

An Innovation Approach Towards Sustainable Mobility in 2035



Introduction

Why Embraer Can Learn From Busses How to Enable Sustainable Aviation Futures

Current trends show that polluting forms of mobility are under threat, while sustainable mobility, in particular, sustainable public transport is getting supported by the government through subsidies. Meanwhile, transportation with high emissions is getting phased out, is under threat to get limited by politicians, kerosene prices are expected to get higher, and consumers partly avoid travelling with airplanes due to its polluting effects. To avoid these major threats, investments into existing sustainable forms of mobility need to be done. In particular, busses use fuel cells powered by hydrogen, which is a technology that Embraer can learn from to enable sustainable aviation in the future. Hydrogen is desirable since it is the most abundant element in the universe and the only fuel capable of enabling zero emission long haul flights in the future. The strategy is divided into three horizons that explain how Embraer can learn now from busses while making revenue through a mobility-as-a-service system that later is useful to integrate its hydrogen airplane in 2035 into the system.

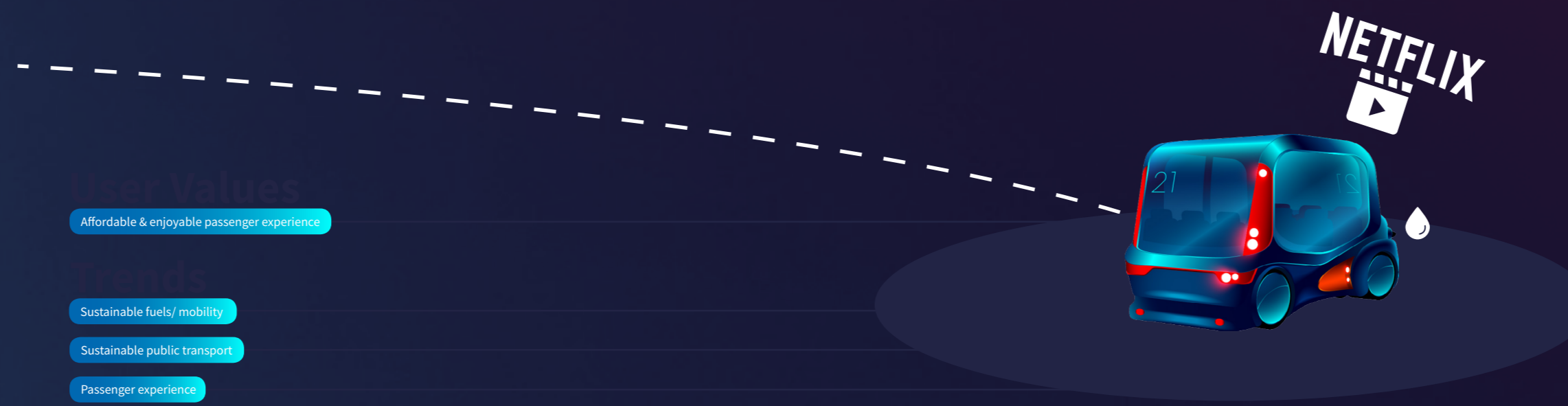
Horizon 2

Gaining Experience With Hydrogen & Convincing Stakeholders (2025-2034)

To get closer to the vision of a hydrogen airplane in the second horizon Embraer introduces its first prototype of a hydrogen airplane. For keeping the costs low an existing regional aircraft can be taken and only the propulsion system needs to be changed from a kerosene propulsion to a fuel cell powered by hydrogen. The prototype serves for two purposes: First, to gain more practical experience in the application of hydrogen technology. Second, to convince stakeholders regarding the hydrogen technology.

While the prototype is under development, Embraer further develops the MaaS system. Since especially students from university often rely on cars it should be considered to also get in touch with a car sharing service and include bus and car sharing as part of the membership programme. Also, bicycles are often used by students and should be part of the mobility membership, as well as electric or hydrogen cars. However, it needs to be considered that electric and hydrogen cars might not always be taken by the target group to avoid additional costs. Around 2025 Embraer also aims to launch its VTOL, which gets integrated into the system.

In the second horizon displays get implemented into the different modes of transport belonging to the MaaS system that do not require the passenger to drive, e.g. inside the busses, or the VTOL. The displays will make it easier to access the entertainment offer in case the passenger doesn't have a suitable device to access the offer inside the vehicle. The membership also enables having access to the entertainment offer when not being inside the vehicle, and make it therefore possible to access it as well if the passenger decides to use the car as part of the MaaS system. Through sustainable milestones the passenger gets rewarded for taking sustainable mobility choices and new entertainment features, e.g. a new series get opened up to the passenger, which otherwise would cost additional money.



- User Values**
- Affordable & enjoyable passenger experience
- Trends**
- Sustainable fuels/ mobility
 - Sustainable public transport
 - Passenger experience

Horizon 1

Collaborations & Networking - Knowledge Sharing & Learning about Hydrogen (2020-2024)

In the first horizon the core action is to start a collaboration with a bus manufacturer, which produces fuel cell busses powered by hydrogen. This way Embraer can learn more about fuel cell technology and find out what potential issues of the technology are, and reliability. A target market of hydrogen fuel cell vehicles in the US is California. Fuel cell busses have especially been introduced there (Leo & Kumar, 2015) and the state aims to have a zero emission bus fleet by 2040 (P&S market research, 2019). Equipping the busses with wifi that connects to a small entertainment offer for the students would be a value enhancement of the journey. Embraer has experience with entertainment offers through commercial aviation and can bring this value to the bus journey. As Snapchat and Netflix are one of the most popular entertainment offers for the target group, collaborations with these companies can enrich the entertainment programme and the passenger experience. Furthermore, on the starting page of the entertainment offer the passenger gets informed about the sustainability of the mode of transport in comparison to other modes of transport. This way, awareness and consciousness is raised about the sustainability of mobility.

Besides, further collaborations are initiated: the Hydrogen Council can help Embraer to get an industrial collaboration to implement later hydrogen airplanes. Governmental support helps to produce the hydrogen airplane for horizon 3.



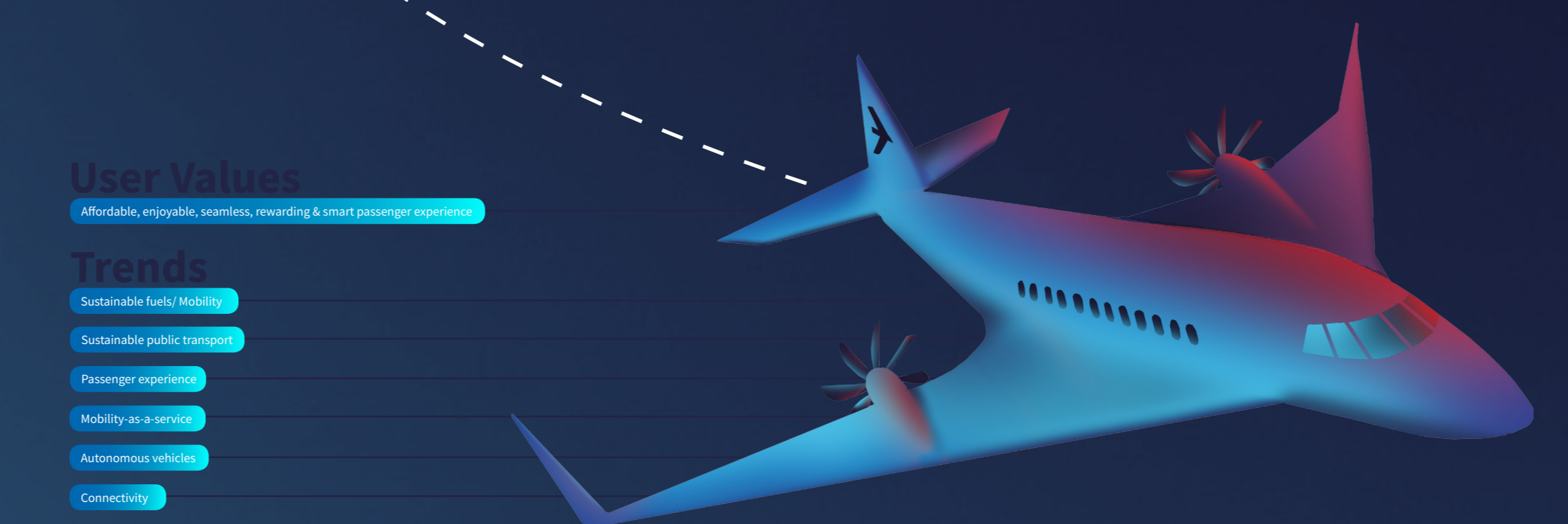
- User Values**
- Affordable, enjoyable, seamless & rewarding passenger experience
- Trends**
- Sustainable fuels/ Mobility
 - Sustainable public transport
 - Passenger experience
 - Mobility-as-a-service

Horizon 3

Smart Sustainable System Experience (2035)

Due to the preparation in the previous horizons Embraer can now introduce their first commercial hydrogen 30-seater airplane. The airplane can cover regional distances up to 2000 km. This distance covers for example the route from San Francisco to cities such as Seattle, Portland, Denver, or Las Vegas.

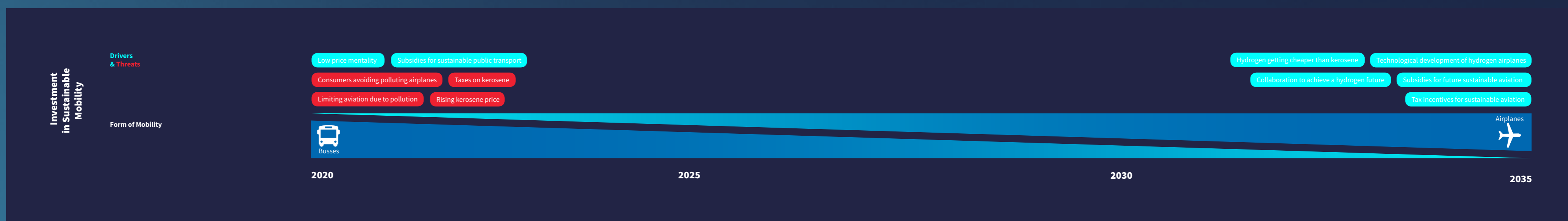
The MaaS system is now used by society, and the hydrogen airplane directly can get embedded into the MaaS system, and support a seamless and sustainable passenger experience. Autonomous vehicles and systems will be digitally connected and communicate to achieve a better connection time and a lower congestion rate.



- User Values**
- Affordable, enjoyable, seamless, rewarding & smart passenger experience
- Trends**
- Sustainable fuels/ Mobility
 - Sustainable public transport
 - Passenger experience
 - Mobility-as-a-service
 - Autonomous vehicles
 - Connectivity

Vision

We envision the vanishing of different modes of transport towards an intelligent seamless one mode transport system. Sustainable impactful and emission limiting mobility will move you to the place, where you need to be, and provides you a passenger experience that supports you in mastering your day.



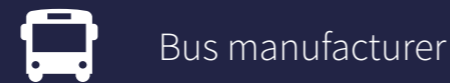
Core Values

For all Stakeholders Involved

Small descriptive texts can be found for each stakeholder. Also, boxes underneath the texts reveal further values achieved for the stakeholder. Embraer is the main stakeholder that collaborates during the first horizon with the bus manufacturer. The government supports Embraer in creating a hydrogen airplane for society in 2035. The Faculty of Industrial Design is further involved in the concept embodiment during the next year.



- Gaining strong stakeholder network
- Avoiding major threats
- Sustainable low risk strategy
- Preparing for the future
- Strengthening disruptive innovation department



- Improving bus aerodynamics
- Saving operational costs
- Improving the desirability of the bus experience
- Making the passenger's journey more seamless



- Acting against climate change
- Acting against scarcity of resources
- Providing sustainable mobility solutions for society
- Raising awareness about sustainable mobility



- Moving around with zero emissions
- Health
- Seamless mobility
- Safe mobility avoiding congestion
- Noise reduction



- Embodiment of the vision and/ or hydrogen airplane
- Awareness about what sustainable mobility includes

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