Deliverable D8.2 / D8.4
Quality Assurance and Risk management Plan

Document information

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Task description and objectives

T8.3 Risk assessment and contingency planning (Duration: M1 – M48; Responsible partner: TNO; Participating partners VITO, AVT, SIE, RCH)

This task includes the management of the risks in the project: financial, organizational and managerial risks. For this, at the start of the project, a risk management plan will be defined and used in the risk management of the project. At every GA meeting, this plan will be reviewed and updated, including the necessary mitigation measures, so that risks are continuously managed in the most effective way and new risks are identified while they can still be mitigated. The risks and management thereof will be reported as part of the progress reports towards the EC.

Approach for risk management

A risk management approach will be followed according to best practises of project management. In general, risk management is the identification, evaluation, and prioritization of risks followed by coordinated and efficient application of resources to minimize, monitor, and control the probability or impact of unfortunate events or to maximize the realization of opportunities.

At the start of the project a risk table has been compiled listing the possible risks per workpackage in terms of likelihood to occur (on a scale of 1-5) and the impact (on a scale of 1-4) when the risk occurs. The multiplication of likelihood and impact gives a number for the severity of the risk on a scale of 1-20. The risks with the highest severities have high priority and thus deserve close monitoring. Risk mitigation options have been identified and listed in the table. The updated table for M6 of the project is duplicated at the end of this document.

The risk table will be evaluated and updated at least every 6 months and the high priority risks discussed in the consortium meetings. WP leaders have the responsibility to monitor and assess the risks of their workpackage regularly and inform the coordinator about any changes. Different situations can occur which require a different approach to minimize the impact:

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1) A **new risk** is identified and added to the risk table. Information needed:
   a) what is the expected likelihood
   b) what is the expected impact
   c) what mitigation measures are in place or need to be in place
2) A formerly identified **risk has occurred**. This has to be resolved as soon as possible to minimize the impact on the project and its deliverables. Mitigation options have already been identified in the risk table.
   a) The WP leader may take the proper measures to mitigate the risk and report to the consortium.
   b) if the risk could not be mitigated by the WP leader, escalate to the consortium and ask for help from the coordinator to resolve the issue, possible by initiating a change to the project via an addendum
3) An **unexpected event** not formerly identified as risk has been occurred with possible impact to the project and its deliverables.
   a) The WP leader and coordinator are to assess the risk potential in terms of impact and severity and identify possible mitigation options. Report to the consortium. Then follow the same approach as for 2).

Risk monitoring – M6

The risks have been discussed and reviewed in the M6 consortium meeting. No new risks have been identified and no risks have occurred yet. However, based on preliminary information, the coordinator has decided to increase the likelihood of risk #8.4.

Risk monitoring summary – M6-M30

The main risk that occurred after M12 was an external and unexpected event - the occurrence of the COVID pandemic. This lead to laboratories being closed or on lower capacity. Less work than planned could be done and especially the availability of new catalyst materials was lower than expected. As of Q1 2021 the main impact of COVID for the project can be mitigated by asking for an extension of the project and focus on the key technologies. However the likelihood of occurrence of all risks related to the performance of the pilot platform have been increased.

Another risk that occurred was the bankruptcy of partner GENSORIC. The risks associated with the work of GENSORIC are risk 2.2 and risk 2.3. After careful examination of the scope and technology that would not be implemented, it was proposed to use the available budget to focus on the remaining key technologies, improve the pilot equipment and as such reach the process intensification goals in a different way. This change will be implemented with Amendment 2, at M30 in progress. Risks 2.2. and 2.3 have been removed.

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The risk table is shown below, it has been updated and is stored on the project SharePoint, accessible by all consortium partners.

Risk table updated M30

#	Description of risk	WP	Likelihood (1-5)	Impact (1-4)	Severity (1-20)	Proposed risk-mitigation measures
1.1	Feedstock characterization indicates that a lot of pretreatment is needed	1	1	3	3	Early assessment of important process parameters incl. feedstock composition
2.1	Catalyst stability insufficient	2	2	3	6	Increase efforts; use INSTM and AVT extensive experience in catalyst development
2.4	unexpected behaviour of the underlying electrochemical reactions (Line-2)	2	1	3	3	Redesign / analysis of chemical reactions underway.
2.5	Low productivity in the electrochemical (de)-oxidation	2	3	3	9	A good catalyst for one of the research lines has not been found yet, also related to the fact that the material development has been delayed due to COVID. Investigate alternative (chemical) oxidations and materials.
2.6	Low Faradaic efficiency in the electrochemical hydrogenation	2	3	3	9	Improve electrocatalyst design and loading, to reduce overpotential and reduce H_2 side formation; optimize reaction conditions to reduce side H_2 formation; recycle H_2 formed
2.7	No selective routes to hydrogenation products can be identified	2	3	3	9	The SoA is already a good indication that sufficiently selective routes can be developed. But since the aim is to improve above the SotA, see also risk 2.5 and 2.6.
3.1	Reactor design doesn't match all requirements	3	2	4	8	Make Design Note before going into the engineering phase. Two flow-chambers will be designed, one for plate & mesh type of electrodes (suitable fro Line 1) and one for felt electrodes (suitable for line 2)
3.2	Product separation is very difficult or not possible	3	1	2	2	Likelihood decrease, since lab scale product separation technology has been tested and demonstrated. It has been shown, separation of all products is possible. However, energy consumption needs to be assessed.
3.3	Product separation is very energy intensive	3	2	2	4	Investigate alternative technologies; look at options where renewable electricity can be used directly
4.1	Delay in equipment procurement, subsequent delays in erection and commission, shortage of test campaign	4	3	2	6	Project extension requested, early identification of delays, quick communication with the suppliers to search for possible solutions.
4.2	HSE incident during testing on site; personal injuries, environmental damage, material damage	4	1	4	4	A HSE plan and a HAZOP (Hazard and Operability Analysis) should be part of experimental test. HSE measures on site are the responsibility of the site owner
4.3	Insufficient data to start engineering	4	2	2	4	Constant monitoring by TNO as WP leader and scientific coordinator. For the pilot, HYS will be active to ask for the needed information.
4.4	Performance of PowerPlatform insufficient	4	3	3	9	Constant monitoring during first 24-36 months to identify critical elements and increase efforts where needed; more efforts during testing, again to identify critical elements
5.1	Quantified impact lower than targets	5	2	2	4	Perform a component analysis to identity critical elements; Constant monitoring during the project to early identify key elements that might cause problems; Evaluate alternative strategies to reach the expected impact
5.2	No data available for developing LCA, LCC, from certain processes	5	1	3	3	The needed data will be collected by means of surveys, interviews industrial partners and getting data from literature; the coordinator will actively involve all partners and make sure this is a joint effort of the consortium
5.3	Not enough kgs for large scale product testing	5	4	1	4	Perform characterization on smaller samples; combine batches from various runs. Use mock-up feedstocks.

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5.4	KPIs (technical, environmental or economic) do not comply with the objectives of the project.	5	**2**	**3**	**6**	Early screening analyses shall flag potential obstacles for reaching set goals; readjustment of research plan, if needed to meet goals
6.1	higher production costs than expected	6	**2**	**2**	**4**	Early contact with industrial panel partners to discuss hardware-development
7.1	Appearance of substitute technologies better than those targeted	7	**1**	**3**	**3**	Within WP7 the reference technology scenario will be continuously monitored so as to take critical decisions in terms of technology substitution is taken as soon as possible;
7.2	Dissemination activities not effective	7	**1**	**2**	**2**	Adopt measure and indicators to monitor the dissemination activities; periodic review and updating of dissemination plan;
7.3	Training activities not effective	7	**1**	**2**	**2**	Adopt measure and indicators to monitor the training activities; periodic review and updating of training plan;
8.1	"Management Risk" – if tasks are not scheduled properly	8	**1**	**2**	**2**	Stimulate WP leader responsibility to analyse WP progress; earlier report to Scientific Management actions to correct deviations; intensify project monitoring.
8.2	Partner fails to deliver work according to proposal	8	**1**	**3**	**3**	Periodic web-based analysis of project progresses (with respect to schedule) by Coordinator in collaboration with Project Management; increase involvement of WP Leaders in project monitoring; shift part of the work to other beneficiaries
8.3	Partners do not share important IP	8	**2**	**2**	**4**	Implement specific procedures in Consortium Agreement and project management for IPR; introduce IP Agreement identified as critical path item before the project; constant monitoring by EIC, led by experienced members, of IP aspects
8.4	Partner goes bankrupt or withdraws / Part of the business interested in this project is sold up	8	**3**	**3**	**9**	GENSORIC did go bankrupt but corrective measures in place (Amendement 2). No additional partners facing critical financial problems are involved. Consortium membership offers some opportunity not to be too reliant on one partner. In the event of a key partner dropping out a contract amendment after negotiation with the EC will be necessary in order to establish a replacement.
8.5	COVID pandemic leads to delays	ALL	**4**	**3**	**12**	Extension of project has been requested. Plan and duration of tasks has been changed in AM2 to accommodate for delays and slower progress.
8.6	COVID pandemic leads to not reaching project objectives or envisioned impact	ALL	**2**	**4**	**8**	In AM2 work has been planned over longer durations to accommodate for e.g. not able to work or having less capacity in the lab available.
8.7	COVID pandemic leads to higher costs to reach the objectives because project runs over longer time period	ALL	**2**	**4**	**8**	To reach the objectives and staff a longer running project, additional funding might be needed which is difficult to be acquired. Impact for partners overrunning budgets is high. Use funding of bankrupt partner GENSORIC to focus on key technologies.

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