1- Subsidy for waste incineration in Europe

It is not possible to identify an exact percentage of how much subsidy do waste to energy (incineration) receive because the subsidy values and types vary from one country to another in the European Union (EU). However, one of the drivers promoting incineration is the landfill tax which averaged to around 80 Euros per tonne across the members of the European Union as of May 2017. Furthermore, many of the EU members have feed in tariffs that favours renewable energy including energy from waste. Another incentive that some EU countries are using is the exemption of incinerators form participation in the emissions trading scheme. For example, Germany has 28% waste incineration overcapacity which means they need to import waste to meet the demand for their incinerators. Germany has a landfill ban on untreated municipal solid waste since 2005. Although there is no direct subsidy applied to electricity or heat generated from municipal solid waste incineration in Germany, feed-in tariff mechanism to support electricity and heat generation from renewable sources is available. It is worthy to note that. Nevertheless, there has been lately a push to scale back waste incineration across members of the EU.

Q2- Waste management options impacts and costs. The following tables are adopted from El Hanandeh and El-Zein (2010).

Table 1. Waste management strategies modelled for Sydney metropolitan

	Base	**MinChng**	**EneRec1**	**EneRec2**	**BioLan1**	**BioLan2**	**Opt1**	**Inci1**	**Opt2**	**Inci2**	**AllLandf**
Food waste	LDF	LDF/E	AD	AD	LDF/BE	LDF/BE	AD	IN	AD	IN	LDF/BE
Garden waste	COMP	COMP	AD	AD	LDF/BE	LDF/BE	AD	IN	AD	IN	LDF/BE
Paper	RE	RE	RE	AD	RE	LDF/BE	IN	IN	IN	IN	LDF/BE
Contaminated paper	LDF	LDF/E	AD	AD	LDF/BE	LDF/BE	IN	IN	IN	IN	LDF/BE
(LDPE, HDPE, PET)	RE	RE	RE	RE	RE	RE	IN	IN	IN	IN	LDF/BE
Other plastics	LDF	LDF/E	LDF	LDF	LDF/BE	LDF/BE	IN	IN	IN	IN	LDF/BE
Glass	RE	RE	RE	RE	RE	RE	RE	RE	LDF	IN	LDF/BE
Metals (Fe and Al)	RE	RE	RE	RE	RE	RE	RE	RE	RE	IN	LDF/BE
Nappies	LDF	LDF/E	LDF	LDF	LDF/BE	LDF/BE	IN	IN	IN	IN	LDF/BE
Wood	LDF	LDF/E		LDF	LDF/BE	LDF/BE	IN	IN	IN	IN	LDF/BE
Inert waste	LDF	LDF/E	LDF	LDF	LDF/BE	LDF/BE	LDF	IN	LDF	IN	LDF/BE
Others	LDF	LDF/E	LDF	LDF	LDF/BE	LDF/BE	LDF	IN	LDF	IN	LDF/BE

LDF: traditional landfill without energy Recovery; LDF/E: traditional landfill with electricity generation; LDF/BE: bio-reactor landfill; COMP: aerobic composting; AD: anaerobic digestion; RE: Recycling; IN: Incineration; Fe: Ferrous metals; Al: Aluminium.

Table 2. Waste management option impacts and costs

Criteria	**Base**	**MinChng**	**EneRec1**	**EneRec2**	**BioLan1**	**BioLan2**	**Opt1**	**Inci1**	**Opt2**	**Inci2**	**AllLandf**
Electricity (kWh)	0.00E + 00	−3.63E + 09	−6.64E + 09	−1.02E + 10	−7.40E + 09	−1.16E + 10	−1.97E + 10	−1.93E + 10	−1.97E + 10	−2.11E + 10	−1.03E + 10
Energy (GJ)	7.77E + 06	−2.64E + 06	−2.86E + 07	−2.65E + 07	−1.80E + 07	−2.45E + 07	−7.10E + 07	−6.94E + 07	−7.19E + 07	−7.58E + 07	−3.69E + 07
GHGE (CO_2eq Mg)	2.11E + 07	−6.69E + 06	−2.97E + 07	−1.18E + 07	−1.18E + 07	1.29E + 07	−1.66E + 07	−2.98E + 06	−1.52E + 07	−2.33E + 04	1.55E + 07
VOCs (Mg)	2.10E + 04	4.30E + 04	−4.32E + 04	3.20E + 04	3.20E + 04	1.46E + 04	−1.25E + 03	−2.70E + 02	−1.03E + 03	1.13E + 04	1.51E + 04
PM (Mg)	3.70E + 02	−5.45E + 03	−7.04E + 03	−6.39E + 03	−6.39E + 03	−3.72E + 01	3.48E + 03	1.09E + 04	4.14E + 03	3.95E + 03	−2.42E + 03
NO_x (Mg)	−1.87E + 04	−2.90E + 04	−4.32E + 04	−2.69E + 04	−3.75E + 04	−1.88E + 04	−1.32E + 04	2.83E + 04	−1.21E + 04	3.46E + 04	−1.97E + 04
SO_x (Mg)	−2.58E + 04	−4.11E + 04	−7.22E + 04	−7.93E + 04	−5.92E + 04	−6.08E + 04	−1.03E + 05	−9.84E + 04	−1.01E + 05	−9.16E + 04	−5.56E + 04
Pb (Mg)	9.93E + 01	−3.14E + 01	−1.54E + 02	−2.54E + 02	−1.02E + 02	−1.81E + 02	−3.58E + 02	−3.49E + 02	−3.59E + 02	−3.77E + 02	−2.25E + 02
Dioxins (kg)	7.39E − 09	−1.57E − 07	−4.68E − 07	−3.37E − 07	−3.37E − 07	−5.40E − 07	2.93E − 05	7.23E − 05	2.93E − 05	3.17E − 05	−5.74E − 07
Waste diversion rate (%)	27%	27%	43%	50%	−22%	−38%	67%	26%	51%	83%	−43%
Cost ($ per hhld per year)	**$194.62**	**$125.83**	**$114.76**	**$104.74**	**$134.75**	**$130.32**	**$104.99**	**$151.33**	**$113.77**	**$166.80**	**$128.10**

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