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	Dissemination level: PU	

Joint Deliverable D3.1, 3.2 and 3.3

Step by Step Road-Map, Stack Development Plan and Master Plan public summary

Grant Agreement number: 245142
 Project acronym: Autostack
 Project title: Automotive Fuel Cell Stack Cluster Initiative for Europe
 Funding Scheme: Support Action
 Project start: 01/01/2010
 Project duration: 18 months

Period covered: from January 2010
 to September 2011

Project co-funded by the Fuel Cells and Hydrogen Joint Undertaking within the Seventh Framework Programme		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the FCH JU)	
RE	Restricted to a group specified by the consortium (including the FCH JU)	
CO	Confidential, only for members of the consortium (including the FCH JU)	
EU restricted	Classified with the mention of the classification level restricted "EU Restricted"	
EU confidential	Classified with the mention of the classification level confidential "EU Confidential"	
EU secret	Classified with the mention of the classification level secret "EU Secret "	



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	Dissemination level: PU	


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1 Objective of this deliverable

This deliverable will summarize the results of work package 3 developing a step by step road map, injection points of research projects, and a master plan to set up automotive fuel cell stack commercialization.

2 Technology Roadmap

2.1 Interfaces and input

The Auto-Stack technology roadmap builds on the OEM specification and platform concept and reflects the results of the associated assessments which were described in the previous chapters. The roadmap assumes a collaborative approach of OEMs, suppliers and research partners in combination with a system integrator. The entire product development will require two product generations for reaching ultimate specification requirements.

Figure 1 below shows the overview of interfaces and inputs for the establishment of the roadmap.

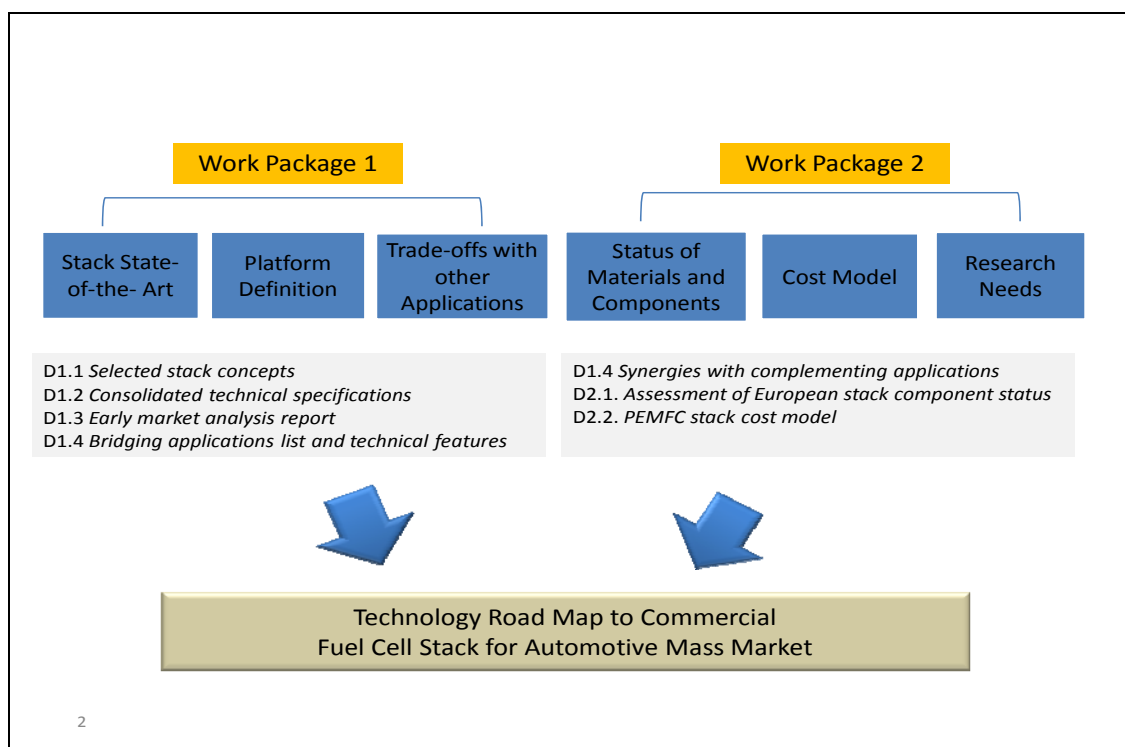


Figure 1: Overview of interfaces and inputs to the technology roadmap

3 Product development plan

The first generation stack development plan is based on today's state-of-the-art materials and components and shall provide proof of concept. It is assumed to serve volumes of a few thousand units at the maximum thus facilitating early commercialization from 2015. The development process is divided into five phases, each starting and ending with a gate. The successful passing of the gates will trigger the next phase. All phases indicate a certain focus and maturity level of the product development.

The Auto-Stack study establishes the initial milestone as prerequisite for starting the first generation stack development. The master schedule of the 1st generation development plan is displayed in Figure 2– below.

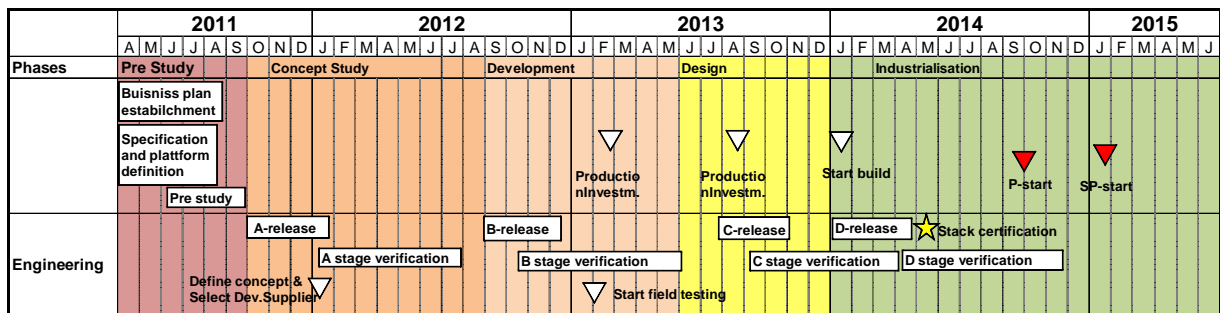


Figure 2: 1st generation development plan

The second generation product development plan is targeted to support mass production volumes > 10 000 units. It therefore has to fulfill all OEM requirements. It shall be based on advanced material and components developed in the timeframe 2011-2014 and will start with the pre-study phase from 2014 to verify and consolidate the advanced platform concept. Start of mass production is assumed for 2018. The master schedule of the 2nd generation development plan is displayed in Figure 3 – below.

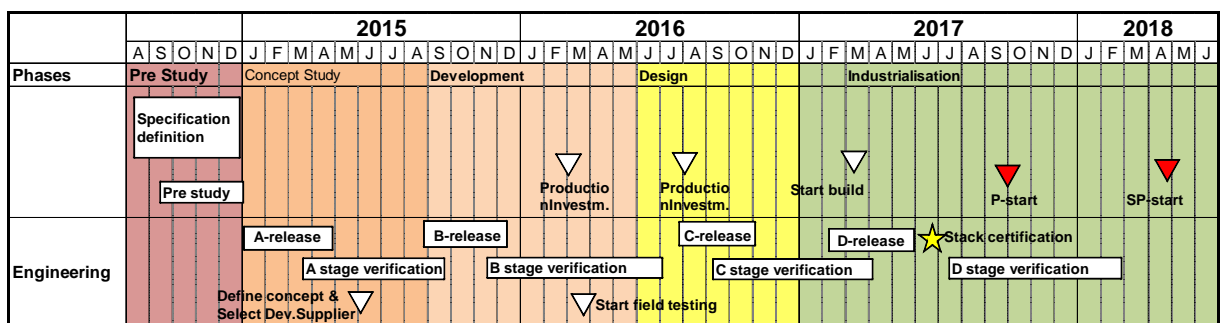


Figure 3: 2nd generation development plan

3.1 Research activities

Considerable R&D on components and materials will be needed during the 2011 to 2015 timeframe to meet the specification requirements of the phase 2 product as described above. For this, advanced component specifications were generated and injection points to the product development plan were determined to support the second generation development targets. The associated research priorities are contained in **Fehler! Verweisquelle konnte nicht gefunden werden.**, above.

The breakdown and alignment of research activities at component level and their respective timing is monitored in Table 1 below.

Stack component	2012	2013	2014	2015	2016
Bipolar plate (Gen1)					
Bipolar plate (Gen2)					
End plate Gen 1					
End plate Gen 2					
Current Collector					
MEA Gen 1					
MEA Gen 2					
GDL Gen 1					
GDL Gen 2					
Stack sealing Gen 1					
Stack sealing Gen 2					
Housing					
Insulation					
Fluent connectors					
Stack assembly Gen 1					
Stack assembly Gen 2					

Table 1: Alignment and timing of R&D activities at component level

4 Master plan

The master plan finally combines all product development and R&D activities in one consistent schedule. It delivers the integrated pathway of all development and research actions, the full product development cycle and the overall rationale of the technology roadmap. The generic master plan and product development cycle is displayed in Figure 4 - below.

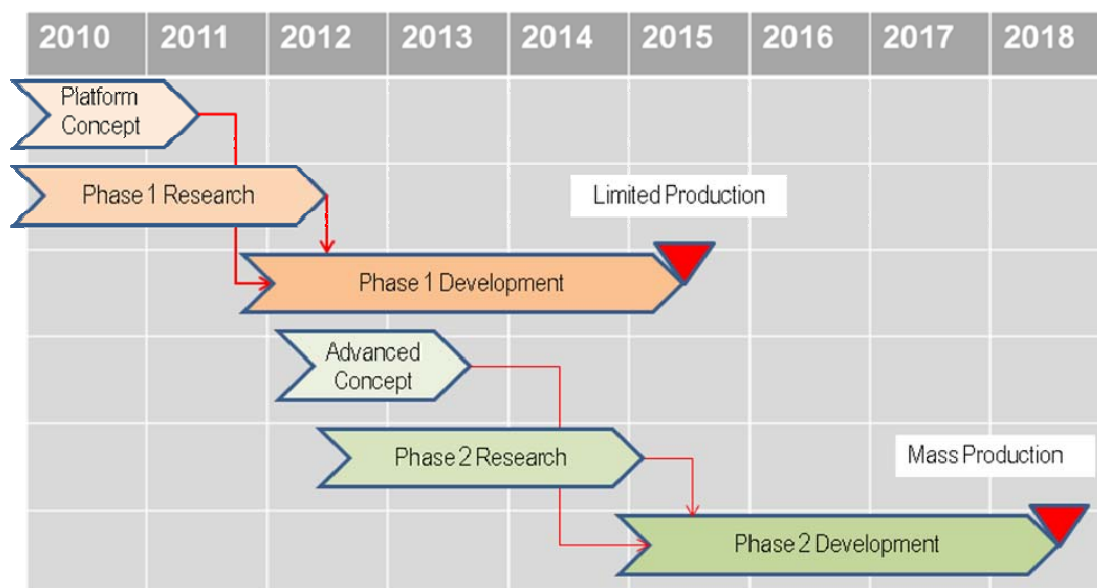


Figure 4: Master plan and product development cycle

Key milestones representing development gates towards the final objective are essential elements of the technology roadmap. While several of them were part of the scope of Auto-Stack and were consequently addressed by the project, others shall be subject of follow-up activities. Amongst them addressed in the project are: fixing specifications, application targets and goals, prioritizing technical and commercial parameters, developing trade-offs between conflicting targets, establishing the platform concept, evaluating technical synergies and developing advanced component specifications. Those milestones reserved for follow-up activities are stack development, validation and manufacturing based on the design, selection and validation of components as described in the master plan.

The technology roadmap delivers a well grounded and consistent tool, to translate the results of the study into hardware and implement the findings in real action. The roadmap provides guidance and navigation for shaping and scheduling research topics of the FCH JU research agenda and the MAIP thus supporting better focus and target orientation of research European activities.