

SLATE: THE GREEN ROOF

Just thirty years ago, bars and restaurants were smoke-filled, car tires were dumped indiscriminately and talk of recycling was deemed a direct infringement on our rights. Personally, I was dragged screaming into the recycling age; but now, putting aside glass, paper, plastic containers and engine oil seems too obvious a solution to warrant discussion. It still amazes me that eating under a cloud of cigarette smoke was tolerated for so long!



Some habits are still under the radar, however, notably in the roofing industry. While residential trash and tire disposal is held under great scrutiny, eleven million tons of asphalt roofing material are dumped into our landfills every year. The slate industry, too, has its critics; some find digging a hole in the ground to be environmentally intolerable. As small as the industry is, it gets close attention from the EPA, primarily concerned with the use and return of water, and its effects on the local aquifer. EPDM (synthetic

rubber roofing) and TPO (thermo-plastic polyolefin) with their toxic glues are another growing cause for concern. However, I would like to limit this discussion to the environmental impact of steep-roof materials, namely slate and asphalt. First, what is an asphalt shingle?

Asphalt shingles consist of organic or fiberglass mats that are impregnated with hot bitumen, coated in ceramic fragments on both sides (the UV protection and color components) and re-coated in bitumen and rock dust on the back. The organic mat is made of waste paper and wood pulp, but requires forty percent more bitumen to create the mass and bonding required. On the roof it boasts only a B or C fire-rating, while the fiber-glass mat is lighter and gains an A fire rating. So far so good? Not so fast!

Bitumen is a component of oil sands. It is too viscous to transport by pipeline so is diluted with naphtha and synthetic crude oil, containing benzene. Not the best company to keep. We are talking highly volatile hydrocarbons, not to speak of carcinogenic benzene. These are heated to 490 deg. Fahrenheit to form the asphalt solution with which the mat is impregnated. But don't worry, everything released in the process is pumped high into the sky above.

By contrast, slate quarrying. The unusable material covering the slate seam (the overburden), is removed by explosives, giant back-hoes drill and dig at the slate seam, prising slabs from the quarry floor. Dump trucks transport the slate to the mill where they are sawn into blocks and prepared for splitting. This sounds fairly innocuous (aside from the blowing-up part), but is by no means a harmless process. Black powder, dynamite and anfo leave trace deposits which can permeate the aquifer, though EPA regulations address these problems with vigor. Primarily, it is the huge use of diesel fuel that is the necessary evil of the quarrying process, albeit in the most fuel-efficient and modern machinery. Also, the use of water. Water for sawing, drilling and cleaning, which then needs filtration and purification. Remarkably, once the slate blocks are cut, the remaining work is done by hand. Splitting, trimming and palletizing are the last (and quietest) tasks before installation.

The original “three-tab” asphalt shingles weigh around 250 lbs per square, while the architectural styles grade up to 450 lbs per square. The latter are designed to provide texture and shadow lines to the roof (imitating slate and shake), but do not necessarily provide greater durability. They do provide nearly twice the volume of waste when the roof is renewed, since they are constructed by adding additional layers of asphalt. From the point of installation, the disintegration of asphalt begins. Summer heat melts the bitumen, which releases its contents to the air and which are taken to ground by the rain. We already know what’s in bitumen!

And yes, the final act. Eleven million tons of asphalt shingle are dumped in our landfills every year. God forbid we should waste any chance to pollute!

Recycling asphalt roofing is promoted, in word at least, by the major asphalt companies. In the Baltimore, Maryland, region however, I found only two asphalt recycling centers. Strangely, one was in Pennsylvania and no longer accepted waste asphalt, while the other charged an extra fee, with the caveat that I used their dumpster service. Not a winning set-up for the shingle installation industry, which is won and lost by the penny. The concept of recycling, in this context, I find to be disingenuous. The recycled product is not transformed into the original product. It has lost its original content to the air and ground. Bitumen and its solvents must be replenished. Asphalt shingle, if recycled, will find reuse in black-top for road surfacing, another great pollutant.

Despite the dubious guarantees and meaningless warranties attached to the asphalt shingle products (what exactly is a Lifetime Warranty?), the track record of asphalt speaks for itself. “Forty-year” asphalt shingles, installed twenty years ago, are looking awful: tabs are curled and broken or stained and blown off by the wind. To give a high quality (read expensive) shingle roof a life expectancy of thirty years is very generous. With which calculation, one good slate roof equals four expensive asphalt roofs. On a modest row home with an eight square roof, one slate roof would be disposed of for each 14,400lbs of asphalt product.

Once out of the ground and split, slate dries out and achieves its most stable form. On the roof, sunlight and water create surface reactions in some slate (weathering), in which Limonite (yellow) and Hematite (buff to red) are formed. These are stable oxides and neither one causes harm. Over a hundred or two hundred year period, tiny amounts of material are worn from the surface. Slate deteriorates from the underside from freezing condensation and from the inside as it becomes more porous. Still no harm done. Eventually it delaminates and quietly gives up the ghost. Unless of course it is Grayson or Peach Bottom and lives on, endlessly.

I always used old slate in my driveway. The colors looked good. It made a great surface and was cheaper than dumping in a landfill. It’s good for ruts and potholes, too. Anything in the ground, where we found it to begin with. Slate wins, hands down, by longevity and being cleaner and greener, at every stage, than its competition. It is a natural product, imitated by many in the asphalt world, but remaining, Slate: The Green Roof.