

Paper making

— they even dig up the stumps

Making paper uses loads of energy. If you knock on wood and think about it, this is obvious. It's hard. You know how tough it is to drill into wood, so it is not surprising that smashing a tree into smithereens (and to make paper they need to be really small smithereens) takes a whole heap of power. Mandy Haggith reports on her 3-month fact-finding study tour of the paper industry.

There are two ways to pulp wood for paper: mechanically and chemically. Mechanical pulp is made by chipping wood and then physically grinding the chips, like flour is milled between grindstones, down to individual fibres. Chemical pulp is made by stewing woodchips in strong alkali solutions at high temperatures to separate and bleach the fibres. Sometimes the chemicals involved are seriously toxic and the paper industry's emissions of chlorine compounds, mercury and other poisonous substances, have caused major pollution problems worldwide, but that's a different story.

Because the chemical stewing process results in a great deal of waste sludge, chemical pulping requires two to three tonnes of wood to produce one tonne of fibre, whereas mechanical pulping only needs about 1.1 tonnes of wood per tonne of fibre, so it is much more efficient in terms of trees. In chemical mills the sludge waste is burned and because there is so much of it, the energy produced is usually

enough to run the mill and sometimes enough to produce an excess for a district heating scheme or to generate electricity. In this sense, chemical mills are described as 'self-sufficient' in energy, though of course they do this by needing two extra trees for each one that ends up as paper. The Forscot mill proposed for Invergordon, if it goes ahead, will use this method to generate power.

Mechanical pulp mills need some external source of energy. Depending on what is available this may be coal, nuclear power or hydro-electricity, all of which are environmentally problematic because of the release of greenhouse gases, safety risks or impacts on watersheds, including displacement of people.

Reducing emissions?

UPM Kymmene is the biggest printing paper manufacturer in the world. It is a Finnish-based multinational company, with significant interests in Scotland: it owns the biggest mill in the country, Caledonian Paper at Irvine; it owns Tilhill Forestry, a major forest management company; and it buys about a million cubic metres of Scottish Sitka spruce per year, takes it to Finland, makes paper with it and then sells it back to, amongst others, Scottish buyers, such as D C Thompson, which publishes the Beano, Scots magazine, the Press and Journal and other Scottish icons.

To try to reduce its environmental impacts, UPM is trying to maximise the amount of biomass used at the Kajaani mill in Finland, the mechanical mill where the aforementioned paper is made. Its power plant currently burns peat, wood, railway sleepers as well as some pulp sludge. UPM buys sawdust from nearby sawmills, and it is also changing its forest management, extracting not only timber



Snow-covered tree stumps at the Kajaani Mill in Finland

for sawn wood and pulp, but also the brash (branches, twigs, leaves and tips) resulting from felling, and even digging up the stumps and roots. These are then driven by truck to the power plant at the mill, over 100km away.

I wonder how much diesel is burnt in order to supply the mill with biomass, and whether, if all of UPM's contractors' fossil fuel consumption was taken into account, this really makes sense in terms of greenhouse gas emissions. And what does

Rethinking energy

the extraction of every shred of biomass do to the ecology of the soil left behind? There is no rotting vegetation, no heaps of brush for insects or small mammals. And what is the carbon loss resulting from digging up these peaty soils?

I asked these questions when I visited the Kajaani mill, as research for a book I am writing about paper, but I was told that as this stump-burning practice is new there has been no detailed research into it. Some academics are starting to look at the issue, but the results of their research will not be available for some years. Meanwhile the impacts on the ground will continue.

Energy costs

Reducing fossil fuel use at the mill is not simply a magnanimous gesture on the part of UPM or the result of a commitment to address climate change. Finland is dependent on Russian imports of gas; energy prices are rising and supplies have an uncertain future, so there are hard economic benefits to shifting to biomass. Also, it costs half as much to replant a site if the stumps have been removed than if not, so UPM has sold the practice to landowners on the basis of cheaper replanting costs. UPM pays landowners a fee per tree regardless of whether the whole lot, stump and all, is used so it is no extra cost to them to take the stump.

At the most recent world congress of the International Union of Forest Research Organisations, one of the topics most hotly debated was what will happen when oil and other energy prices reach the point that using wood for energy becomes competitive. In particular, as the user of the cheapest end of the timber spectrum, the pulp industry will be the first to see this competition. The situation will be complicated by carbon credits or taxes: who knows whether they will act as perverse or benign incentives?

In terms of the paper industry's impacts on climate change, we also should not forget the fact that peatlands have in the past, and continue to be, devastated by the establishment of exotic plantations of trees grown for their fibre. The Flow Country of Caithness and Sutherland bears the scars, but we have not globally learned the lesson. This is best demonstrated by the current conflicts in the Kampar peninsula in Riau province, south eastern Sumatra, Indonesia, where forest communities are fighting the security forces of paper multinationals

APRIL and APP, resulting in tragic losses of homes, livelihoods and even lives. The Kampar peninsular forests grow on deep peat, damage to which may cause devastating releases of carbon.

Recycled paper facts

Another big focus of paper-related energy questions is recycling. There is a myth put around by the most cynical end of the waste management industry that somehow recycling paper uses more energy than making it from trees. Basic intuition should tell us that this is hogwash: if you dump a batch of paper into your bath and leave it for a while it



Segezha pulp mill, Russia.

pretty much goes to pulp of its own accord. It flops and squishes without much of a struggle. If you put it in a blender it is pulp within seconds. But try putting a lump of wood in and it's goodbye blender. Trust that intuition, it is backed up by hard facts.

In 1998 a major American study called the Paper Task Force collated data from a range of paper-making industries, the forestry industry that supplies the mills, and a spectrum of potential destinations where paper could end up, including landfill dumps, incinerators and recycling plants. They carried out what is known as 'life-cycle analysis', totting up the materials and energy used, waste and emissions produced and other impacts of each potential route from the creation of a piece of paper to its disposal (or reincarnation, in the case of a recycled sheet). The study was vast, comprehensive and proved beyond reasonable dispute that recycling paper uses much less energy (between a sixth to a third, depending on what type of paper it is), requires less than half as much water, produces far fewer greenhouse gases, emits a tiny fraction of the toxic chemicals to air and water and is on all relevant parameters much less damaging to the environment than making paper from virgin fibre.

The argument that recycling uses more energy than using virgin fibre includes the claim that vast amounts of fuel is used to transport waste paper to recycling plants. This is fair enough – and in the UK we certainly need to build more paper reprocessing facilities closer to the big urban jungles, where the used paper resources are most dense, to cut down on these paper-miles. However, we should also note that huge volumes of transport fuel are used in the forestry industry for logging and delivering timber to pulp mills, and if paper is not recycled, those big waste trucks also burn a lot of fuel taking it to landfill. In the case of the Highlands where I live, which exports much of its landfill waste, the scuffy vans are driven as far as Perth. Paper for recycling goes to Stirling, so there is not a great deal to divide them.

Another way the pro-virgin paper lobby tries to argue against recycling is by claiming that virgin paper mills are self-sufficient in renewable energy, whereas recycling plants use a lot of fossil fuels and are thus responsible for greenhouse gas emissions. There is some truth in this too, but again, life-cycle analysis shows that the figures for recycling paper still add up to be more benign than virgin-fibre-to-landfill.

We definitely need to find renewable sources of energy to power our recycling plants and push for research and development into more efficient processing methods. However, the 'self-sufficiency' and 'totally renewable' claims of the pulp and paper industry also need to be scrutinised very carefully. Paper may be something we take for granted, but it is very costly and that's something to bear in mind when balking at the price of recycled paper made from 100 per cent post-consumer waste. It is a price worth paying.

Mandy Haggith is a researcher and writer based in Assynt. After spending a decade trying to work out how Artificial Intelligence could save the world, and eventually discovering it can't, she has spent the last 10 years campaigning in support of people in forests. She recently published a collection of poems, called Letting Light In, which is being sold in aid of Assynt Foundation, helping them to bring the Assynt mountains into community ownership and management. Copies can be obtained for £5 by emailing hag@worldforests.org or writing to 95 Achmelvich, Lochinver, IV27 4JB.