

The problem is not with waste, but with climate... - how perceptions influence behaviour

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Editor's Note: This paper has been targeted for a broad audience. The level of scientific detail provided is therefore not as high as would be normally be required in a technical paper subject to peer review by environment industry professionals.

Both solid waste and greenhouse gases are “wastes” in a broad sense, one solid, the other gaseous. Solid waste has access all our senses, not so greenhouse gases. Over recent decades, inadequate disposal of solid waste has caused locally felt environmental damage and nuisance. As a consequence our management of waste has improved to a level approaching sustainability, at an acceptable cost to society. Yet, in spite of the twenty-fold greater mass of greenhouse gases polluting our environment, we have so far not been motivated to act as we did, and continue to do, with solid waste. An urgent need exists to heighten society’s perception of the potential damage of our greenhouse emissions so that mitigating measures – both technical and value based – can be implemented.

Introduction

Environmental problems and challenges can be attributed to a range of very different main causes: solid waste, wastewater, toxic gases, atmospheric particulates, noise, and greenhouse gases. These problems are resolved to varying degrees in the economically highly developed countries of Western Europe (let’s here take as examples Switzerland, Austria and Germany). This paper – written from the perspective of these countries and offering food for thoughts – compares “waste” against “greenhouse gases” to demonstrate to what extent our perception of the problem is steering our willingness to resolve it.

From a broad perspective both materials concern wastes, one solid, the other gaseous. The first is perceived with our senses, the other not. Solid waste is accessible to all the senses: we see, feel, smell – and even hear it, once the garbage truck arrives. The essential greenhouse gases of methane, nitrous oxide and carbon dioxide are outside our sensory capacities: invisible, odourless – and, moreover are disposed of at virtually zero cost, even allowing for the current European carbon trade system. We simply dump the gaseous garbage into the “air ocean” on the bottom of which we live.

Comparison of quantities – visible apples, invisible oranges.

About 250 kg of household and commercial garbage is generated per person per year. In addition, about the same amount of recyclable materials is separately collected, comprising: paper, glass, biowaste etc., altogether 500 kg of “waste” per person per year. The quantity of greenhouse gases (measured as CO₂-equivalents, to which the various greenhouse gases are converted according to their relative impact) comes to about 10,000 kg of CO₂-equivalents per person and year, or 10 tonnes, about 20 times the quantity of waste.

If you were of the opinion that the waste problem has largely been resolved in Germany (and Austria, Switzerland...), you would be correct. Separate waste collection is almost a cultural given in these countries, it has been forbidden to landfill untreated waste in these countries for at least the past five years, the climate-damaging release of methane from landfills has therefore been dealt with. The utilization of waste through resource and energy recovery has been perfected over the last 20 to 30 years in such a way that the greenhouse gas balance of management of our waste is now positive: recycling of waste saves more emissions through substitution of raw materials than emissions released during its collection and treatment. That’s a considerable success story which is the envy of many countries outside Central Europe.

No action without suffering, or reward.

Three factors have been the main drivers for this development: the negative impacts of improper waste treatment were quickly felt (e.g. groundwater pollution caused by dumpsites), and prompted action to be taken. Secondly, waste – through its sensory qualities – is present to some degree in everyone’s mind on a day-to-day basis – this increased the political priority to deal with it. Thirdly, the adoption of environmentally friendly waste treatment has enabled tangible environmental benefits to be quickly realised.

All these mechanisms do not apply to CO₂-waste: damages occur only following considerable delay and are not locally connected to the source. This, together with the fact that CO₂-waste cannot be perceived “sensorily”, has resulted in less intense countermeasures being taken. Good behaviour is not rewarded promptly and locally, but only following considerable delay, and at a diffuse, global level.

No perception = no problem.

In order to understand how our willingness to solve a problem is influenced by the capability to perceive the problem, the following example is given: You observe somebody throwing a noticeable piece of paper litter – say an empty cigarette packet – out their car window every

two seconds. This continues for a minute, over one kilometre, resulting in 30 pieces of litter lying on the road, one piece every 33 m, altogether maybe 150 g of waste. Your indignation at *this* would likely be considerable. What if everybody behaved like this! At the same time, the car has left behind 150 g CO₂ over the one kilometre “on the road” via its exhaust. Does this annoy to the same degree? Almost certainly not: CO₂-waste cannot be seen, cannot be smelt, cannot be felt – so it does not exist in our perception. Apart from that *everybody does it*.

Although vehicular traffic produces “only” about 20 % of greenhouse gases, the car example above can be taken further as an object of comparison as it is something that falls easily within our perceptive capacity.

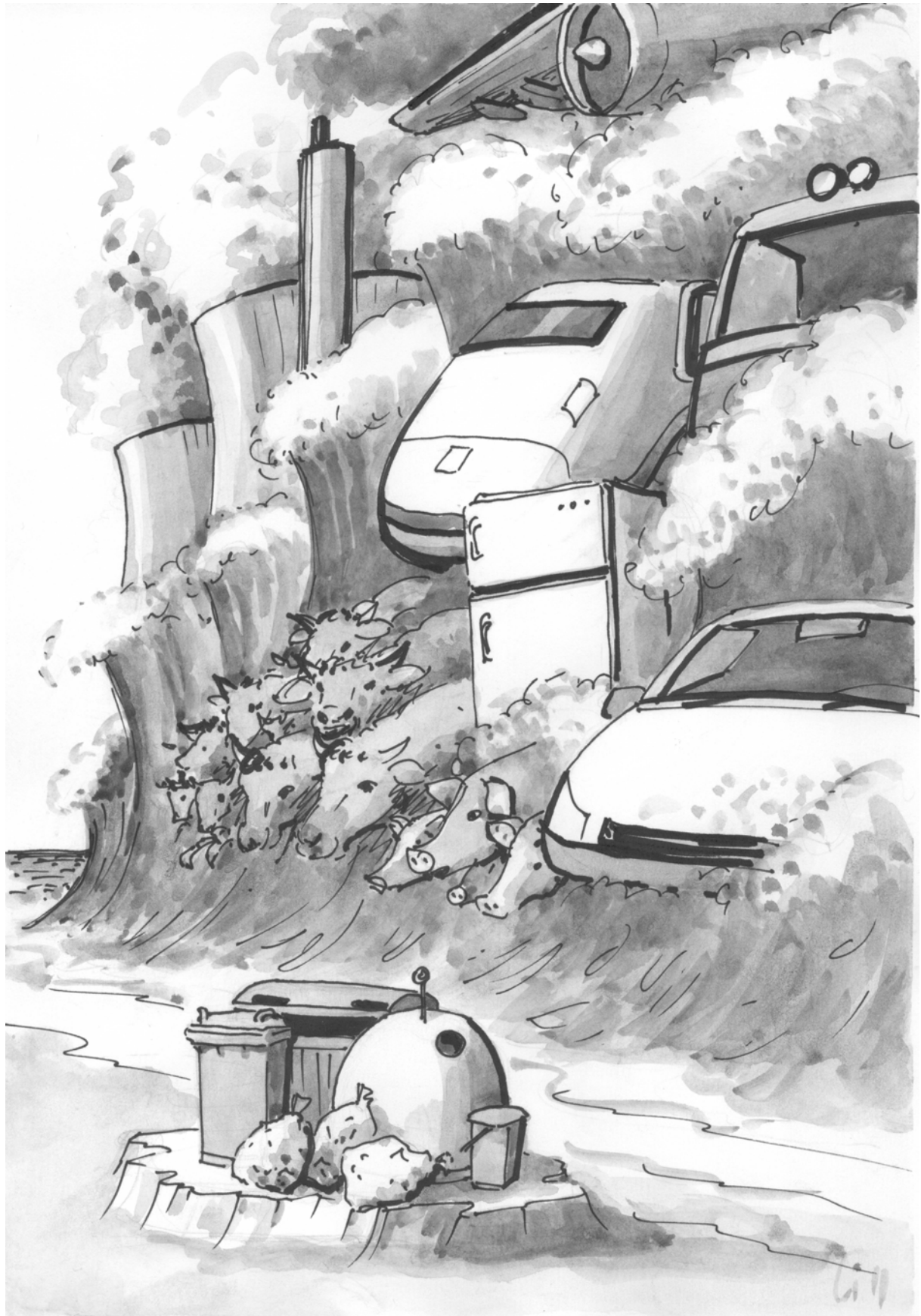
Differences in perceptions between solid waste and CO₂

	Solid waste	CO ₂
<u>Amount</u> in kg/inh., yr	ca. 500	> 10.000
<u>Perception</u> : - visible?	yes	no
- tangible?	yes	no
- smellable?	yes	no
- audible?	yes (garbage truck)	no
- of cost?	yes	no
- of environmental damage?	yes	with big delay
- of the impact of “good behaviour” related to the respective material	yes	no
	↓	↓
<u>Problem</u> (in the referred countries)	<i>resolved</i>	<i>not resolved</i>

If greenhouse gases were solid waste we would already have solved the problem.

Unlike solid waste, carbon dioxide regrettably does not do us the favour to be a solid material at ambient temperature – it is in solid form (as dry ice) only at temperatures less than -78 ° C. Let’s imagine – using the car example – that CO₂ is a solid waste: of course it could not be dispersed on the road, but would need to be collected in a “dust box” inside the car. At each stop for refuelling of say 50 L of petrol the dust box, containing 130 kg of “solid” CO₂-ash, would need to be emptied, at considerable effort. Each petrol station would need large containers to collect the ash, the CO₂-landfills of our cities would be (when considering all

CO₂-sources) 20 times larger than the solid waste landfills we know (an impressive example of a "landfill" composed of former gaseous CO₂ is the Alps).



Grafik: Lothar Lindner

On further reflection, if CO₂ were solid, the disposal problem in the above example would never have occurred, as it would have already become a major issue some 80 – 100 years ago, with the rapid expansion of electricity production and industrialisation. Surrounded by rising CO₂-ash heaps from these activities, the notion to transport a human body weighing around 100 kg using a vehicle weighing more than 1,000 kg, thus a payload of less than 10 % of the total mass, resulting in more than 90 % energy loss, which is clearly too high as a proportion of energy inherent in the system, would have been promptly rejected.

We have after all direct experience of the banning of forms of energy consumption that produced atmospheric pollution which is obvious, we could see smell, and even taste it, and in terms of fatalities: in most of Europe in the middle of the last century laws were introduced to limit particulate atmospheric pollution ('smog') through smoke control. Within a few years people willingly gave up burning coal to heat their houses and water, because they could see both the problem and the benefits of action.

But would we be ready to accept being deprived of the automobile in its energetically senseless, conventional, 45 million (number of passenger cars in Germany) form? Almost certainly not. Why? Because we have become accustomed to this highly convenient form of transport and because we do not suffer directly and immediately from the resulting CO₂-waste.

And because of its friendly gaseous nature, at the end of each winter we also do not have to drag out from our homes 40 kg of CO₂-waste for *each square metre of living space*, we don't have to carry from the plane 5,000 kg of CO₂-waste together with our luggage after each long-distance holiday. We belong just to the second generation in the history of mankind that has had the luxury to conveniently and cheaply move more than 500 m away from our places of residence. Let's be honest: would we be willing – by way of climate protection rationale – to drastically reduce our air travel for the rest of our lives? No? That's exactly what we mean. We – you and the authors – don't feel like doing so (and moreover do not want to know if a levy were applied to cover the entire damage).

Smart waste management – sluggish climate protection.

It is interesting to compare the speed and extent to which solutions for waste-related problems have historically been implemented with those for climate protection. Roughly speaking, in successive 10 year periods in e.g. Austria, all uncontrolled dumpsites have been closed, separate collections for glass, paper, biowaste etc. have been introduced nationwide, and facilities for environmentally friendly treatment of residual waste established – all measures which have solved the waste "problem" by nearly 100 %. Over similar timeframes the country was equipped with wastewater treatment plants with no single object left discharging untreated effluent to receiving waters. Based on such experience it is somewhat puzzling when a

commitment is announced – example again from Austria – to reduce within 30 (!) years fossil-based greenhouse gas emission by 16 % (!), followed by the announcement that even this target might not be achieved.

Recycling is easy and makes us feel good – avoidance is hard and an annoyance.

Another important difference should be noted: solid waste is largely usable. From almost each component (glass, paper, metal, kitchen waste, etc.) more energy can be generated from recycling than the energy expended for its recovery. This also applies to incineration with energy recovery of commingled waste. Because of this, waste *avoidance* at all cost, i.e. through reduced consumption has not been deemed necessary. The analogous idea to utilize our CO₂-waste by extracting and recovering the energy from the carbon present does not work due to its physiochemical properties: certainly it is possible to disassemble CO₂, but the energy required is greater than the energy of the reclaimed, disassembled carbon. The envisaged subterranean storage of CO₂ at thermal power plants (Carbon Capture & Storage CCS) shows clearly that, for generated CO₂, the *only* option is disposal – either by conventional dumping into the “air ocean”, or by innovative subterranean storage. So, a fundamental partial solution for reducing CO₂-waste must be *avoidance* – in contrast to solid waste with its recyclability – and that means abstaining from consumption, which we are reluctant to do because we love convenience, and because we do not suffer enough immediately from the problem.

With over 100 years of increasing CO₂ output, the unspoken assumption has been made that its disposal would not cause environmental damage. Hence no aversion measures or costs have been forced on polluters. Until science could at long last agree that there *would be* any damage *at all*, technology and society developed into a state of enormous – because of its free-of-cost – CO₂-waste production. The acknowledgement of the damage, and acceptance of the soon-to-be enforced CO₂-levies will be, unlike for solid waste, clearly more difficult, as

- a) the damage is a *future* damage, is *not clearly defined* and *not locally felt* (honestly, who really is touched by the *possible* extinction of Bangladesh)
- b) the *existing* social and economic system would be hit hard – one may imagine that *all* 10 tons CO₂ per person per year would be charged per tonne analogous to waste treatment with say 100 € (which is the cost for *one* tonne of avoided CO₂ for renewable energy technologies). Such a cost impost would only be seriously considered by someone who had lost their desire to hold office.
- c) for this investment no reliable and auditable outcome can be assured.

The notion that fossil fuel based energy can be universally substituted by renewable sources, or that other technical solutions can be found, thus enabling our current way-of-life to

continue, will hardly pass a sound sustainability check. We already see cornfields for fuel production up to the horizon and countless windmills, yet renewable sources cover just 10 % of our energy demand. We can wrap our houses warmly and optimize energy processes, nevertheless additional avoidance will be indispensable for achieving real sustainability.

Climate protection achieved through low energy happiness generation

At this point a philosophical consideration of the avoidance issue is necessary:

As humans – apart from the securing of our basic survival needs – we ultimately aim for one thing: *to be happy* (according to competent studies “happiness” is the least common human condition by the way, and not attainable by directly trying). Now, happiness is a condition that exists only in our minds and is generated in essence by ourselves and our emotional response to external influences. If we can produce in ourselves the same level of happiness with reduced material and energy consumption, it can be referred to as climate friendly happiness. The initially noticeable satisfaction “loss” caused by abstention and effort is counter-balanced by the satisfaction “benefit” caused by the certainty of “doing the right thing” (Mr Kant would be posthumously pleased by this consideration). This, we have already achieved with waste. If we were able to imagine greenhouse gases “materialized” in solid form according to the examples outlined above, we would be able to create within us an increasingly greater sense of happiness from the initially unpleasant sacrifice associated with “doing without”. This prospect appears to us – in view of what we regard as necessary to meet the basic requirements for an enjoyable and fulfilling life – as almost impossible to imagine. Rather, we prefer almost as a reflex response that – as per usual – technology will find a solution, and that the Chinese and Americans... we are quick to come up with extremely ‘powerful’ arguments against the prospect of reduced consumption.

On the other hand we realize that in the waste sector we have – with the participation of the broader community and developments in technology and organizational framework – been able to achieve something which, at the end of the seventies, was also *unimaginable*. In the area of climate protection, *technology*, while vitally important, will not provide the whole answer; the challenge remains to shift our *philosophical* basis and value set. Only then will meaningful and efficient outcomes be achievable.

Hence a policy target for Central Europe’s foremost countries with regard to climate protection could read, coarsely broken up, as follows:

- *One third* by renewable energy
- *One third savings* by technical measures
- *One third savings* by changing values – leading to reduced consumption.

The technical/scientific knowledge for implementing a climate-related change of values is available and is gathering momentum. It is now a priority to keep this change of values in our conscience, and to increase its perceived importance.

Together, we have been able to develop a highly successful solution to the challenges of waste management. We now need to demonstrate to the world how best to respond to the climate challenge, through a combination of innovative technical measures and a society-wide “value change”



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