

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY

LIST



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Enseignement supérieur
et de la Recherche

SCMM-IC

SUSTAINABLE COMPOSITE MATERIAL AND MANUFACTURING
INNOVATION CENTER

AIRBUS

ALSTOM

ThalesAlenia
a Thales / Leonardo company Space

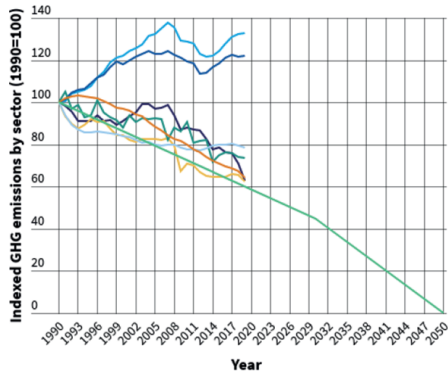


TOYOTA

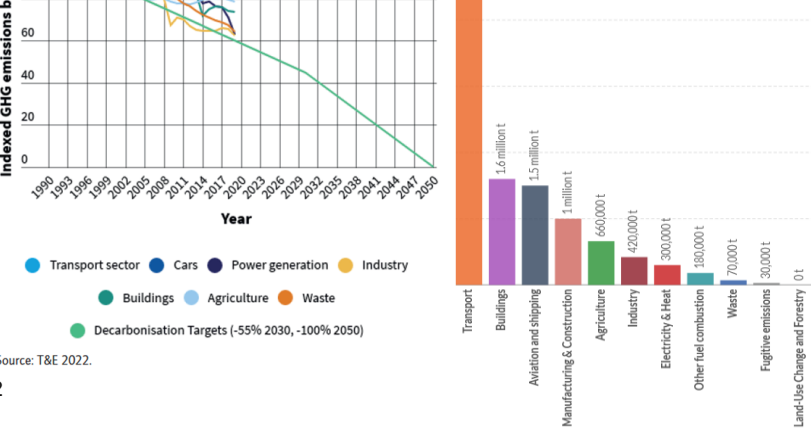


GRADEL
LIGHT WEIGHT

MOTIVATION



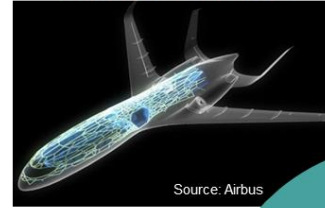
GHG emissions from transport (Luxembourg, 2016)
(source: ourworldindata.org)



source: T&E 2022.

Sustainable composites as key enablers towards net zero-emission mobility

AERONAUTICS



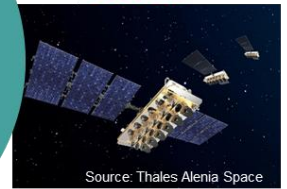
AUTOMOBILE



RAIL



SPACE



SUSTAINABLE & LIGHTWEIGHT COMPOSITES

URBAN AIR MOBILITY



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SCMM – THE CONCEPT

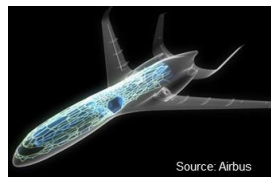
Integrate rapidly the research outcomes into critical **demonstrators** triggering innovations



Source: Toyota



Source: Alstom



Source: Airbus



Source: Thales Alenia Space

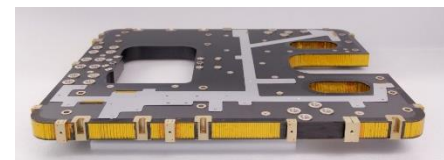
Sustainable automotive parts made of secondary or bio-based materials



Sustainable body panels (Natural Fiber)

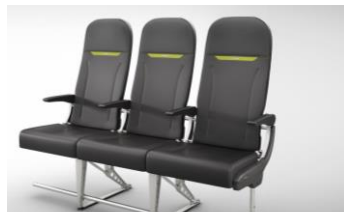


Fully bio-based / recyclable panels for interior applications



Easy assembling / repairable satellite panels

Recyclable high-pressure tank



Lightweight and sustainable interior component through additive manufacturing



Structural sub-element, bracket (sub-scale)

XEMBORG
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TECHNOLOGY



RESEARCH PILLARS

High-Level View

PROCESSES

Advanced Composite
Manufacturing
& Additive Manufacturing

Collaborative
& adaptive
Manufacturing

Materials, structure
Design & Virtual Testing,
process simulation



MATERIALS

DESIGN

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Sustainable Composites

- **Design & structure**

- Data-driven computational Mechanics
- Multi-scale modelling
- Virtual testing

- **Advanced materials**

- Polymer synthesis: Bio-based, recyclable polymers
- Filler and fibre engineering
- Surface & interface engineering

- **Manufacturing**

- Composite Manufacturing
- Robotized Composite Manufacturing (Fibre-reinforced) 3D Manufacturing
- Advanced joining



In partnership with
Daher, Gradel, Guala Closure, Anisoprint, ESA, Euro-Composites, Thales Alenia Space, Kleos,
Goodyear, Tofas, KARELKALIP, B-Preg, Flokser, Bambooder

RESEARCH EXCELLENCE IN LIST

Bio-based benzoxazines resins



Bio-based composites

1. Sustainable components

Monomers & resins



Composite processing

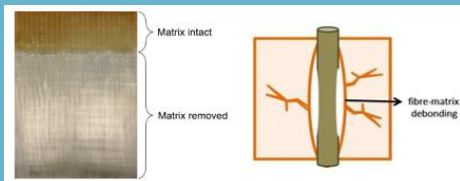


2. Sustainable design & (re-) manufacturing



Recycling & recovery

Disassembly on demand



Inexpensive, safe, bio-based recycling agents

Reinforcement

Fine chemicals

3. Regeneration of high value components

Vitrimer composites

Enabling reprocessing, repairing & recycling

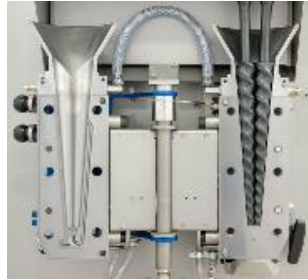


MAIN EQUIPMENT AND CAPABILITIES

Development of novel polymers and formulations



Processing of polymeric materials



Micro compounders

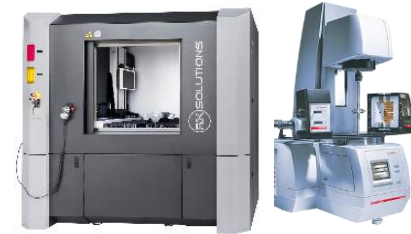


Twin screw extruder

Advanced composite manufacturing



Advanced characterization and testing



SCMM - WORKING ALL TOGETHER

Multiple stakeholders: public research, ministries, Mat. & Tech. providers, Tier Suppliers, OEMs

*Propose / develop
technologies &
demonstrators*

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Endorse the SRIA

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LIST 

& MEMBERS

Raw Materials

- Monomers & polymers
- Fibers
- Additives

Semi-finished products

- Powders
- Filament
- Tapes & fabrics
- Pre-preg
- Preform

Components

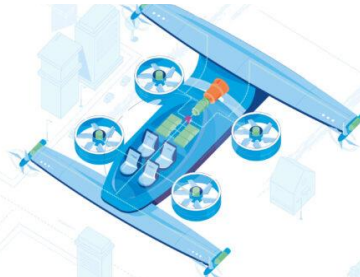
- Design
- Tooling
- Manufacturing tech.
- Testing

Structures

- Design
- Assembling
- Testing

Recycling

STRATEGIC RESEARCH AND INNOVATION AGENDA



**SUSTAINABLE AND LIGHTWEIGHT
COMPOSITE MATERIALS**



ThalesAlenia
a Thales / Leonardo company *Space*

ALSTOM

 **AIRBUS**

 **LUXINNOVATION**
#MakingInnovationHappen



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SCMM – WORKING ALL TOGETHER

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Phase 1: 4-year program

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STRATEGIC RESEARCH AND INNOVATION AGENDA

Collaborative projects based on own
budget or leveraging public funding



Companies (e.g. Mat. & Tech.
providers, Tier Suppliers, OEMs)
Academic / RTO

Complementarity: *TRL, Scale,
Technology, Expertise*

Sustainable and lightweight
composite materials



Supported or
coordinated by



LUXEMBOURG
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TESTIMONY FROM AIRBUS OPERATIONS



Christian Rückert
Head of Sustainable Technologies R&T

Airbus Operations GmbH
Airframe Research & Technology

Airbus is very honoured and pleased to support the SCMM Innovation Centre.

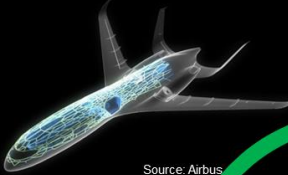
Highly skilled staff and state-of-the-art equipment are providing a perfect platform for shared research efforts which have already been launched in an ambitious timeframe.

We are fully convinced that LIST will provide innovative and sustainable solutions for our future challenges, e.g. in the technology fields of Aircraft Interior Structures or Advanced Composites Processing for Zero Emission applications.

SUSTAINABLE COMPOSITE MATERIALS & MANUFACTURING (SCMM)



AERONAUTICS



AUTOMOBILE



RAIL



**SUSTAINABLE
& LIGHTWEIGHT
COMPOSITES**

SPACE



**URBAN AIR
MOBILITY**



WHERE TOMORROW BEGINS

Some dream.
Some discover.
Some change the world for the better.

We connect it all.

At LIST, we build the bridges that connect the world of academia with the real change that's happening in the market. It's research and innovation made in Luxembourg. And it's at your service.

LIST.lu

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