



 www.ssuchy.eu
 [ssuchy_eu](https://twitter.com/ssuchy_eu)
 [ssuchy](https://www.linkedin.com/company/ssuchy)

ENVIRONMENTAL SUSTAINABILITY OF BIOBASED COMPOSITES

Karel Van Acker (KU Leuven)

Ponnapat Watjanatepin (KU Leuven)

Hanie Zarafshani (KU Leuven)

What are the *potential environmental impacts* of (products made of) biobased composites?



Carbon
footprint



Water
footprint



Ecosystem
quality



Natural
resources



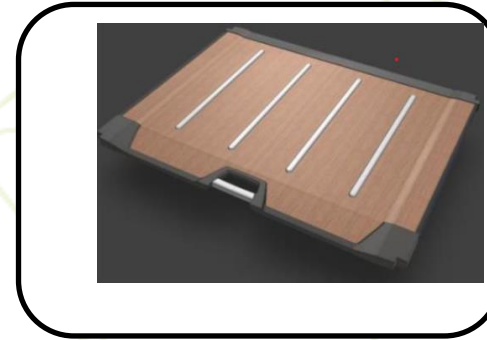
Human
health

What are the *potential environmental impacts* of (products made of) biobased composites?

- ⇒ Focus in this presentation is on the CO₂ footprint
- ⇒ ... of the *production*, use and end-of-life of the products

To keep in mind:

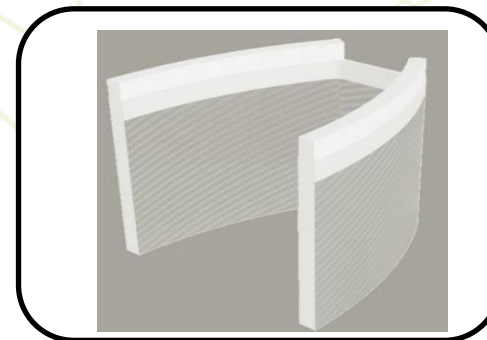
- ⇒ “renewability” of the biosource
- ⇒ Resource dependency
- ⇒ Technology evolution (considered are pilots...)



Bio-based floor and trim panel structures for automotive applications



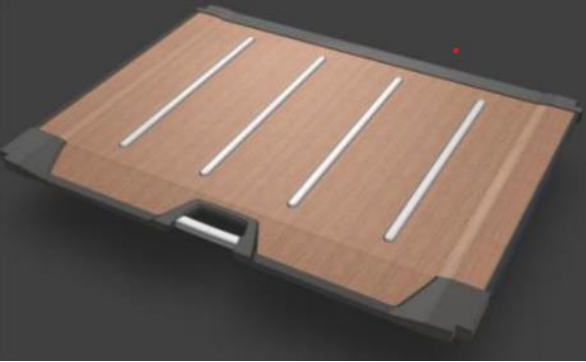
Bio-based sandwich material that fulfills the requirements of aerospace certification



Bio-based composite materials in terms of vibration and acoustics

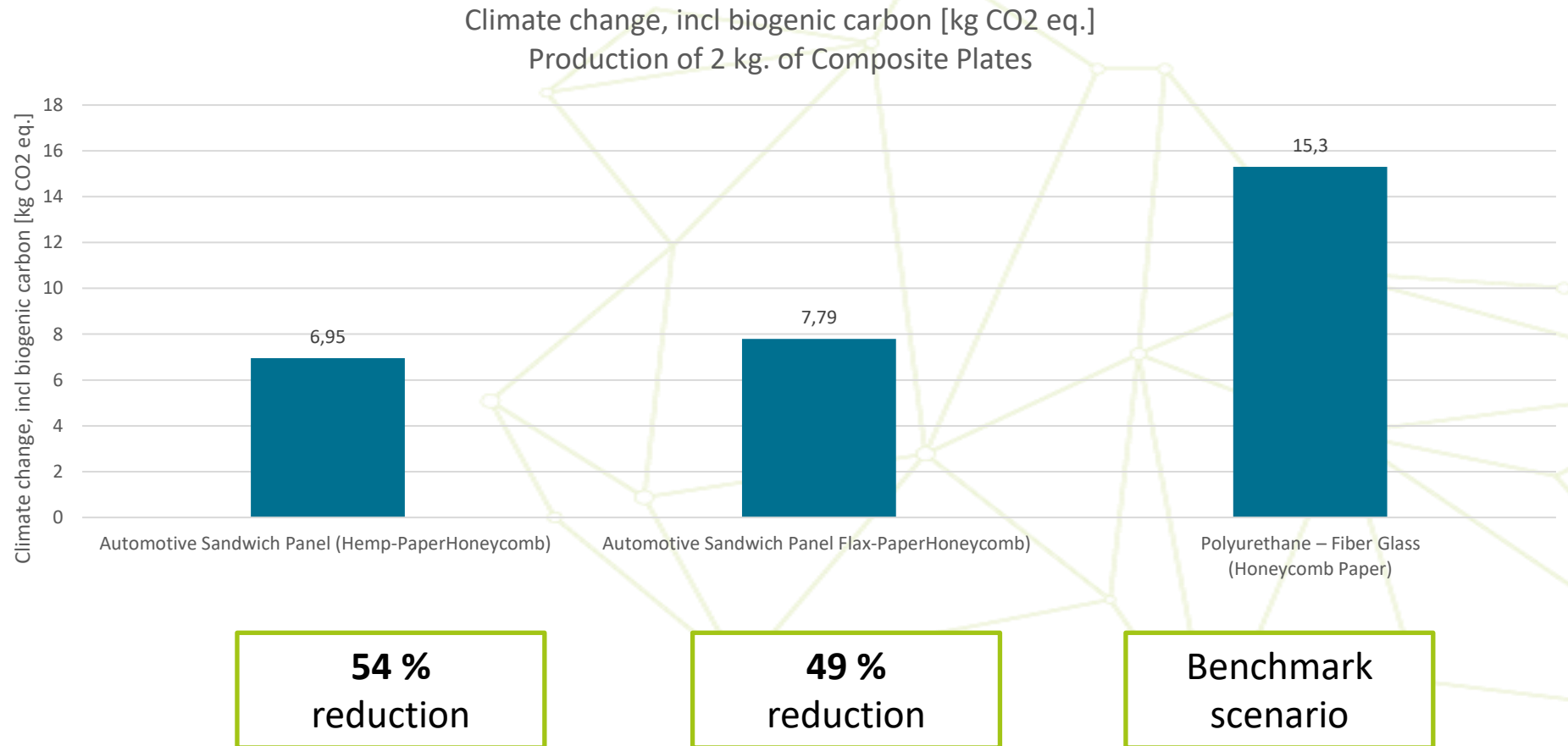


Bio-based monocoque scooter frame



Production of
automotive
sandwich
panel

Functional unit : 2 Kg. of composite plates





Full life cycle
of automotive
sandwich
panel

Production of
composite plate

- Up to **54% reduction on GWP**(compared to the benchmark scenario)
- The most impactful environmental impact is **human toxicity**.

Use phase of
composite over the
lifetime of the car

- **0.37% reduction** on GWP (5 Kg mass reduction)
- **0.75% reduction** on GWP (10 kg mass reduction)

End Of Life of
composite

- Selection between the options for the EOL scenario needs to be discussed by considering all environmental impact indicators

Full life cycle

- Up to 1.3% reduction
- Use phase is the most contributing phase



Production
of scooter
monocoque

Functional unit : one scooter frame



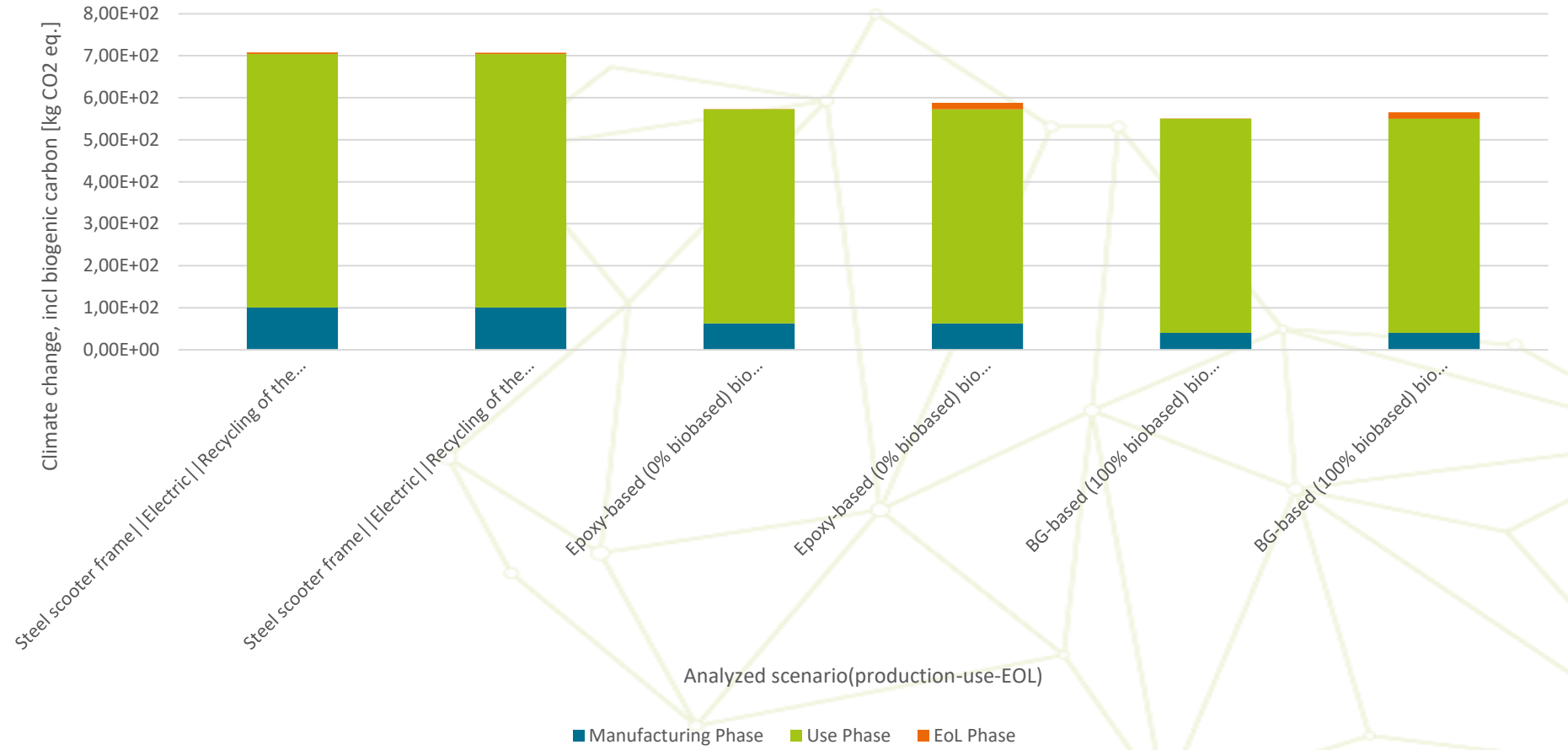
ANALYZED SCENARIOS

Production of composite plate (Resin-Fiber)	Use phase	End Of Life of composite
Benchmark: Steel scooter frame	electric engine	Recycling at 70% of the steel frame + body incineration of the ABS
Benchmark: Steel scooter frame	electric engine	Recycling at 100% of the steel frame + body incineration of the ABS
SSUCHY panel: Epoxy-based (0% biobased) bio monocoque	electric engine	Sanitary Landfill
SSUCHY panel: Epoxy-based (0% biobased) bio monocoque	electric engine	Incineration
SSUCHY panel: BG-based (100% biobased) bio monocoque	electric engine	Sanitary Landfill
SSUCHY panel: BG-based (100% biobased) bio monocoque	electric engine	Incineration



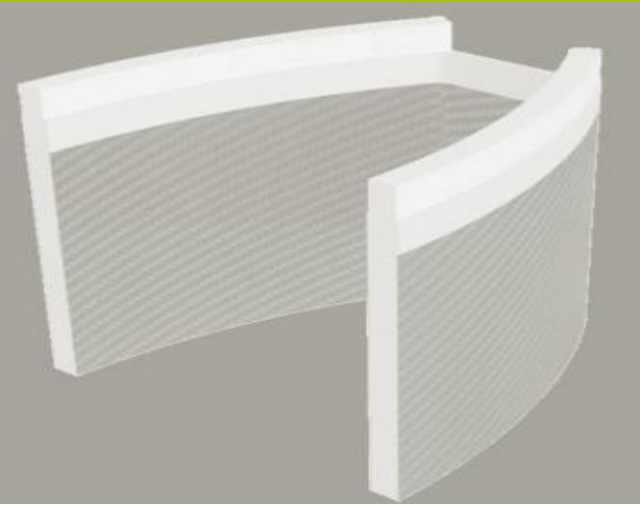
Full life cycle of scooter monocoque

GWP Comparison of the Full Life Cycle of the Scooter Demonstrators



Benchmark

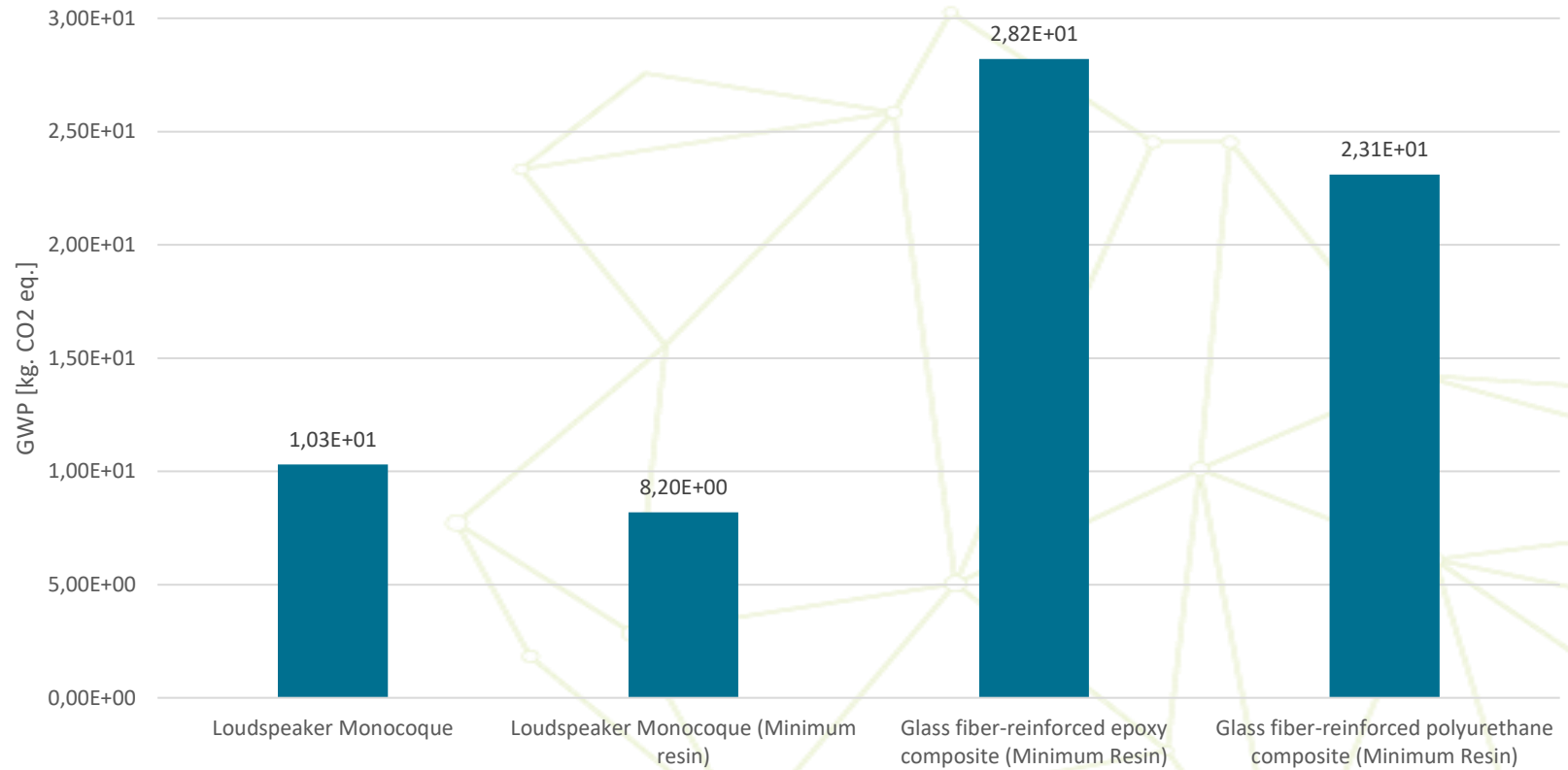
11 % lower compared to Benchmark



Production of loudspeaker monocoque

Functional unit: 5 Kg. of monocoque

GWP of Loudspeaker Production Phase ~ 5 kg. Monocoque



64 %
reduction

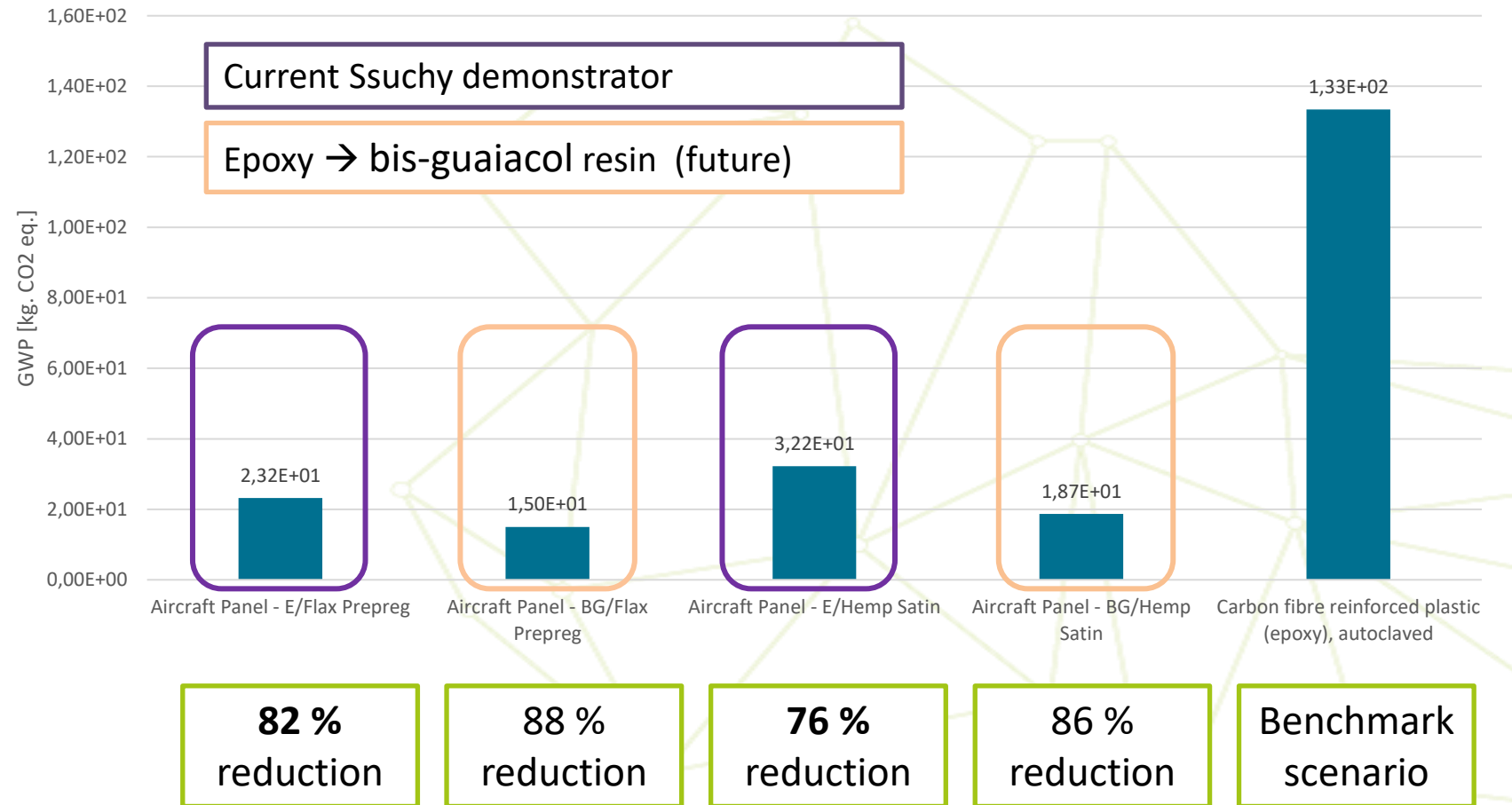
71 %
reduction

Benchmark scenarios



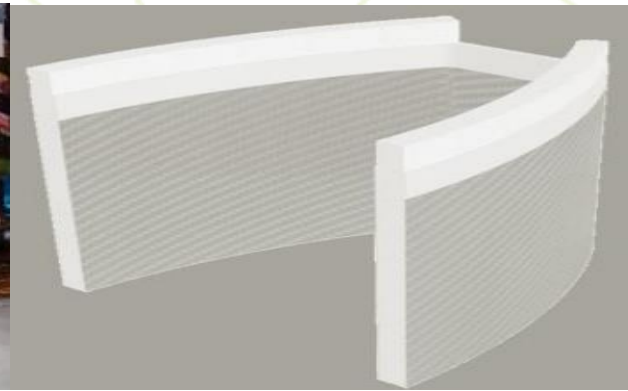
Production of
aircraft
dashboard
composite
panel

GWP of Aircraft Panel Production [excluding freezer and storage]



MAIN CONCLUSIONS

- ⇒ **High potential** to reduce CO₂ footprint of products by using biobased composites
- ⇒ Especially during **production**, also for the full life cycle
- ⇒ + other environmental benefits, but take care of land use, water depletion, eutrophication
- ⇒ **renewability**



 www.ssuchy.eu

 [ssuchy_eu](https://twitter.com/ssuchy_eu)

 [ssuchy](https://www.linkedin.com/company/ssuchy)

ssuchy
DEVELOPING ADVANCED BIO-BASED
COMPOSITES



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation program under grant agreement No 744349.