

# YIM HYO-SUNG

Vice President of the Corporate Strategy Center of Hyosung Corporation

**Lucia Sinapi-Thomas, Executive Director of Capgemini**

I will now move to Hyo-sung Yim, you are Vice President at the Corporate Strategy Center of Hyosung Corporation, a prominent South Korean conglomerate. What is interesting is that your company is already embracing recycling natively in all its processes. Could you tell us more about that.

**Yim Hyo-Sung**

Thank you, Lucia. For those of you who do not know what Hyosung does, today we have a very diversified business portfolio ranging from textiles to energy, chemicals and advanced materials. However, Hyosung started out in 1966 as a maker of nylon and polyester fibre and since then, we have expanded these products into tyre cords, carpets, airbags, seat belts, to name just a few. Therefore, a big portion of our recycling programme at Hyosung revolves around the reuse of pre-consumer and post-consumer nylon and polyester waste. Currently, we can do most of the mechanical recycling of polyester and nylon, but chemical recycling is much harder. This is because the key success factor in mechanical recycling is the ability to secure clean nylon and PET product wastes. However, for chemical recycling, you have to take the contaminated, dirty nylon and polyester wastes, break them down by melting them and filter out the impurities. You separate out the contaminated parts and all the other compounds you do not need, and the raw material you actually want to recycle. This is very much harder than mechanical recycling and Hyosung still has some work to do to catch up in this area.

The point I want to make here is that there are many recycled products out there already. The technology is there but the problem is, is there a demand for these products currently in the market? Sadly, the answer is no because no one is willing to pay for it. There is a success story for one of our recycled products called Regen, which is short for regenerated fibre. What we do is, we take used PET bottles, mechanically crush them and use it to make a polyester fibre. Currently we cannot make enough of them because the only limitation we have right now is trying to secure more of the used PET bottles, but there is only a limited number recirculating in the economy. The demand is there because apparel brands can use 100% recycled PET fibre to make jackets and a lot of other clothing. They are also willing to take on the higher prices, which are 15% or 20% higher than normal, non-recycled PET fibre because raw material fibres only actually account for 20% of the price of the clothing you all wear. If you factor in the fact that the pricing is only 15% to 20% higher and the raw material only accounts for 20%, the actual price hike the apparel brands have to absorb is only around 3% to 4%. They are willing

to do this because of the benefits in terms of enhanced brand awareness and increased sales of their recycled clothing is much higher than the cost they bear from buying recycled products.

This is a success story, but the sad thing is that most other polyester and nylon products we make do not share the same success. One example is recycled spandex, which is the elastic fibre you mix with other fibres to give you the stretchy function of your clothing. The thing with spandex is that you only use 10% of these fibres mixed in with 90% nylon or PET fibres. For apparel brands to actually buy higher-cost recycled spandex for their brands and to then call it an eco-friendly product, no consumer is actually going to buy that story. They are really reluctant to buy these other products that make up only a small portion of their raw materials. In this sense, I think we have to pay more attention to increasing the demand for recycled products that are already out there. This is crucial if you actually want to get the circular economy going as fast as we would like.

### **Lucia Sinapi-Thomas**

Thank you. Therefore, the quality of what needs recycling matters. One of the by-products from your industrial process is hydrogen and you are now looking at that as also being a source of energy, so tell us more about that.

### **Yim Hyo-Sung**

As Lucia just said, Hyosung produces hydrogen from a process called PPDH, a dehydrogenation process. What we do is we take propane and strip it of two molecules of hydrogen. If you do that, you get a substance called propylene. When you mix that together with more propylene, you get polypropylene. Polypropylene is the raw material used to make thermal plastics, for example, hard piping and protective films, the basic source of the plastics we use in our everyday lives. With the hydrogen generated from the process of making polypropylene, we recirculate it into the economy as a fuel for mobility. We are currently doing that as a 50:50 joint venture with Linde of Germany to liquefy the hydrogen gas. Currently, all the hydrogen consumed in Korea right now is supplied in the form of gas, so you might ask why we are liquefying it. It is really about economics because if you have a vast network of pipeline dedicated to the transport of hydrogen, then hydrogen gas makes sense. Without that network, it is far cheaper to actually transport large quantities of hydrogen to wherever it is wanted in Korea. This is mainly because liquid hydrogen has a density that is only around 1/800th of hydrogen gas, which means you can transport 13 times more hydrogen to refuelling stations or wherever you need it. Yes, there are additional costs because we have to add the liquefaction plant and we also have to keep the hydrogen at a temperature of minus 253 degrees, to keep it liquid. That does add cost to the hydrogen but the savings from the transportation cost far outweigh them. We are building liquid hydrogen fuelling stations and targeting non-passenger vehicles, bigger ones like buses and trucks that require more hydrogen. We aim to open our plant and refuelling stations in early 2024.

### **Lucia Sinapi-Thomas**

Thank you. What is interesting in that example, apart from the by-product, is that you are becoming a renewable energy producer, which is also a change in paradigm.