OpenInnovation Circularity 2023

ConvaTec neria™ guard

AN INNOVATIVE, TRUSTED, AND SUSTAINABLE SOLUTION DRIVEN BY USER FEEDBACK

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THE PROBLEM

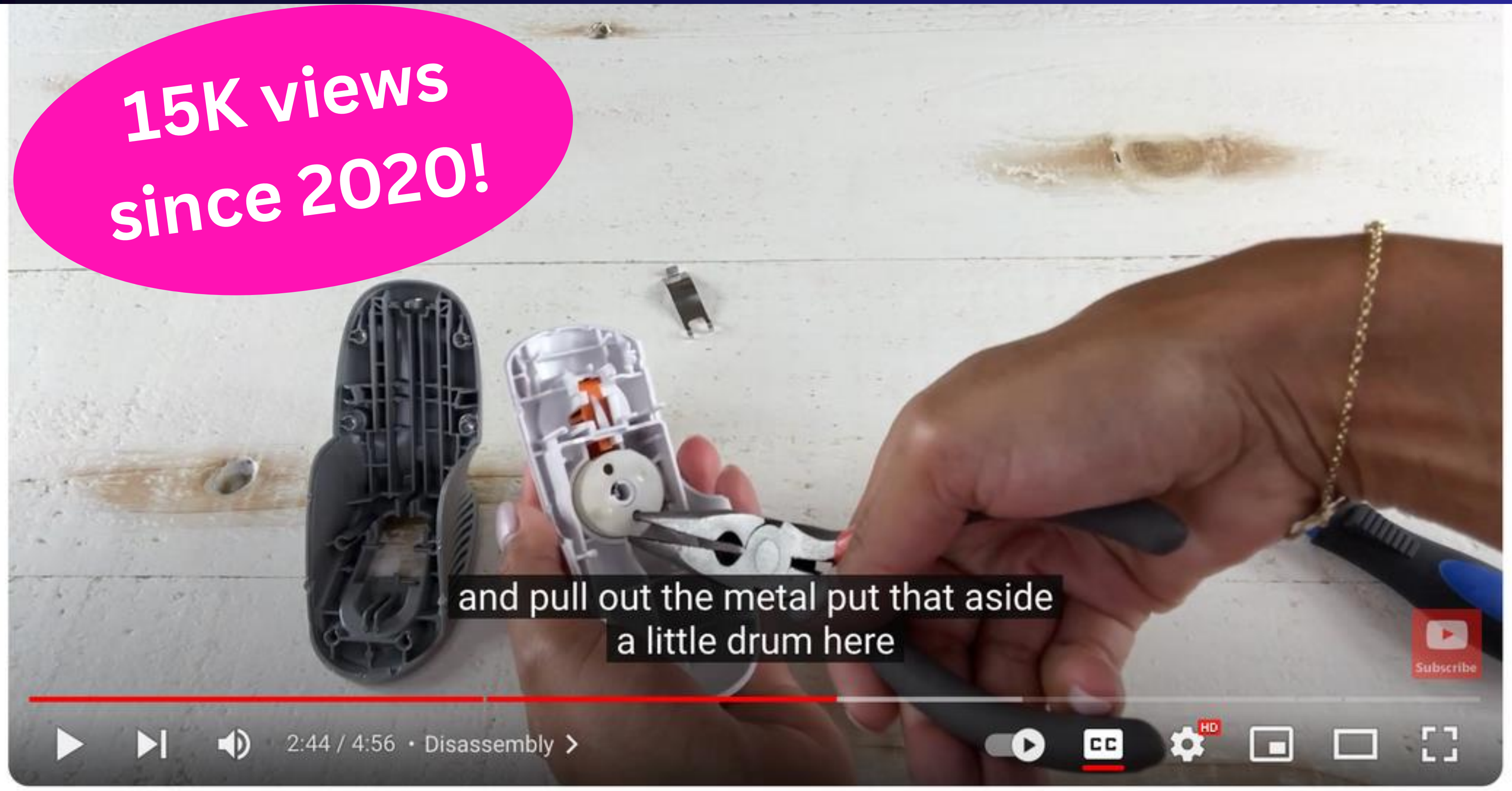
ConvaTec produces more than **100 million** infusion devices a year resulting in a huge amount of **plastic waste**, which must be thrown away as the device becomes **biohazardous** after just one use.

ConvaTec wants to become **carbon neutral by 2045** while maintaining **user safety** and following **regulatory requirements.**

THE REAL PROBLEM

Diabetic users are **demanding** a better way to reuse and recycle their infusion products. Some are using pliers to dismantle their devices, putting their **safety at risk**.

How can Convatec fulfill this unmet demand?



How to Recycle Your Dexcom G6 Inserter

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If you use the Dexcom G6 Continous Glucose Monitor (CGM), you end up with a lot of trash, including the packaging and the large plastic inserter. The inserter is technically a sharps container and it can not go in the recycling bin.

The first thing I researched when I started using the Dexcom G6 was how to recycle your Dexcom G6 inserter, simply because the amount of trash pains my soul.

@richardforster4429 1 year ago
But use a bigger and better screwdriver to pry it open. And be careful with that too. Or if you have a vice use it to pop the plastic rivets. That's good quality plastic should be recyclable? Should start a petition to present to Dexcom. I'd like to sign it.
3 Reply

@-DeScruff 1 year ago
When I first saw these thing I was absolutely amazed how much garbage they make. I kept thinking "Why can't this thing be like shaving razor blades?" - Where the big piece of plastic would be like the handle then you insert a small cartridge that contains the sharps and the part that sticks to you.

GIVE THE USERS WHAT THEY WANT

Safety, ease of use, and recyclability

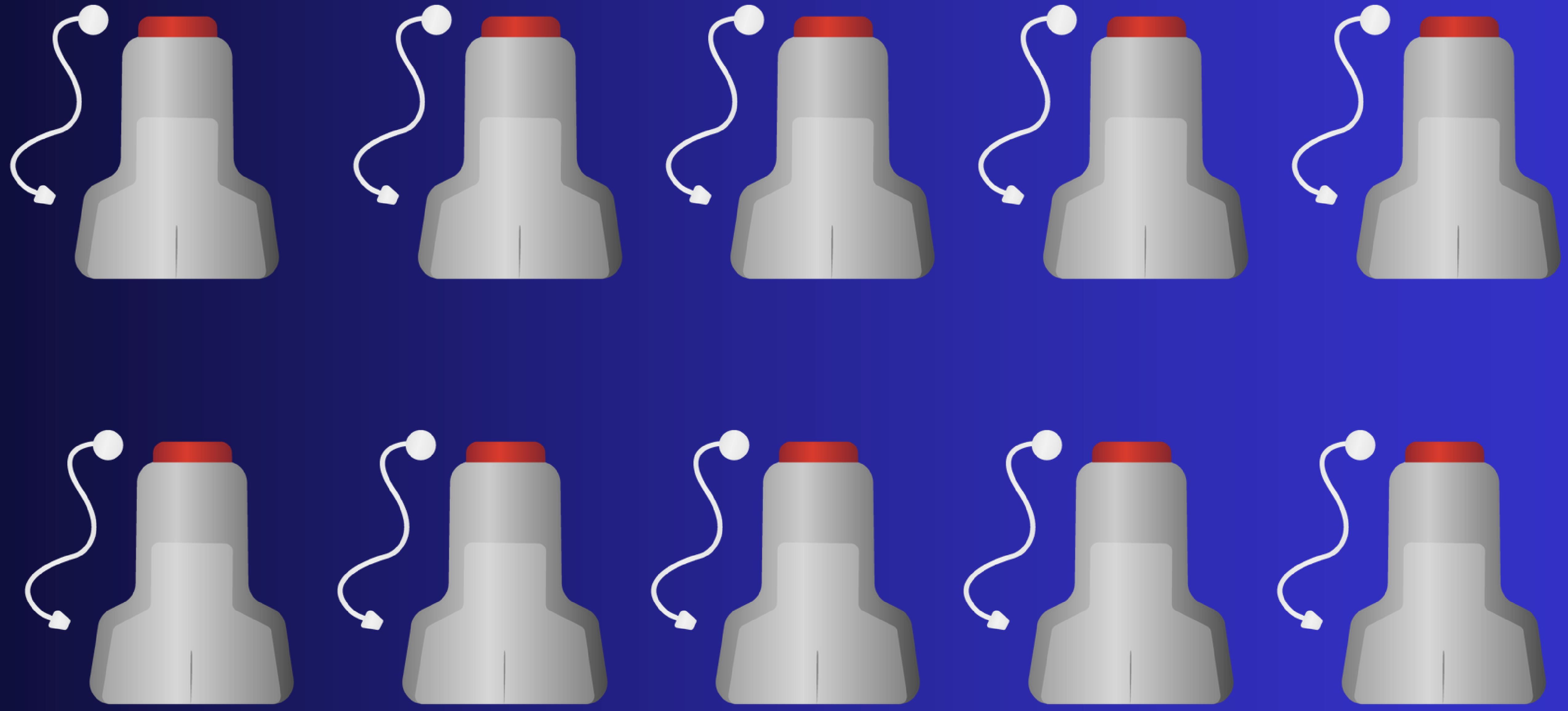
APPLICATOR

- Outer casing and “push” mechanism.
- Made out of recycled material.
- Cleaned and reused indefinitely, no need for sterilization.
- Recycled at end of life.

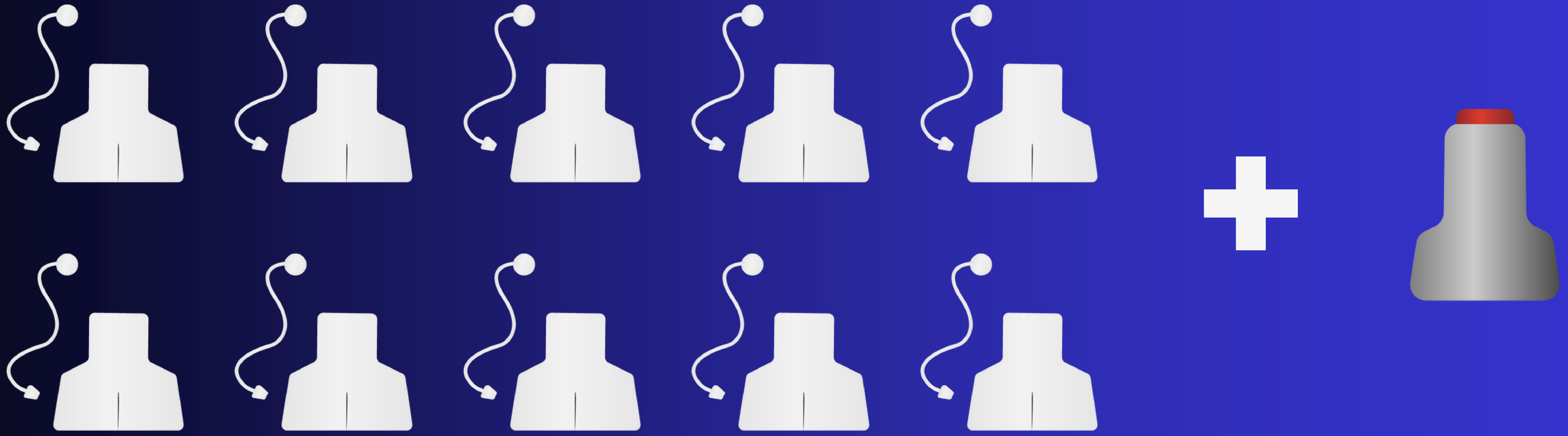
BASE

- Includes needle, tubing, and adhesive patch.
- Made out of virgin materials and sterilized.
- Replaced after one use for safety reasons.

ONE MONTH SUPPLY (CURRENT DESIGN)



ONE MONTH SUPPLY (PROPOSED DESIGN)



STAKEHOLDER BENEFITS

Less Plastic Waste

- Optimized manufacturing
- Greater recyclability

Reduced Emissions

- Reduced medical-grade material
- Reduced carbon footprint

User Risks & Safety

- Less risk of injury, less dismantling

Competitive Advantage

- Recycling alternatives
- Industry leader advantage threatened

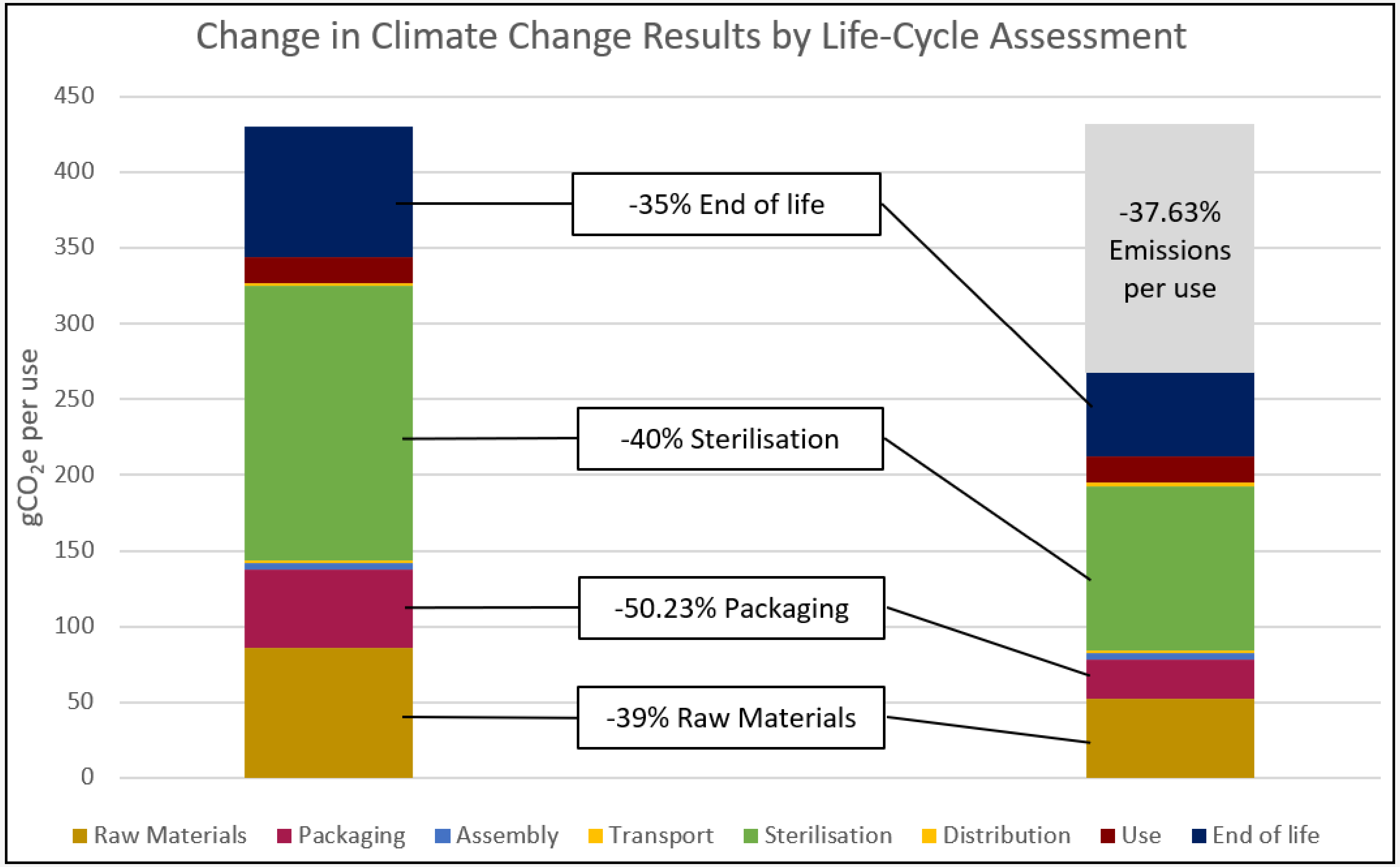
Cost Savings & Financial Gain

- Optimized manufacturing and sterilization
- EBIT gain of 42%

ENVIRONMENTAL BENEFITS

SUMMARY

- Less biohazardous waste leads to greater End of life recyclability.
- Less required medical production leads to greater Sterilisation efficiency.
- SKU separation leads to greater overall packaging efficiency.
- Less required medical-grade and virgin material leads to greater utilization of materials.
- Resulting in a **reduction of more than 1/3rd of the LCA emissions**.



THANK YOU FOR LISTENING!
ANY QUESTIONS?

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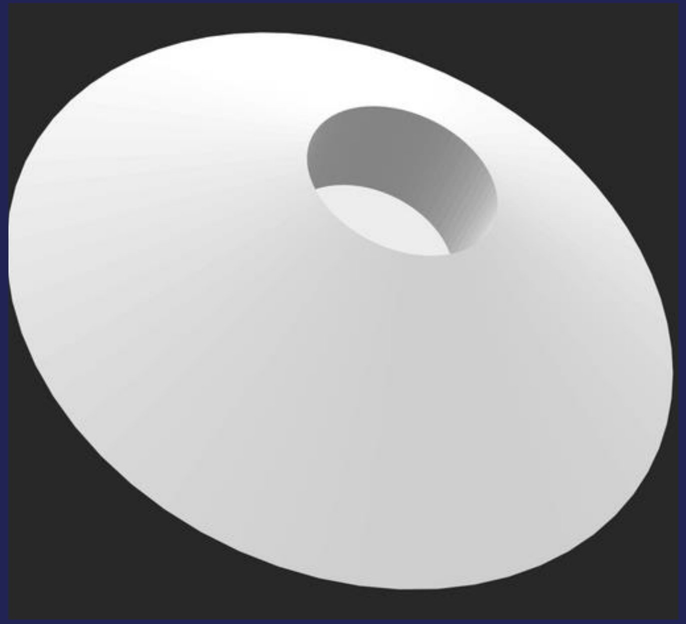
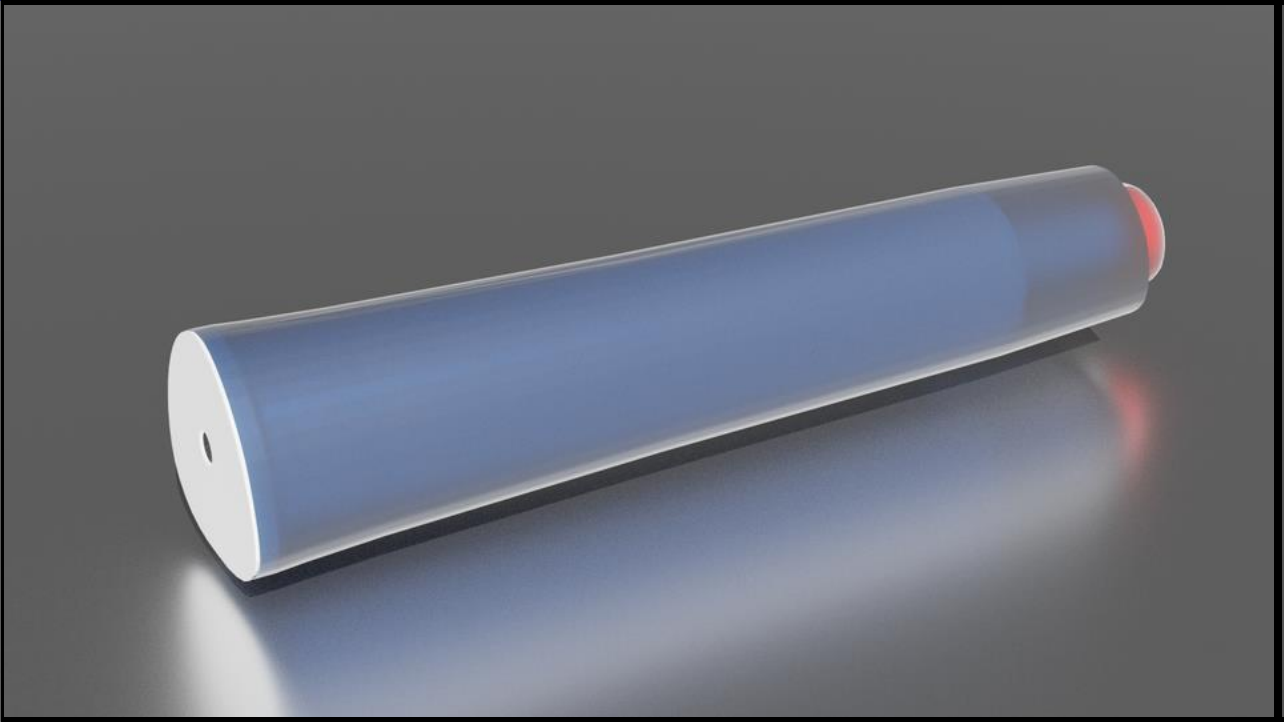
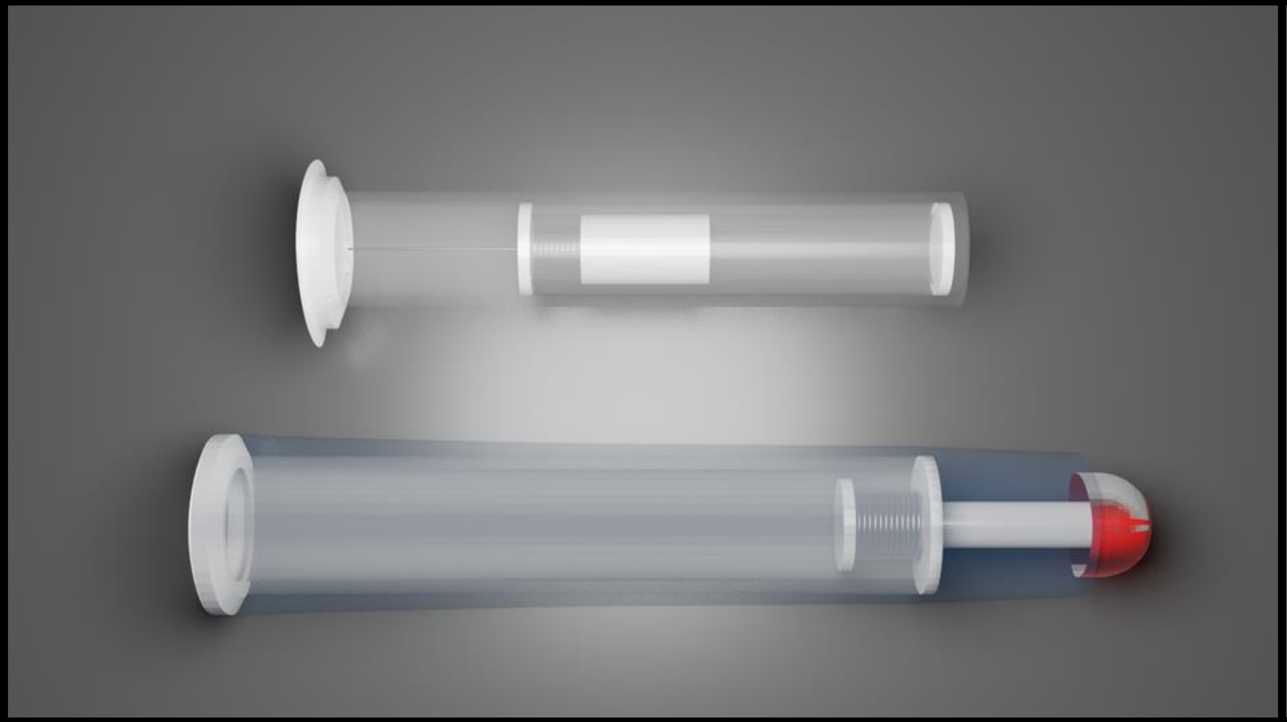
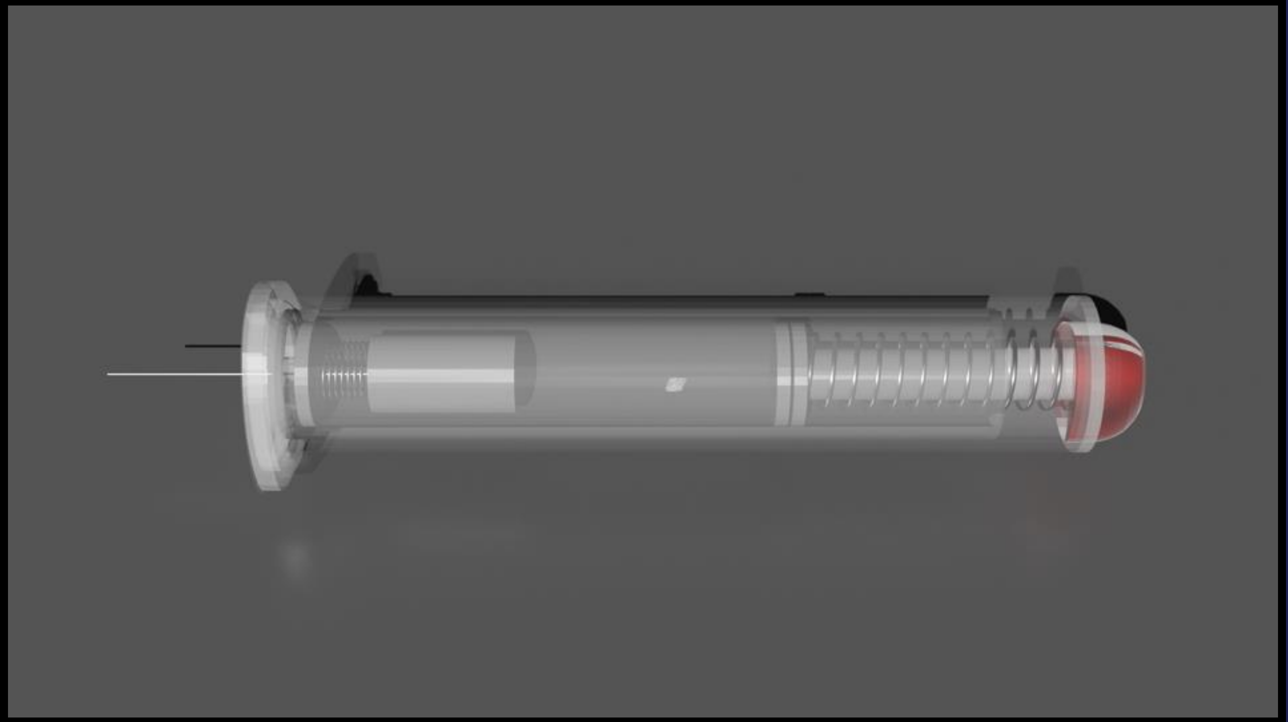
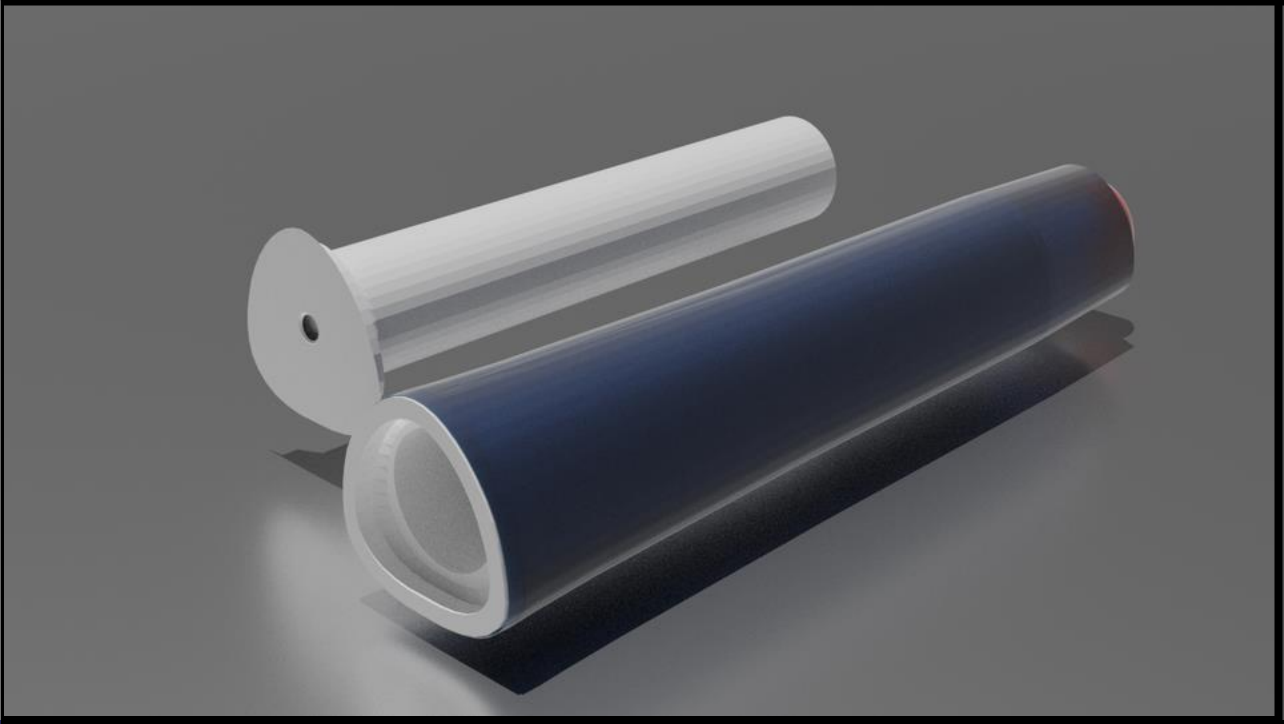
PROPOSED APPLICATOR & NEEDLE DESIGN

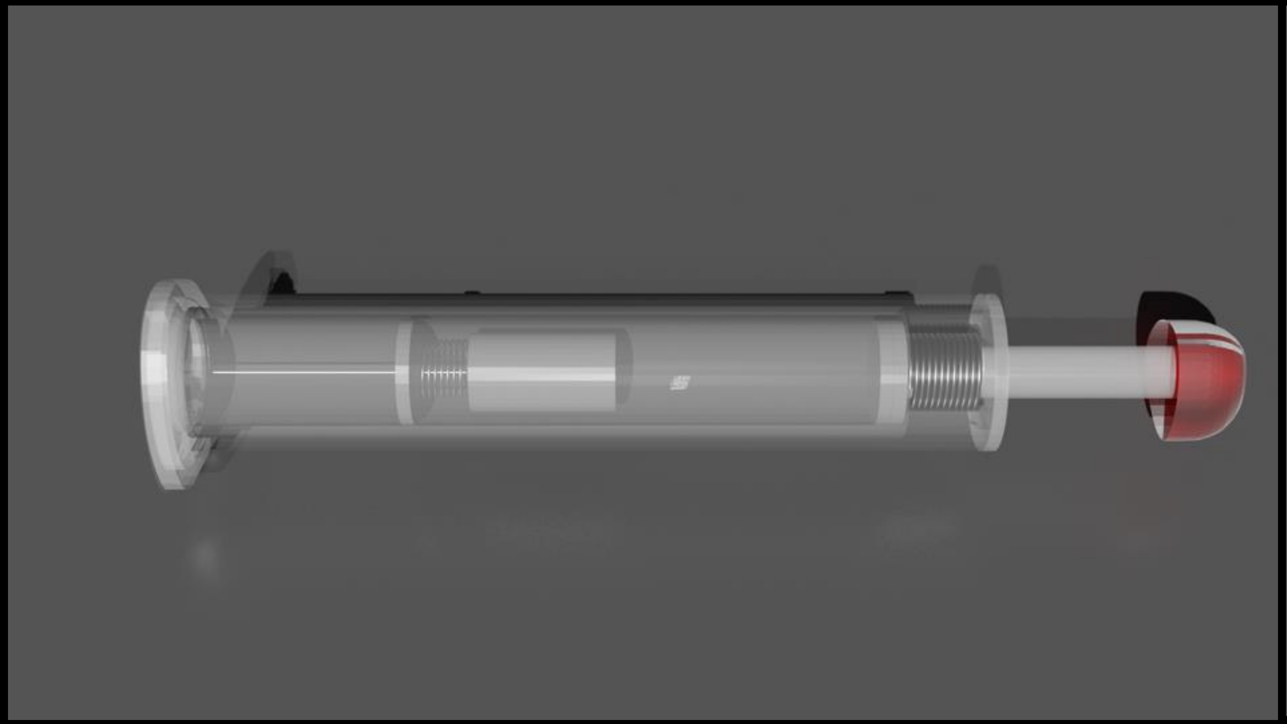












Financial Gain (1/2)

1.4.1 Key Numbers & Metrics

- Group EBIT = \$400,000,000
- Infusion Care Revenue (R) = \$130,000,000
- COGS = \$130,000,000
- SG&A = \$120,000,000
- EBIT = \$60,000,000

$$\text{COGS Margin} = \frac{COGS}{R} = \frac{\$130,000,000}{\$310,000,000} = 41.94\%$$

$$\text{SG\&A Margin} = \frac{SG\&A}{R} = \frac{\$120,000,000}{\$310,000,000} = 38.71\%$$

$$\text{EBIT Margin} = \frac{EBIT}{R} = \frac{\$60,000,000}{\$310,000,000} = 19.35\%$$

1.4.2 Cost Structure

- **Assumption 1**: Average Market Price = \$10
  Price = \$10
  COGS per Unit = Price * COGS Margin = \$10 * 41.94% = \$4.19
- **Assumption 2**: Materials = 50%, Labor = 20%, Overhead = 30%
  COGS Materials = COGS per Unit * 50% = \$4.19 * 50% = \$2.10
  COGS Labor = COGS per Unit * 20% = \$4.19 * 20% = \$0.84
  COGS Overhead = COGS per Unit * 30% = \$4.19 * 30% = \$1.26

  SG&A per Unit = Price * SG&A Margin = \$10 * 38.71% = \$3.87
  Profit per Unit = Price * EBIT Margin = \$10 * 19.35% = \$1.94
- **Assumption 3**: Feasible to Reduce Raw Materials by 39%
  New COGS per Unit = (Materials * 0.61) + Labor + Overheard
  = (\$2.10 * 0.61) + \$0.84 + \$1.26 = \$3.38
  New Profit per Unit = Price - (New COGS per Unit + SG&A per Unit)
  = \$10 - (\$3.38 +\$3.87) = \$2.75

Financial Gain (2/2)

1.4.3 EBIT Margin

- New EBIT Margin $= \frac{\text{New Profit per Unit}}{\text{Price}} = \frac{\$2.75}{\$10} = 27.54\$$

- EBIT Margin Gain = 27.53% - 19.35% = 8.18%

- New EBIT = R * New EBIT Margin = $310,000,000 * 27.54%
  = $85,350,000

- EBIT Gain = New EBIT - EBIT = $85,350,000 - $60,000,000
  = $25,350,000

- Infusion EBIT %Gain $= \frac{\text{EBIT Gain}}{\text{EBIT}} = \frac{\$25,350,000}{\$60,000,000} = 42.25\%$

- Group EBIT %Gain $= \frac{(\text{Group EBIT} + \text{EBIT Gain})}{\text{Group EBIT}} - 1$

  $= \frac{\$400,000,000 + \$25,350,000}{\$400,000,000} - 1 = 6.34\%$

Carbon Emission: Sterilization

We assumed that by separating the product into two components we would save 40% of the amount of surface we need to sterilize.

- 430 $gCO_2e.*42\%$ sterilization ratio from LCA $\approx$ 180.6 $gCO_2e.$ emitted from sterilization per use.
- 180.6 $gCO_2e.*40\%$ sterilization savings $\approx$ 72.24 $gCO_2e.$ saved per use.

That is about **23.2% gCO2e. savings** on sterilisation!

Carbon Emission: Packaging (1/2)

The initial packaging can be split in two parts:

Small Part: 45ml

Big Part: 85ml

For the **separable sterilised part**, we estimated that only 60mL of packaging were necessary, i.e. saving about 53% of the original 130mL packaging.

- $430\ gCO_2e. * 12\%$ packaging ratio from LCA $\approx 51.6\ gCO_2e.$ emitted for biohazard part packaging per use.
- $51.6\ gCO_2e. * 53\%$ packaging savings $\approx 27.3\ gCO_2e.$ saved per use.

Carbon Emission: Packaging (2/2)

We would still need to package the **applicator unsterilised part**. We estimated that in this case 105mL of packaging were necessary, i.e. saving about 20% of the original 130mL packaging.

- $51.6\ gCO_2e. * 80\%$ packaging used $\approx 41.3\ gCO_2e.$ needed per applicator separate packaging.
- However we assumed users can re-use this applicator up to 30 times, so $\frac{41.3}{30} \approx 1.38\ gCO_2e.$ extra needed per infusion.
- Total $gCO_2e.$ savings for one use of the separated product's packaging: $27.3 - 1.38 = 25.92\ gCO_2e.$

That is about **50.2% of gCO2e. of savings** on packaging!

Carbon Emission & Plastic Usage: The Stabiliser (1/2)

Carbon Emissions from the Packaging of the Stabiliser:

- Our prototype needs a volume needed to package of about $302.9cm^3$.
- From the $gCO2e$. from the initial product's packaging, we estimate at $302.9 * \frac{51.6}{130} = 120.24gCO2e$. the carbon emissions from the packaging.

Amount of plastic needed in the Stabiliser:

- The volume of our first prototype for a stabiliser is of about $255cm^3$.
- The volumetric mass of PP is of about $900kg/m^3$, i.e $0.9g/cm^3$, so: 255.23 * 0.9 = 229.71g of PP needed per stabiliser.

This looks like a lot, but actually....

Carbon Emission & Plastic Usage: The Stabiliser (2/2)

We can use **recycled materials** to build our stabiliser!

- 10.7g is our estimate of the amount of PP in our new applicator.
- Reusing the plastic from defective batches in manufacture to build these stabilisers, $229.72/10.7 \approx 21.5$.

So reusing **22 applicators** worth of plastic would be enough to build a stabiliser!

The stabiliser **isn't single use**, we estimated it had a year of lifetime (≈ 122 uses).

- $\frac{229.72}{122} \approx 1.88g$ of additional plastic per use.
- $\frac{120.24}{122} \approx 0.98gCO2e.$ of additional carbon emissions per use.

Which is very negligible! And not all patients, will need/want to buy a stabiliser!