



**EASA**  
European Aviation Safety Agency

# **Product Certification and Design Organisation Approval Workshop**

**22<sup>nd</sup> -23<sup>rd</sup> November 2016**

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TE.GEN.00409-001



**EASA**  
European Aviation Safety Agency

# **AVIATION GOES ELECTRIC**

## **Clean Sky 2**

### **EASA Electric Propulsion Project**

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# Clean Sky 2

## ➤ Joint technology Initiative

- Public-private partnership bringing together companies, universities, public laboratories, innovative SMEs and the European Commission.
- Develop and demonstrate break-through technologies for the civil aircraft market to cut aircraft emissions and noise
- Runs 2014 to 2024
- Increasing fuel efficiency -> reducing CO<sub>2</sub> by 20 to 30%
- Reducing NO<sub>x</sub> and noise by 20 to 30%
- MEA, Electric Propulsion





# Electric Propulsion – The Future

## ➤ Outlook into the short and mid term Future

- Electric propulsion is developing very quick (MEA, replacement, new way of transportation, etc.)
- Can allow for a sustainable, environment friendly aviation (all electric, active influence on aerodynamic, hybrid, ...)
- Seen as one measure for the agreed cut down of emissions
- Promise to be an economical means for different operations
- Multi billion Euro market
- There are challenges ahead (technology, infrastructure, ..)
- at least 1/3 will be electric





# Electric Propulsion – Activities

## ➤ Activities outside EU

- FAA, NASA, many other US companies + associations working intensively on EP and ODM towards future
- Several research projects (NASA, ZEE AERO, Apple, Google, etc.)
- China certified a while ago its first small all electric aeroplane
- Different other countries are going in the same direction

## ➤ Activities within EU

- Horizon 2020 (80 billion), Clean Sky 2 (HypstAir, GRETEL, etc.)
- Research projects done by Pipistrel, Diamond, etc.
- Airbus and Siemens signed cooperation agreement on Electric Propulsion (April 2016)
- .... EASA Electric & Hybrid Propulsion Project?



# What we already have

- Certified Glider
- Lange E1 Antares
- Sportine Aviacija  
LAK-17B FES





# Arrived and on the radar

## ➤ Arrived already

- Airbus (Voltair) E-FAN 2.0
- Extra 300 PEP
- ....



## ➤ On the radar

- direct exchange of propulsion in existing airframe,
- other conventional a/c ,
- More Electric Aircraft (MEA), and ...







# On the radar (true electric aircraft)

## ➤ Lilium

- CS-LSA, 2-Seater



## ➤ Airbus A<sup>3</sup> Vahana

- Pilotless Single-Seat aircraft
- demonstrator by 2020



## ➤ Uber

- White Paper on future operation
- Vahana and Joby S2

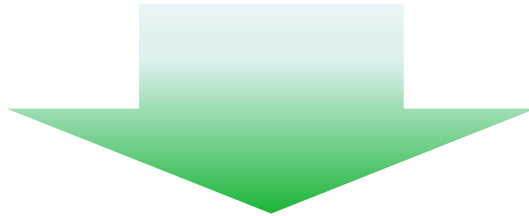






# Electric Propulsion – EASA

- Current rules, regulations and systems do not yet address electric propulsion, emerging technologies and operation
- Technology is still developing in different directions
- New ways of transportation will be possible
- Currently any imagination is allowed, thinking out of the box



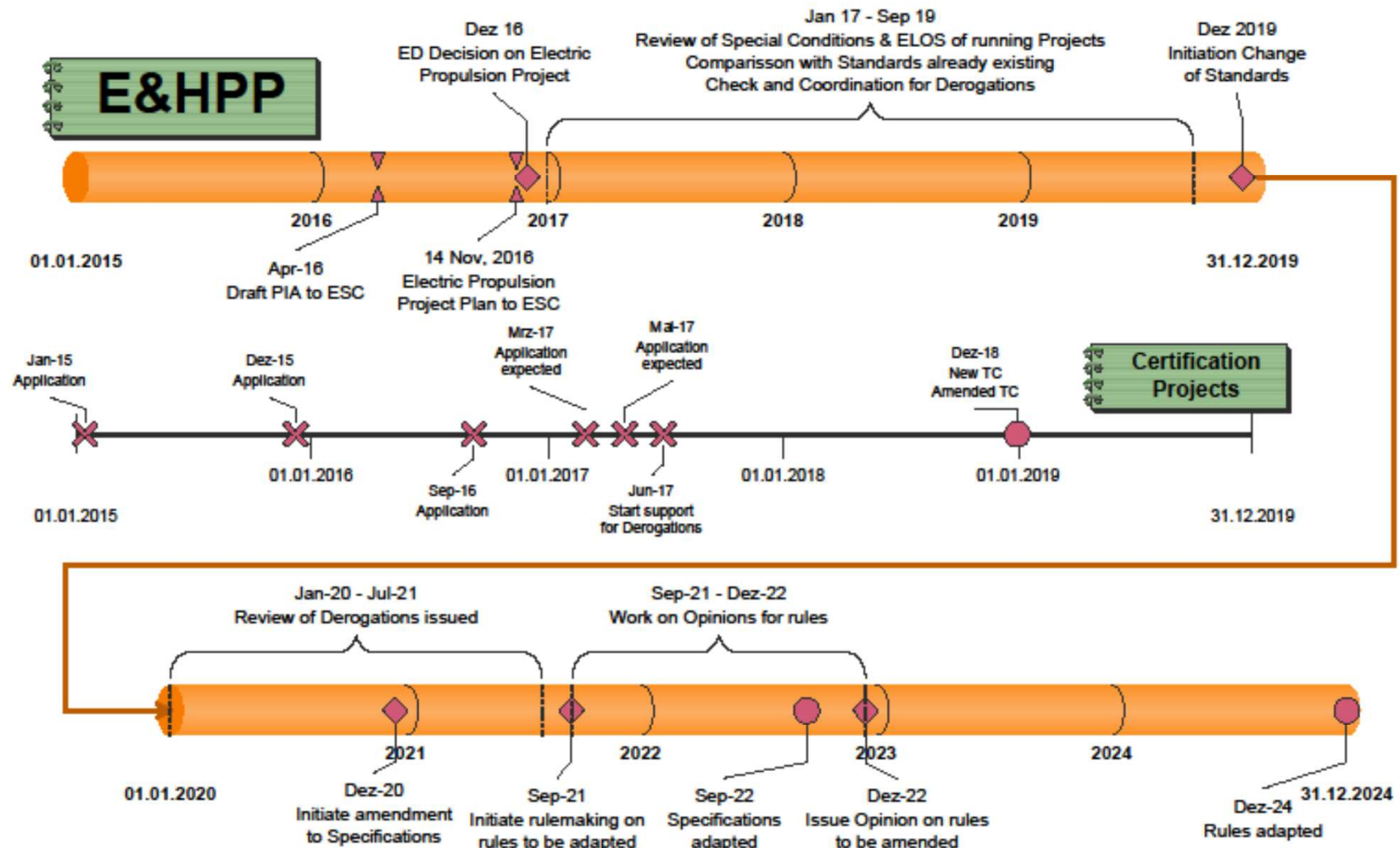
- EASA internal coordination of way forward
- Avoid limitation of technology by too early regulation
- Use built-in flexibility (SCs, ELOS, Derogations)



# EASA Electric Propulsion Project

## ➤ EASA Electric & Hybrid Propulsion Project

- EASA is currently discussing about the details of an Electric & Hybrid Propulsion Project.
- The idea is to run the E&HPP in parallel to the existing and upcoming certification projects.
- The E&HPP will:
  - collect SCs and ELOS issued for the running projects
  - support the Cert Teams in respect to coordination of SCs, ELOS and with NAAs for derogations
  - Initiate adaption of standards, Specifications and rules when a clear picture has been developed
  - Liaise between the other ongoing projects like drones , cyber security, ...
- Timeline ->





# The Research

- New technology and completely new ODM operation
- Going to check the possibilities to have research projects
  - Research on Batteries and other energy sources / storage
    - Li-Batteries
    - Flow batteries
    - Fuel Cell
  - Research on ATM / UTM
    - Airspace
    - Flight Control
    - Communication of autonomous vehicles
  - Research on Landing Patches for ODM
    - Possible areas in Europe
    - Specific needs
    - acceptability to public



# Interesting Links

- Clean Sky 2  
[https://ec.europa.eu/research/press/jti/factsheet\\_cs2-web.pdf](https://ec.europa.eu/research/press/jti/factsheet_cs2-web.pdf)
- Pipistrel HypstAir  
<https://www.youtube.com/watch?v=x1Xrr82Hbkc>
- Cooperation on Electric Propulsion Siemens - Airbus  
<http://www.reuters.com/article/us-airbus-group-siemens-hybrid-engines-idUSKCN0X411Q?feedType=RSS&feedName=technologyNews>
- Cooperation Diamond Aircraft – Siemens  
<https://www.youtube.com/watch?v=kyjTZYqchDo>
- Volocopter, first manned flight, ODM  
<https://www.youtube.com/watch?v=OazFilhwAEs>
- Airbus A<sup>3</sup> Vahana  
<https://vahana.aero/welcome-to-vahana-edfa689f2b75#.362lefqb1>
- UBER Elevate  
<https://www.uber.com/elevate.pdf>



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**Thank you for your attention!**

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**Questions?**

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