

**Answers to the Questions sent into the Q&A chat during the S-GE webinar
“RECYCLING AND WASTE MANAGEMENT IN NEW ZEALAND
New Zealand meets Swiss Technology and Solution providers” held 29th November
2021**

The questions asked are clustered under a series of themes and where necessary the language has been adapted slightly to aid understanding. Each question is denoted by a bullet and the answers from S-GE and the panellists present during the event are marked in blue.

Why waste to energy?

The priority of the future circular economy must be “clean cycles”: Hazardous substances must be removed from cycles and disposed in safe “final sinks” where they cannot harm humans and the environment. This is a prerequisite if recycling is expected to contribute effectively to resource conservation and environmental protection. To guarantee clean cycles in a circular economy (CE), waste to energy (WtE or w2e) will continue to play an important role in addition to prior attempts for reduce, reuse, recycle for residual not recyclable burnable waste fractions in Switzerland and also in the EU.

- **Surely, a circular economy is about designing out waste? How do we avoid locking ourselves into infrastructure?**
 - *There are goals, targets, and steps on the way to these. Waste-to-Energy can be seen as one intermediate step before achieving the full circular economy. In the meantime, there is still a need for processing non recycled municipal waste, and waste to energy as a valuable approach to this.*
 - *Fully agreed that the best way is to never let waste happen and designing all products so they can be fully recycled. This is the new imperative in manufacturing. The ever-increasing disorder in the world is a natural law (entropy as part of thermodynamics) means there will still be waste occurring in future. Whilst the waste quantity will hopefully decrease, there is at this time still a need for the processing and management of municipal waste hence the continued role of waste to energy as a valuable approach to this. Councils can avoid getting locked in by signing up for waste service contracts which only oblige them to supply whatever residual waste is still occurring. An example is the East Rockingham project (www.erwte.com.au). Hence, councils are fully incentivised to source-separate recyclables and organics.*
- **EU countries are moving swiftly moving away from all Waste to Energy (WtE) technologies with major European financial institutions excluding it from financial support from the EU circular economy package. A 2019 study commissioned by the Nordic Council of Ministers found that Nordic countries will not achieve key elements of the EU circular economy package unless they**

reduce their reliance on waste-to-energy incineration. The report recommended a shift away from incineration towards policies shown to reduce waste generation, including a packaging tax, recycling and recovery rate targets, landfill bans on biodegradable waste, deposit return schemes and extended producer responsibility (i.e., product stewardship).

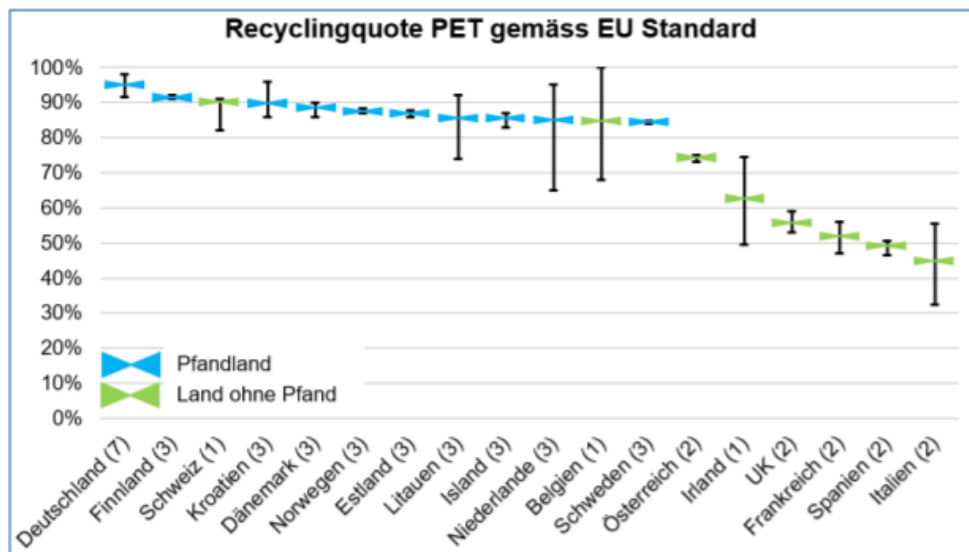
- *There have been always attempts to reduce or even dispense with WtE as an essential element of modern waste management and/or in CE-strategies (see above). But this was mostly ideological motivated than scientifically based. The fact that European financial institutions excluding WtE from financial support from the EU circular economy package is not prior, much more important is the ban of direct landfilling and to strictly enforce polluter pays principle. Under these conditions WtE will not need financial support in developed countries such as Switzerland, EU and New Zealand.*
 - *All efforts to reduce waste (zero packaging, reuse, fixing etc.) and manage waste at source (recycling, composting, etc.) are important and must be encouraged. But despite all that effort, there will still be residual waste that our society has to deal with. For that, WtE is the most appropriate solution, because:*
 - *it destroys all the hazardous ingredients in waste. This prevents air, soil, water and at the end people from pollution,*
 - *it reduces the volume of waste by a factor of 20,*
 - *it produces energy.*
 - *The biggest enemy on the way to zero waste is missing regulations and low costs for depositing on landfill and not WtE technology.*
 - *Nordic European Countries may currently have an overcapacity in WtE, hence they will have gradually to reduce this capacity by not renovating existing plants. However, the conclusion of the report is not to eliminate WtE.*
 - *The export ban of recyclables to China and South East Asia was caused by the fact that the residuals which could not be recycled were burnt in the open and disposed of via rivers into the Pacific plastic patch. Europe as well as the other developed countries must now onshore recycling which also means higher treatment prices (higher wages and environmental standards plus appropriate disposal of non-recyclables into WtE). This also means that the previous recycling numbers have come down because now only what gets truly recycled is accounted for and not the quantity which was exported.*
- **Will WtE infrastructure require a longer investment/commitment for our waste which is not able to be reduced, reused, recycled in comparison to landfills which are currently being proposed or will be needed to replace existing landfills? How will WtE support reducing our waste generation? i.e. how will you allay the fears that you need to 'Feed the beast' which seems to be a common response when WtE is suggested in NZ. Although one could also argue that landfills are already a beast being fed too.**
 - *The plants are planned and built based on assumptions of the future evolution of population and waste generation. This continues to evolve and so discussions around this are a key part in achieving good solutions.*
 - *Implementing innovative waste reduction policies as well as recycling strategies require years of legislative preparation, communication to citizens, investments by private parties, etc. A reduction of waste quantity is aimed since long in Switzerland, but despite new regulations and incentives, it is*

advancing very slowly. What also happens is that reduction of waste quantity per person is partly compensated by the increase of population.

- *Please also refer to the answer to the previous question.*
- **Why is this presented as an either, or situation: landfill or burning? This misses the Zero Waste/Circular Economy imperatives. These are not as complicated as are made out in this presentation. Indeed, many top-of-waste hierarchy solutions require less technology, no lock in investment, are cheaper and simpler than WtE.**
 - *WtE is not a one-to-one substitution of landfills, but part of a whole waste management strategy which includes avoiding, reuse, recycle. Even the best waste management system will not be able to avoid all waste, that then has to be treated somehow: for this WtE is definitely better than Landfill (see also the answers to the other questions above)*
- **Shouldn't we be heavily investing in reduction and reuse right at the top of the zero-waste hierarchy, instead of very expensive lock-in investment in technology that does not even feature as an acceptable form of waste management according to Europe Zero Waste Hierarchy?**
 - *Please refer to the answer above*
- **We are seeing European countries move away from WtE, such as the moratorium in Wales. Why do you think the context is different in Aotearoa?**
 - *A moratorium for WtE-plants is not the right and environmentally clever way forward. This will only support the continuation of landfilling with shifting problems and costs to the future (groundwater contaminations etc.) or the export of waste into uncontrollable areas of the world (such as in the case of China and now other substituting countries since China closed its borders). It is far better is to establish a modern waste management system with the intelligent planning of capacities that is adjustable in a rolling process according to the changing parameters such as increasing recycling efficiency for plastics, organics etc.*
 - *Also please refer to the previous answers.*
- **Europe is phasing out incineration, so why is it a good idea for Aotearoa?**
 - *There might be areas in Europe which would like to avoid WtE plants, but there is none that can manage all its waste without WtE, or without using landfills.*
 - *The UK is building various WtE-plants to reduce depositing waste in overflowing landfills.*
 - *Europe is not phasing out WtE. Some countries still have a lack of capacity, whilst some other countries adjust their capacity by not rebuilding old plants or rebuilding them with smaller throughputs.*
- **We have a national strategy to minimise waste. Can you provide any evidence that this incineration plan hasn't interrupted Switzerland's own zero waste goals / that incineration doesn't undermine our national strategy?**
 - *Switzerland has a clear 3R policy but no ideological zero waste policy. WtE has not hindered the 3R approach. Good examples are paper and PET-plastic recycling (see the graph below). There are high PET-Recycling rates despite the high importance of WtE in WM in countries like Switzerland, Germany etc.*

(source:

https://www.petrecycling.ch/tl_files/content/PDF/Medien/Medienmitteilungen/2020/PET-RecEuropa_Studie.pdf



- *As soon as technology and product quality are available, and costs reasonable recycling is the first option in reality.*
- *Overall, the statistics of all European countries show that recycling, composting, and WtE go hand in hand. Only the use of landfilling is decreasing.*
- *In Switzerland we now have a real recycling rate of domestic waste of around 50%. We are continuously trying to increase this rate, and the aim is to reach 65%. However, this will take time, and in the meantime, we avoid landfilling by using WtE. The incineration capacity is being reduced by dismantling small plants and reducing the capacity of renewed plants.*
- *Recycling is not equal to separate collection. Recycling is what can be brought into the economic cycle and used as primary material. Separate collected waste has first to be treated and “cleaned” and this process generates waste which cannot be recycled. The better the separate collection, the higher the potential recycling rate, but also vice versa. By separating collected mixed plastics, the real recycling rate is not higher than 60%.*
- *For mixed plastics in the future, it is expected that for additional waste fractions recycling will also increase in the future due to technology and market developments.*
- **Or here's a third option, what's the advantage of zero waste compared to landfills and incineration?**
 - *Here the question is of timescale. Waste is a problem today and we need for developments to occur in parallel (see the answer above regarding Wales)*
- **If there was cheap landfill and no demand for heat energy in Switzerland, do you think there would be any large-scale incineration plants?**
 - *The main reason for the construction of WtE plants in Switzerland is the protection of water, air, and soil from dangerous substances created by waste and landfill.*

- *The ban on landfills has speed up the WtE approach in Switzerland. And the energy production is a welcome add-on and from an environmental point of view important, too. However, the WtE plants have been built primarily to treat waste and not to produce energy: About 95% of energy in Switzerland is produced by other sources than waste.*

Process or waste management

- **How do they make sure recyclable or compostable material is removed from the input stream?**
 - *As shown in the videos there is provision in all Swiss communes for the collection of different waste streams, organic waste, paper, cardboard, glass, metals, batteries, PET and so on. Rules, regulations, and local controls support this along with education.*
 - *Furthermore, Swiss households are charged for the collection and treatment of residual waste (either per weight or per volume), whereas recycling is “free” for them when disposing it (paid by ground fee). Therefore, it’s in the interest of all people, to recycle as much as possible to reduce costs. The communes are obliged to provide drop off points for recyclable waste as well as shops must take back batteries, electronic devices and probably soon, plastics.*
 - *It’s not correct to say that Europe is phasing out WtE. Europe is trying to push in the direction of a circular economy and setting high goals on avoiding and recycling waste. But the highest aim is still to avoid bringing waste to landfills, where now about 40% of Europe’s garbage lands.*
- **Is your waste separated at collection or by households and businesses prior to collection? How is it sorted into the different streams?**
 - *Waste needs to be separated as much as possible by law to maximise recycling. In Switzerland all “household waste” is taxed by weight or volume to further incentivise everybody to do this prior to collection*
- **It is not renewable energy as the feeder fuel in municipal solid waste including large volumes of plastic. In NZ, this is not defined as renewable energy**
 - *In fact, not all energy produced by WtE is considered renewable, only about 50%. In the garbage about 50% of the energy content is biogenic: wood, paper, cardboard, food waste, natural textiles, leather, etc.*
 - *WtE has the option for carbon-sequestration which then leads to a carbon-negative operation.*
 - *In any case, WtE is a better climate option as even the best managed landfill operations leak landfill gas which is composed of CO₂ and methane.*
- **Avoiding waste has not been mentioned. What is the incentive to avoid waste given that companies will be wanting to maximise waste volumes to keep plants generating energy?**
 - *Swiss households are charged for the collection and treatment of residual waste (either per weight or per volume), whereas recycling is free. Therefore, it’s in the interest of all people, to recycle as much as possible to reduce personal cost.*
 - *In the revision of the environmental protection law “Strengthening the Swiss circular economy” there is proposed further duty and incentives for avoiding waste.*

- **How do you separate your recycling?**
 - *Waste needs to be separated as much as possible to maximise recycling, all “household waste” is taxed by weight or volume to further incentivise everybody to do this*
 - *In all Swiss communes there are separate collection stations for different recycling material such as organic waste, paper, cardboard, glass, metals, batteries, PET and so on.*

Waste to Energy and circularity

- **How does this energy from waste process enable the circular economy?**
 - *The WtE process does not so much enable a circular economy as form a part of it. For material that was not able to be recycled earlier in the process, the recovery of metals after the waste is burned is possible enabling them to be returned as useful new raw materials that would otherwise be lost.*
- **Did I hear the energy from EfW (energy from waste) to be called renewable? That doesn't sound right.**
 - *In Switzerland according to the state of the art, unavoidable heat losses resulting from energy conversion or chemical processes (including waste incineration plants) is defined as renewable energy as it is not out of primary energy (such as oil etc.). (Please also see the previous answer).*
- **Our traditional 'approach' to waste or more rather, the way we live and use resources is one of circularity. Incineration by the Japanese example you gave appears to disincentivise the way we traditionally live.**
 - *Here it sounds as if you are touching on a broader question than the webinar aims to cover, as mentioned the incineration of waste is not the first step in the process.*
- **Will the speakers be talking about effective waste prevention mechanisms and infrastructure as an alternative or only recycling and landfilling as an alternative to burning?**
 - *The webinar here focusses on WtE as a method for treating remaining waste more sustainably and safely than via landfill. It does not seek to address the whole topic of waste management in its entirety.*
 - *In Switzerland there are very efficient and successful sector agreements with the state. According to these agreements the sectors (Aluminium, Paper, PET) organize and carry out the recycling system by themselves.*
 - *As said in some previous answers, WtE doesn't exclude the objective to reduce and recycle waste as much as possible, but avoids the problems of landfilling during the long journey to reach this goal.*
- **What about importing all the waste NZ cannot recycle into Switzerland until we have restricted the importation of problematic plastics and build a refuse and repair economy?**
 - *Although technically a possibility the need for a responsible solution and one that doesn't create more negative climate impacts due to transportation should be considered.*

- *Switzerland has no WtE capacity for waste from abroad such as NZ, there would never be a political acceptance for this due to environmental and NYMBY-aspects.*

Technical questions

- **IPEN has found dioxins in most soil, air, and water sources in the vicinity of all the incinerator facilities they tested. What processes are in place to deal with any environmental outputs? What emissions are expected (to air, soil, and water) and in what concentrations?**
 - *There are regulations at Federal and Cantonal level for emissions. Problems discovered have been attributed to historic activities and this (for the present) further reinforces the need for responsible, sustainable modern waste management with BAT (best available technology) now available. The filtering system of modern WtE plants reduce the output of exhaustion gases to a minimum. The quantity of dangerous gases is below the maximum values defined by law and massively below the amount put out by landfills.*
- **Do the companies monitor and measure emissions not only during optimum conditions, but also during upset conditions or malfunctions, and during start-up or shut down?**
 - *Yes, monitoring happens during all phases and are controlled by the government too.*
 - *Many WtE operators put their measured emissions online.*
- **What happens to filters/scrubbers etc once they are spent and concentrated with dioxins? Will they be going to landfill?**
 - *Special processes are put in place to neutralise and treat the filters. They get treated with BAT-technology as for other waste fractions.*
 - *Dioxins are either destroyed in special flue gas catalysers or absorbed by activated carbons. The latter are deposited in geological stable underground salt mines.*
- **Is biomonitoring required for WtE incineration in Switzerland considering past evidence of dioxin contamination? (Biomonitoring for human health impacts).**
 - *Plants and emissions are tightly controlled and monitored.*
 - *No evidence could be stated of increased diseases near WtE plants.*
- **To what extent does your technology rely on fossil fuel content (i.e. plastics) to get the high calorific level needed?**
 - *The calorific content of the waste is important for the process to run efficiently and this needs to be considered in the equipment design. Normal household waste contains enough calorific level for burning by itself even after recycling of all recyclable goods (recyclable plastic, wood, paper, etc.).*

Regulatory environment

- **What are your perspectives on the regulatory environment for EfW and how are municipalities thinking about EfW alternatives?**

- *In Switzerland there is a framework and there are efforts to tackle waste at many levels. This includes, but is not limited to, working towards lower waste, making products easier to recycle, have longer lifetimes, and being reusable. In the framework WtE is a solution for the residual material.*
- **I understand that regular high volumes of waste will be needed to ensure the technology works as planned. How will this technology reduce and offset the production of problematic, toxic, and non-recyclable materials?**
 - *WtE plants are a solution to the residual waste and form part of a system. There are many steps before this that must be in place to reduce overall volumes of waste, to enable waste to be streamed, to recycle and to avoid toxic components.*
 - *The capacity of WtE plants is defined according to the estimated amount of waste within the next 20-30 years. There are examples in Switzerland where the capacity has been reduced because of reduction of waste produced in the corresponding area.*
- **How has Switzerland tackled the issue of public perception relating to waste plant emissions to air. When this has been suggested in NZ, the result has been huge public disquiet, a hole in the ground being filled with rubbish is more out of sight, out of mind, and does not seem to illicit the same response. Whether this is correct scientifically as far as environmental harm does not seem to figure in public perceptions. How do you reassure the public that emissions are not toxic in their back yard without spending years going through the judicial system to gain a consent to build and operate a WtE plant?**
 - *Switzerland has many years of experience with these technologies, and they continue to evolve. The technology evolves as do the perceptions. Previously there were many places where landfill was dumped, today the perception is that landfills are a risk to local ecosystems and to ground water sources.*
 - *Of course, also in Switzerland the construction of a WtE plant can encounter opposition from the public. What is extremely important is to start from the beginning with a transparent and clear communication campaign, include all the stakeholders and have an open discussion. Scientific evidence must be explained. It's not an easy task, but it works.*

What comes after WtE plants?

- **Isn't this a case of lock in investment for very expensive technology (huge investment)? What happens when these are shut down after 25 years?**
 - *In Switzerland some of the earliest machines have already been replaced, as the need still exists, new plants have been built that take into consideration the actual technology and planned future requirements.*
 - *The investment is paid back within its life cycle by the fee on waste brought in and the energy sold.*
 - *WtE plants often supply district heating systems. Once a plant must be shut down, it will be replaced i.e. by a biomass power plant or any other heat production plant (geothermic, heat pump,).*
- **How do you fuel those homes after the 25-year life span of a plant?**

- *WtE is foremost a way to treat waste in an environmentally responsible manner. The derived heat and electricity is used to the best potential and avoids needing to generate it from other sources. Naturally this is only a small amount of the overall requirements and Switzerland continues its development of low-carbon heat and electricity sources. Most WtE plants are replaced by a successor plant at the same place. This safeguards the continuation of energy supply. If the WtE plants no longer existed, then alternatives would be required, one part of this potentially being wood-fired plants.*
- **If there is not enough waste to regularly 'feed the technology' in NZ; are we expected to import it as has been the case in Europe?**
 - *There has been a big change in the way waste is managed and how it is perceived. There is still a considerable amount that needs to be processed and the dimensioning of solutions is a key part of this. The evolution of technology and of product design/consumer behaviour also plays an important role. Transporting waste over large distances is probably not a good idea.*
- **Can one of the speakers please speak to lock-in investment? Large-scale WtE incinerators (particularly for municipal solid waste) are expensive to set up and require a return on investment - a long-term proposition. Once built, most large-scale modern incinerators require a consistent inflow. Councils sign long-term contracts requiring them to deliver a minimum quantity of waste for 20 to 30 years. If they do not meet the minimum, they must pay fees to compensate the incinerator company for lost profits.**
 - *The model and the question of contractual requirements is important. The solutions chosen need to respect the local situation and needs.*
 - *The business model of WtE plants in Switzerland works the other way: Swiss households are charged for the collection and treatment of residual waste (either per weight or per volume), whereas recycling is for free. Therefore, it's in the interest of all people, to recycle as much as possible instead of "feeding" the WtE plant.*
 - *The contracts with WtE operators must be well structured. Councils pay a gate fee per ton of waste delivered. If the quantity goes below 75-80% of nominal capacity of the plant, only then Councils must pay the "missing" waste. The size of the plant must hence be chosen to optimize between incinerated and landfilled waste. If the size is too small, waste to landfill will be more; if size is too big, cost for incineration will be higher, but less waste to landfill will be good for the environment.*
- **Is it possible to burn old landfills?**
 - *It is possible and may even be needed as a part of the process of remediating old sites. A key question here is the economics as this will have a cost, but so too does not doing anything.*

Stakeholder engagement

- **Have you considered how you will engage with tangata whenua (indigenous here in NZ) and their authority over their ancestral lands where you intend to put these plants?**

- *From the point of view of today's webinar, it is not the place of the Swiss to comment on this. However, we are mindful and respectful of the local context. The only thing we can do today is explain the procedure in Switzerland.*
 - *The definition of the optimal location of a WtE plant in Switzerland is based on several criteria which include all sustainability aspects: e.g. short transportation distances for the waste, close to large energy consumers, ecological compatibility, and social compatibility. Especially the last two mentioned criteria ensure that WtE plants are not allowed in protected areas and that the population has to be involved in the location analysis.*
- **Has the panel seen much 'demand pull' from NZ policy settings and municipalities?**
 - *The reason for organising this event was in response to the news about the growing problem of capacity of landfill and need for solutions. It is a part of understanding the "pull" and desire to further explore potential solutions.*

A general comment was also made from the panellists that here is a need for clear competences/responsibilities (with regards to planning, authorisation, control, including costs, precisely regulated in laws and articles relating to the application of the laws, such as for waste in CH in the USG and the VVEA). Especially for municipal solid waste (MSW), where local authorities (in Switzerland, the cantons, and municipalities) should also have clear competences and responsibilities. This would also be a relevant basis for obtaining cost transparency.

Further reading and additional resources:

[CEWEP - The Confederation of European Waste-to-Energy Plants](https://waste-management-world.com/a/in-depth-why-switzerland-does-not-enforce-plastics-recycling)

<https://waste-management-world.com/a/in-depth-why-switzerland-does-not-enforce-plastics-recycling>

https://ec.europa.eu/info/sites/default/files/energy_climate_change_environment/events/presentations/speaker_intervention_-_eswet.pdf

<https://www.bioenergy.org.nz/documents/memberprofile/2020-WMR-Editorial-Zero-Waste-Utopia-Role-of-WtE.pdf>

