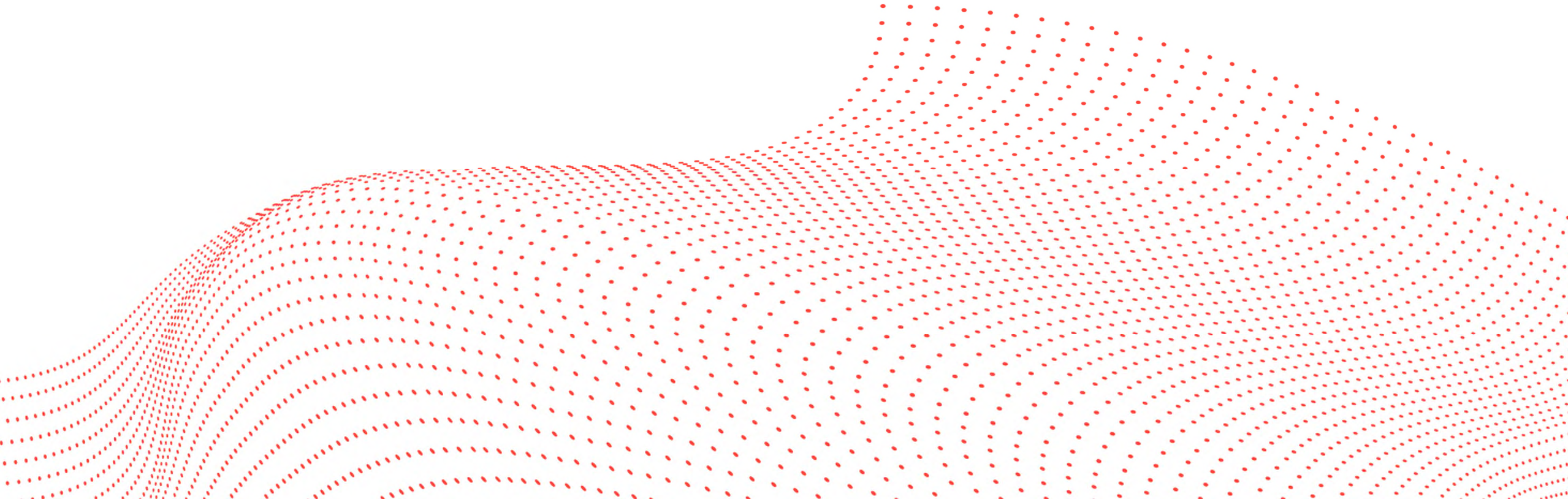
Sustainable RAIN Technology

12/06/2019

smartrac
connect things



The Good News

Our Industry is growing FAST!

Over 15 Billion RAIN RFID Tag Chips Sold in 2018

RAIN RFID technology growing fast across many markets

https://www.prnewswire.com/news-releases/over-15-billion-rain-rfid-tag-chips-sold-in-2018-300803213.html

The “Bad” News

70 to 80% of all RFID tags are likely to end up here:

Landfill

Or here:

Trash Incinerator

Waste Disposal is a Global Problem

"We're Gonna Need a Bigger Planet

The incredible volume of landfill waste produced each year poses enormous challenges for the health of our planet, creating toxic environments, impacts to human health, and yet-to-be-understood long-term issues. Not to mention, they are just plain ugly.

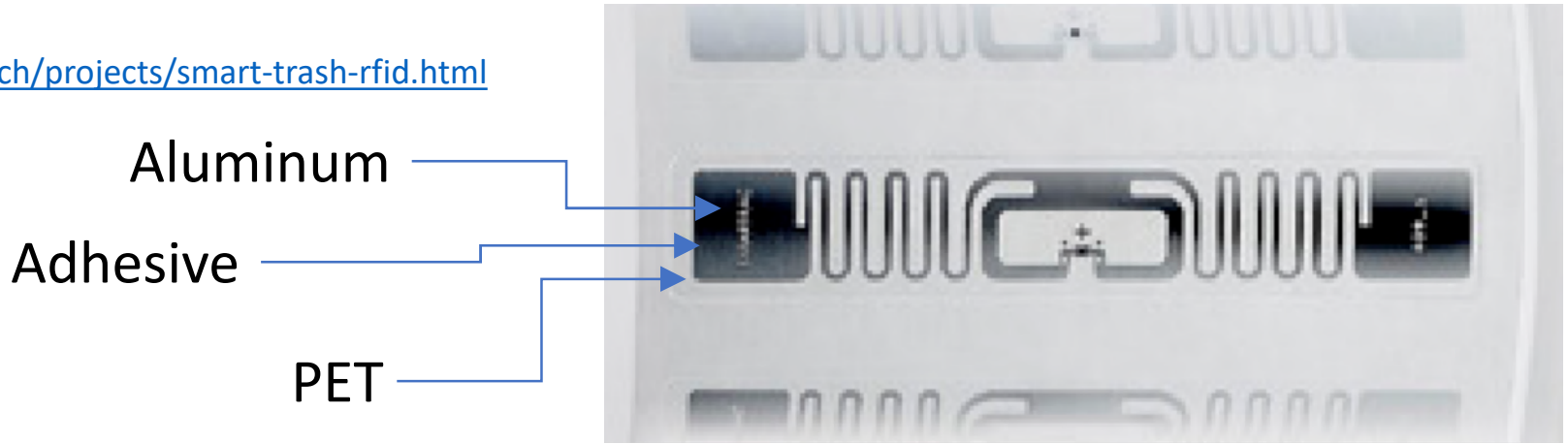
Despite decades of messaging and efforts by many to "Reduce, Reuse, and Recycle", the fact is we are generating more landfill trash now than ever before. Even worse, the pace of waste creation is projected to nearly double globally over the next 15 years."

https://re-mat.org/the-environmental-damage-caused-by-landfills-is-growing/

So Why Not Recycle RAIN Tags and Labels?

Radio Frequency Identification (**RFID**) **tags** offer benefits for product lifecycle management and can also be helpful to indicate how best to **recycle** the product at the end of its life. Because they introduce metals and extraneous materials into the **recycling** stream, however, **RFID tags** themselves can also be difficult to **recycle**.

https://www.rand.org/randeurope/research/projects/smart-trash-rfid.html



And There is This…

"Scientific evidence for warming of the climate system is unequivocal."

- Intergovernmental Panel on Climate Change

https://climate.nasa.gov/evidence/

"Taken as a whole, the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time."

- *Intergovernmental Panel on Climate Change*

https://climate.nasa.gov/effects/

Back to Some Good News

RFID Technology already contributes to making the world “greener” by increasing the efficiency of the global manufacturing and overall supply chain. This helps keep energy and waste to a minimum and puts less stress on the environment.

Of course, more can and is being done to make RAIN products more sustainable…

Smartrac's Green Tag Program

Press release from: January 10, 2019

Smartrac Announces Comprehensive Green Tag Program, Taking a Holistic Approach

"It is and always has been our mission to be the RFID innovation leader. I am convinced that our Green Tag Program will fairly and squarely lead the RFID industry in terms of environmental sustainability. We are doing this because it is important for all of us and our planet, as well as being in accordance with the wishes of our global customer base, who will soon be able to receive real, sustainable Green Tag products," says Christian Uhl, CEO at Smartrac.

https://www.smartrac-group.com/smartrac-announces-comprehensive-green-tag-program-taking-a-holistic-approach.html

Message from the RAIN Alliance President

"As we move forward, implementing RAIN RFID in thousands of applications, we need to be aware of the issues we are creating and start taking steps now to solve them. The solutions are starting to exist, lets move forward with a greener technology."

steve@rainrfid.com

RAIN Tag Sustainability Framework

Starting with these initiatives and a commitment to perform Life Cycle Assessments per ISO-14040/ 44 :

- Development of inlay and tag products with biodegradable materials and minimal residual waste at the end of life.
- Analysis of the GHG (Green House Gas) footprint of our products with the intent to systematically research and develop new products that minimize GHG emissions through their life cycle.
- Research into sustainable business models starting with reusable tags and “recirculation”.

Life Cycle Assessment of a Paper Face PET/ Al Label

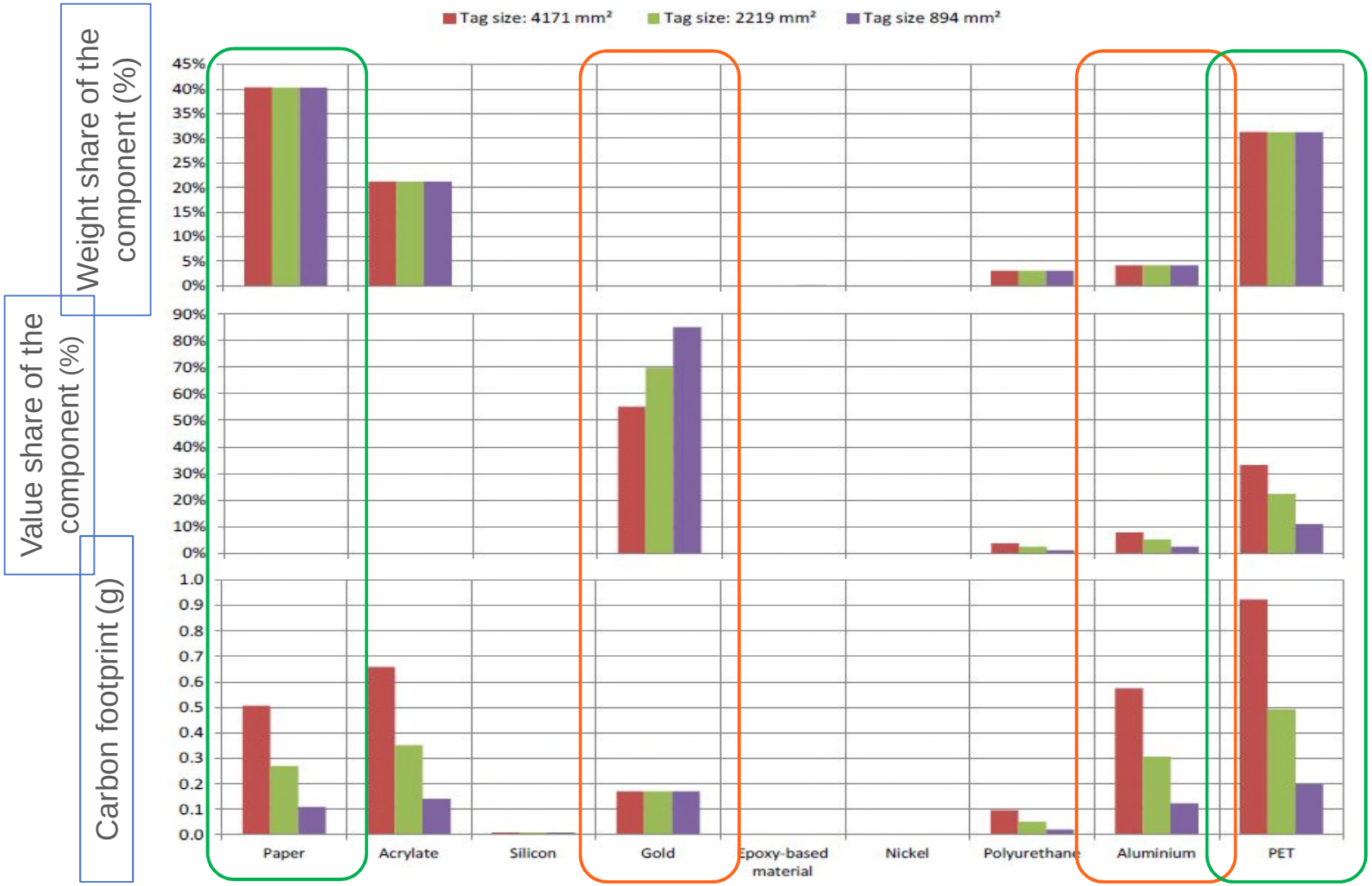
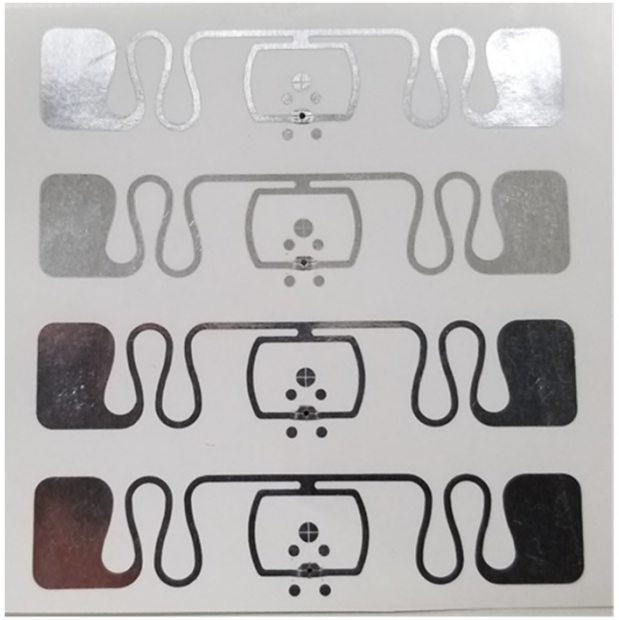


Table 4: RFID tags with etched aluminum antennas and paper faces

Component	Weight share	Value share	Carbon footprint
Paper	High	Low	Low
PET	Medium	Medium	High
Aluminum	Low	Low	Medium
Gold	Low	High	High

From Report titled:
"LIFE CYCLE ASSESSMENT OF RFID TAGS"
By Rita Meissner and Bettina Kairies – July 07, 2017
Smartrac Dresden

Biodegradability and Minimal Residual Waste



PET lasts forever in a landfill even if it breaks down to a molecule it is still PET. Biodegradable paper is decomposed by microbes and other natural processes into smaller molecules like water and carbon dioxide. Biodegradable FSC® (Forest Stewardship Council®) certified paper is recommended.

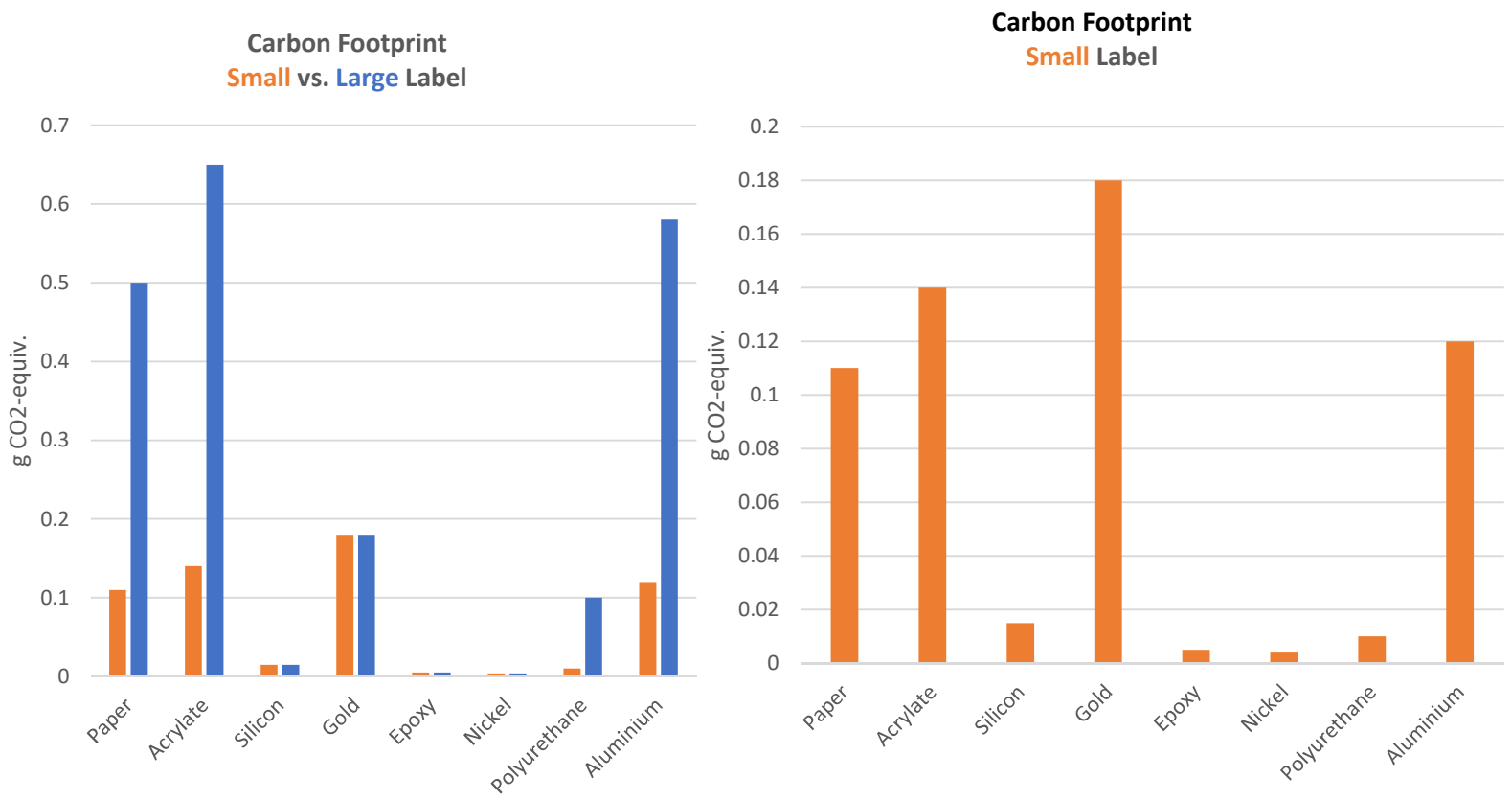
Additional R&D needs to be done on reducing the residual waste from the (mostly inorganic) components that remain after decomposition and/ or recycl. This will be accomplished by reducing the size and therefore the mass of the antenna and chip, for example.

Green House Gas Analysis

As an integral part of any Life Cycle Assessment will to estimate the greenhouse gas (GHG) impact on their “green product developments.

The GHG footprint assessments adds a dimension to on-going sustainability and innovation efforts by exposing improvement opportunities that might be missed with a (biodegradable) residual waste analysis.

Green House Gas Analysis



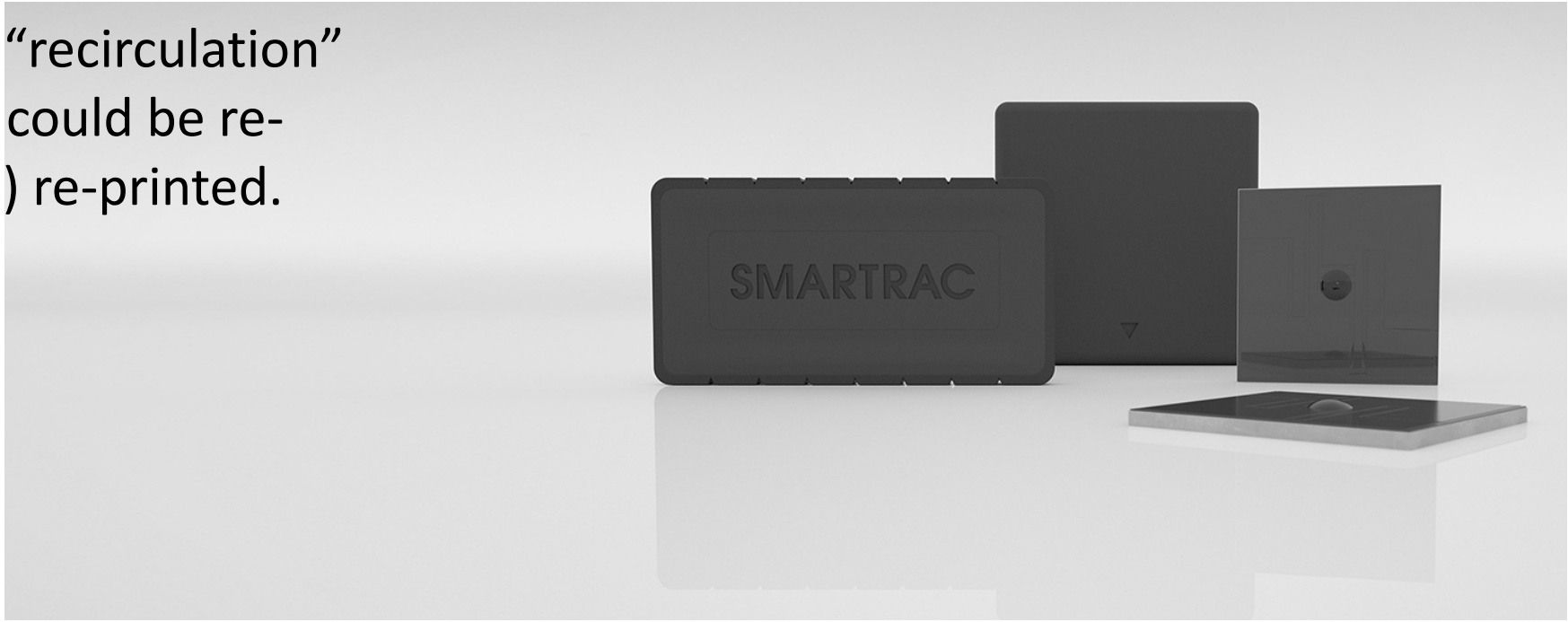
CO2-equiv. estimations taken from the 2010 Rand Europe Working Paper " SMART TRASH: Study on RFID tags and the recycling industry". https://www.rand.org/pubs/technical_reports/TR1283.html

In any efforts to reduce residual waste, it is logical to make the product smaller by reducing the overall size and the mass (thickness) of the components.

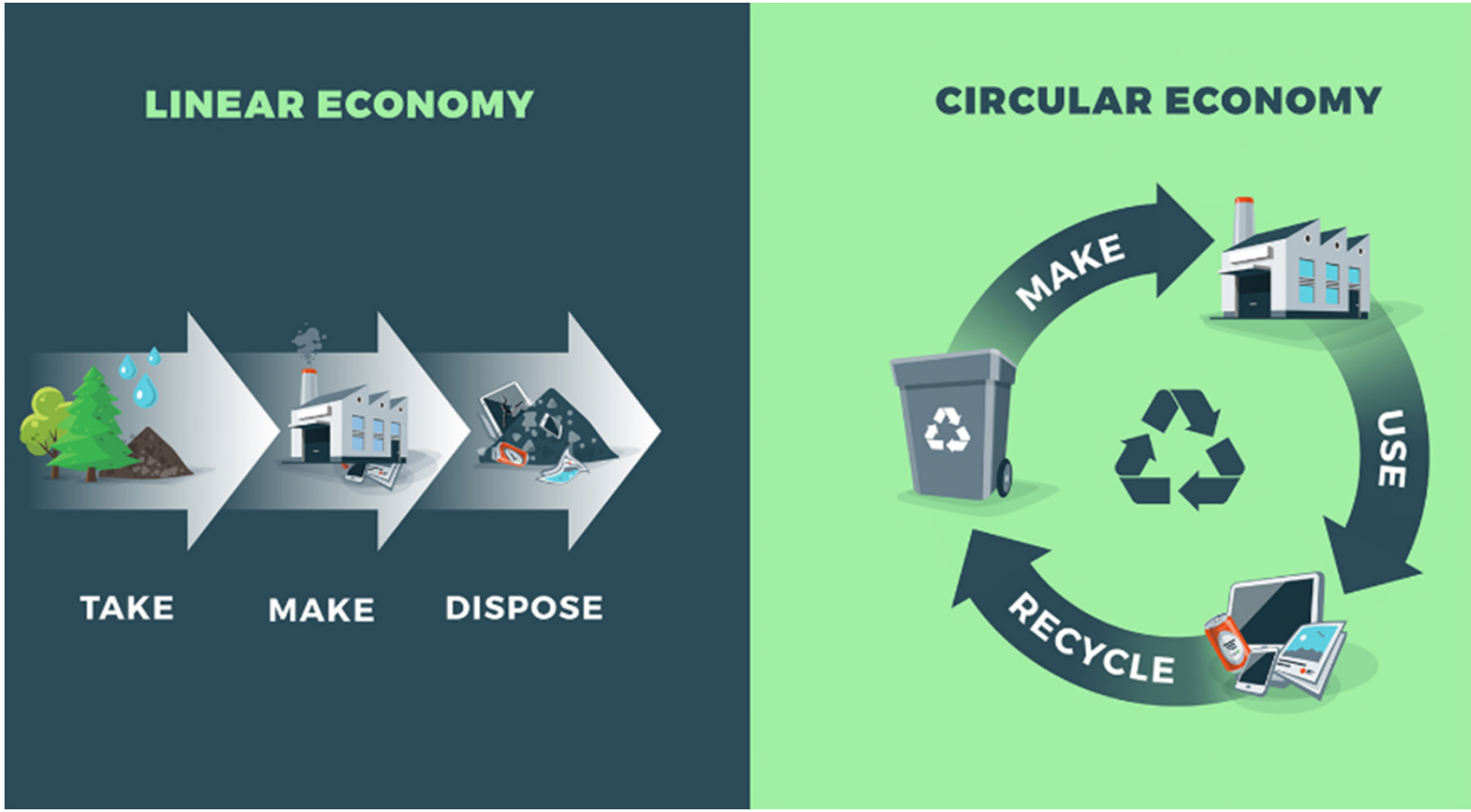
To the left, the GHG estimation shows that for smaller products the tiny gold chip bumps are the largest contributor of GHG (due to the very high extraction costs of gold).

And finally… Reusable/ Recirculating RAIN Tags

One business model that is interesting is one where durable tags are basically reused over and over by a company or alternatively they could be “rented” and returned to a regional “recirculation” facility where the tags could be re-encoded and (perhaps) re-printed.



Linear vs. Circular Economy



Thank you for viewing this presentation!

Questions or Comments?

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