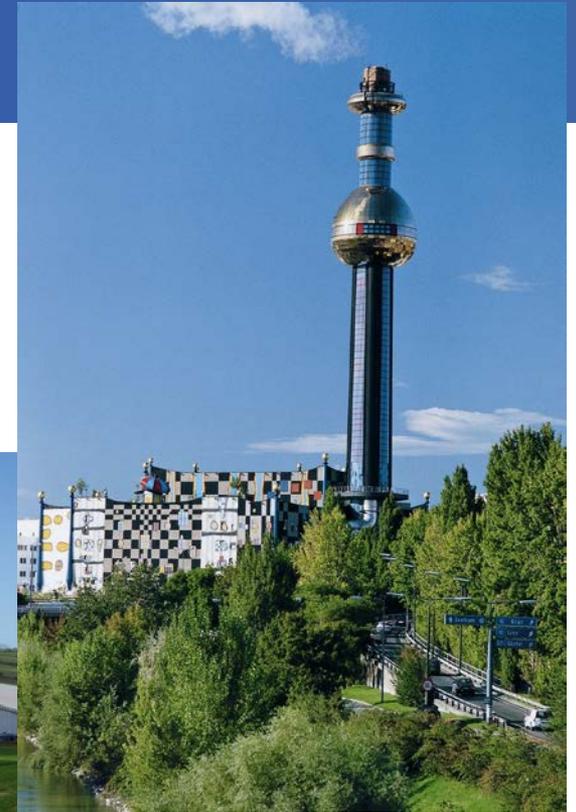
- ▶ Materials too dirty or too contaminated (e.g. vacuum-cleaning bags)
- ▶ Mixed materials (too difficult/expensive to sort)
- ▶ Materials degrade after repeated recycling
- ▶ Demand necessary for recycled products

**If high quality recycling is not possible,
the waste should be turned into energy,
rather than being landfilled.**

**It is worth noting
that residues from
recycling
also often need
thermal treatment**

Even countries with the highest recycling rates in Europe (e.g. Austria, Belgium, Germany and the Netherlands) depend on WtE to treat remaining waste not suitable for recycling.

Modern WtE is safe & clean ...



Stringent regulations strictly controlled

Waste-to-Energy Plants are equipped with **sophisticated filtering devices** to deal with the pollutants that are in the waste and minimise emissions into the atmosphere.

“Directive 2000/76/EC on the incineration of waste makes the incineration of waste one of the most stringently regulated and controlled industrial activities.”



Answer given by Mr. Potočnik, Environment Commissioner,
to a Parliamentary Question on 10th June 2010

Health studies

Lisbon University's Institute of Preventive Medicine: waste incineration *"does not impact on dioxin blood levels of nearby residents"* of Waste-to-Energy plants
www.sciencedirect.com

UK Committee of Carcinogenity:
"any potential risk of cancer due to residency near to municipal solid waste incinerators was exceedingly low, and probably not measurable by the most modern epidemiological techniques"
<http://www.advisorybodies.doh.gov.uk/Coc/munipwst.htm>

A recent Spanish study concluded that the Tarragona Waste-to-Energy plant *"does not produce additional health risks for the population living nearby."*
It presents results from monitoring of the Tarragona (Catalonia, Spain) Waste-to-Energy plant regarding PCDD/Fs levels in soil, vegetation, and air samples collected in the period 2009–2010. The concentrations of PCDD/Fs in the surroundings of the Tarragona plant were monitored over the last 15 years.
<http://wmr.sagepub.com/content/30/9/908.full.pdf+html>

For further Health Studies please visit

<http://www.cewep.eu/information/healthandenvironment/index.html>



TOPICS

in Brussel's

legislative pipeline

Energy Recovery

R1 status and Climate Correction Factor

Achieving energy recovery status for **efficient** Waste-to-Energy Plants

Waste Framework Directive, Art. 3(15):

‘recovery’ means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfill a particular function, or waste being prepared to fulfill that function, in the plant or in the wider economy.

Annex II sets out a non-exhaustive list of recovery operations

Annex II R 1 ‘Use principally as a fuel or other means to generate energy’
This includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal to or above:

0.60 for plants permitted before 1.1.2009

0.65 for plants permitted after 31.12.2008

Impacts of 'R1 energy recovery status'

Waste hierarchy:

- ▶ Efficient WtE plants are higher up the hierarchy than landfilling.
- ▶ Level playing field with co-incinerating industry (e.g. cement kilns) which was already considered as 'energy recovery' (European Court of Justice).
- ✓ Public acceptance – building awareness of energy recovery from waste through the improvement of energy efficiency

Climate Impacts

A warm climate influences the R1 performance of a WtE plant in two ways:

1

it decreases
electricity
production
efficiency

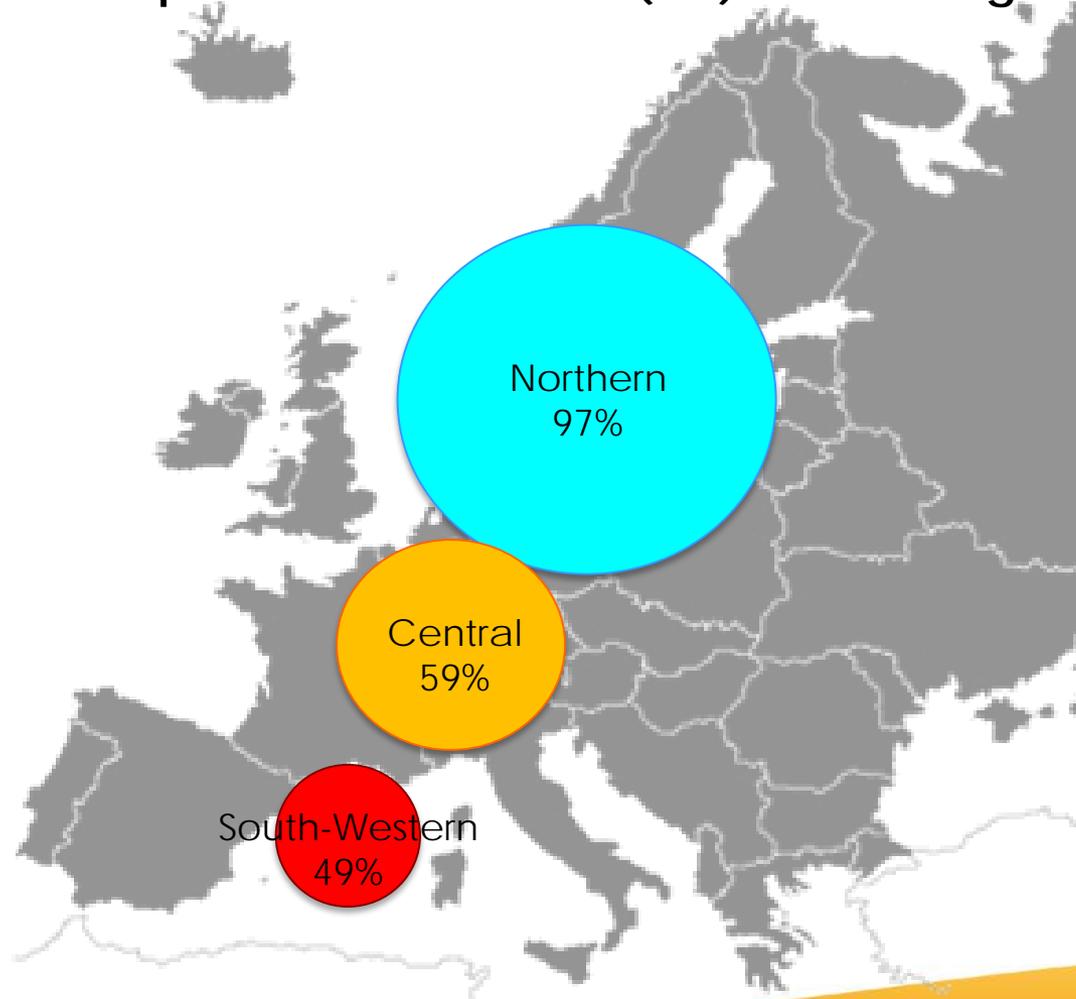
2

it limits
the heat
demand

Statistical evidence of R1 value dependency on local conditions was provided by the 3rd CEWEP Energy Efficiency Report

CEWEP Energy Efficiency Report III (2012)

European WtE plants that reach R1 (0.6) based on geographical area



Percentages are calculated based on the total number of plants

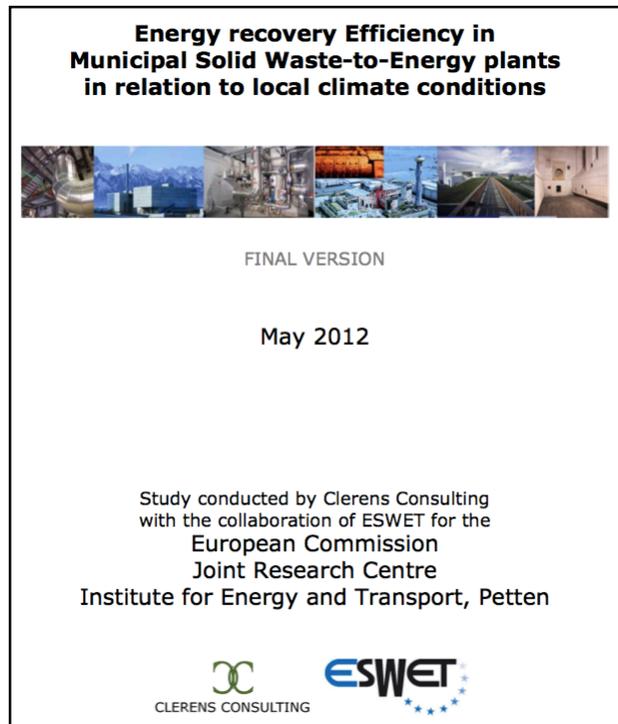
Climate Impacts

Waste Framework Directive, Article 38 “Interpretation and adaptation to technical progress” states:

1. “[...] *If necessary, the application of the formula for incineration facilities referred to in Annex II, R1, shall be specified. **Local climatic conditions** may be taken into account, such as the severity of the cold and the **need for heating** insofar as they influence the amounts of energy that can technically be used or produced in the form of electricity, heating, cooling or processing steam. [...]*”

Climate Impacts -2012 Climate Factor Study

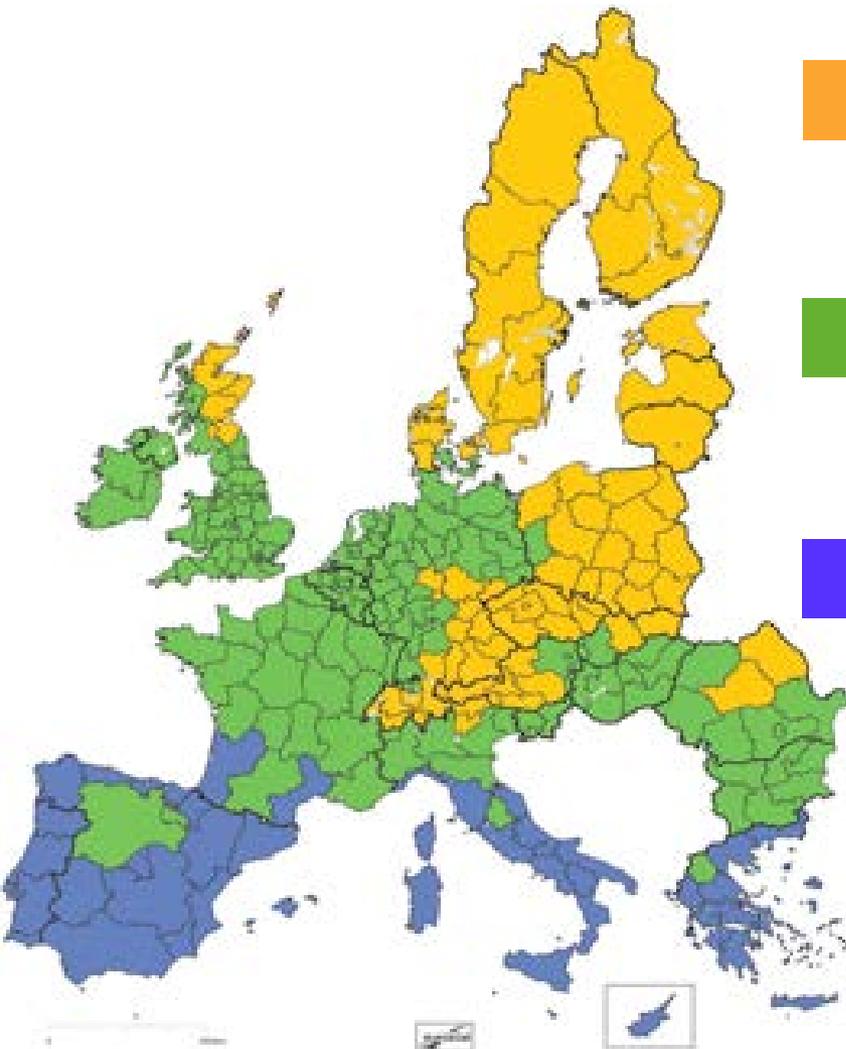
To address this issue in more details the JRC commissioned a study to Clerens Consulting



Investigate the impact of climate on the production and use of energy and assess the opportunity to introduce a climate correction factor

Climate Impacts

Heating Degree Days (HDD)



HDDs > 3350 - cold climate, well developed District Heating network

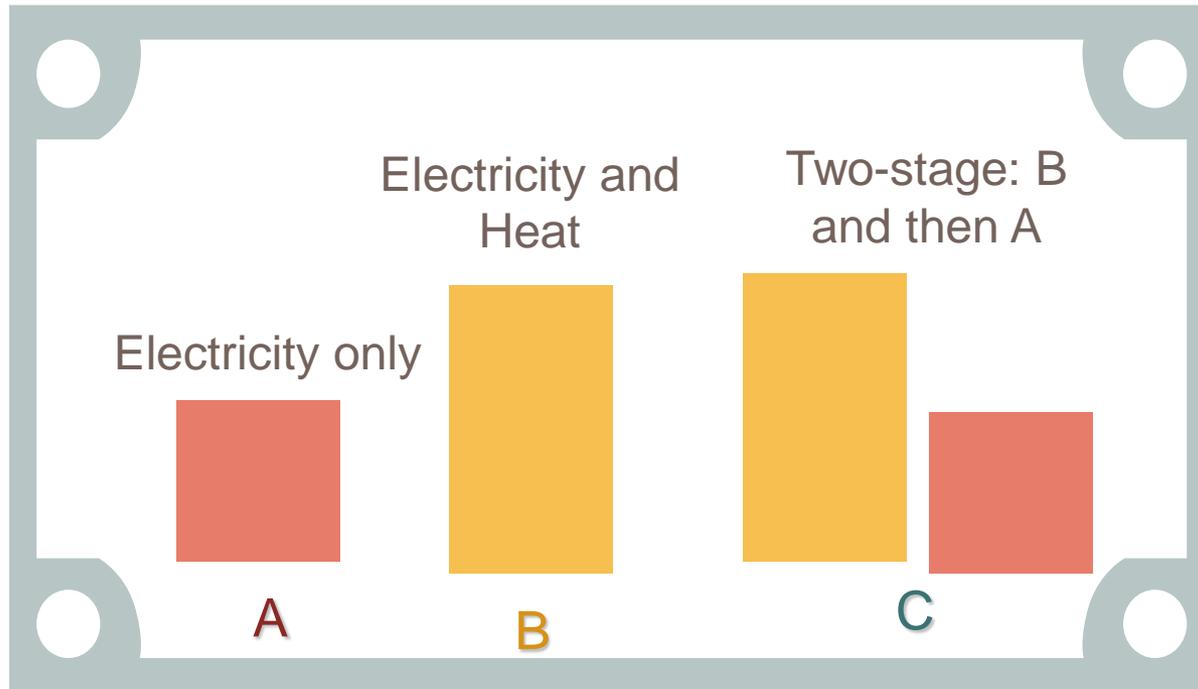


2150 < HDDs < 3350 - moderate climate, heating demand limited both in quantity and time



HDDs < 2150 - warm climate, low heating demand

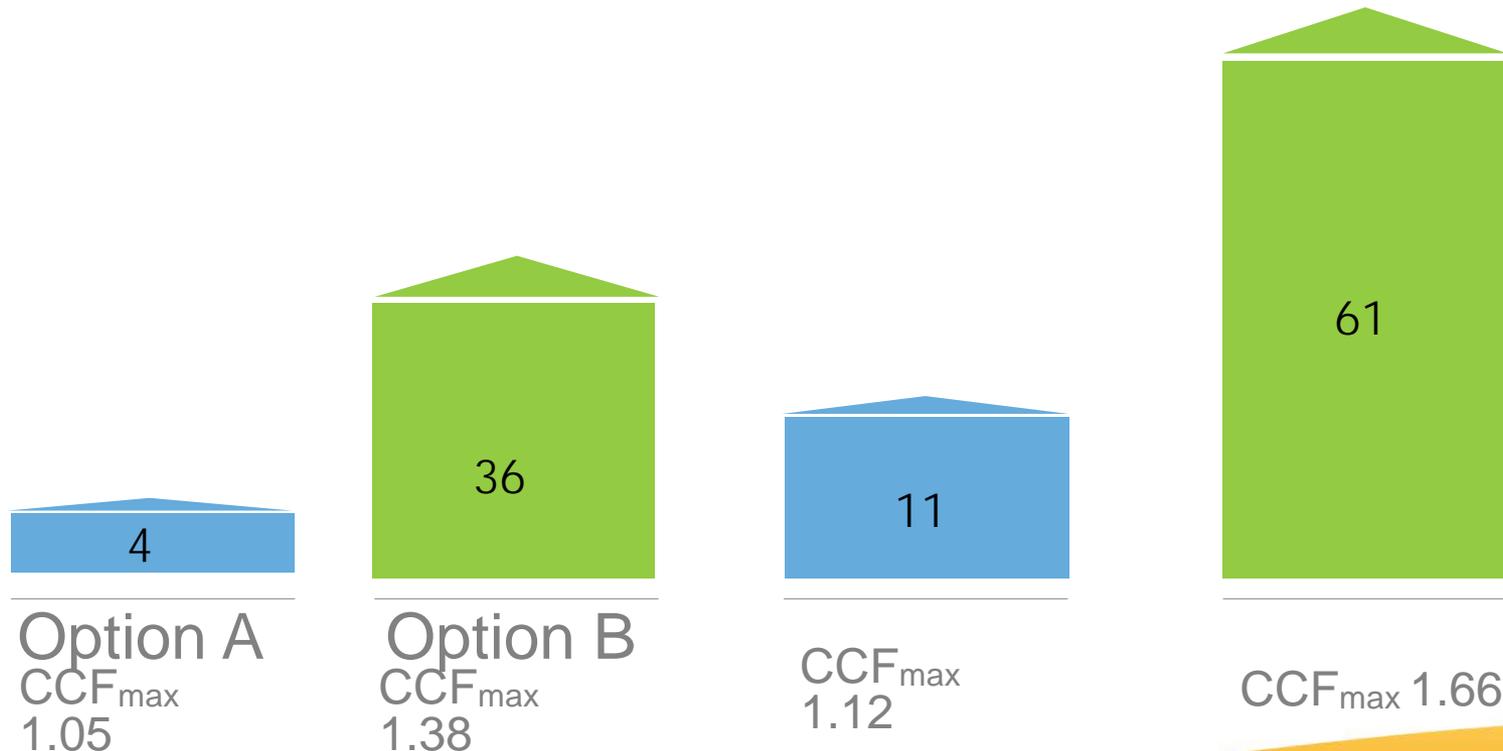
Proposals for a Climate Correction Factor



Climate Correction Factor Options CEWEP Impact Assessment

To assess the impact, four options have been applied to the Southern and Central EU WtE plants that have delivered data for CEWEP Energy Efficiency Report III.

Additional number of plants achieving R1 in EU



Data refer to year 2010 and operational years 2007-2010 for the R1 calculations.

CEWEP's opinion on a Climate Correction Factor (CCF)

Climate influences the R1 value of a WtE Plant

Uneven playing field in EU

The correlation between CCF and HDD is a useful approach to determine which regions should benefit from the CCF

Considering that landfill diversion is of utmost importance, waste should be used as a resource, moving higher up the hierarchy (i.e. from landfills to R1 WtE plants)

The factor should compensate for lower electricity produced but also for lack of heat demand. Nevertheless, it should be appropriate and fair, avoid the impression of a “free ride” and provide incentive to improve efficiency

Review of Waste Management Law

Review of Waste Management Law

Issues covered:

- ▶ **Review of waste targets**
- ▶ Ex-post evaluation of EU Directives on separate waste streams
- ▶ Assessment of best plastic waste management

Review of Waste Management Law

The European Commission (COM) is currently working on a communication on “circular economy” which is supposed to be launched in May 2014, including:

- ▶ New waste targets (step by step approach 2025 – 2030)
- ▶ Phasing out of landfilling of municipal and similar waste
- ▶ Recycling for Municipal Waste: from 50% (aim for 2020) to 60, 65 or 70% by 2025/2030?

To be discussed: definition and monitoring of recycling, better data/transparency

Revision of BREFs (Best Available Techniques REFerence) documents

Best Available Techniques REference documents (BREFs) revision timeframe

Work programme for the EIPPC Bureau, Seville:

- ▶ Start 2013: review of **BREF Waste Treatment** (inter alia flue gas cleaning residues, stabilisation processes); estimated final draft 2015
- ▶ Start 2014: review of the **BREF Waste Incineration**
Bottom ash will be covered in BREF WI; estimated final draft 2016

To conclude: CEWEP members stay for

- ▶ High environmental standards
- ▶ Waste-to-Energy's contribution to Europe's
 - Circular Economy (in an integrated approach) and
 - Resource and Energy Efficiency
- ▶ Diverting waste from landfills with the help of both, quality recycling and efficient Waste-to-Energy, providing local, cost-effective and secure energy!

For more information on Waste-to-Energy

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