Name of the technology: 3.1 W-to-E - Cogeneration Municipal Solid Waste (MSW) Power Plant

Stage of development:

Widely used technologies (the technology is used by many actors on global/EU level).

Technical application:

Cogeneration MSW power plant to produce thermal energy for heating and domestic hot water and electricity.

Short summary (up to 200 characters):

The technology applied enables energy utilization (the combined heat and power production) of RDF produced from MSW with MBT. Two stage combustion systems can be applied as thermal treatment technology to ensure complete combustion and minimal influence on the environment.

The main goals are:

- energy utilization of waste to cover part of the heating energy needs for a city (urban area),
- meeting the strict requirements regarding the biodegradable carbon content in waste disposed of in the landfill (base on European landfill directive)

The operation of the W-to-E plant reduces the negative effects on the environment – in addition to the utilization of energy in waste.

It is important to note that a W-to-E plant should not be seen as a waste treatment plant but more accurately as a power station or even a Combined Heat and Power (CHP) plant. A thermal W-to-E plant, in particular, 'treats' waste in the same way that a coal-fired power station 'treats' coal. Any other benefit, such as volumetric reduction, is a useful by-product but is not the primary purpose of a W-to-E plant.

Unfortunately, most legislation over recent years has erroneously and dogmatically focused on W-to-E as waste treatment rather than as energy production, and has attempted to deal with a W-to-E plant as if it were an incinerator, rather than a power station. The approach is very different in most other parts of Europe, where recycling and W-to-E are both used to their optimum potential, and, as a result, land filling is successfully minimised.

Justification – why was this technology selected (up to 500 characters).

W-to-E, in its various formats, is the only 'renewable' (most suitable 'waste' is bio-waste) technology which can realistically meet the EU 2020 commitments for 'heat' and 'transport' sector requirements, whilst at the same time also providing significant quantities of electric power.

A Waste to Energy (W-to-E) plant works by taking the waste and converting its potential energy into any type of usable energy – the three main forms being heating, electricity and transport fuels – just as coal, oil and gas are used as fuels in fossil-fired power stations. W-to-E can be used with many different types of waste from domestic, commercial, industrial, construction and demolition, to sewage and agricultural etc. The only criterion is that the waste fraction is combustible and/or biodegradable.

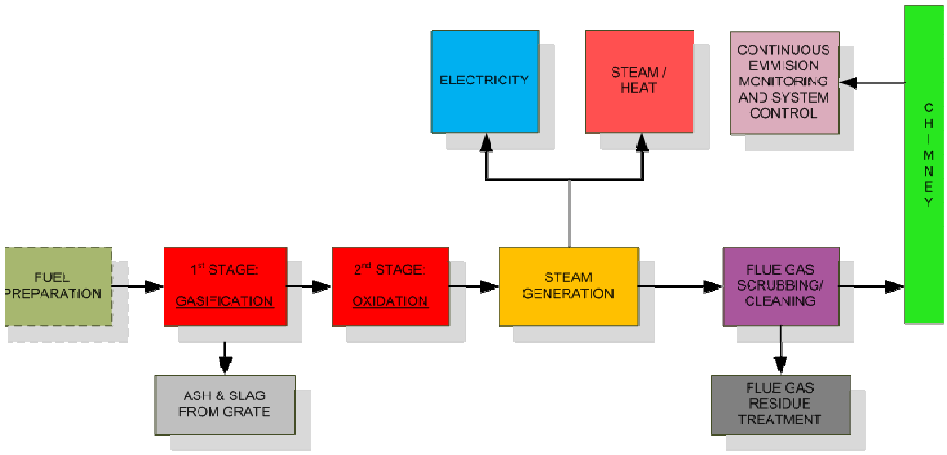
It is important to note that a W-to-E plant is not the same as an 'incinerator' and it is highly misleading to describe it as such. An incinerator is purpose-built to reduce the volume of waste by burning (incinerating) it to produce an ash which is disposed of elsewhere, e.g. to landfill. A W-to-E plant, by contrast, is purpose built to provide usable energy and can be designed to have little or no output to landfill.

Most W-to-E plants should correctly be described as **combustion** systems which are 'the process of burning' or 'any process in which a substance reacts to produce a significant rise in temperature and the emission of light' or 'a process in which a compound reacts slowly with oxygen' with the creation of energy and heat which can be used.

A considerable advantage of advanced thermal conversion technology is the controlled conversion process and the low dust emissions in the gasses, which positively affects the reduction of the catalytic processes of harmful substances being produced during the flue gas cooling process and resulting in smaller quantities of flue gas treatment residue.

Characteristics (up to 500 characters):
There are four main processes which are used in W–to-E plants, three are thermal (combustion, gasification and pyrolysis) and one is biological (anaerobic digestion). For reasons which are not at all obvious, as all four processes have been in widespread use for many decades, it has decided that 'gasification', 'pyrolysis' and 'digestion' are Advanced Conversion Technologies (ACTs), while 'combustion' is not.

Combustion
This is the most common and well-proven thermal process using a wide variety of fuels. The combustion process is that used in all the large coal-fired power stations in the UK, for example, and follows a process known as the Rankine Cycle. The Rankine Cycle inherently produces both electric power and heat. The heat energy produced is not a by-product, as with some other processes, but is the basic principle on which the system works. It is therefore, inherently, a CHP plant.



- Weighing, inspection and storage of RDF and Sewage Sludge
- Fuel mixing, transport and dosing into the gasification chamber
- WID-compliant two-stage gasification and thermal treatment process
- Heat recovery / utilization
- Flue gas treatment, emission monitoring and system control

Impact on the economy (up to 1000 characters):
Cogeneration on MSW is mature and proven. The systems adapt easily to a variety of industrial facilities and district heating system. Main impact is on climate change (cogeneration), but the instalment of such systems also brings many advantages in other areas, like job creation and bettering of life standard.

Unfortunately, most legislation over recent years has erroneously and dogmatically focused on W-to-E as waste treatment rather than as energy production, and has attempted to deal with a W-to-E plant as if it were an incinerator, rather than a power station. The approach is very different in most other parts of Europe, where recycling and W-to-E are both used to their optimum potential, and, as a result, landfilling is successfully minimised.

Therefore it is recommended to happen the following:
1. The Government should review its energy strategy and make W-to-E a key component in energy production, with the added benefit of avoiding waste to landfill.

2. The Government should promote and encourage investment in district and community heating projects with local 'waste' being used as the fuel resource.
3. The Government should redefine waste as an energy resource, allowing the Department for Energy and Climate Change to focus on its optimal use.
4. The Government should abandon its focus on recycling as the only way to rid us of landfills, as this is quite unachievable and is clearly deceiving the public about what is really happening to their waste.
5. Recycling should only be for waste products which cannot be more sustainably converted into electricity, heat and/or transport fuels.

Global development (up to 1000 characters):
Many of the most developed countries in Europe recognised the problems associated with landfill and have been developing alternative processes for dealing with waste for several decades. The two main methods of landfill reduction are recycling and W-to-E.

In most European countries, it is normal to build W-to-E plants as part of the communities that they serve, so the waste from the community is used as fuel in the W-to-E plant, which then supplies electricity and heat back to the community. This is a very much healthier approach than that traditionally.
In Europe, especially in the northern part the MSW Plants are constructed to the state of the art specifications and therefore fulfills the highest standards of safety, workplace safety, environment protection and availability. Operating efficiency is increased through a close cooperation with sister companies (intensive collaboration, exchange of information).

The chosen location is well connected with regard to the access to the energy infrastructure.

Main barriers are that residents are concerned about a possible increase of waste disposal fees.

Milestones[1] *(List at least one milestone per year against which the progress towards the achievement of the local/regional 2020 targets can be measured)*

Given the scope of the roadmaps (municipally or regionally based) technological improvements that would require major research and development processes would tend to fall outside of the scope of these roadmaps. This does not necessarily mean that such technological improvements cannot be used as milestones, but that before any such technological improvements are stipulated in the milestones, the capacity of the municipal and/or regional stakeholders, and the capacity of the municipality/region to collaborate with external partners, should be carefully considered.

Milestones more likely to fall within the scope of this roadmap are those that are able to help measure desired changes in the deployment and/or wider usage of the previously identified key energy technologies or those that measure the effects of this changed deployment or usage (i.e. production of thermal energy (GWh); increase of thermal energy production (%); installed capacity (GW or m2); increase of installed capacity (%); CO2 reduction (t)).

Year	2015	2016	2017	2018	2019	2020
Milestones			**40 MWe installed capacity**			

The group assumed a hypothetical amount of 40 MWe of installed cogeneration MSW power plant until 2020.
They assumed an installed capacity of 40 MWe in year 2017.

Financial Gaps

(List financially related challenges that need to be addressed in order to increase the uptake/wider usage of this technology)

1. **Lack of predictability when launching the financial instruments at national level.**
2. **Lack of institutional capacity of existing Programs Implementation Units (ESIF)**
3. **Overcompensation generated by beneficiaries receiving both state aid and subsidies for green certificates**
4. **High bureaucratic public procurement procedures**
5. **Lack of cooperation between public authorities and private investors.**

Policy Gaps

(List important policy gaps that prevent the uptake/wider usage of the key technology)

1. **Contradictions and major issues in promoting, developing, implementing and operating RES in terms of financial and legal environment**
2. **Lack of interest and active involvement on behalf of central governmental authorities – ministries and national regulatory bodies**
3. **Lack of interest from projects developers for disseminating, sharing experience, know-how and best practice**
4. **Lack of awareness-targeting actions meant to increase knowledge on legislative provisions, financial and technical solutions**
5. **Lack of institutional transparency and high bureaucratic public procurement procedures.**

Financial Instruments and Period of Implementation

(List all relevant financial instruments that can address the above financial gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the financial instrument.)

1. **Support Actions for public-private partnership (PPP)**
2. **Support schemes for legal entities (reinvestment of profit)**

Policies and Period of Implementation

(List all relevant policies that can address the above policy gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the policy.)

1. **Rising the level of importance and involvement of the local authorities**
2. **Transposition of the new Public Procurement Directive as well as the ex-ante conditionality on Public Procurement for accessing EU Structural funds 2014÷2020**
3. **Increasing institutional capacity of existing Programs Implementation Units (for accessing ESIF 2014-2020) in order to assist from the early stages of the project and reduce project evaluation processes**

Stakeholders

(List all relevant stakeholders for the implementation of the policy and/or financial instrument above)

1. **Municipalities, administrations, ministries.**
2. **Building associations, corporations.**

Policy Recommendations

(*Relevant policies for this particular technology have already been identified above. This section aims to provide the steps needed for the practical implementation of the policies and financial instruments listed above.)*

1. **Identification of "Champions" that could be the motivated players in starting the public-private partnership (PPP).**
2. **Organise meetings to develop the public-private partnership (PPP).**
3. **Formally launch public-private partnership (PPP) and start procuring main equipments at preferential prices.**