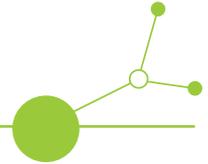


Activity 3.1 Stakeholder analysis



Version 1
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IMPRINT

PROJECT DETAILS

Project title	Hydrogen integration for efficient renewable energy systems
Acronym	HyEfRe
Programme	Interreg Central Europe Programme
Programme priority	Cooperating for a greener Central Europe
Programme priority Specific objective	Supporting the energy transition to a climate neutral Central Europe
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Lead partner	www.interreg-central.eu/projects/hyefre/
Project ID	CE0200523

SHORT DESCRIPTION

Sector-coupling is a promising approach to replace fossil fuels with renewables. However, this idea of “electrifying” the entire economy requires the rollout of new technologies and rules. The HyEfRe project helps with this by establishing green hydrogen ecosystems in eight regions. Partners will foster an investment-friendly environment for renewable energy and green hydrogen technologies. They evaluate hydrogen potentials with a new model and develop and test a new tool to calculate ideal parameters for technical plants. Their action plan for policy actors will reduce regulatory barriers impeding a timely expansion of renewables and green hydrogen.

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1. Introduction

The **HyEfRe** project (Hydrogen Integration for Efficient Renewable Energy Systems) addresses the urgent challenges of integrating and balancing fluctuating renewable energy sources, such as wind and photovoltaic power, in the energy systems of Central Europe. These challenges are compounded by suboptimal energy efficiency, high energy prices, and the continued reliance on carbon-intensive energy production methods, which contribute significantly to climate change. HyEfRe leverages green hydrogen as a pivotal enabler of sector coupling, presenting an innovative solution to mitigate these systemic issues and accelerate the transition towards a climate-neutral energy infrastructure.

A central aim of HyEfRe is to develop and implement tools and methodologies that optimize the integration of hydrogen into renewable energy systems. By utilizing waste heat and enhancing grid balancing, the project seeks to maximize energy efficiency and system reliability. These innovations will be validated through pilot actions that test the technical, economic, and operational feasibility of hydrogen integration within diverse use cases. Additionally, HyEfRe will design a comprehensive decision-support tool for investors, enabling economically viable planning of hydrogen technologies, such as grid-balancing electrolysers and storage systems. Another key aspect of the project is the identification and mitigation of regulatory and legal barriers that hinder the widespread adoption of hydrogen technologies. It will engage policymakers through the development of action plans aimed at improving the legislative and economic framework conditions for renewable energy and hydrogen technologies. Social acceptance, often a significant barrier to implementing novel energy solutions, will be proactively addressed through tailored engagement strategies that account for country- and stakeholder-specific contexts.

The expected outcomes of HyEfRe include the establishment of regional hydrogen ecosystems that serve as blueprints for scalable and replicable solutions. By fostering transnational cooperation, the project will accelerate the local and regional learning curves necessary for effective hydrogen integration. This collaborative approach is underpinned by a multidisciplinary consortium comprising research institutions, energy and regional development agencies, and small- and medium-sized enterprises with expertise in hydrogen integration, modeling, legal and economic assessment, and stakeholder engagement. Through its holistic and innovative framework, HyEfRe aims to not only contribute to the timely energy transition but also generate significant socioeconomic benefits, including the creation of decentralized jobs, the promotion of regional prosperity, and the enhancement of Europe's global leadership in renewable energy technologies.

A cornerstone of the HyEfRe project is the **comprehensive stakeholder analysis** conducted across eight partner countries: Germany, Austria, Poland, Slovenia, Italy, Hungary, the Czech Republic, and Croatia. This analysis was important to identifying the roles, influence, importance, and attitudes of key stakeholder groups involved in hydrogen project development. By focusing on critical aspects such as stakeholder roles, perceived importance, and influence, the analysis provided a detailed understanding of the stakeholder landscape, ensuring targeted engagement strategies and maximizing project alignment with stakeholder needs. These findings are not only essential for shaping the regulatory, technical, and social dimensions of hydrogen integration but also form the foundation for the successful establishment of regional hydrogen ecosystems.

The report is structured as follows. First, Chapter 2 describes the research methodology and explains the stakeholder analysis as the tool towards the establishment of green hydrogen ecosystems. Chapter 3 presents the results of the stakeholder analysis, focusing on roles, influence, perceived importance, attitudes and the final priority assessment. Finally, Chapter 4 summarizes the key findings, discusses their implications and describes potential measures as well as recommendations.



2. Methodology

2.1. Stakeholder analysis

Stakeholder analysis is a structured approach to identifying, understanding and engaging individuals, groups, or organizations that have an interest in or influence over a project, policy, or initiative. Originally developed within strategic management, the methodology has gained prominence across diverse fields, including public policy, health care management, and development planning. Its widespread adoption reflects an increasing recognition of the critical role stakeholders play in shaping the outcomes of complex projects and policies through their interests, power and interconnections [1].

The primary objective of stakeholder analysis is to enhance decision-making by systematically examining who the stakeholders are, what their interests and attitudes are, and how their influence can be leveraged or managed [2]. By gaining insights into these dynamics, decision-makers can align project goals with stakeholder needs, mitigate potential conflicts, and foster cooperation. This is particularly relevant in initiatives where technical, social, and political dimensions intersect, such as renewable energy projects, public health interventions, or policy reforms [3], [4].

Stakeholder analysis begins with the identification of all relevant stakeholders, ranging from directly involved actors, such as government agencies and companies, to indirectly affected groups, including local communities, advocacy organizations, and the media [2]. Comprehensive mapping ensures that no critical stakeholder is overlooked, particularly in projects involving multiple sectors or geographies. Once identified, stakeholders are typically categorized based on their level of interest, influence, and power. Key stakeholders with high power and interest are usually prioritized for direct involvement, while others may be engaged through targeted communication or consultation. An essential aspect of stakeholder analysis is understanding the roles stakeholders play and their attitudes toward the initiative. Stakeholders may act as supporters, opponents, critics or neutral observers, depending on how their goals align with the objectives of the project.

The final step in stakeholder analysis involves designing and implementing engagement strategies based on the insights gathered. These strategies aim to build alliances, address concerns, and ensure that stakeholders are actively involved in or supportive of the initiative. Engagement methods can range from participatory workshops and surveys to regular updates and targeted consultations. A successful stakeholder analysis ensures that diverse perspectives are incorporated into decision-making processes, fostering transparency, trust, and long-term sustainability [3].

As part of Task A3.1 in the HyEfRe project we conducted a stakeholder analysis to understand and engage key actors critical to hydrogen integration across Central Europe. The analysis focused on identifying stakeholder roles, attitudes, influence, and power, providing a foundation for an effective engagement and collaboration.

2.2. Stakeholder Analysis in the HyEfRe Project

2.2.1. Sample

The stakeholder analysis was conducted in eight participating countries: Germany, Austria, Poland, Slovenia, Italy, Hungary, Czech Republic, and Croatia. The scope included stakeholders across the hydrogen value chain, including production, storage, distribution, and consumption. A total of 45 stakeholders were identified within these six sectors across the eight countries. The stakeholder identification process was supported by the expertise of local consortium members and their networks. This ensured that the selected



stakeholders represented a comprehensive cross-section of those influencing or impacted by hydrogen ecosystem development. These stakeholders were grouped into six main categories:

- **Administration:** National and regional bodies responsible for policy implementation.
- **Politics:** Representatives involved in shaping hydrogen and energy policies.
- **Economic Players:** Companies active in energy and hydrogen-related industries.
- **Associations and NGOs:** Organizations advocating for renewable energy and hydrogen.
- **Press and Media:** Entities shaping public awareness and opinion.
- **Civil Society:** Community groups, end-users, and other societal actors.

2.2.2. Survey Design and Implementation

The analysis was based on a standardized survey developed to capture key aspects of stakeholder perspectives. The survey focused on the role, attitude, influence and importance of the respective stakeholder.

The dimension role examined the level of stakeholders' involvement in hydrogen projects, categorizing them along a spectrum from active participants—such as project developers or regulators shaping the direction of hydrogen initiatives—to passive observers, who may be indirectly affected or hold minimal direct engagement with the projects. Understanding the distribution of roles helped clarify which stakeholders are instrumental in driving hydrogen integration and which require targeted outreach to increase their engagement.

The survey assessed stakeholders' overall attitude toward hydrogen projects, identifying them as supporters, opponents, critics or neutral observers. This evaluation provided critical insights into potential resistance or support to hydrogen technologies. Supporters typically included stakeholders with aligned interests or benefits in hydrogen initiatives, while opponents might represent groups facing challenges or uncertainties regarding hydrogen adoption. Neutral stakeholders, on the other hand, presented opportunities for further engagement to sway their position positively.

The dimension influence focused on the ability of stakeholders to shape the outcomes of hydrogen projects through their actions, networks, or advocacy. Influence was defined by a stakeholder's capacity to drive or hinder progress based on their position, resources, or relationships. Key influencers often included policymakers, industry leaders, or prominent advocates whose involvement could significantly impact the adoption and public perception of hydrogen technologies. By mapping the level of influence among stakeholders, the survey identified those who could act as catalysts for positive change or, conversely, as barriers to project success.

Interest examined the degree to which stakeholders were invested in or concerned with the outcomes of hydrogen projects. Stakeholders with high interest typically view the projects as directly relevant to their goals, priorities, or values, leading to active engagement or opposition based on their alignment with project objectives. Conversely, stakeholders with low interest tend to show limited engagement or awareness, offering an opportunity to raise their involvement through tailored communication and awareness strategies. Understanding the level of interest allowed the project team to anticipate the extent of stakeholder engagement and develop interventions to foster alignment with project goals.

The online-survey was distributed to the identified stakeholders in each participating country. Local consortium members facilitated the process, ensuring the survey's relevance to regional contexts while maintaining its standardized structure.



2.2.3. Outcomes and Analysis

The stakeholder survey achieved a response rate, with 71 completed surveys collected from participants across the eight countries involved in the project. This outcome, detailed described in chapter 3, underscores the significant engagement of participants with the project's objectives and highlights the high level of collaboration within the HyEfRe consortium. The strong participation rate reflects not only the relevance of hydrogen-related initiatives to diverse regional and sectoral actors but also the effective coordination and commitment of the project partners. By leveraging their networks and ensuring that the survey reached the appropriate stakeholders, the consortium facilitated broad engagement, demonstrating the value of collective effort in addressing complex, transnational issues.

By focusing on stakeholders' roles, attitudes, and power dynamics, the analysis provided a detailed understanding of the landscape shaping hydrogen integration in Central Europe. This approach supports HyEfRe's goal of fostering effective stakeholder engagement and advancing the adoption of hydrogen technologies across diverse regions.



3. Results of the stakeholder analysis

The stakeholder analysis for the establishment of green hydrogen ecosystems in the course of **HyEfRe** was carried out specifically for the eight regions of the project partners in Germany, Austria, Croatia, Czech Republic, Hungary, Italy, Poland and Slovenia. The process of identifying stakeholders relevant for the analysis resulted in a list of in total **45 stakeholders** assigned to six predefined categories, with the following numbers of stakeholders: **administration (5), politics (4), associations and NGOs (5), economic players (20), press and media (5), and civil society (6)**. Table 1 shows the final list of all identified stakeholders.

Table 1: Number and name of stakeholders per category

Administrations and Authorities		Economic Players	
Ad1	Administrative bodies and competent authorities	Ec1	Renewable energy producers
Ad2	National trade and economic association	Ec2	Fossil energy producers
Ad3	Central environmental authority	Ec3	Hydrogen and hydrogen derivatives producers
Ad4	Labour Unions	Ec4	Natural gas producers
Ad5	Science & Education	Ec5	Biogas producers
Politics		Ec6	Small storage operators
Po1	European Commission	Ec7	Small-scale storage operators
Po2	National government	Ec8	Large-scale storage operators
Po3	Regional government	Ec9	Electrical grid operators
Po4	Local government	Ec10	Gas network operators
Associations and NGOs		Ec11	Iron and steel industry
As1	National climate associations	Ec12	Transportation terminal operators
As2	Nature conservation associations	Ec13	Industry
As3	National energy agencies	Ec14	Refineries
As4	National hydrogen associations and alliances	Ec15	Suppliers of hydrogen and renewable technologies
As5	National gas and water associations	Ec16	Suppliers of fossil technologies
Civil Society		Ec17	Trading companies
Cs1	Endconsumers (households)	Ec18	Rail transport companies
Cs2	General public (nationwide)	Ec19	Maritime transport companies
Cs3	Regional public	Ec20	Aviation transport companies
Cs4	Local public	Press and Media	
Cs5	Neighbours	Pr1	Scientific journals
Cs6	Property owners	Pr2	Professional hydrogen & energy magazines
		Pr3	Nationwide and regional newspapers
		Pr4	Private media
		Pr5	Radio & TV channels

In the subsequent stakeholder evaluation process, a total of **71** participants from the project consortium as well as the individual partner countries contributed with their individual assessments on all listed stakeholders to the generation of results. The aim was to receive at least 8 responses per country from the following categories: Consortium member, Energy provider, National/regional hydrogen or renewable energy associations, National/regional politics and National/regional administrative bodies or competent authorities. Subsequently, the received ratings were included in equal parts in the overall statement by forming an average value.



The table below shows the responses per country for a transparent presentation of the data. This shows which sectors from which country took part in the stakeholder analysis.

Table 2: Breakdown of responses by country

Country	Consortium member	Energy provider	National and regional administrative bodies or competent authorities	National and regional hydrogen or renewable energy associations	National and regional politics
Austria	3	2	2	1	1
Poland	4	1	1	2	2
Hungary	3	1	1	1	1
Croatia	2	1	1	2	2
Italy	4	1	2	1	1
Germany	3	2	2	2	1
Slovenia	4	1	1	1	3
Czech	3	1	1	1	1

In the following sections of the **HyEfRe** stakeholder report, the results of the assessment towards the role, attitude as well as influence and importance are shown.

3.1. Role of the stakeholders

As a first step the role of the stakeholders towards the establishment of green hydrogen ecosystems in the eight regions was done regarding ‘active’ or ‘passive’.

3.1.1. Result per category: Administrations

The category ‘Administrations’ consists of in total 5 stakeholders and Figure 1 shows the results regarding the role evaluated by experts.

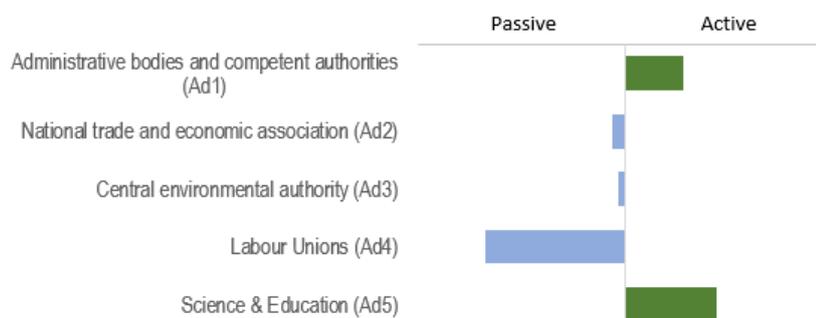


Figure 1: Role of stakeholders in administrations (n=71)

The results show with ‘Administrative bodies and competent authorities (Ad1)’ and ‘Science & Education (Ad5)’ two stakeholders with an active role towards the establishment of green hydrogen ecosystems. In



addition, on the opposite side, the stakeholder ‘Labor Unions (Ad4)’ is evaluated with a strong passive role. Overall, the passive stakeholders dominate this group.

3.1.2. Result per category: Politics

The category ‘Politics’ consists of in total 4 stakeholders and Figure 2 shows the results regarding the role evaluated by experts.

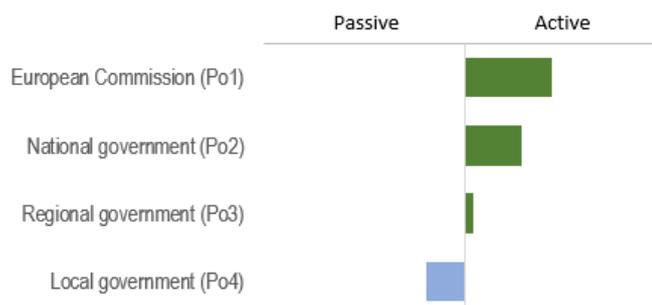


Figure 2: Role of stakeholders in politics (n=71)

The results show with the ‘European Commission (Po1)’ and ‘National government (Po2)’ two stakeholders with a strong active role towards the establishment of green hydrogen ecosystems. On the other hand, only the stakeholder ‘Local government (Po4)’ is evaluated as passive.

3.1.3. Result per category: Associations and NGOs

The stakeholder category ‘Associations & NGOs’ consists of in total 5 stakeholders and

Figure



Figure 3: Role of stakeholders in associations and NGOs (n=71)

The results show that the stakeholders ‘National energy agencies (As3)’ and ‘National hydrogen associations and alliances (As4)’ with a strong active role towards in the establishment of green hydrogen ecosystems. Overall, in this category only the stakeholder ‘Nature conservation associations (As2)’ is evaluated as passive and therefore the importance of associations and NGOs in course of the energy transition is highlighted.



3.1.4. Result per category: Economic Players

The stakeholder category ‘Economic players’ consists of in total 20 stakeholders and Figure 4 shows the results regarding the role evaluated by experts.

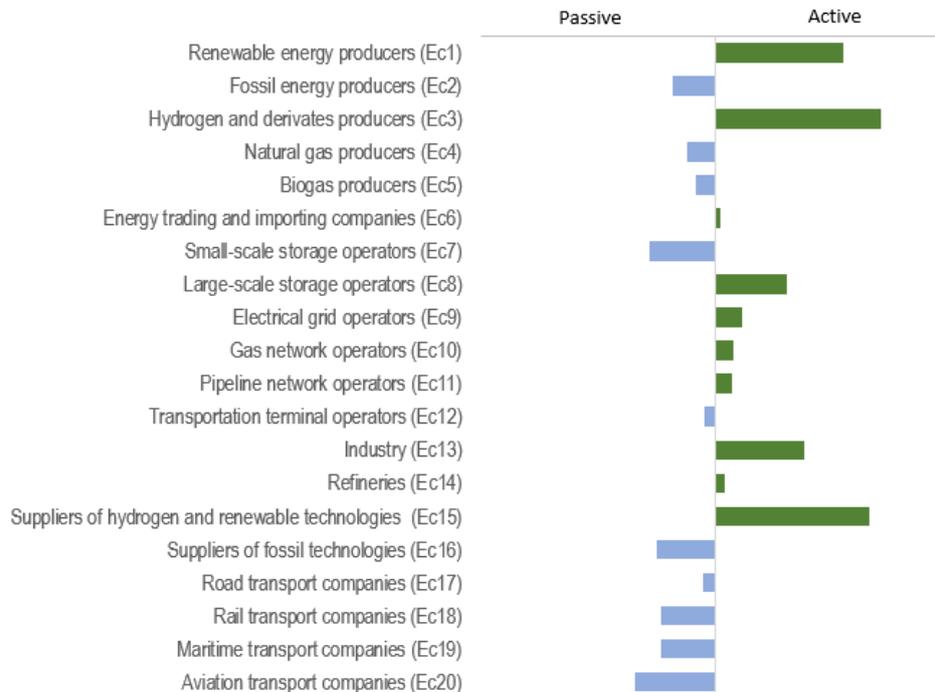


Figure 4: Role of stakeholders in economic players (n=71)

The results show the stakeholders ‘Renewable energy producers (Ec1)’, ‘Hydrogen and derivatives producers (Ec3)’, ‘Suppliers of hydrogen and renewable technologies (Ec15)’ and ‘Industry (Ec13)’ with a very strong role towards the establishment of green hydrogen ecosystems. Overall, transportation companies are evaluated with a passive role in the context of the energy transition. Overall, there is no clear trend of passive or active stakeholders in this group.

3.1.5. Result per category: Press and media

The stakeholder category ‘Press and media’ consists of in total 5 stakeholders and Figure 5 shows the evaluated results regarding the role evaluated by experts.

Figure



Figure 5: Role of stakeholders in press and media (n=71)



Four out of five stakeholders in this category are evaluated with an active role towards the establishment of green hydrogen ecosystems, whereby ‘Social media (Pr4)’ and ‘Professional hydrogen & energy magazines (Pr2)’, should have a strong position. ‘Professional hydrogen & energy magazines (Pr2)’ are assessed with a passive role.

3.1.6. Result per category: Civil society

The stakeholder category ‘Civil society’ consists of in total 6 stakeholders and the results regarding the role evaluated by experts.

Figure 6 shows



Figure 6: Role of stakeholders in press and media (n=71)

The evaluation shows that the two stakeholder stakeholders in this category ‘Regional public (Cs3)’ and ‘Local public (Cs4)’ with a strong active role. On the other hand, only the ‘General public (Cs2)’ is evaluated with a passive role towards the establishment of green hydrogen ecosystems in this group of stakeholders.

3.2. Attitude of the stakeholders

As a first step the general attitude of the stakeholders (‘support’, ‘neutral’, ‘ambivalent’, ‘opponent’) towards the establishment of green hydrogen ecosystems in the eight regions of the HyEfRe project consortium was evaluated by the consortium members and experts from their countries in a survey. Ambivalent stakeholders are neither supportive nor opposed, but may have a critical attitude. Figure 7 shows the overall assessment, while Figure 8 shows a breakdown of the attitudes into the various corresponding categories.

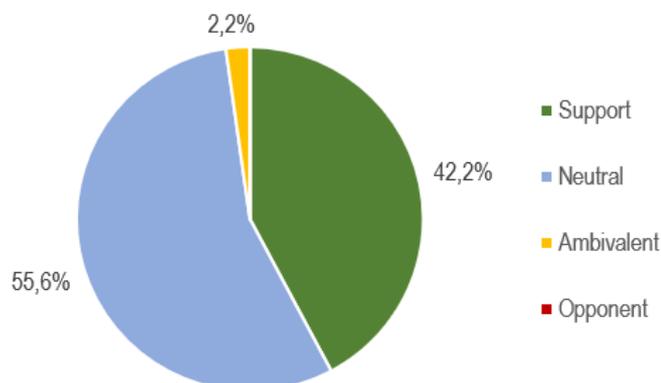


Figure 7: Attitude of stakeholders towards the establishment of green hydrogen ecosystems (n=71)



As shown in Figure 7, most stakeholders were assessed as having a positive or neutral attitude towards the establishment of green hydrogen ecosystems, while 2% of all 45 identified and assessed stakeholders are expected to be ambivalent, while there are no opponents.

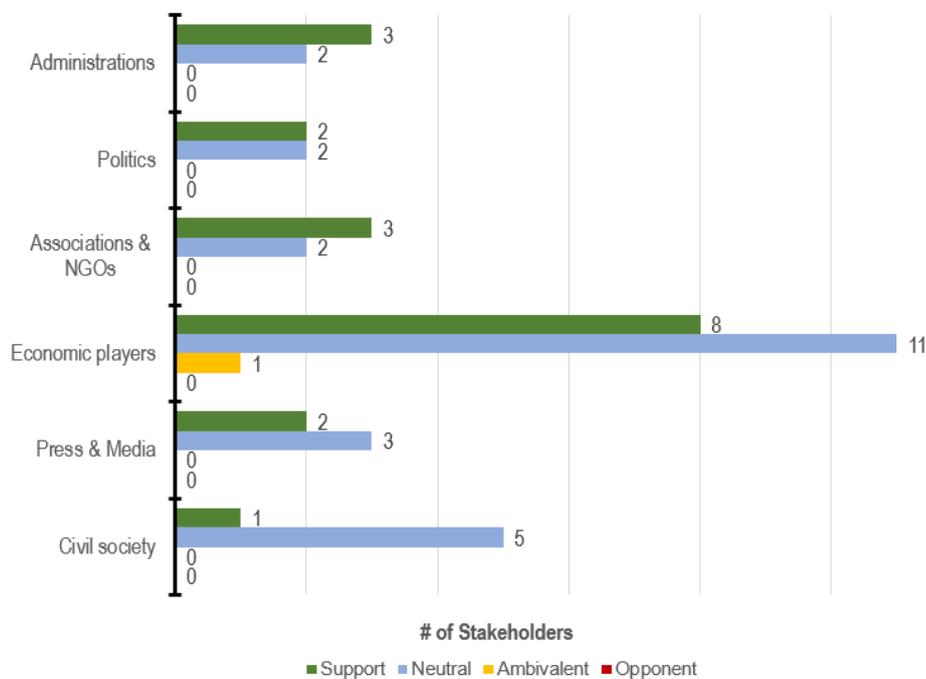


Figure 8: Attitude of stakeholders per category towards the establishment of green hydrogen ecosystems (n=71)

According to Figure 8, one stakeholder expected to be ambivalent was found in the category of economic players based on an average of all individual assessments. The stakeholder ‘Suppliers of fossil technologies’ showed the potential for conflicting perspectives on the establishment of green hydrogen ecosystems due to challenges with the existing business and established markets.

3.3. Influence and importance of stakeholders

This section shows the final assessment of all identified stakeholders on the criteria of influence (power) and importance (interest) on the establishment of green hydrogen ecosystems, evaluated by experts from the HyEfRe consortium and experts in the eight partner countries. The diagram is divided into four categories, with the corresponding categorization based on the average assessment. Each category describes how the stakeholders in the respective fields should be involved, informed, and given appropriate attention. The classification of stakeholders provides input for the design of engagement process and the following characteristics could be assigned to the four categories:

- **‘Manage closely’** (high influence, high importance) – Stakeholders with the highest priority, requiring consideration as closely and regularly as possible;
- **‘Keep them satisfied’** (low influence, high importance) – Stakeholders with medium priority who do not require regular attention and can be helpful in decision making;
- **‘Keep them informed’** (high influence, low importance) – Stakeholders with medium priority who require regular information;
- **‘Monitor’** (low influence, low importance) – Stakeholders with the lowest priority that do not require special effort, but whose possible changes in ‘influence’ and ‘importance’ must be considered.



While for ‘manage closely’ stakeholders, active involvement (e.g., workshops, discussion rounds, surveys, etc.) can be recommended, the ‘keep them informed’ category can be addressed through rather active or sometimes passive stakeholder measures. No special attention must be paid to the ‘monitor’ group. Nevertheless, together with the ‘keep them satisfied’ group they should also be included in passive stakeholder measures throughout the course alongside technology development as their classification to one of the four areas could change to ‘keep them informed’ or even ‘manage closely’. Figure 9 shows the evaluation results of the stakeholders for the criteria influence (horizontal axis) and interest (vertical axis) evaluated by **71 consortium members and experts** on all listed stakeholders. Due to the large number of stakeholders in a single figure, each is coded by the number shown in Table 1. The scores were then equally weighted by forming an average and represent only a snapshot that may change over time.

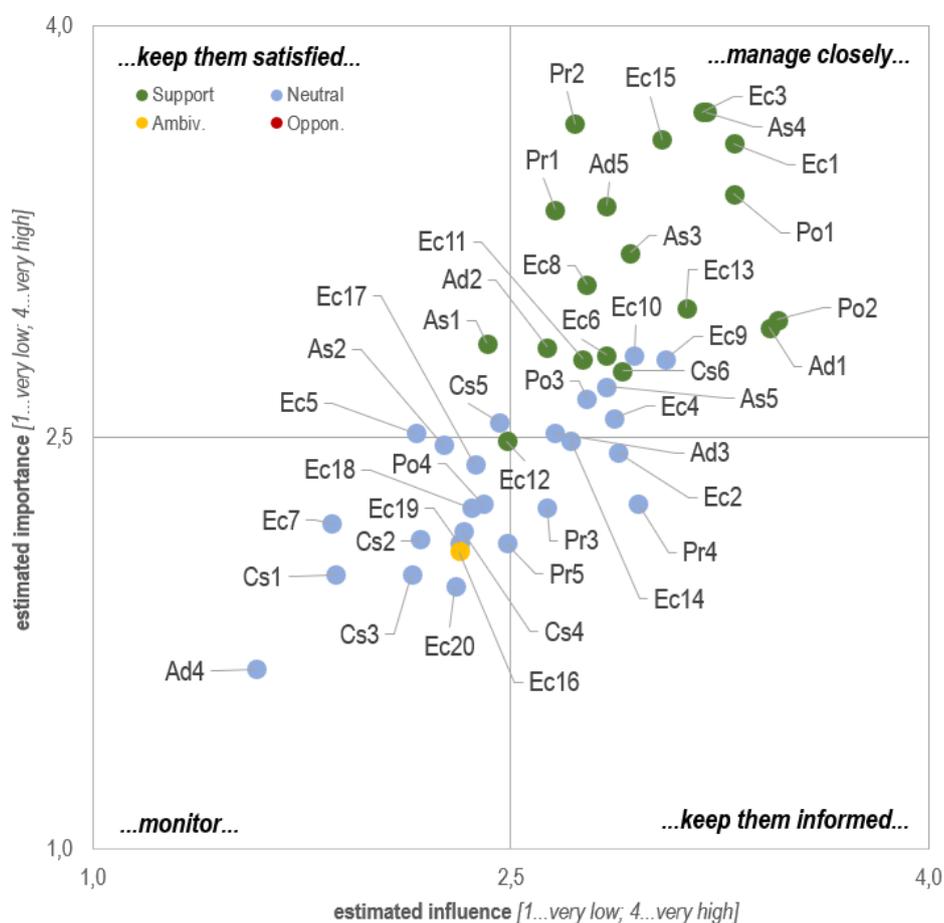


Figure 9: Overall influence and importance of stakeholders towards the establishment of green hydrogen ecosystems (n=71)

As shown in Figure 9, most of the stakeholders are in the ‘manage closely’ and the ‘monitor’ categories. The main focus is on the first category due to its high level of influence and importance towards the establishment of green hydrogen ecosystems. Detailed results per stakeholder category are presented in the following sections.

3.3.1. Result per category: Administrations

The category ‘Administrations’ consists of in total 5 stakeholders and Figure 10 shows the results regarding the criteria ‘influence’ and ‘importance’ evaluated by the project consortium experts. Additionally, Figure 11 adds the frequency of attitude per stakeholder providing the input for the average of the result.

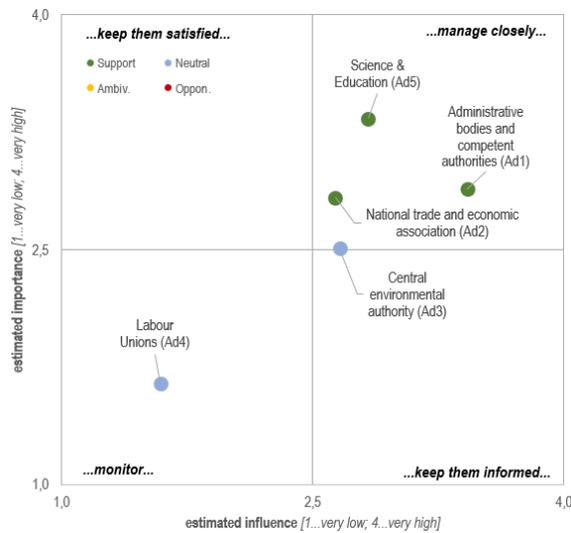


Figure 10: Influence and importance of stakeholders in administrations (n=71)

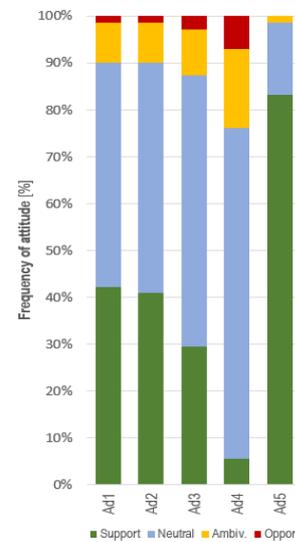


Figure 11: Frequency of attitude responses in administrations (n=71)

The results show no stakeholders with an average ambivalent or opposing attitude and the stakeholders ‘Administrative bodies and competent authorities (Ad1)’, ‘National trade and economic association (Ad2)’ and ‘Science & Education (Ad5)’ have to be managed closely, although assessed with a supportive attitude. It can be interpreted that the establishment of green hydrogen ecosystems is of significant importance for authorities and industry in corporation with targeted research. In addition, no resistance is expected from the stakeholder ‘Labor Unions (Ad4)’ due to the neutral attitude and the assignment to the ‘monitor’ category.

3.3.2. Result per category: Politics

The category ‘Politics’ consists of in total 4 stakeholders and Figure 12 shows the results regarding the criteria ‘influence’ and ‘importance’ evaluated by the consortium.

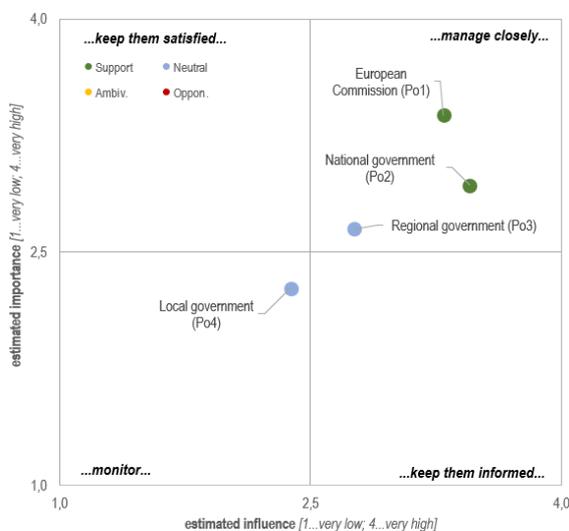


Figure 12: Influence and importance of stakeholders in politics (n=71)

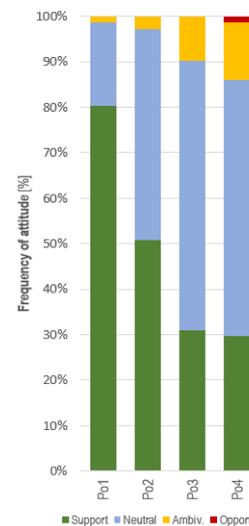


Figure 13: Frequency of attitude responses in politics (n=71)



The results show that the stakeholders ‘European Commission (Po1)’, ‘National government (Po2)’ and ‘Regional government (Po3)’ are in the ‘manage closely’ category and no ambivalent or opposing attitudes exist. However, although the stakeholder ‘Local government (Po4)’ is in the ‘monitor’ category due to the low level of influence and importance, Figure 13 shows ambivalent as well as conflicting responses, with the result that targeted engagement strategies are relevant in this context.

3.3.3. Result per category: Associations and NGOs

The stakeholder category ‘Associations & NGOs’ consists of in total 5 stakeholders and Figure 14 shows the results evaluated by the project consortium experts.

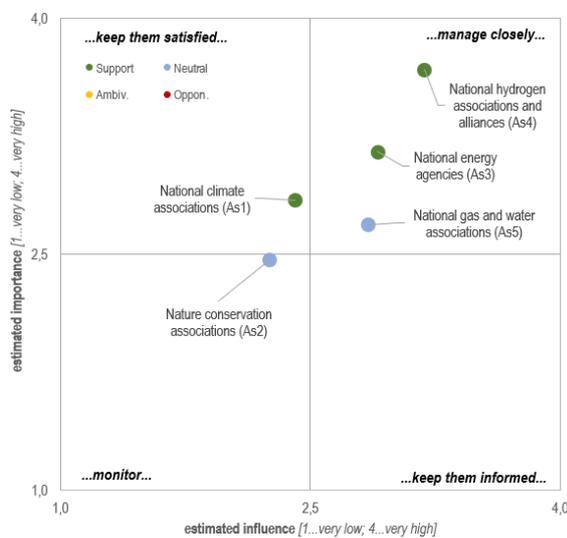


Figure 14: Influence and importance of stakeholders in associations and NGOs (n=71)

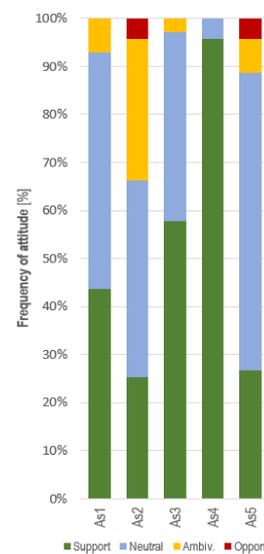


Figure 15: Frequency of attitude responses in associations and NGOs (n=71)

The results show that the stakeholders ‘National hydrogen associations and alliances (As4)’, ‘National energy agencies (As3)’ and ‘National gas and water associations (As5)’ in the ‘manage closely’ category with a supportive or neutral attitude towards the establishment of green hydrogen ecosystems. The stakeholders ‘National climate associations (As1)’ in the ‘keep them satisfied’ category and ‘Nature conservation associations (As2)’ in the ‘monitor’ category need little attention due to their lower estimated influence. However, according to Figure 15, “Nature conservation associations (As2)’ and ‘National gas and water associations (As5)’ received significant opposing and ambivalent attitudes, making them important for targeted strategical involvement.

3.3.4. Result per category: Economic players

The stakeholder category ‘Economic players’ consists of in total 20 stakeholders and Figure 16 shows the results regarding ‘influence’ and ‘importance’ evaluated by the consortium.

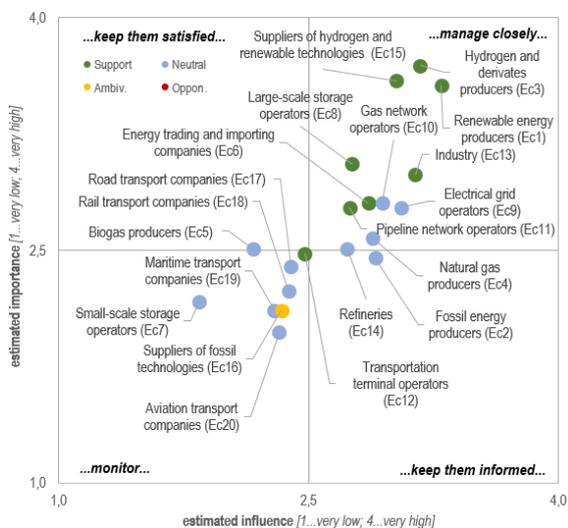


Figure 16: Influence and importance of stakeholders in economic players (n=71)

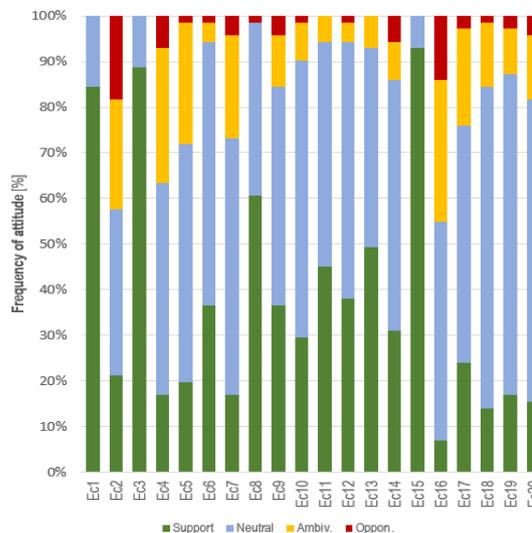


Figure 17: Frequency of attitude responses in economic players (n=71)

As shown, no stakeholder is expected to be an opponent, but the stakeholder ‘Suppliers of fossil technologies (Ec16)’ is evaluated as ambivalent with significant opposing attitude evaluations. Furthermore, according to Figure 17, also ‘Fossil energy producers (Ec2)’ and ‘Natural gas producers’ received significant opposing attitudes and as a result, the establishment of green hydrogen ecosystems may lead to challenges for their market and daily business. On the other hand, many stakeholders are in the ‘manage closely’ category, ranging from renewable energy producers to large storage operators to industries and refineries, as hydrogen may play a key role in their future strategies.

3.3.5. Result per category: Press and media

The stakeholder category ‘Press and media’ consists of in total 5 stakeholders and Figure 18 shows the evaluated results regarding the two criteria ‘influence’ and ‘importance’.

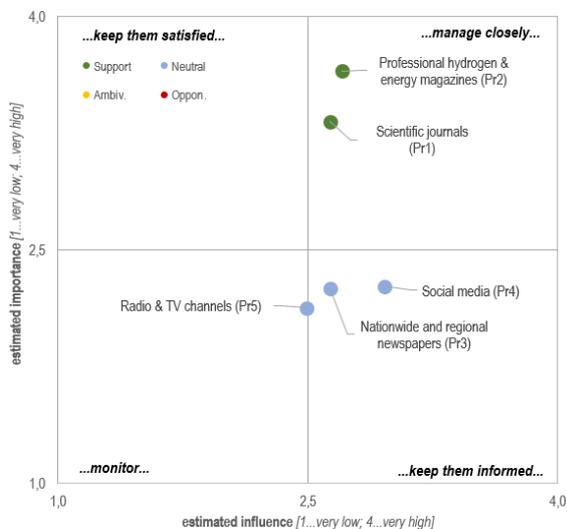


Figure 18: Influence and importance of stakeholders in press and media (n=71)

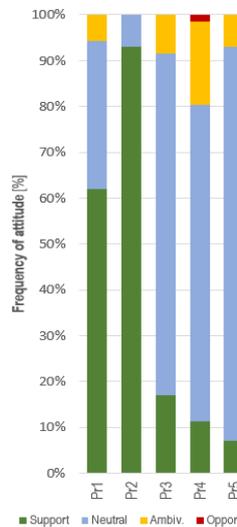


Figure 19: Frequency of attitude responses in press and media (n=71)



According to Figure 19, four out of five stakeholders in this category received ambivalent attitudes, and ‘Social media (Pr4)’ also opposing evaluations, showing the potential critical influence of such channels. Overall, the stakeholders ‘Scientific journals (Pr1)’ and ‘Professional hydrogen & energy magazines (Pr2)’ are assessed with a ‘supporting’ attitude to the ‘monitor’ category and therefore the establishment of green hydrogen ecosystems may be seen as a relevant issue for them.

3.3.6. Result per category: Civil society

The stakeholder category ‘Civil society’ consists of in total 6 stakeholders and Figure 20 shows the results regarding the criteria ‘influence’ and ‘importance’ evaluated by consortium experts.

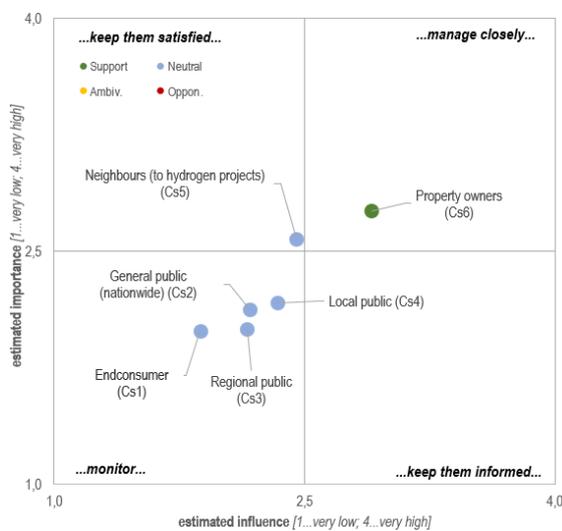


Figure 20: Influence and importance of stakeholders in civil society (n=71)

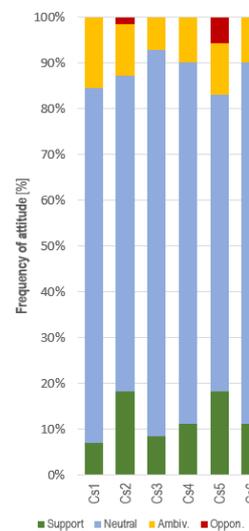


Figure 21: Frequency of attitude responses in civil society (n=71)

The evaluation in Figure 21 shows that all stakeholders in this category received ambivalent attitudes, and the stakeholders ‘General public (Cs2)’ and ‘Neighbours (Cs5)’ also opposing evaluations. Overall, only the stakeholder ‘Property owners (Cs6)’ is in the ‘manage closely’ category and was also assessed with a supportive attitude, towards the establishment of green hydrogen ecosystems, resulting in a reduced focus on this category. Although the general average attitude of civil society stakeholders is rather neutral, a good information policy and education on hydrogen properties is of great value.

3.4. Assessment of stakeholder priority

The final assessment of the stakeholders in the form of a heatmap, as shown in Table 3, allows a summary of all evaluated parameters and therefore, a simple and clear prioritization of stakeholder management. With regard to the individual parameters, the following heatmap prioritizes active over passive stakeholders and also opposing or ambivalent stakeholders over supporters, as they can prevent the implementation of projects, such as the establishment of green hydrogen ecosystems.



Table 3: Priority of stakeholders

		Role	Influence	Importance	Attitude	Value	Priority Number
Administrations	Administrative bodies and competent authorities (Ad1)	2,9	3,4	2,9	1,7	48,7	1
	National trade and economic association (Ad2)	2,4	2,6	2,8	1,7	30,6	26
	Central environmental authority (Ad3)	2,5	2,7	2,5	1,9	30,4	27
	Labour Unions (Ad4)	1,5	1,6	1,6	2,3	8,8	45
	Science & Education (Ad5)	3,2	2,8	3,3	1,2	35,3	18
Politics	European Commission (Po1)	3,1	3,3	3,4	1,2	42,4	7
	National government (Po2)	2,9	3,5	2,9	1,5	44,8	5
	Regional government (Po3)	2,6	2,8	2,6	1,8	33,5	22
	Local government (Po4)	2,2	2,4	2,3	1,9	22,2	36
Associations & NGOs	National climate associations (As1)	2,7	2,4	2,8	1,6	29,8	28
	Nature conservation associations (As2)	2,4	2,3	2,5	2,1	28,1	30
	National energy agencies (As3)	3,1	2,9	3,2	1,5	41,5	9
	National hydrogen associations and alliances (As4)	3,6	3,2	3,7	1,0	44,3	6
	National gas and water associations (As5)	2,7	2,8	2,7	1,9	39,1	13
Economic Player	Renewable energy producers (Ec1)	3,3	3,3	3,6	1,2	45,1	4
	Fossil energy producers (Ec2)	2,2	2,9	2,5	2,4	37,9	14
	Hydrogen and derivates producers (Ec3)	3,6	3,2	3,7	1,1	46,4	2
	Natural gas producers (Ec4)	2,3	2,9	2,6	2,3	39,2	12
	Biogas producers (Ec5)	2,4	2,2	2,5	2,1	27,2	31
	Energy trading and importing companies (Ec6)	2,5	2,9	2,8	1,7	34,6	19
	Small-scale storage operators (Ec7)	2,1	1,8	2,2	2,1	17,9	41
	Large-scale storage operators (Ec8)	3,0	2,8	3,1	1,4	35,5	17
	Electrical grid operators (Ec9)	2,7	3,1	2,8	1,8	41,6	8
	Gas network operators (Ec10)	2,6	2,9	2,8	1,8	39,3	11
	Pipeline network operators (Ec11)	2,6	2,7	2,8	1,6	31,9	24
	Transportation terminal operators (Ec12)	2,4	2,5	2,5	1,7	25,3	33
	Industry (Ec13)	3,1	3,1	3,0	1,6	45,4	3
	Refineries (Ec14)	2,6	2,7	2,5	1,9	33,1	23
	Suppliers of hydrogen and renewable technologies (Ec15)	3,5	3,0	3,6	1,1	40,7	10
	Suppliers of fossil technologies (Ec16)	2,1	2,3	2,1	2,5	26,5	32
	Road transport companies (Ec17)	2,4	2,4	2,4	2,0	28,2	29
	Rail transport companies (Ec18)	2,2	2,4	2,2	2,0	23,3	35
	Maritime transport companies (Ec19)	2,2	2,3	2,1	2,0	20,8	38
	Aviation transport companies (Ec20)	2,0	2,3	2,0	2,1	18,8	40
Press & Media	Scientific journals (Pr1)	3,0	2,6	3,3	1,4	37,7	15
	Professional hydrogen & energy magazines (Pr2)	3,3	2,7	3,6	1,1	34,5	20
	Nationwide and regional newspapers (Pr3)	2,2	2,6	2,3	1,9	24,7	34
	Social media (Pr4)	2,4	3,0	2,3	2,1	34,1	21
	Radio & TV channels (Pr5)	2,1	2,5	2,1	2,0	22,0	37
Civil Society	Endconsumers (households) (Cs1)	1,5	1,9	2,0	2,1	11,2	44
	General public (nationwide) (Cs2)	1,7	2,2	2,1	2,0	15,8	42
	Regional public (Cs3)	1,8	2,2	2,0	2,0	15,7	43
	Local public (Cs4)	2,0	2,3	2,2	2,0	20,0	39
	Neighbours (to hydrogen projects) (Cs5)	2,4	2,5	2,6	2,0	30,7	25
	Property owners (Cs6)	2,6	2,9	2,8	1,7	36,1	16

1 - Low 2 - Medium 3 - Medium 4 - High



The heatmap show a strong need to prioritize the stakeholder 'Administrative bodies and competent authorities (Ad1)', 'European Commission (Po1)', 'National government (Po2)' from an administrative and political perspective in the course of establishing green hydrogen ecosystems. From a production perspective, beside the 'Industry (Ec13)', in particular the stakeholders 'Hydrogen and derivatives producers (Ec3)', 'Renewable energy producers (Ec1)' are considered to be of a high priority number in this context. In addition, the heatmap shows, that civil society stakeholders have a lower priority.



4. Discussion and conclusion

This report in the project **HyEfRe** answers based on a stakeholder approach, potential roles, influence and importance towards the establishment of green hydrogen ecosystems. The results show a list of 45 identified stakeholders in the 6 groups: 'Administration', 'Politics', 'Associations and NGOs', 'Economic players', 'Press and media', and 'Civil society', evaluated by 71 experts from the project consortium as well as from each of the eight partner countries.

First, the assessed role of the stakeholders shows, that an active participation dominates in the groups of 'Politics', 'Associations and NGOs', 'Press and Media' and 'Civil Society'. In the groups 'Administrations', three out of five stakeholders are evaluated as passive, while in 'Economic Players', an equal distribution of roles exists. As a result, the force towards the establishment of a green hydrogen ecosystem is gaining momentum.

Second, in terms of attitudes, most stakeholders were assessed as having a positive or neutral attitude towards green hydrogen ecosystems, with only 2% of all 45 identified stakeholders are expected to be ambivalent, while there are no opponents. The stakeholder 'Suppliers of fossil technologies' may have potential for conflicting perspectives due to challenges with the existing business and established markets.

Third, the assessment of all identified stakeholders on the criteria of influence (power) and importance (interest) shows, that most of the stakeholders are in the 'manage closely' and the 'monitor' categories. In this context, the ambivalent stakeholder 'Suppliers of fossil technologies' is due the evaluated lower influence and importance in the 'monitor' category and therefore, no special stakeholder engagement is required. On the other hand, stakeholders such 'National hydrogen associations and alliances', 'Hydrogen and derivatives producers' and 'Renewable energy producers' need to be closely managed. However, the assessment shows, that in group of civil society, only the stakeholder 'Property owners' is in evaluated with a higher influence and importance and therefore, no direct strategies for their engagement are required.

Fourth, the final stakeholder heatmaps allows a clear and simple prioritization of stakeholder management in the course of establishing green hydrogen ecosystems. It shows a strong need to prioritize 'Administrative bodies and competent authorities (Ad1)', 'European Commission (Po1)', 'National government (Po2)' from an administrative and political perspective. In addition, the stakeholders 'Industry (Ec13)', and 'Hydrogen and derivatives producers (Ec3)', 'Renewable energy producers (Ec1)' are considered to be prioritized in different strategies from an economic perspective.

Overall, the momentum for a green hydrogen and energy transition appears robust when analyzed from a stakeholder perspective. The high number of stakeholders in the 'manage closely' category and their largely supportive attitude towards the establishment of green hydrogen ecosystems shows that measures for their targeted involvement, for example in the context of workshops, can be an important step towards implementation. Stakeholders such as European and national governments, key industrial players mainly from the renewable energy and technology sector as well as environmental organizations are driving this transition forward. Governments are setting ambitious targets for reducing carbon emissions and industrial stakeholders are investing in sustainable projects as a clean alternative to fossil fuels, although these investments are intensive and not without obstacles. On the other hand, from the industrial side, the shift towards green hydrogen as a sustainable energy carrier for various applications, is gaining traction. Key stakeholders from various groups are forming alliances and partnerships to accelerate research, development, and deployment of hydrogen technologies. As a result, there is a significant alignment between industrial capabilities and environmental objectives, creating a synergistic push towards the hydrogen economy.

However, this transition is not without its conflicts, particularly from the fossil fuel sector, as a shift to hydrogen and renewable energy is a direct threat to their business models. Additionally, civil society stakeholders play in the hydrogen transition due to their relatively lower influence and importance a more



peripheral role relative to governmental and industrial players. This is surprising, as in comparable projects, mainly stakeholders next to newly constructed hydrogen facilities, were evaluated as ambivalent, with significant individual opposing attitudes and higher influence as well as importance. Nevertheless, for a more inclusive and comprehensive energy transition, it is crucial to increase the engagement and influence of these stakeholders to ensure that the transition to a hydrogen economy is not only technologically and economically driven, but also socially equitable and widely supported.



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