Ecodesign criteria for the assessment of the maturity level of technologies

Clean Space Industry Days

ESA- ESTEC

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AIRBUS

Introduction - Sustainability in Airbus Defence and Space

UN Sustainable Development Goals, with Airbus prioritization

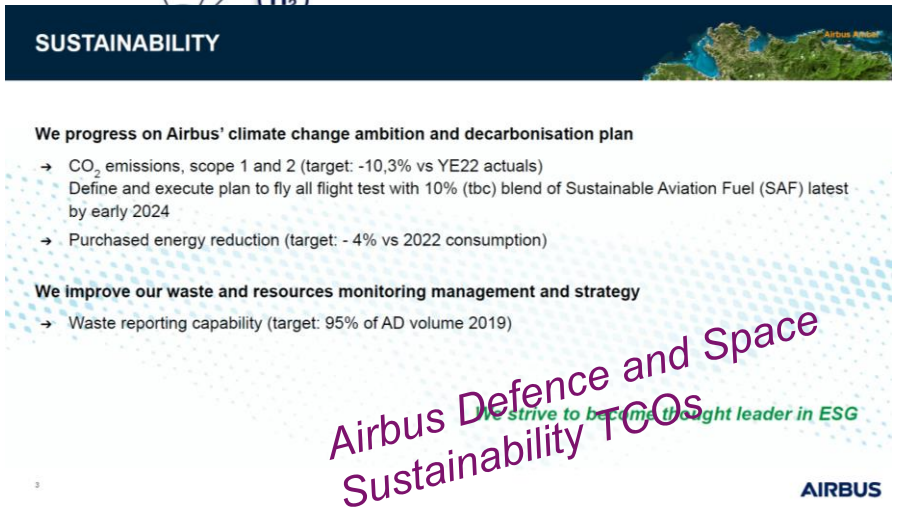
"Pioneering sustainable aerospace for a safe and united world"

Validation of **Airbus** decarbonisation targets by the **Science Based Targets initiative (SBTi)**

- reduce its **Scope 1 & 2** industrial emissions by up to **63%* by 2030**
- reduce CO_2 emissions intensity generated by its commercial aircraft in service (**Scope 3**) by **46%* by 2035**

*based on 2015 as a baseline year

Airbus Defence and Space Engineering Sustainability Objectives 2023



Airbus Defence and Space Sustainability TCOs

An assessment of the R&T sustainable performances is an integral part of the actionable plan to achieve emissions´ reduction

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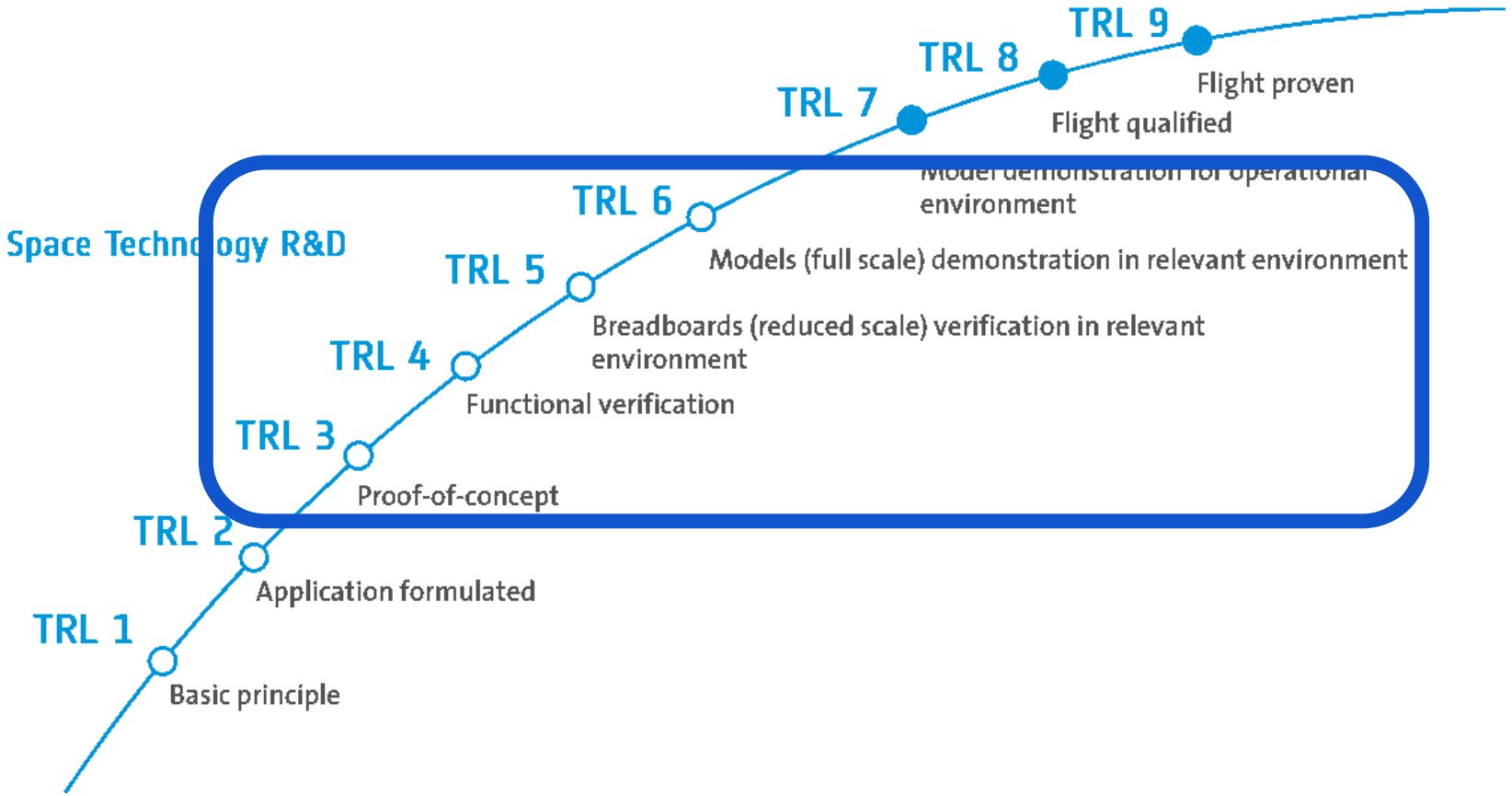
Techonogy Readiness Levels´ assessment perimeter

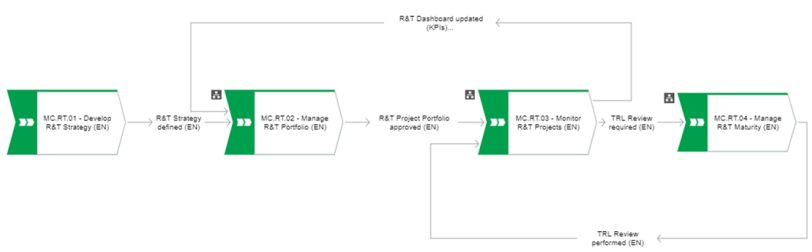
The R&T activities in Airbus Defence and Space focus on TRL levels between 3 and 6.

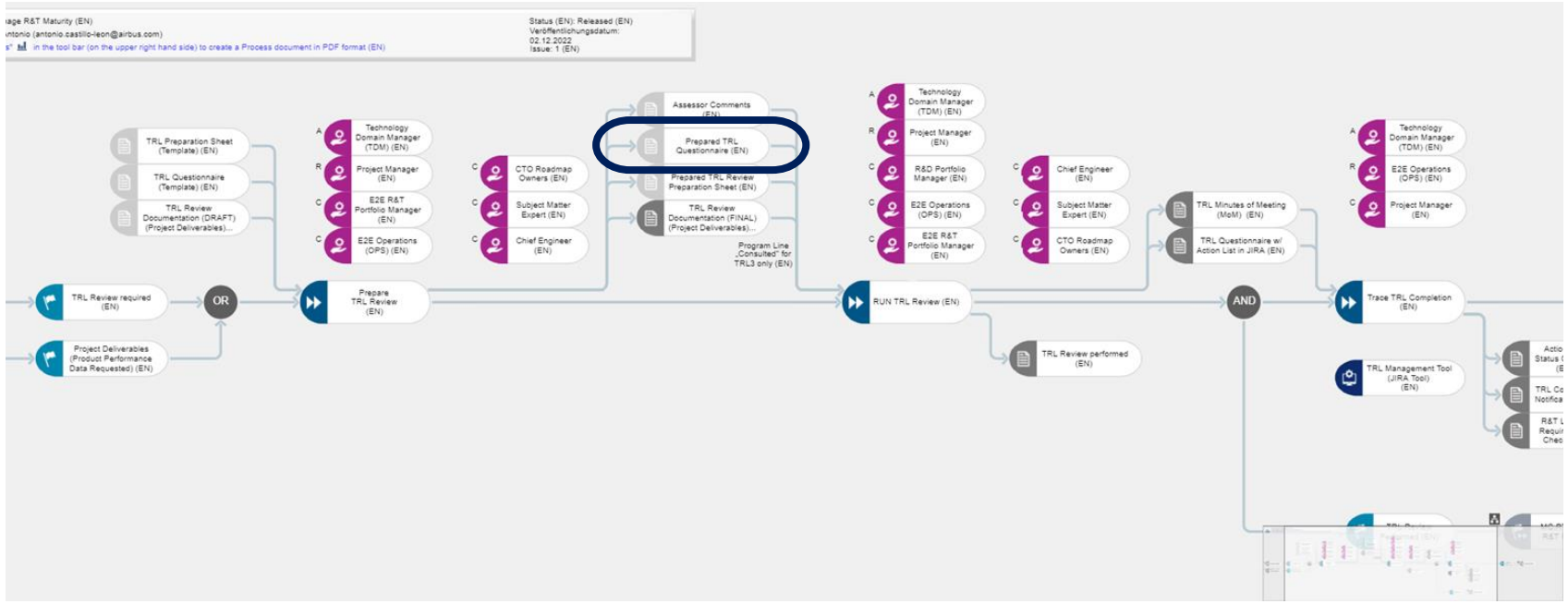


ESA TRL definitions - Courtesy of ESA ©

TRL reviews´ process

The Airbus Defence and Space´ standardised process to assess the maturity of the technologies being developed relies on a set of questions that ensure the homogeneity of the maturity level achieved and the objectiveness of the assessment of such levels.
The process relies on answering and providing factual evidences to a standardised set of questions, which are tailored to the specificity of the technology under assessment, that cover the full spectrum of expected performances and several other aspects (e.g. certification aspects, operational and user experience, etc).
It is therefore conceived as a two-dimensional matrix in which one dimensions represent the different performances and the second one the level of maturity that is being assessed.





First dimension – the performances and sustainability

The following are the performances that are assessed. In 2022 a dedicated chapter related to sustainability has been identified. A step-wise implementation of the performances to be assessed has also been identified, with a first step implementation in 2024 and an ambition to full deployment in 2026.

Questionnaire for TRL Levels´ assessment

ID	Intention	
1. Functional (Fu) Aspects		
2. Dependability (De) Aspects		
3. Certification (Ce) Aspects		
4. Risk (Ri) Managment		
5. Manufacturing / Supply Chain (Ma)		
6. Operational (Op) Aspects		
7. Sustainability		
		Substances
		Climate Change/Atmospheric Environmental Impacts
		Energy efficiency.
		Materials (incl. use of critical materials - i.e. materials where we are dependent on entities outside EU for example)
		Through Life Support (Sustainability)
		Obsolescence (Sustainability)
		End of life Definition
		Disposal, recyclability
		Water consumption

Second dimension – the maturity levels

Each of the performances described above require a different set of evidences, or a constantly evolving one, to validate the achievement of a maturity level.

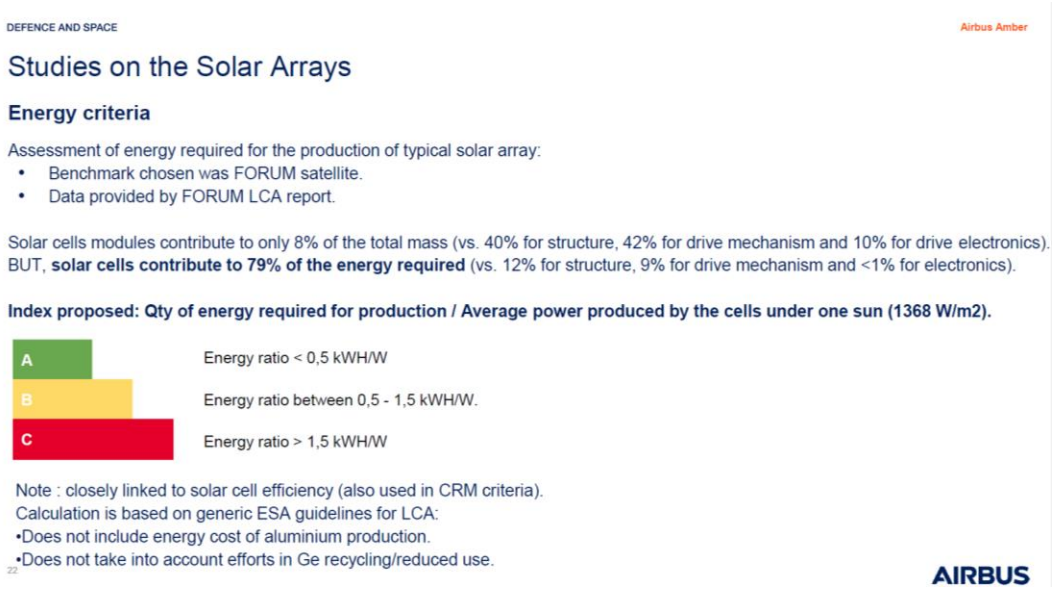
The following example is given on the specific evidences´ requests for the energy consumption parameter of the technologies being assessed at each TRL level review.

Questionnaire for TRL Levels´ assessment						
ID	**Intention**		**TRL 3**	**TRL 4**	**TRL 5**	**TRL 6**
7. Sustainability						
		Energy efficiency. **1. Analyse and characterise the energy consumption and efficiency of the technology under review, in absolute terms, and w.r.t. potential benchmark**	First estimation of the energy budget and efficiency with comparison to similar technologies	Produce component level evidence for the estimations made (e.g. test results)	Produce system level evidence in a laboratory environment for the estimations made (e.g. cooling system and required infrastructure essential to run technology)	Produce system level evidence in a relevant simulated or real environment for the estimations made (e.g. cooling system and required infrastructure essential to run technology in worst case environmental conditions)

The challenge – technologies´ benchmarking and FoMs

The assessment of the sustainable performance of the technologies needs to be relativized to comparable solutions/technologies and/or solutions/technologies that are meant to be replaced by the new technology being assessed.

Given the high complexity of such technologies and the highly dynamic development program, it is very difficult of ensure a proper methodology to successfully relativize sustainability performances. Airbus has performed some pilot benchmarking of specific technologies and the adoption of databases such as the one being developed by ESA could cover some of the aspects, however a more generic and shared approach seems to be needed.



Conclusions – way forward

- The implementation of sustainability questions in the TRL reviews´ questionnaire at Airbus Defence and Space is a first step to ensure that the maturation of new technologies takes into consideration sustainability aspects and fulfils the company´s purpose as well as objectives and commitments.
- Due to the complexity of the assessment of some specific sustainability performances, there is a need to:
  1. Identify and apply a simplified approach.
  2. Adopt a step-wise implementation approach with incremental complexity.
  3. Identify and develop a database source for the data referenced in the assessments.
  4. Identify and develop synergies that may facilitate the establishment of such databases for the aerospace products on e.g. statistical values such as mean and standard deviation of a pool of anonymised data.

Thank You