Plastic Houses

We're gaining on ways to keep plastic out of the oceans and landfills, but we're way behind on what to do with it, so it's just piling up. Almost all of our current methods of plastic recycle require a lot of processing, are only handling a very small percentage of what we're producing, and are doing almost nothing with the massive amounts of mostly contaminated and degraded plastic already piled up. For the most contaminated plastic waste and the plastic in the oceans, it should go to the enzyme digestion factory, where it's broken down back to a monomer. Once it's a monomer, we can turn it into whatever we want. There's already a pilot plant in operation in France.

Because of the volume of CO2 that it takes to make cement, the lack of sand to make concrete, and the need to protect the last of the world's carbon sink forests, we cannot continue to build with concrete and wood on anywhere near the scale we need to replace what climate change, earthquakes, fires, and the world's military activity are destroying. Two of our greatest needs are more houses and less plastic. There's no point sticking your finger in the dike when it's blown out 50 meters wide just around the corner. We need to consolidate a lot of plastic in a hurry, and we have a serious need for more housing. Let's build plastic houses. Shielded from air and sunlight, plastic houses would last indefinitely and would sequester and seal many millions of tons of plastic for hundreds of years.

Thick solid plastic walls sandwiched between standard metal roofing would be fire proof, earthquake proof, flood proof until the current swept it away slab and all, wind proof until the suction pulled it away slab and all, vermin proof for anything from mold to an elephant [a small one], a good mix of thermal insulation and thermal mass, a good faraday shield, and their manufacture and eventual recycle would be environmentally clean and low tech. With laminated cardboard or steel roof trusses and a steel roof, they could last for centuries and it solves two problems.

A 2.5x5 meter [8X16 ft] house with 15 centimeter [6 inch] thick walls would accommodate a bed, stove, sink, counter space, storage, and a toilet. It would sequester about 25 tons of plastic. One would fit on a semi, and there would be no need for anything but standardized electrical and plumbing hookups. Larger units would accommodate larger families, but would still be modular. Just put two units together for a 5x5 meter house. It could be done with prefab wall panels and assembled on sight. On a larger scale, modular panels would have a lot of uses in construction and remodel.

A large 3D printer seems too complicated, expensive, energy intensive, and can't use contaminated feed stock. They have their place in the ongoing waste stream and are already coming online to build houses. The main drawback to conventional plastic recycle is feedstock impurity. It’s a major portion of the cost of recycling, and it's the reason we're not recycling the massive amounts of contaminated and degraded plastic piling up all over the planet. It wouldn't matter much if the wall panels were cast rather than extruded. Casting wall panels pressed between standard metal roofing in a solar heated oven would be much simpler. Solar parabolic troughs with hot oil heat transfer in tandem with electric, propane, or natural gas to keep a stable temperature are a simple, relatively cheap, and very low carbon way to heat an oven. Oil filled 1x3 inch steel tubing fits between the ribs of standard U panel metal roofing and could press and directly heat the panels. In order to operate in less than ideal solar input, it will take a lot of mirror, but it's the cleanest, most efficient way to capture heat from the sun. It will take a large, well-insulated oil reservoir to control oil temperature, but thermostatic control of oil temperature should be relatively simple, although it will take some tinkering with manifolding and valving and a high volume low pressure pump to maintain a uniform temperature across the entire surface. Rather than putting the panels in the oven, it might be easier to slide the oven over the panel [less moving hydraulic parts].

The devil's always in the details. All plastics have major shrinkage as the mold cools, causing a lot of distortion if it's not slowly annealed. Plastic needs to be shielded from fire, sunlight, and out-gassing, but it has a very high coefficient of expansion compared to steel, so it needs to be constrained and slightly compressible. Pressing it and baking it between conventional metal roofing should do the trick. For chipped #1, #2, and most other kinds, there'll be a balance between leaving just enough air to maintain a bit of compression as it cools and to absorb the plastic's coefficient of expansion, but not enough to support combustion or slow oxidation. Pulling a vacuum might work. Slow cooling under compression should balance the coefficient of expansion with the modulus of elasticity. On larger spans it might need expansion joints.

There will be applications where big Legos will be more practical, either interlocked or hot plate welded. Once the oven is in place, a lot more applications can evolve. Once plastic is formed into large blocks, it can by easily machined. Large annealing ovens will help with accurate dimensions.

On a larger scale, it might be most efficient to ship the plastic and steel skin to assembly factories in the hot, dry desert where there's lots of sun, oil, and natural gas, and there's lots of people in need of work.

Since there needs to be natural gas or other heat backup, and most of the startup costs are in the solar mirror; in low budget situations initial production could be done without solar which could be incrementally added.