



**Business plan for a DIN SPEC project
according to the PAS procedure on
"Liquid Organic Hydrogen Carrier (LOHC)
based on toluol - Evaluation, testing and
assurance of LOHC quality"**

**Status:
For developing after adoption**

**Requests to participate in the project and/or comments on the
business plan had to be submitted by
2020-02-03 to [amelie.leipprand @din.de](mailto:amelie.leipprand@din.de)¹**

Recipients of this business plan are requested to name all patent rights known
to them to be relevant to the project and to make available
all supporting documents.

Berlin, 21.02.2020 (Version 2)

¹ Applications for participating in the project and comments on the business plan that are not received by the deadline do not need to be taken into consideration. Once constituted, the project workshop will decide whether or not to consider the comments received in good time.

Table of contents

1. Status of the business plan	3
2. Initiator and other consortium members	3
3. Objectives of the project.....	4
4. Work programme.....	5
5. Resource planning	6
6. Rules of cooperation in the DIN SPEC (PAS) consortium.....	7
7. Contacts	9
Annex: Project schedule (preliminary)	10

1. Status of the business plan

- **For public commenting (Version 1)**

This business plan is intended to inform the public of a new DIN SPEC project. Any interested party can take part in this project and/or comment on this business plan. Please send any requests to participate or comments by e-mail to amelie.leipprand@din.de.

Once this business plan is published, the Chairman of DIN's Executive Board decides whether or not the project is to be carried out.

If the project is accepted, all those who have applied for participation or have commented on the business plan by the deadline will be invited to the kick-off meeting of the project consortium.

- **For developing the DIN SPEC (PAS) after adoption on 2020-02-13**

2. Initiator and other consortium members

- Initiator:

Person/Organization	Short description
Daniel Baschke Hydrogenious LOHC Technologies GmbH Weidenweg 13, 91058 Erlangen Tel.: +49 (0)9131-12640-271 https://www.hydrogenious.net/	

- Other potential participants:

This DIN SPEC will be developed in a consortium (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired.

- Organizations that have registered for participation:

Person	Organization
Daniel Baschke	Hydrogenious LOHC Technologies GmbH

Person	Organization
	Helmholz Institut Erlangen-Nürnberg for Renewable Energy
	FAU Erlangen Nürnberg – Lehrstuhl für Chemische Reaktionstechnik
	ARKEMA
	Eastman Chemical
Amelie Leipprand	DIN

- Organisations that have adopted this business plan (consortium members):

Person	Organization
Daniel Baschke	Hydrogenious LOHC Technology GmbH
Jérôme Blanc	Arkema
Stefan Dürr	FAU Erlangen-Nürnberg
Dr.-Ing. Patrick Preuster	HIERN
Matthias Schopf	Eastman Chemical HTF
Amelie Leipprand	DIN

3. Objectives of the project

3.1. General

Die Transformation des Energiemarkts von fossilen Energieträgern hin zu erneuerbaren Energien erfordert effiziente und langfristige Speichertechnologien zum Ausgleich der fluktuierenden Energiebereitstellung aus erneuerbaren Energien. Wasserstoff, der durch Elektrolyse aus grünem Strom erzeugt wird, stellt eine solche Speicherform dar. Mit Hilfe der LOHC-Technologie ist es möglich, Wasserstoff mit Hilfe eines chemischen Prozesses sicher an eine Trägerflüssigkeit zu binden und unter Umgebungsbedingungen (Umgebungstemperatur und -druck) zu lagern und zu transportieren.

Bisher gibt es im Bereich der Toluol-basierten LOHC-Technologie keine allgemeinen Standards, Regeln oder Leitlinien zur Beurteilung der Qualität der Trägermaterialien und für deren fachgerechten Umgang. Die Ziele dieser DIN SPEC sind daher:

- Festlegung der Eigenschaften der Trägermedien im frischen und im mit Wasserstoff beladenen und unbeladenen Zustand sowie Zwischenzuständen
- Definition von Testmethoden zur Bestimmung der LOHC-Qualität
- Definition von Prüfkriterien zur Kontrolle der LOHC-Qualität
- Beschreibung der optimalen Handhabung von LOHC in den Bereichen Transport und Lagerung.

3.2. Planned scope

This DIN SPEC will specify requirements for the properties of toluene-based LOHC carrier fluids, together with the appropriate test and inspection procedures. The DIN SPEC will be applicable to the use of toluene-based compounds serving as liquid organic hydrogen carriers for the purpose of storing hydrogen. It will also give guidance on handling toluene-based LOHC carrier fluids in the context of transport and storage.

3.3. Related activities

The subject of the planned DIN SPEC is not at present the subject of a standard. However, there are bodies, standards and/or other technical rules that deal with related subjects and thus need to be taken into account - and involved or incorporated, where necessary - during this project:

- none

4. Work programme

4.1. General

The aim of the project is to develop a DIN SPEC according to the PAS procedure ("DIN SPEC (PAS)") (see www.din.de/go/din-spec-en). The DIN SPEC shall be consistent with the body of German standards and shall not contradict any DIN Standard.

The kick-off meeting took place on 2020-02-13 in Erlangen. The project duration will be about 6 months.

At this meeting, the consortium for developing the DIN SPEC was constituted, and further organizational issues and the subject of the work have been agreed on.

A draft for public commenting will not be published.

2 additional project meetings will also be held and 2 web conferences are planned, during which the content of the DIN SPEC will be presented, discussed and adopted. The content of the DIN SPEC can also be drawn up by individual consortium members or in working groups.

Dates of further meetings and/or web conferences are to be agreed on within the consortium in consultation with DIN.

The DIN SPEC will be drawn up in English (language of meetings, minutes, etc.). The DIN SPEC will be prepared and published in English.

NOTE The calculation covers only one language version. Please keep in mind the fact that other language versions involve additional expenses; for this reason, they shall be agreed on separately. If another language version is desired, Beuth Verlag/DIN can provide a translation. Requests for translations are to be submitted after the DIN SPEC manuscript has been adopted for publication.

5. Resource planning

Each consortium member shall bear the costs of participation in the project.

If the DIN Executive Board approves the project, the initiator of the project will then conclude a contract with DIN and Beuth Verlag.

The performance of this project will incur costs for DIN to a total of 24.734 EURO, excluding VAT.

Sharing the burden of these costs is a prerequisite for membership in the consortium.

By approving this business plan, consortium members declare their willingness to bear their share of the project costs, which is based on the number of consortium members.

Each consortium member is to declare this willingness to take on his/her share of costs by individual agreement with the initiator.

If the consortium is expanded later, the additional consortium members shall pay the initiator the same fee to cover costs as the original consortium members. Any surplus arising from this shall be managed in trust by the initiator and shall be used for any additional project-related purposes (e.g. testing, marketing activities, etc.). Should there still be a surplus once the project has been completed, this shall be divided up among all consortium members.

6. Rules of cooperation in the DIN SPEC (PAS) consortium

This project is governed by the rules of procedure for developing DIN SPEC PAS. All interested parties and consortium members are to inform themselves of these procedures by going to www.din.de/go/din-spec-en.

The consortium will be constituted during the course of the kick-off meeting. The kick-off meeting will not take place until the business plan has been published and approved by DIN's Executive Board. The consortium shall comprise at least three members from different organizations². It is not necessary that these members come from different areas and represent different stakeholders. By approving this business plan, the interested parties declare their willingness to participate in the consortium and will be formally named as consortium members, with the associated rights and duties. Participants at the kick-off meeting who do not approve the business plan are not given the status of a consortium member and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the project.

If an organization (e.g. an association) sends someone who is not an employee to the consortium, this person shall be authorized by the organization, who shall provide proof of this to DIN.

Each consortium member is entitled to vote and has one vote. If an organization sends several experts to the consortium, that organization has only one vote, regardless of how many consortium participants it sends. Transferring voting rights to other consortium members is not permitted. During voting procedures, decisions are passed by simple majority, not counting abstentions.

As a rule, the consortium is closed once it is constituted. The current consortium members shall decide whether any additional members will be accepted or not.

During the kick-off meeting, the consortium members shall elect a consortium leader, who is responsible for content management and any decision-making and voting procedures. The leader is supported by the responsible DIN Project Manager, whereby DIN will always remain neutral regarding the content of the DIN SPEC. Furthermore, the DIN Project Manager shall ensure that DIN's rules of procedure, rules of presentation, and the principles governing the publication of DIN SPEC have been observed. Should a consortium leader no longer be able to carry out his/her duties, the DIN Project Manager shall initiate the election of a new leader. The core task of the consortium leader is content management.

² Organizations are participating legal entities that send the experts to the DIN SPEC PAS consortium and are assigned to a corporate structure as defined by § 15 of the German Stock Corporation Act or § 271 paragraph 2 of the German Commercial Code.

The DIN Project Manager is responsible for organizing and leading the kick-off meeting, in consultation with the initiator. Further project meetings and/or web conferences shall be organized by the DIN Project Manager in consultation with the consortium leader.

If consortium members cannot be present when the DIN SPEC or its draft is adopted, an alternative means of including them in the voting procedure shall be used (e.g. in writing, electronically).

All consortium members who voted for the publication of the DIN SPEC or its draft will be named as authors in the Foreword, including the organizations which they represent. All consortium members who voted against the publication of the DIN SPEC or its draft, or who have abstained, may not be named in the Foreword.

The previous consortium members decide on a subsequent extension of the consortium. It is particularly important to note that

- a) the enlargement is conducive to shortening the duration of the project or to avoiding or averting an imminent delay in the planned duration of the project;
- b) the extension does not lead to an impending extension of the duration of the project;
- c) c) the new consortium member does not address any new or complementary issues beyond the scope of application defined and approved in the business plan;
- d) the new consortium member brings complementary expertise to the consortium in order to bring in the latest scientific knowledge and state of the art;
- e) the new consortium member actively participates in the manuscript work by submitting concrete but not abstract proposals and contributions.
- f) f) the new consortium member ensures an increased application of DIN SPEC.

To allow the legal reproduction and distribution of results for the purposes of project work, the consortium members grant DIN rights of use on the basis of the copyright that will accrue to them for the results of their work on the DIN SPEC. The transfer of these utilization rights does not prevent the consortium members from using and further developing the knowledge, experience and findings they bring to the project.

Consortium members are requested to inform DIN of all patent rights known to them to be relevant to this DIN SPEC project.

Subsequent changes to the scope of application (Section 3.2) or to the resource planning (Section 6) require, in addition to a two-thirds majority of all votes cast, the approval of DIN.

7. Contacts

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Annex: Project schedule (preliminary)

DIN SPEC project	2019	2020											
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Initiation													
1. Request and review													
2. Business plan drawn up													
3. Publication of business plan													
Development phase													
4. Kick-off meeting / consortium constituted													
5. DIN SPEC (PAS) drawn up													
6. DIN SPEC (PAS) adopted by consortium													
Publication													
7. Review and release by DIN													
8. Publication of DIN SPEC (PAS)													
Milestones													

- K** Kick off
M Project meeting
W Web conference
A Adoption of DIN SPEC (PAS)