



*Smart system of renewable energy storage based on **IN**tegrated **EV**s and **bA**tteries to empower mobile, **D**istributed and centralised **E**nergy storage in the distribution grid*

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**Abbreviations and Acronyms**

<b>Acronym</b>	<b>Description</b>
B2B	Business-to-Business
B2C	Business-to-customer
BRP	Balance responsible party
DSO	Distribution system operator
EC	European Commission
EMS	Energy management systems
ESCO	Energy service company
EV	Electric Vehicle
FO	Flexibility operator
GA	Grant Agreement
IoT	Internet of Things
MLP	Multi-level perspective
MNC	Multi-national company
PUT	Public utility
TAG	Technical advisory group
ToC	Table of Contents
TRL	Technology readiness level
WP	Work Package

## Executive summary

This deliverable identifies relevant stakeholders concerning the project's innovations. Previous deliverable (D3.1) forms the foundation for this work as it provides initial stakeholder list. The stakeholder list is further extended in this task via interviews with business partners of the consortium and doing a market review. A novel methodology based upon mapping is developed in this task to assess stakeholders across various attributes. The methodology is then applied to assess the identified stakeholders of INVADE. Through this assessment it was possible to identify which stakeholders should be targeted for alliances and against whom caution should be kept. The methodology allows to categorize stakeholders into different typologies which can then be used to predict the stakeholder's behaviour in the future flexibility market. An important contribution of this work is to develop appropriate methodology for stakeholder assessment.

Based upon generated maps of stakeholder, generic maps were created which would in future help in assessing new stakeholder when they emerge or are identified. From stakeholder analysis, recommendations are provided on which business partners are best for flexibility operator (FO) role and on future exploitation work. Key recommendations are:

1. Lyse, Greenflux, and EYPESA are most suitable candidates for playing FO role. Lyse comes out to be strongest based upon its market position and experience with platform based businesses.
2. Existing regulations are biggest barrier to realize full impact of project outcomes. Therefore, exploitation plan should consider a got-to-market strategy with adverse market regulations, i.e., in what way project results can be exploited before policy change happens.
3. Support or resistance from many powerful and key stakeholders depends upon business model used by FO. This highlights the importance of activities in ongoing WP9.
4. DSOs, BOs (building/property/charging station owners), and public utilities are key stakeholders to form alliances with for FO.
5. EMS platform providers (local ecosystems) are critical for INVADE ecosystem. Synergies need to be formed with them so that they don't feel threatened.

The outcomes of T3.2 which are documented in this report are important inputs for WP9 activities, T3.3, T3.4, T3.5, & T3.6.

# 1 Background

## 1.1 Project in essence

This document is a deliverable produced within Work Package 3 (WP3) of INVADE as a partial fulfilment of the goals specified for the project. The objectives for task T3.2 have been formulated in the project proposal and DOA. On an overall level INVADE have the following objectives:

1. Competitive demand response schemes for the benefit of the grid and the consumers
  - a. INVADE platform will:
    - i. Allow consumers/prosumers to make informed decisions for freeing up electricity in times of peak demand
    - ii. Help in maximising energy usage in times when there is minimum congestion
    - iii. Deliver services to the grid
2. The demonstrated solutions have the potential to be scaled (if needed) and replicated
  - a. The INVADE project is designed to provide a generic INVADE platform that could be demonstrated based upon different energy storage technologies.
3. Validated contributions for improved, stability and flexibility in the distribution grid, avoid congestion; enabling near real-time pan European energy balancing market
4. Support the emergence of new services provided by storage systems to the distribution grid and the consumers/prosumers at affordable costs, deferral of investments in grid reinforcement.
  - a. A holistic concept like INVADE, different ways could be employed in the market to lower the entry threshold i.e. leasing, different forms of financing, management, installation and maintenance.
5. Target conversion of excess electricity, avoid curtailment, provide services to the grid

6. Creation of synergies with transport users (e.g. services to the grid with smart charging) / support the decarbonisation of transport
7. Current regulations, standards and interoperability issues, regulatory environment for privacy and data protection

INVADE will improve on the existing standards by:

1. Leveraging EU energy policy:
  - a. contribute to binding national targets of EU member countries for raising the share of renewables and more
2. Contribute to ongoing discussions/policy developments on:
  - a. EU's internal energy market
  - b. The retail market
  - c. self-consumption
3. Help to create enhanced interconnections between Member States and/or between energy networks.
  - a. INVADE will boost competition on energy markets and reinforce the EU's energy security by diversifying energy sources
  - b. Contribute to the EU's climate and energy goals by integrating renewables.
  - c. INVADE will serve the distribution grid by creating an utilizing flexibility
4. Help EU power network to integrate 50% ++ shares of renewables (primarily variable sources) by 2030, in a stable and secure way
  - a. INVADE delivers an ecosystem of integrated components to increase the share of renewable energy sources in the grid.
  - b. The entire project concept is built around that key goal
5. EU based companies will be able to deliver adequate competitive product and services on the market in 2-5 years after the end of the project
  - a. integrates different technological components
  - b. envisages innovative business models

To achieve success and create the intended impact the project will involve a full chain of stakeholders from various sectors. Stakeholder analysis becomes an important task to uncover possible alliances and potential market dangers.

## 1.2 Objectives of the document

The Stakeholders analysis exposes all potential entities involved in the INVADE Platform and it corresponds to the task T3.2. Consequently, it wraps up the first 12 months of work (not 50% of the 24-month effort) of the task 3.2 Stakeholder analysis. This is specified as follows:

- The INVADE stakeholders' analysis will be part of the market review to be presented in the following task and serves to identify the relevant stakeholders for local energy markets and evaluate them across different dimensions.
- Stakeholder maps will be created to identify and understand sources of support and resistance towards the establishment of such markets. In the subsequent development of the business and exploitation plan, the stakeholder analysis will be a valuable tool to target the stakeholders' needs in a very specific way, thus making the development of individual stakeholder exploitation strategies possible.
- The task will have close links to Task 3.1, however, within the present task, an in-depth local energy market stakeholders' needs and desires analysis regarding how INVADE could address, them will be performed.

It will support the overall objectives of the exploitation task which can be specified as follows:

- 1<sup>st</sup> priority: *Consortium members* are given a chance to capitalize on the results and prosper accordingly.
- 2<sup>nd</sup> priority: To enable *stakeholders beyond the project* to benefit from the INVADE research effort.

It has been a challenge to find an existing stakeholder assessment methodology which can be applied as it is to the innovation project like INVADE. The existing methodologies do not help in meeting the goals set previously (limitations are discussed in chapter 3). Substantial effort has been made to develop a novel & comprehensive methodology to meet the objectives of study and forms one of the important outcomes of this task. We

will come back to method chapter in later tasks of WP2 to validate performance of stakeholders.

The stakeholder analysis focusses on companies or organizations and not on individuals belonging to such stakeholders. Analysis of roles of individuals, especially from higher management, within the company is important and is more appropriate for future exploitation purpose.

### **1.3 The Flexibility Operator role and its principal beneficiaries**

The work in task T3.2 and for this deliverable has evolved in parallel with the endeavours taking place in WP4, WP9 and WP10. During the first months of the project, a better understanding on how technical resources for flexibility should be organized has been developed. The pivotal role here is the concept called “Flexibility Operator” (FO). A FO consolidates the technical flexibility resources and offer them to beneficiaries that typically have a local or regional responsibility. The obvious candidate here is the local Distribution System Operator (DSO) and in some countries where there is a division between local and regional responsibilities, the Public Utility (PUT) must also be counted in. Yet, other potential beneficiaries with a local or regional responsibility exist. Both building/property owners (BO) and the Balancing Responsible Party (BRP) in a specific part of the grid are likely recipients of the services that the FO can provide. Building and property owners may be incentivized to seek partnership with the FO under a specific tariff regime where curtailment of power peaks can yield economic benefits. “Time of Use” contracts with retailers could imply a similar need for FO assistance. BRPs may solicit analogous services as an alternative to operations in the intraday and balancing market. BRPs, DSOs and PUTs would require the FO’s assistance in managing a consolidated flexibility infrastructure. This typically involves a third party i.e. households and charging station owners (BO). To get a clear understanding of all stakeholders we divide BOs further as consumers (residential + commercial), prosumers (residential + commercial), and EV charging station owners in this study.

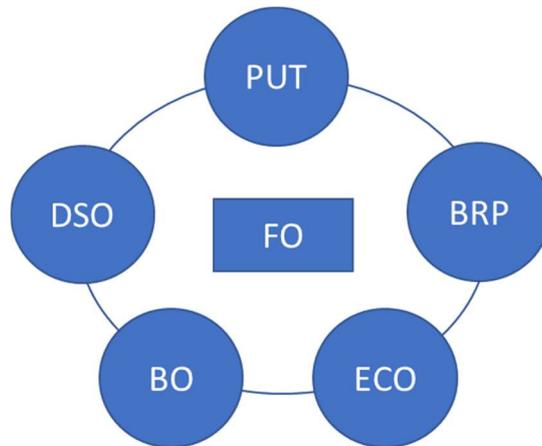
To link up flexibility providers requires physical connections and digital monitoring and control. This must be built from scratch, acquired by means of a financial operation or otherwise leased. The leasing option can take many guises and is related to the type of business model that the FO adheres to. This is important and will be discussed later. In the case of the building/property owner there is no third party involved. The flexibility resources that need to be consolidated exist essentially within the domain of the building

itself. As such the role of the FO resembles that of today's ESCOs (Energy Service Companies).

As Internet of Things (IoT) expand and grow we are likely to see numerous, parallel set-ups, all aiming for the same addresses. Each of these initiatives are likely to be propelled by a single or a few services. These could be energy related, media related, entertainment related, security related or other. An important question is then how many parallel structures could be foreseen? It is compelling to think that only one backbone structure will survive. This will fork out at different ends and for different purposes and play host to diverse services. Even though the INVADE project is spending significant resources on creating one type of infrastructure to demonstrate the viability of the INVADE platform in different pilots it would be a folly to envision that this would be the sole IoT initiative for energy related services. Consequently, three important hypotheses can be drawn from this. One is the idea that the most potent innovation in INVADE lies with the creation of the services using the infrastructure and the business models supporting these services. Second, the creation of the service mix, the contracts supporting this and the payment models will be essential ingredients for market success. Third, it makes sense to combine forces with other service providers that control a complementary part of the general infrastructure. This can be useful to exploit the results of the INVADE project faster and to reduce the threshold for efficient capitalization. In that case other platform based systems supported by complementary business models to the one developed in INVADE emerge as important stakeholders. WP9 calls these platforms digital ecosystems. Many small units could constitute a consolidated overarching whole. In that case the FO role may not limit itself to local or regional operations, but become a national or even global player. The digital platform offers such an opportunity.

But instead of buying or partner in a balanced manner it can also pay off to lease access or assume the possibility to piggyback other platforms if the added value can defend the cost. That could be compared to a specific supplier or department in the global web store Amazon.com. Since the completion of D3.1 on stakeholder engagement the ideas presented here have evolved and is now saturating the work in multiple work packages. Task T3.2 is no exception and consequently the view of the stakeholder kernel can be depicted as in Figure 1 where the FO can be both a local, regional and global player with focus on beneficiaries like the DSO, the PUT, the BO and the BRP. In addition, another platform based ecosystem could be a beneficiary. At the same time, the same ecosystem could serve other stakeholder roles, such as a customer of services or an equal partner

consolidating its infrastructure and services with that of the INVADE FO. It recommended for readers to acquaint themselves with D3.1 to understand the INVADE ecosystem and its various players.



**Figure 1:** The primary beneficiaries and stakeholders that surrounds the INVADE Flexibility Operator (FO); The Distribution System Operator (DSO), The Public Utility (PUT), The Balancing Responsibility Party (BRP), the ECOsystem, The building or property owner (BO). The BO includes consumers, prosumers, and EV station owners.

## 2 Method of approach

### 2.1 Introduction

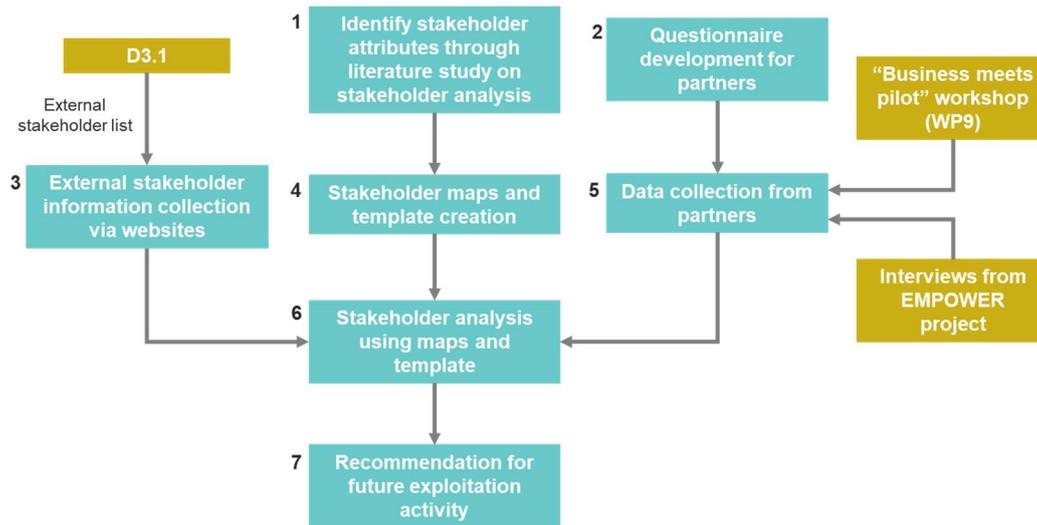
The starting point of task T3.2 was the work initiated in task T3.1. This precipitated into the deliverable D3.1 on which this work is based on. However, as parallel work has evolved attention has been drawn to the kernel concept shown in **Figure 1**. The results produced here are therefore as consequence of two parallel approaches, one defined in WP3 and founded on top of the D3.1 effort. This is described below. The other is based on the methods and work carried out in WP9 on business models. The approach applied here will be described in a parallel deliverable stemming from this work package.

This study should primarily help project partners to optimally exploit the outcomes. **Figure 2** provides schematic of approach used to perform stakeholder analysis. With this task, we want to find sources of support and resistance to the business of FO in the future. This would further help to target and attract right stakeholders for the exploitation activities (Task 3.3, 3.4, 3.5, & 3.6).

### 2.2 Methodology description

#### Block 1

The aim of this process was to identify salient attributes required to assess stakeholders. Existing literature on project management provides different attributes and frameworks. As the INVADE project deals with innovations, classical attributes and frameworks need to be adapted while more attributes than proposed in a single framework are required to provide an in-depth understanding. A literature review was carried out to find essential attributes and most relevant framework for the goal of this task. After this the attributes and framework were adapted to suit our purpose. Chapter 3 discusses this in detail.



**Figure 2: Approach used to analyse stakeholders.**

### Block 2 and 5

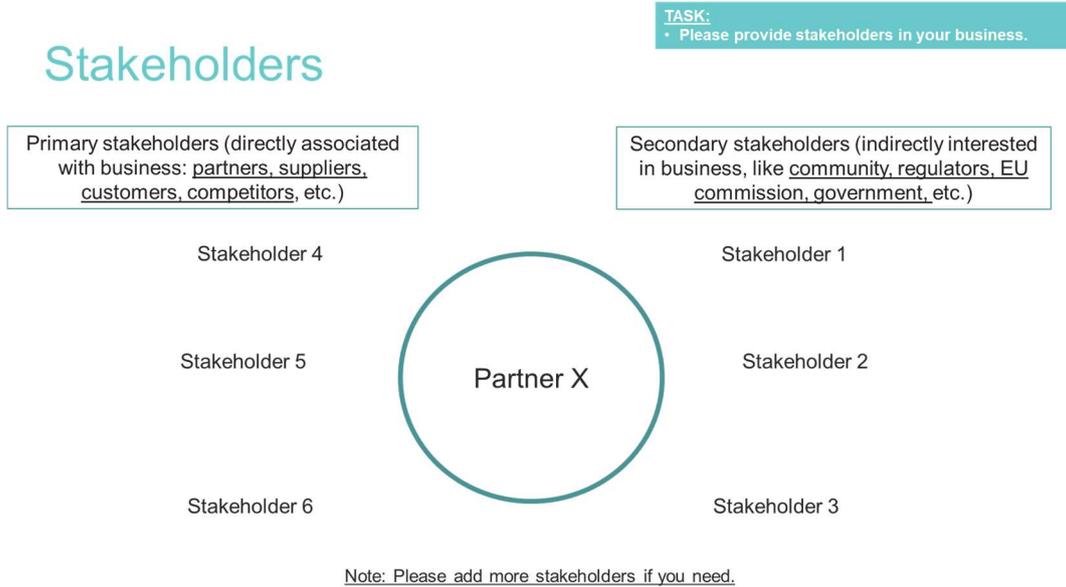
Primary beneficiaries of INVADE outcomes are members of the INVADE consortium who are referred to as *internal stakeholders*. Aim of process in these blocks was to gather information on partners who are into business, i.e., not the research institutes. This information forms basis to determine attributes of stakeholders. Four sources formed the basis for data collection:

1. Direct collection via questionnaire: A questionnaire was developed to understand their business model, stakeholders in their business, their current strategy to use innovation and their business ambition.
2. Parallel activities going on in WP9 to support pilots, and
3. Prior interviews collected in a parallel H2020 project called EMPOWER (deliverable D8.2<sup>1</sup>). These interviews were conducted with top leaders of Schneider electric, eSmart, and NewEn to gather their views of local energy markets and their future business ambitions with respect to it.
4. Direct interviews with pilot owners (Albena, Schneider, and EYPESA) during consortium meeting held in Granollers on 13<sup>th</sup> & 14<sup>th</sup> September 2017.

Information collected in this step helped us to identify more stakeholders beyond the project which were not identified previously in T3.1. By knowing their ambitions and

<sup>1</sup> List of deliverables are available here: <http://empowerh2020.eu/tag/deliverables/>

strategy to use innovation we could identify gaps in realizing their true potential in future energy markets. **Figure 3** to **Figure 7** provide the templates distributed to internal stakeholders to collect information. The responses are compiled in supplementary document.

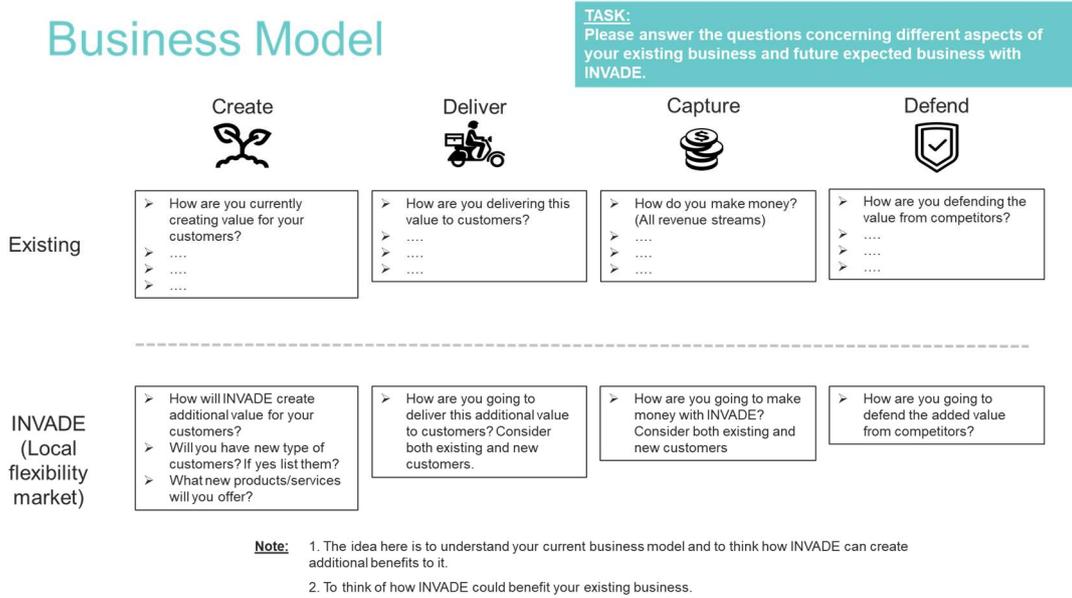


**Figure 3:** Template to get to know stakeholders in the business of internal stakeholders.

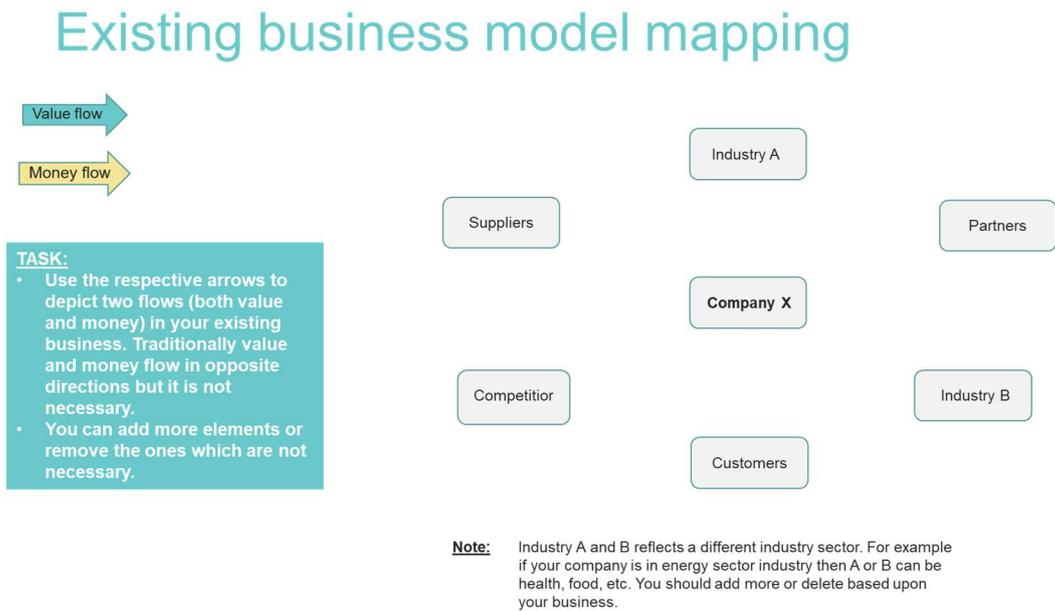
## Stakeholders

<p>Mentions at least 3 stakeholders who you think could facilitate adoption of INVADE in your business:</p> <ol style="list-style-type: none"> <li>1. ...</li> <li>2. ...</li> <li>3. ...</li> </ol>	<p>Mentions at least 3 stakeholder who you think might become barrier for adopting INVADE in your business:</p> <ol style="list-style-type: none"> <li>1. ...</li> <li>2. ...</li> <li>3. ...</li> </ol>
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**Figure 4:** Template to understand possible obstacles in internal stakeholders' uptake of innovation.



**Figure 5:** Template to understand current business model and possible future business model in flexibility market.

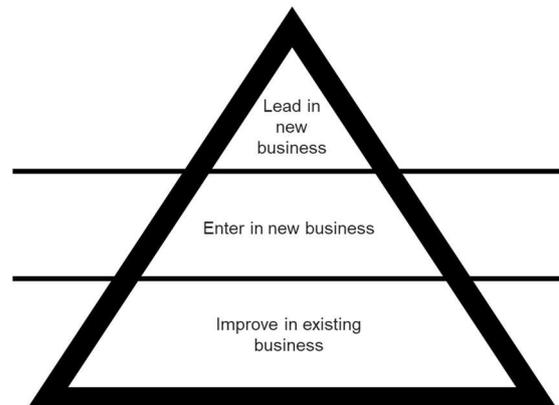


**Figure 6:** Template to understand value and money flow in existing business of internal stakeholders.

## Ambition

**TASK:**  
Please drag and drop your company name to the places based upon what you want to achieve via INVADE outcomes.  
You can target multiple places.

Company X



**Figure 7:** Template to identify ambition level of internal stakeholders.

### Block 3

To create highest possible impact in the society we also need to assess stakeholders beyond the project. For this, stakeholders are selected from an exhaustive list created in task 3.1 (D3.1) and from inputs from business stakeholders of INVADE partners. The information required to understand various attributes of these stakeholders are collected via their websites. Some examples on information collected are: stakeholders' business strategy, ambitions, market presence, and working capital. More on this is explained in chapter 3. Such information was used to assess them across various attributes.

### Block 4

To record all the collected information a specific template was generated. This template is provided in Chapter 3. Based upon literature review, maps were selected and developed to suit this tasks' purpose. In total 3 maps are used in this study, one of them is used as is, second is adapted from a previous prominent framework and third one is developed to complement the second one.

### Block 6

All the information collected for stakeholders is compiled in supplementary document. With this data different attributes of stakeholders were qualitatively measured and stakeholders mapped on maps selected/developed in previous step. Purpose of this process was to reveal potential allies and competitors of innovation.

Block 7

An elaborate understanding of stakeholder behaviour is then developed through maps. Based upon this, specific recommendations are provided to internal stakeholders to maximize business capitalization through the innovation. Furthermore, broader recommendations are provided for external stakeholder to maximize benefits of new platform based business for flexibility.

## 3 Stakeholder attributes and template

### 3.1 Background of stakeholder analysis

Freeman provides a definition of stakeholders in his pioneering work (Freeman, 1984). According to him a stakeholder is any person or organization who can be positively or negatively impacted or cause an impact on actions of a company. Traditionally stakeholders of an organization have been managed by managers for whom primary question to answer while dealing with stakeholders is: “Who and what really counts?” To know who and what really counts various attributes have been developed by researchers mostly from the field of project management. Central to INVADE project are its innovations (both technical and business models) and thus any entity which affects innovations’ market entry and subsequent growth is a stakeholder.

In the previous task T3.1 the analytical frameworks provided by Porter have been used to develop an engagement plan. This formed a starting point for stakeholder analysis. Porter’s models however have certain limitation when applied to an innovation. Thus, to do a detailed analysis, we need to go further and assess stakeholders across other dimensions which are not considered in Porter’s model. For this we did a literature study and collected important attributes. Most of the stakeholder attributes used in literature are inspired from prominent analytical framework proposed by Mitchel et al. (1997) and Suchman (1995). These classical attributes also need to be updated as they have been developed 20 years ago where market scenario was different from what it is now and such frameworks do not cover all the aspects which are required to meet the goals of this task. Thus, we consider another notable and extensively used framework in the field of innovation sciences, *Multi-level perspective* developed by Geels (2002).

In coming sub-sections, we will first provide brief overview of these classical frameworks and provide arguments why and what needs to be changed to achieve objectives of the task. This will be followed by description of novel framework developed from adaptation of classical framework.

### 3.1.1 Porter model critical analysis

Porter's analytical frameworks have been extensively discussed in previous deliverable D3.1<sup>2</sup>. We encourage readers to refer to this report for the details. In this work, we critically analyse the framework.

Michael Porter developed two models: cluster model (Porter 1980) and competitive analysis model (Porter 1985) or Porter's 5 forces model, as it is commonly known. These models were created to measure level of competition within a company's industry. Thereby helping business manager to assess current and potential lines of businesses. With these characteristics, it forms a strong basis for FO to assess its position in future energy market where flexibility would be a normal commodity. We therefore take the following attributes to assess potential market players in the future energy market: competitors, suppliers, and intruders.

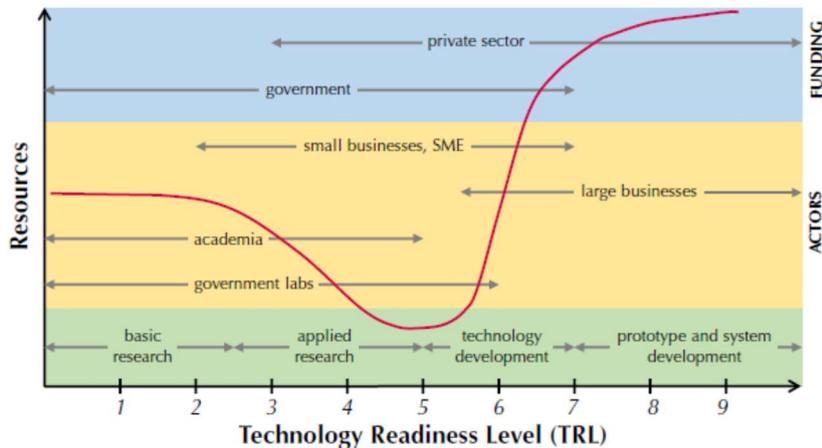
The limitations of these models are revealed when they are applied to innovations. A key aspect for these models is that they assume the market is already mature with all players in place. Other important aspect is that the models can only be applied to assess an industry rather than a specific business. The market for flexibility however is not yet developed and thus there are no established market players in this sector. There are many projects developing and testing local markets at pilot level and thus cannot be considered mainstream yet. Businesses and technologies have changed drastically since Porter developed these models. Platform based business models which are central to INVADE are inherently cross-industry and with prosumers coming in energy market it has proven difficult to apply the existing framework as it is. Porter's model works perfectly where there is clear distinction between different industries. But today, platform based business models are disrupting existing market structures and blurring the boundaries between different industries. Such conditions make it difficult to clearly define roles of different stakeholders.

For an innovation to become commercial it must cross, what is often referred as, "valley of death". **Figure 8** shows a graph of resources available versus the TRL of the technology. The INVADE project is positioned at TRL 5 and aims to reach TRL 7 (according to GA). Under current scenario INVADE innovation must come out of this valley and strategy should evolve from "market push" to "market pull". For this transition

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<sup>2</sup> Report available at: <http://h2020invade.eu/deliverables/>

to happen we need partners who could play a supportive role and Porter's model provides limited insights on possible supporters and threats.



**Figure 8:** Resource availability for an innovation across various TRL levels. The gap in the middle is also referred as "valley of death". Source: Hensen et al. 2015.

### 3.1.2 Mitchell's framework of stakeholder salience

Mitchell et al. (1997) proposed a framework to analyse different stakeholders based upon their salience. Stakeholders are assessed across three relationship attributes: power, legitimacy, and urgency. The framework further provides understanding on behaviour of stakeholders based upon their degree of possession of these three attributes. This framework facilitated project managers to develop appropriate strategies to manage different types of stakeholders. The framework is thus a tool to identify and prioritize stakeholders. Retroactively such framework can also help in understanding why project managers approached certain stakeholders in a specific way. It is important to note that possession of these attribute is subjective and depends upon how management perceives it. The three attributes are described as:

Power: Mitchell provides a few definitions from previous theories and concur with the definition of Salancik and Pfeffer (1974):

“power may be tricky to define, but it is not that difficult to recognize: ‘it is the ability of those who possess power to bring about the outcomes they desire’ “

Power can be possessed through coercive, utilitarian, or symbolic means.

Legitimacy: Suchman (1995) defines legitimacy as:

“A generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, definitions”.

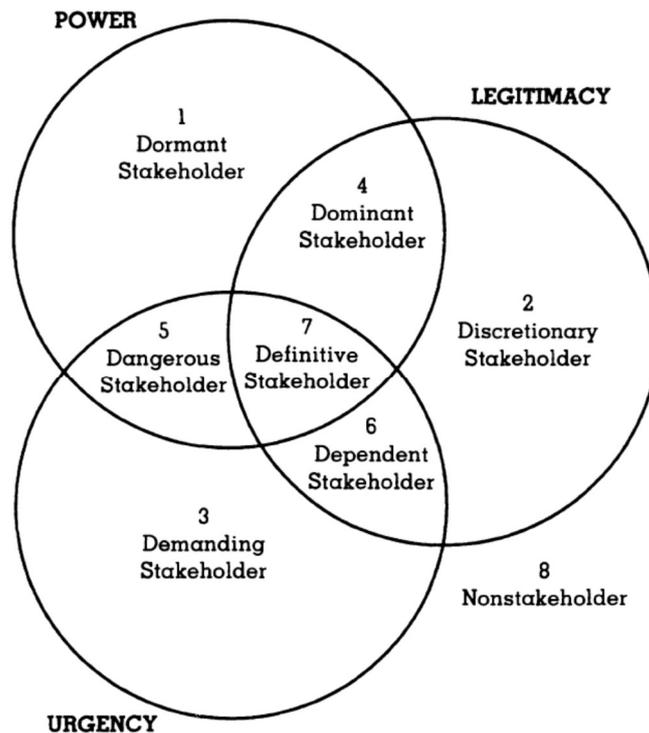
This definition is accepted by Mitchell in his work. Power and legitimacy are often considered the same but it is not the case. Although there is a common linkage, both are distinct attributes which when combined create authority (Mitchell et al., 1997). In the long run if power is not exercised as desired by society the one holding it will lose it. The society and thus BOs are the ones who provide legitimacy to any stakeholder. Multinational corporations have high power to influence because of their networks, large work force, ability to mobilize big capital quickly, and their research and innovation capabilities. However, it does not mean that their actions will be perceived positively by BOs and thus have legitimacy.

Urgency: According to Mitchell urgency depends upon two parameters: 1) time sensitivity – the degree to which managerial delay is unacceptable, and 2) criticality – the importance of claim or the relationship to the stakeholder. Based upon these parameters Mitchell defines urgency as degree to which stakeholder claims call for immediate attention.

There are three important aspects about these attributes: 1) Each attribute is a variable which can change over time, 2) Existence of each attribute is perceptive and is subjective rather than having an objective value, and 3) Stakeholder might not be aware of possessing these attributes or if aware they might decide not to enact implied behaviour. Having combination of these attributes increases the importance of a stakeholder and provides insight on their behaviour in a project. Based upon the existence of these three attributes in a stakeholder, they can be divided into seven typologies. In the next sub-sections we describe different typologies of stakeholders as proposed by Mitchell.

#### 3.1.2.1 Stakeholder typologies

Typologies are created based upon what attribute or combination of attributes stakeholders have. Stakeholders possessing only one attribute are categorized as *latent stakeholders*, while those who have combination of two are *expectant stakeholders* as two attributes lead to an active stance rather than a passive one. And stakeholders having all three are *definitive stakeholders*.



**Figure 9:** Stakeholder typologies as described in Mitchell et al. (1997).

**Dormant stakeholders:** Such stakeholder have little or no interaction with the firm as they lack urgency and legitimacy. Because they have potential to acquire other attributes it is recommended that the management keep a close eye on them and keeps them informed.

**Discretionary stakeholders:** These stakeholders only possess legitimacy. As they lack power and urgency management usually do not feel any need to engage them in their activities.

**Demanding stakeholders:** These have urgent claims but no power or legitimacy to enforce them. Such stakeholders are usually irksome to project managers as they keep complaining or demanding their claims, however these are not dangerous. Project managers usually do not bother investing time on them. Such stakeholders need to acquire other attributes or partner with one having other attributes to meet their claims.

**Dominant stakeholders:** Such stakeholders are influential to the project as they possess both power and legitimacy. Project managers pay attention to them and meet their demands when required. These stakeholders might also decide not to impose their power.

Dependent stakeholders: These have urgency as well as legitimacy but lack power. To satisfy their claims they rely on advocacy of others or on benevolence of firm's management. Managers need to manage such stakeholders effectively.

Dangerous stakeholders: These are the ones having power and urgency but no legitimacy. They have urgent needs and to fulfil them they can resort to coercive means by enacting power, thus are called dangerous. Such stakeholders can negatively impact a project. Managers are recommended to keep them satisfied.

Definitive stakeholders: These stakeholders possess all three attributes. They are top priorities for managers and should be kept informed and satisfied at all the times.

Such typologies provide basis for any project manager to strategise their interaction with stakeholders. It also gives insights on how different stakeholders might behave. This framework has proven to be an effective tool for managers and thus considered one of the classical works in the field of project management.

It is evident that the attributes were defined keeping traditional companies and market structures in mind, having focus on project managers/leaders within an organizational setup. Thus, when it comes to manage an innovation which is likely to disrupt existing markets and businesses this framework needs to be developed further. Another important difference for a project like INVADE is that it is a research and innovation cooperation of several European expert organizations. Therefore, a hierarchical project manager approach is not appropriate in this context.

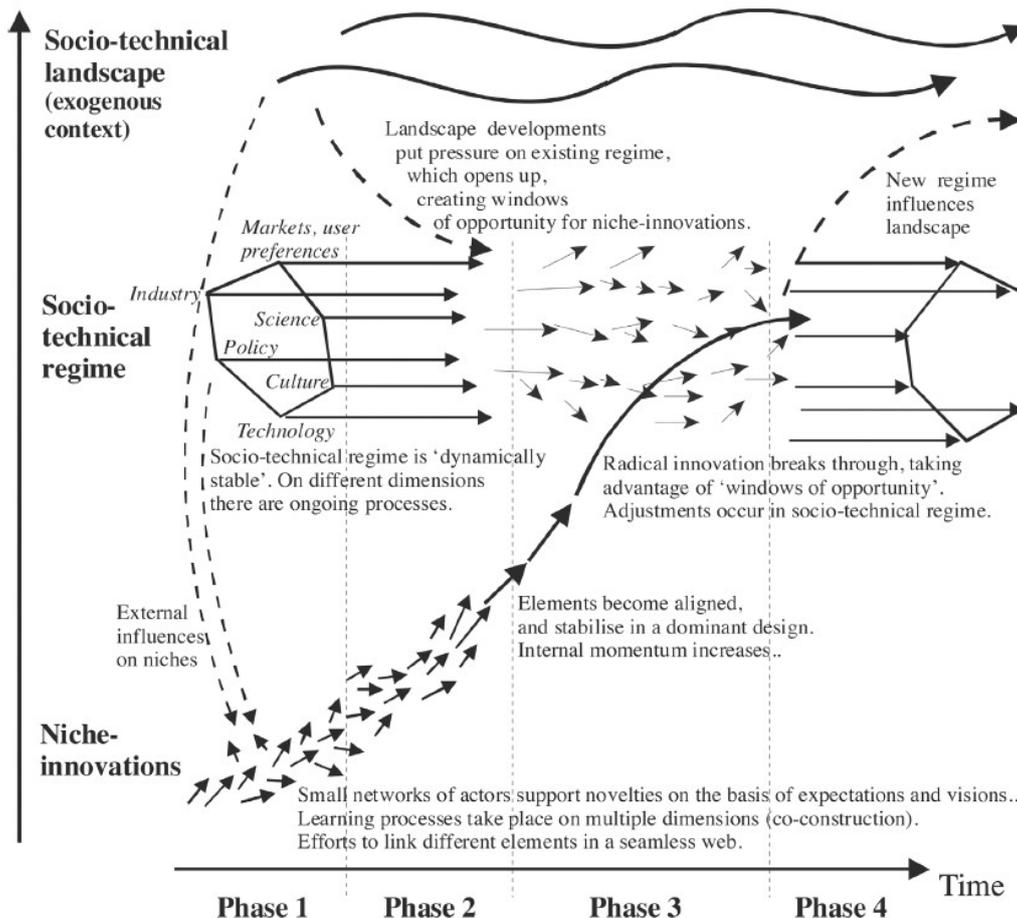
The definitions for the three attributes need to be extended or redefined to suit the purpose of exploitation of the INVADE innovation. We are no more considering a well-defined market and industry, but a new niche market which is going to disrupt the energy industry. In this context the power of a stakeholder needs to be extended to consider more parameters. Urgency no more relates to how urgent the claims of a stakeholder are and the definition of legitimacy needs to go beyond the legitimate claim of a stakeholder on an organization. As the attributes change the typologies are also going to be affected and thus further developments are needed.

### **3.1.3 Multi-level perspective (MLP)**

MLP is a multi-dimensional approach to understand how transition occurs in society. It is a broad framework which considers technological as well as societal aspects. MLP is developed to understand interactions between niche innovations and existing regimes at broader level (Rip and Kemp, 1998; Geels, 2002). MLP consists of three levels; Macro-

level called *Socio-technical landscape*, Meso-level called *socio-technical regime* and Micro-level called *niche* (see **Figure 10**).

*Niches* are the cradle of innovation and these can be both technological and market niches. The niches behave as incubation rooms shielding new technologies/markets from mainstream market. Niches are characterized by three important niche-internal processes: social networks, learning process, and articulation of expectation to guide learning processes (Verborg and Geels, 2007). INVADE thus belongs to the niche.

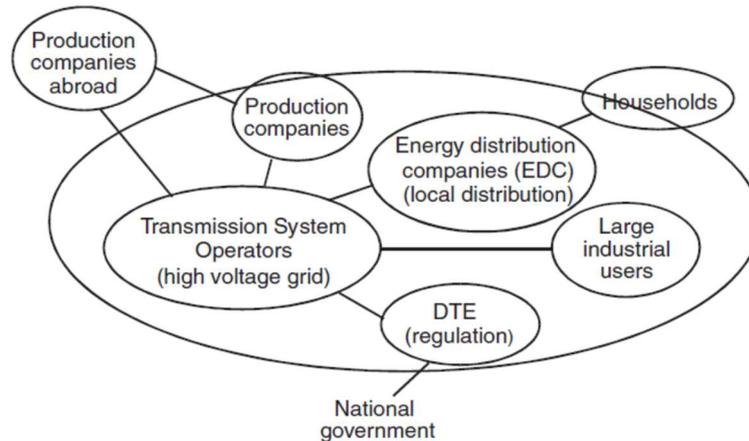


**Figure 10:** Multi-layer perspective on socio-technical transitions. Source: Geels 2017 (adapted from Geels and Schott 2007).

According to Geels (2005) *socio-technical regime* or just regime consists of 3 interlinked dimensions:

- i. stabilized connections between various actors and social groups,
- ii. formal, normative and cognitive rules which lead the actions of actors involved,
- iii. material and technical elements (in electricity regime it is for example generation plants, distribution and transmission grid, and electric vehicles).

For INVADE context the regime is the existing and traditional electricity sector (see **Figure 11**).



**Figure 11:** Example of well-connected and stabilized electricity regime. Source: Verbong and Geels (2007).

At macro-level, there is *socio-technical landscape* which contains elements which are beyond direct influence of niche and regime actors, it forms an exogenous environment to other two levels (Geels and Schot 2007). An example for this could be a country with its political strategy for dealing with energy.

This framework has been extensively used by researchers to understand how transitions in societies have happened previously. It can also be used to understand how transition can be brought in future. For the stakeholder analysis, it provides framework to understand how actors from different levels will react to our innovation. This could for example be assessed based upon whether stakeholders are incumbent stabilizing existing regime or whether they are niche innovators who are destabilizing the regime. An important attribute which comes out of this framework is the ‘impact of stakeholder on existing regime’. The importance of this attribute to this task is further explained in section 3.2.

### 3.1.4 Summary

Traditional stakeholder analysis attributes have their limitations when applied to innovations. These attributes were developed to be used by project managers to handle projects which were mostly intra-sectoral and happen in developed markets (Elias et al. 2002, Bunn et al. 2002, Sulaimani et al. 2013). However, innovation projects like INVADE have different needs. The scope of INVADE goes beyond the project to include exploitation of outcomes in a broader context. The market for INVADE is not yet

developed and this is potentially a multi-sector innovation. Therefore, definitions of traditional attributes need to be modified to better suit the purpose of this work.

There are more frameworks and theories for stakeholder analysis available in the literature, however most of them have evolved from one of the described above popular frameworks. We therefore stick to these three basic frameworks and develop them further for our aim.

## **3.2 Adapting stakeholder attributes**

### **3.2.1 Introduction**

All projects, including which involves innovation as outcome, are meant to match the stakeholder's expectations to promise of the project. The attributes defined in this section provide insights to stakeholder expectations thereby revealing possible alliances and frictions. We believe redefining attributes from the two classical frameworks combined with modern framework of MLP would provide the insights needed. This would provide partners and entrepreneurs an understanding on how different stakeholders are going to behave and subsequently help them to manage these stakeholders. In this section, we first provide adapted definitions of attributes used for analysis. Secondly, we describe other attributes which do not need modifications and are used as they are.

### **3.2.2 Adapted attributes for INVADE innovation**

- Power: Mitchell et al. (1997) and Suchman (1995) describe power as an ability of a stakeholder to influence project outcomes. In INVADE context this definition is extended to include the following abilities:
  - Ability to affect market penetration of innovation. For this we look upon three parameters: current market share, geographic presence, and digital presence,
  - Ability to influence final design of the innovation,
  - Working capital and ability to mobilize capital,
  - Ability for research and innovation.

Having one or a combination of these abilities brings varying degrees of power. If a stakeholder having large customer base in a region adopts the INVADE platform, then it is likely to involve its customers in it and thereby accelerating the

market uptake. On the other hand, if such a stakeholder is averse to the INVADE platform it can hinder the growth of INVADE in the region where the stakeholder is a dominant player. Thus, stakeholders with large market presence in energy sector (or other which has connection to the energy sector) will have high power and are important to successful development of the INVADE market. Similar logic is applicable to digital presence as well. Currently reference for market presence is European level. DSO's are one of the key future customers/suppliers of flexibility and have high ability to influence final design of innovation. In other words, to be accepted by them we need to adapt design of our innovations according to their preferences. As such these stakeholders also have power element with them. Alliances with powerful stakeholder is crucial. And if powerful stakeholder is not supportive, a protection strategy needs to be formulated so that such players do not become a roadblock in market development and growth for INVADE. Power is qualitatively assessed as high, medium or low.

- *Urgency:* This represents how urgent is the need of INVADE product/service to a stakeholder. Urgency provides a window of opportunity for an innovation to enter the market. Such stakeholders should be targeted to form alliances as they will be more supportive in accepting the innovation and subsequently provide push for flexibility market development. Urgency is qualitatively assessed as yes and no.

- *Legitimacy:*  
Definition provided by Suchman (1995) is broad and in context of INVADE this should be understood as how activities of a stakeholder are perceived by the end users and other players of the respective industry. This is like brand image of a stakeholder. Such end-users in case of INVADE ecosystem are consumers, prosumers, and EV charging station owners (defined as BOs). As such BOs and educational institutes are the source from where legitimacy is derived. Endorsement by such stakeholders would also attract interest of other players towards the ecosystem and might also motivate them to be part of it. Thus, acceptance by stakeholders having high legitimacy in society is likely to ease out market entry as well as subsequent penetration of our innovation. Such stakeholders should be prime target of exploitation activity.

### 3.2.3 Other attributes

- **Interest:** This shows how interested a stakeholder is to outcomes of INVADE. At the initial stage of the project this is assessed by answering the following questions:
  - Is there added value to stakeholders and do they see this added value?
  - For incumbents in energy sector: Are they conservative or open to innovation?
  - Is business strategy and goals of a stakeholder in-line with ambition of INVADE?
  - What motivates the stakeholder?
  - Are stakeholders proactively seeking to take part in local flexibility markets?

The estimated interest at this stage needs to be confirmed later through exploitation and dissemination activities. Interest is qualitatively assessed as high, medium and low. For this assessment, interest in both the technological outcomes and the new platform based business model are considered.

- **Attitude:** Stakeholders can be supportive or opposing to flexibility market depending upon how it affects their business and how open they are to innovations. To find their attitude we need to assess how such market will affect their business and vision. Stakeholders are likely to have negative attitude when both their business and vision are adversely affected or they see our innovation as a competition while the vision aligns. Their expected market category (according to Porter model) in flexibility market would also help in assessing this attribute. It is qualitatively assessed as positive or negative or not having any attitude (+, -, or 0).
- **Flexibility service added value:** Flexibility services could add value to existing business of stakeholders to various degrees. Higher the added value, higher the interest could be expected and vice-versa. The level of this added value will reflect how much a stakeholder will be interested. To assess this, we follow a two step approach, first we qualitative assess added value to stakeholder's business from the benefits INVADE promises. Second, we conduct interviews with stakeholders (internal project stakeholders and external) to know how they see the added value based upon their future business strategies. This two-step

approach allows us to contrast the added value we see and what stakeholders' see. This process provides two-way learning. First, this will throw light on added values which stakeholder might not realize themselves. And secondly it might provide new ways of creating values via stakeholders input. Such knowledge would become important information for future exploitation purpose, like developing exploitation plan for partners. At this stage, we have only conducted interviews with partners. These attributes indirectly helps us in assessing the interest of a stakeholder.

- **Impact on existing electricity socio-technical regime:** An innovation can have stabilizing or destabilizing impact on existing regime. Knowing this would help in identifying potential alliances and threats from incumbents as well as competing niche innovations. If a stakeholder's business is supports existing regime which will be adversely affected by destabilizing of regime, it would be difficult for FO to form synergy with such stakeholders (by making them supplier, customer, etc). Such stakeholders would not be interested and would have negative attitude towards our innovation. If stakeholder's products/services have destabilizing effect then such stakeholders should be targeted to form synergies to develop flexibility market. A regime destabilizing stakeholder can also be a potential competitor to INVADE and thus a protection strategy from such stakeholder would be required. Furthermore, we (INVADE project internal stakeholders) can also learn from such stakeholders, i.e., how are they dealing with the incumbent regime and what are their strategies to deal with incumbents. This attribute also provides insights to qualitatively assess the interest and attitude of a stakeholder.
- **Market category:** Market categories are based upon Porter's 5 forces model (Porter, 1980). The categories are: customers, suppliers, competitor, intruders, and substitutes. For this it is assumed that market for INVADE is already developed and stakeholders in each of these categories have common interests in the flexibility market. The market category attribute would provide information of their positions in the ecosystem thus allowing us to see possible alliances and threats. This attribute also contributes in qualitatively assessing the power, attitude and interests of stakeholders. Deliverable 3.1 provides details on these attributes.
- **Geographic presence:** Places where stakeholders are involved with their business activities. This is connected to the 'power' attribute, the bigger the geographic presence, the higher the capacity of a stakeholder to introduce

INVADE to new markets. This is crucial for success of INVADE that it is established in as many countries as possible. Having multi-national presence adds up to the attribute of power.

- **Motivation:** This assesses the motivation of a stakeholder, i.e., what drives stakeholders in doing their existing business, what are their goals and future strategies. Knowing this information provides inputs to qualitatively assess stakeholders' interest and attitude.

### 3.2.4 Conclusion

The combination of different attribute gives dynamism to stakeholder's behaviour towards the INVADE platform and FO. Understanding this is crucial to know whom to approach, when to approach and how to approach. This will further benefit other tasks of exploitation activities (T3.3, 3.4, 3.5 and 3.6). To understand the dynamism of stakeholder we have created three maps which assess different stakeholders across various attributes. Based upon the background study on stakeholder attributes it was realised that there are five main attributes and the rest form the basis to qualitatively assess the main ones. We therefore divide attributes as primary and secondary. The stakeholder maps are made with the primary attributes. The five primary attributes are:

- i. Power
- ii. Legitimacy
- iii. Urgency
- iv. Interest
- v. Attitude

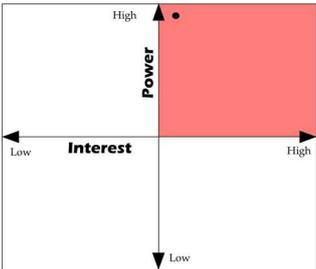
### 3.3 Stakeholder template

Previously we defined the attributes required to assess the stakeholders. A template was created to record the information collected about stakeholders (**Table 1**). As explained in the methodology section, input for external stakeholder is gathered from their respective websites while for partners, specific templates (as provided in Section 2.2) were distributed to collect information and via a workshop. The stakeholder template basically serves as a database to assess the attributes. It should be noted that as the attributes changes over time the template will also be updated. And as exploitation activities to involve external stakeholder have not yet begun, certain sections will be filled up later.

Thus, this template serves as an extensive dynamic database to store information about stakeholders.

Certain attributes like R&D capability and working capital are only relevant for businesses and not for others like communities and municipalities. All attributes are thus not required for every stakeholder.

**Table 1:** Template used to collect data on stakeholders.

<b>Name of company</b>	<p style="text-align: center;">Stakeholder position</p> 
<b>Business</b>	What kind of business they are doing in the energy sector
<b>Stakeholder category</b>	Customer / Supplier / Competitor / Intruder / Substitute
<b>Flexibility services added value</b>	How much value flexibility services can add to a company's existing business
<b>Motivation</b>	What is the driving force behind the company's existing business
<b>Working capital</b> ( <i>only for businesses</i> )	Self-explanatory
<b>Maturity of technology</b> ( <i>only for businesses</i> )	Pertaining to technology competing with the INVADE platform
<b>R&amp;D capability</b> ( <i>only for businesses</i> )	Self-explanatory (based upon both how good they are in research with respect to electricity sector as well as ICT technology)
<b>Innovation capability</b> ( <i>only for businesses</i> )	Self-explanatory
<b>Existing business model</b>	Explained previously
<b>Impact on existing electricity regime</b>	Explained previously

<b>Impact on existing electricity socio-technical regime</b>	Explained previously
<b>Stakeholder position explanation (power-interest map)</b>	Why are stakeholder mapped in respective position on the map
<b>Analysis key points</b>	Covers key points about a company's business and how INVADE could affect them. Suggestion on how exploitation activities should be focussed. Forms the basis for creating the engagement plan
<b>Geographic presence</b>	Explained previously
<b>Engagement Plan</b>	INR, MON, WPE, INT, FFC ( from D8.1)
<b>Level of participation</b>	Based upon their responsiveness to engagement plan and exploitation activities.
<b>Latest contribution</b>	Active contribution to the project.

## 4 Stakeholder maps

### 4.1 Introduction

Previously we defined different frameworks and adapted attributes from them to suit the purpose of the work. Changing of attributes also changes the maps provided by Mitchell. In this chapter, we provide explanation of new map arising from adaptation of attributes, along with two other maps. The focus here is on five primary attributes: power, interest, attitude, legitimacy and urgency.

Stakeholders when mapped across primary attributes reveal important information on their behaviour and role they might play in success of the innovation. For INVADE behaviour of stakeholders will have impact INVADE platforms' success, FO's market

entry and its business thereafter. These maps provide inputs to meet objectives of WP3 as follows:

- Assist partners in assessing their current position with respect to flexibility market.
- Allow partners to understand what efforts must be made to become a FO. Help them to decide where they fit best in the flexibility market considering their business strategy.
- Provide strategic information to entrepreneurs who would like to take up INVADE innovation and develop new business as FO.
- Identify stakeholder with whom organic partnership is required and against whom shielding is required to enter the market and subsequently grow.
- Provide inputs to T3.4 to draft informed business and exploitation plan. And provide list of important stakeholders to T3.6.

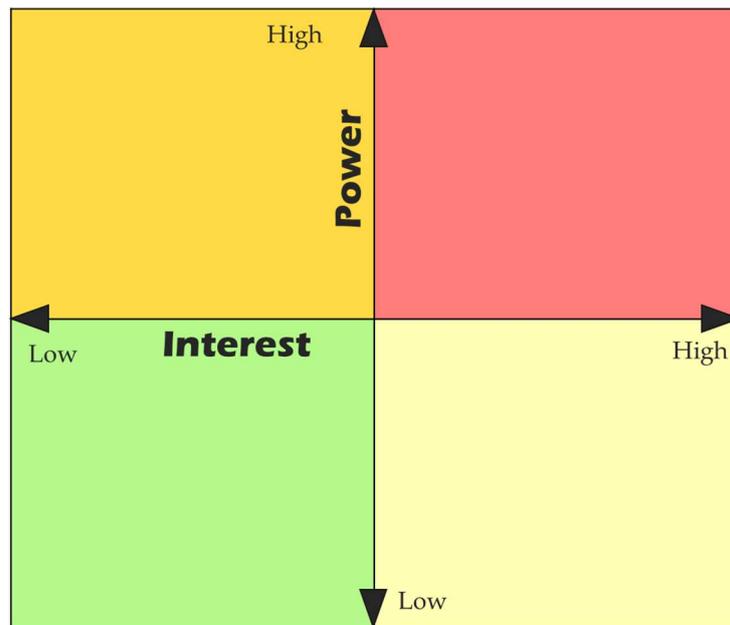
To achieve these three maps have been used. First is the traditional power-interest map used extensively by both project manager and innovators. Second map is adaption of Mitchell's typologies as described in Chapter 3. Lastly a power-interest-attitude map is developed to complement the second map.

## **4.2 Classical Power-Interest map**

This is the most extensively used map to study stakeholders (Bryson, 1995). Mapping stakeholders on power-interest dimensions provides basis for prioritizing the stakeholders and developing an engagement strategy for them. Based on this map four strategies are provided in literature:

- I. High power – high interest: These are the key stakeholders which require most of the attention. Exploitation activities should closely seek to connect needs of such stakeholder's and outcomes promised by INVADE. Important consideration should be given in the activities of WP9 to develop new business models which fulfils the need of such stakeholders. High power – high interest stakeholders must be made aware of the possibility for matching of their needs with our innovation.
- II. High power – low interest: These stakeholders should be managed only in the issues important to them. General aim should be to keep them satisfied and engagement activities should focus on increasing their interests.

- III. Low power – high interest: these are potential supporter/goodwill ambassadors. Such stakeholders should be kept informed about the progress made during the project. Generic approach should be to show consideration towards them. They should be kept interested by involving them in dissemination activities, like workshops, and other social/technical events.
- IV. Low power - low interest: these stakeholders should only be monitored. Efforts should be to generate interest in them.

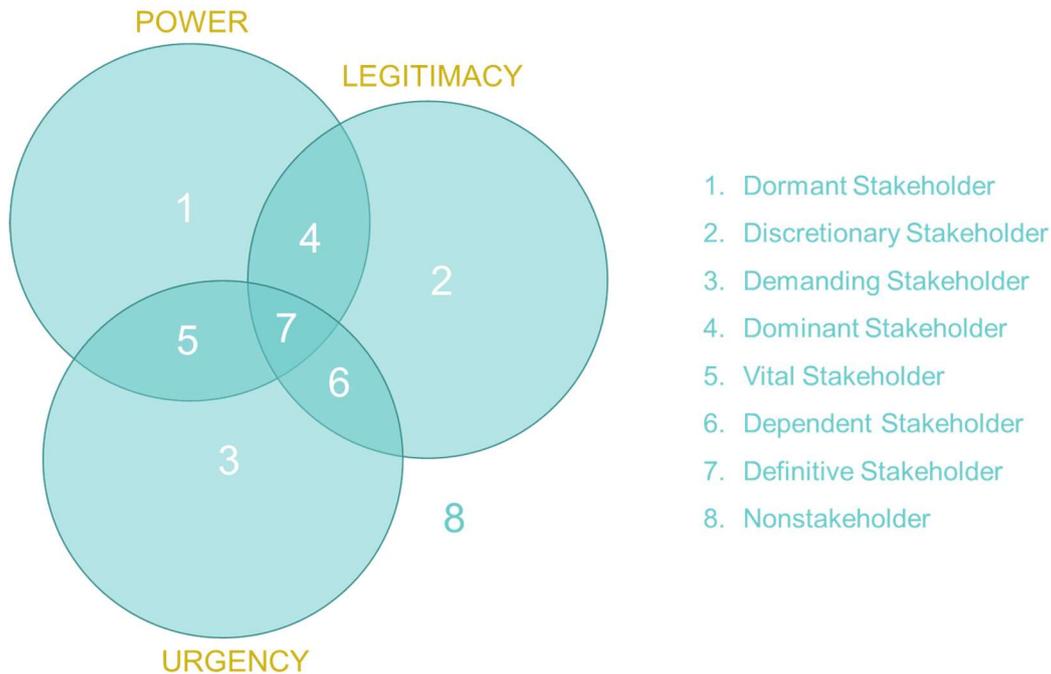


This map is static which provides guidance on how to handle various stakeholders at an instance. The interest and power are not always the same and change over time. Thus, this map does not provide insights into how stakeholder behaviour might evolve. Furthermore, interest by a stakeholder does not always mean having positive attitude. Stakeholders might also be interested in an innovation to get competitive advantage or to know how it affects their existing business and if it is expected to have adverse effect they might try to block the innovation. Such information cannot be derived from this map. The next two maps fill in these gaps and help in understanding stakeholders better.

### 4.3 Power-Legitimacy-Urgency map

Mitchell et al. (1997) proposed typologies of stakeholders based upon their possession of three attributes: power, legitimacy and urgency (Described in Chapter 3). Adapted attributes from Mitchell's framework also changes the typologies (although not all the

typologies). This map is adapted version of Mitchell's typologies. In this section, we present what these typologies mean for INVADE.



**Figure 12:** Graphical representation of different classes of stakeholder adapted from Mitchell et al. (1997).

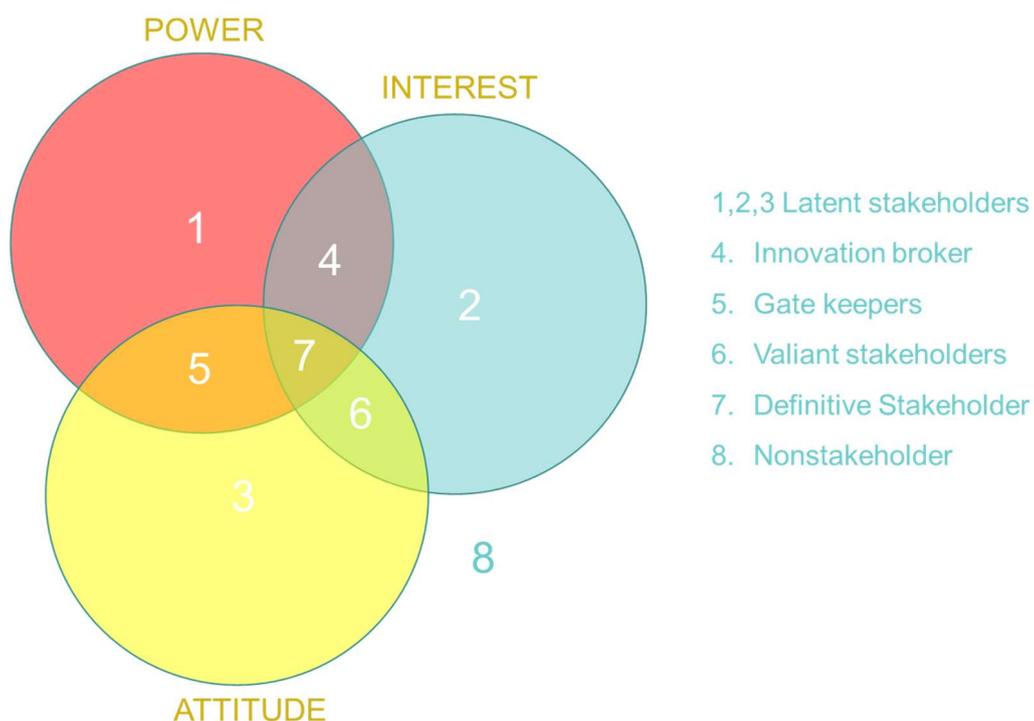
- Dormant stakeholders: These only possess power attribute and are same as described by Mitchell. The target for exploitation activity should be to find ways to exploit this unused power for the benefit of INVADE. Some suggestions will be made later when results are presented and discussed. Because of their potential to acquire other attributed the exploitation team should be cognizant of their activities.
- Discretionary stakeholders: These have attribute of only legitimacy and are traditionally ignored by project managers. As described before these mostly comprised of BOs. For innovation projects, it is of prime importance that such stakeholders are given apt attention and their preference considered in the design phase. As we will observe later in the results these stakeholders are crucial to attract powerful stakeholders and influencing them to adopt INVADE platform.
- Demanding stakeholders: These only possess urgency attribute. These are likely to have high interest in the INVADE and as such would be interested in following project outcomes closely. It is important that such stakeholders are made aware

about INVADE. Since they have urgency to have innovation like ours they will become natural promoters of the outcomes. It is important to recognize and reach them as early as possible. Once they are identified these should be frequently updated about project outcomes and they are likely to be active themselves in knowing more about outcomes of INVADE. They should also be proactively supported if they want to understand how they can benefit from the project.

- Dominant stakeholders: These possess both power and legitimacy, but since there is no urgency they might not be interested in the project and provide no support for the market growth of INVADE. These are tricky stakeholders as when urgency arises they could possibly become toughest competitor or strongest promoter of FO. If they see FO as a competitor to their existing business and if they are conservative they are likely to block the entry and market growth of FO business and thus limiting the impact of our innovation.
- Dependent stakeholders: These are characterized by having legitimacy and urgency. To satisfy their needs they depend on advocacy of powerful stakeholders. Any internal stakeholder or external entrepreneur should try to connect dependent stakeholders to the ones having power as such alliances could benefit market penetration of FO.
- Vital stakeholders: The stakeholders having power and urgency are defined as 'dangerous stakeholders' by Mitchell. However, as we have extended the definition of the urgency attribute, the classification description does not apply for INVADE. We therefore call these 'vital stakeholders' as these are the ones who are looking for services/products which delivers value same as INVADE. Such stakeholders are consequential to success of INVADE. If they are on board and accept the innovation they will prove instrumental in developing market for the INVADE innovation and are likely to become its promoter. However, if they do not accept or are not aware of the project they could align with competitor or can develop their own competitive product/service and thus can seriously hinder penetration and market development for the FO who has adopted the INVADE platform.
- Definitive stakeholders: These are the high-priority stakeholders which have all three attributes and utmost efforts are needed to get their attention.

#### 4.4 Power-Interest-Attitude map of stakeholders

Mitchell's framework does not show interest or attitude of the stakeholder. As it considers typical company projects and their management, it is implicitly assumed that all stakeholder benefit from success of project. However, for innovation this might not always be the case as many interested stakeholders might have negative attitude towards innovations. An example could be potential competitor who is interested in the innovation but has negative attitude towards our innovation. Conservative DSOs could also have no interest and negative attitude towards INVADE. Such stakeholders are likely to block INVADE's market entry as well as growth. Conservative stakeholders are usually characterized as incumbents who have stabilizing effect on existing regime and are conservative in their business. To unveil such stakeholders another map comprising power, interest and attitude attributes is developed. This map is inspired from Mitchell's framework and complements it.



**Figure 13:** Stakeholder map based upon attributes: power, interest and attitude.

- Latent stakeholders: Following the similar logic from previous section the stakeholders having only one of the three attributes are likely play inactive role in the market development of our innovation, at least without push from exploitation activities. Thus, these are classified as latent stakeholders. They become active

when they acquire one or more other attributes. This could happen in many ways and we will discuss it later in the results and discussion sections.

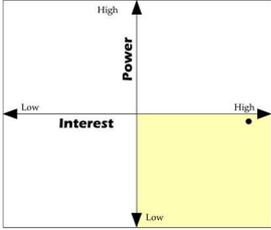
- Innovation broker: These have both power and interest in the project and are likely to act as a broker to market our innovation. Such stakeholders have not yet developed any attitude towards INVADE as they are not sure how it can benefit them. Thus, by being broker they would like to test the innovation in the market and how it impacts their existing business.
- Gate keepers: These have power and attitude attributes with them and hold a critical position in market development of the innovation. Gate keepers will either block or provide a push to the innovation. Gate keepers depends upon positive or negative attitude they hold towards the innovation. Positive attitude will result when these stakeholders see added value to their business through adopting innovation or by facilitating its market development. Gate keepers stakeholders can also block the market for innovation if they see them as a threat to their business. Having an attitude towards our innovation does not necessarily mean having interest. An example of this could be tech giant like Google, which might have positive attitude towards INVADE but because of different business strategy they might choose not to show any interest. On the other hand, there could be conservative DSOs who might not show interest in our innovation and as they are conservative they will have negative attitude and will try to block entry of FO in the area they are operating.
- Valiant stakeholders: These have attributes of interest and attitude but lack power. They are termed valiant as they have determination to venture into new markets and thereby positively or negatively affect success of our innovations. If they have a negative attitude towards our innovation, they will try to slow down the innovations market uptake. However, if they have positive attitude than they would be potential allies in the ecosystem. As such stakeholders don't have power element they cannot do much more than slowing down the market growth.
- Definitive stakeholders: these are those who have power, interest and a positive attitude towards our innovation. The earlier these stakeholders are identified faster and easier the market penetration of the innovation will be. Targeting such stakeholders is crucial to generate highest impact from the project.

## 5 Results

### 5.1 Data collection

All the business partners (seven in total) were asked to provide feedback via the template created for information collection (see Section 3.3). Three partners, Greenflux, Elaad, and EYPESA provided the information via template. For rest information is collected from previous interviews. An example for stakeholder template is presented in **Table 3**. Information regarding other stakeholders both partners and external are provided in the supplementary document.

**Table 2:** Information template for partner EYPESA.

 <b>Estabanell Energia</b>	<p>Stake holder position</p> 
<b>Business</b>	DSO, retailer, producer (Electric utility)
<b>Stakeholder category</b>	Customer/Supplier/competitor
<b>Flexibility services added value</b>	High
<b>Motivation</b>	With increasing demand and customer base in the area they operate they want to prolong the investments for reinforcing their distribution grid.
<b>Working capital</b>	Medium
<b>Maturity of technology</b>	They currently don't have any competing product to INVADE platform
<b>R&amp;D capability</b>	Medium
<b>Innovation capability</b>	Medium
<b>Existing business model</b>	Traditional (B2B, and B2C)
<b>Impact on existing electricity socio-technical regime</b>	Disruptive
<b>Digital presence</b>	-
<b>Stakeholder position explanation</b>	Holds high power in region it operates. As it is regional company it holds moderately high power. As it wants to postpone its investment in the grid via flexibility, they have high interest in INVADE concept.
<b>Analysis key points</b>	<ul style="list-style-type: none"> <li>• Can have multiple role in flexibility market.</li> </ul>

	<ul style="list-style-type: none"> <li>• Based upon face-to-face interviews held in 2<sup>nd</sup> review meeting they are actively looking to become FO.</li> <li>• Will play strategic role introducing INVADE concept to Spanish market.</li> </ul>
<b>Geographic presence</b>	Spain (Girona)

Some of the key outcomes are summarized below:

- All partners agree that DSOs are a key player which can facilitate market growth of INVADE outcomes.
- Only EYPESA has shown interest of becoming FO. Other want to exploit the outcomes by improving their existing products/services. EYPESA is also exploring business model based upon USEF framework (see supplementary document).
- All partners seek to use outcomes by having traditional business model around them. Currently no one is seeking to use double sided platform based business model. It might also be the case that partners do not truly understand such kind of business model.
- Elaad being an association has a different ambition and view on competitors, they describe this as:
 

*“.....We are a foundation and a knowledge and innovation centre who’s objective is knowledge sharing about EV smart charging research and projects. We are looking for co-operation and consensus, not competition.”*
- A new stakeholder was revealed during the interview with Albena, they are the tour operators, like Thomas Cook.

## 5.2 Mapping external stakeholders

### 5.2.1 Power-Legitimacy-Urgency map #1

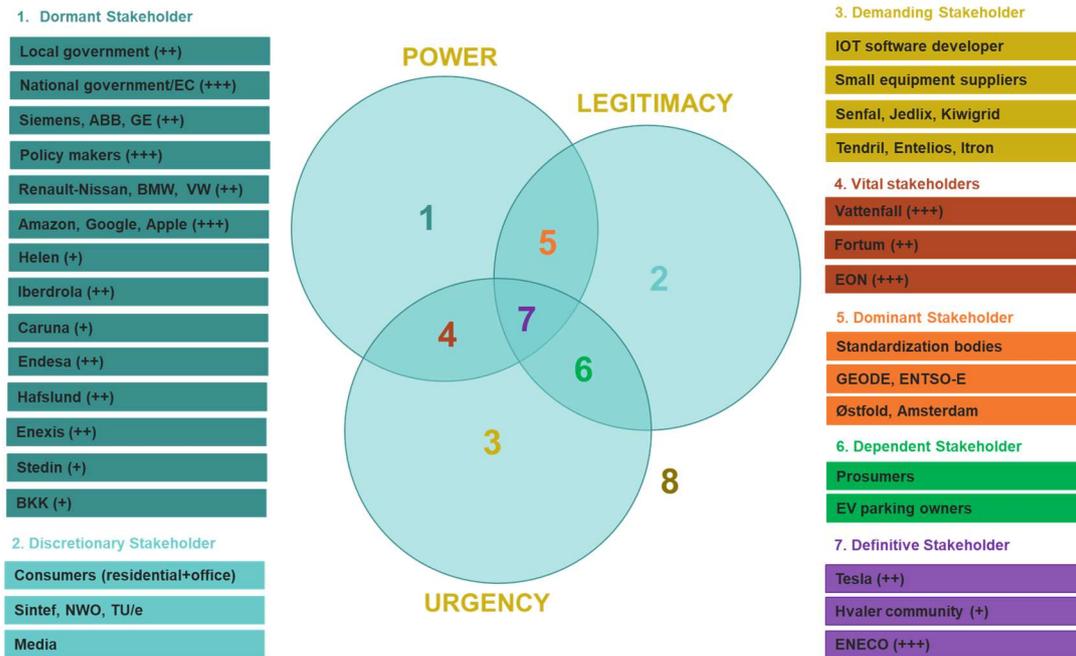
External stakeholders are those who are not involved in the project but would be associated with the INVADE ecosystem. D3.1 forms the basis for selecting the external stakeholders. More than hundred stakeholders have been identified and it is not possible to map every one of them. Moreover, the point of this exercise is to come up with a generic map which can then be applicable to all stakeholders who are already identified or are yet to be identified.

**Dormant stakeholders**

- Policy makers, governments (both national and local) and standardization bodies hold only power. They act based upon influence of other stakeholders like BOs (citizens) and multinational companies. They can potentially move towards becoming dominant or vital or definitive stakeholders depending upon influence from others.
- Some DSOs fall into this category, DSOs like Iberdrola, and Endesa are working in varied DR projects but currently do not see the need to invest in flexibility services and thus do not have urgency. While DSOs like Hafslund and Helen are sceptical to benefits of our innovation and are conservative in doing their business. Conservative DSOs have an opinion of continuing business as usual and are likely to resist FO's business. DSOs in this typology are the ones which do not yet see the need for storage and flexibility in their network or do not see our innovation as an effective solution or are conservative in doing their business. DSO's manage the grid at low-voltage level and have power to determine rules on what can and cannot be done at this level. Additionally, DSO's in Europe usually have monopoly where they operate, thus DSO's always have element of power with them. The amount of power depends upon level of their presence in a region. When DSOs see the need for investing in our innovation, they might move to gain more salience. DSOs do not inherently have legitimacy and has to be derived from end-customers by getting their support.
- EV manufacturers like Renault-Nissan, BMW and Volkswagen have high power. Their power comes from large market share, high ability to mobilize capital and high research and innovation capability. Presently major EV manufactures, like Nissan, are collaborating with utilities in Europe<sup>3</sup> to test V2G concepts. As INVADE takes advantage of flexibility available through EV, EV manufacturers could in future have interest in our outcomes. Currently they are not yet aware of the ecosystem we are creating and do not have urgency to move into a flexibility market. Neither do they see business opportunity in becoming FO themselves.

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<sup>3</sup> Information on the example pilot project available at: <https://newsroom.nissan-europe.com/uk/en-gb/media/pressreleases/145248/nissan-and-enel-launch-groundbreaking-vehicle-to-grid-project-in-the-uk>



**Figure 14:** Mapping external stakeholders across Power-Urgency-Legitimacy dimensions. +, ++, +++ represents low, medium and high power respectively.

- Platform giants like Amazon, Apple and Google currently only exhibit power. They have high digital presence, high capital to dispose and high research and innovation capabilities. In short, they are frontrunners in platform based business and are most powerful of all other stakeholders. They are developing IoT products and already have platform based energy management systems (EMS). These technologies and local platforms are important part of the INVADE ecosystem and complement FO’s business if operations (managed by FO) are handled via common information model and communication protocols. Such platform giants have not yet shown specific interest towards a new business line of being FO. And thus, we assume they currently don’t have urgency. If they see big market potential in being FO they might develop urgency, however that does not mean they would be supportive to INVADE innovations. Such companies have large customer base showing customer loyalty. Large customer base reflects that BOs endorse such platform and this should give them legitimacy. However, having such loyalty in social platforms does not translate into having legitimacy from citizens when it comes to sharing data on energy use. As they are not yet directly involved in energy business, it is unclear how BOs will perceive them in this sector. In general, there is concern that platform giants can be intrusive. It is important to understand that current technologies, from platform

giants, consume energy but from BOs' point of view its benefits are more in better health and security rather than saving in energy consumption.

- Multi-national (MNC) electrical giants like GE, Siemens, and ABB have high power because of international customer base, availability of high capital and high research and innovation capability. They currently have product/services for energy management but have not shown interest in playing active role in platform based flexibility ecosystem or as FO. A sense of urgency and interest will only arise when they see a big market potential for becoming FO. But this does not mean they will have positive influence on our innovation, we will come back to this in the next section where we explore these stakeholders further. Such companies do not have inherent legitimacy as it comes through BOs perception. As such multinational companies, who have B2B type business, we classify them as not having legitimacy attribute.

#### **Discretionary stakeholders**

- Consumers, educational institutes and research centres have legitimacy (high) and fall into this category.
- Media (all forms) are also categorized here as they are considered are legitimate source of information by BOs.

#### **Demanding stakeholders**

- IoT suppliers, equipment manufacturers (e.g. batteries and inverters) and energy management system solution providers constantly look to expand their business. By becoming part of flexibility market, they can expand their business and this makes them demanding stakeholders. Demanding stakeholders can also gain attribute of power as they grow their customer base and thus will move to different category.

#### **Dominant stakeholders**

- Standardization bodies are the ones who have both power and legitimacy attributes and thus they fall into this category.
- Associations like GEODE, ENTSO-E have powerful members and legitimacy as they can actively make or change opinions in the market.

#### **Vital stakeholders**

- Vattenfall, EON and Fortum are companies who have power because of their market presence varied range of business portfolio in energy sector, research and innovation capability. Vattenfall and EON are multinational electric utilities and Fortum is mostly multinational electricity retailer. They all have shown interest in flexibility services through their investments in energy management platforms. It is also clear from their motivation and future goals that they want to invest in green energy and have acknowledged importance of storage in future energy systems. They also benefit in their existing business by getting involved in the flexibility market. For example, Fortum as a retailer can offer more competitive electricity prices to its customers by participating in a flexibility market.

#### **Dependent stakeholders**

- Prosumers and EV parking owners want to take benefit of flexibility available with them. This gives them attribute of urgency and as they are also BOs they have attribute of legitimacy.

#### **Definitive stakeholders**

- Companies like Tesla and Eneco have all three attributes and thus are definitive stakeholders. Tesla's and Eneco's legitimacy comes from their positive image in public. The ability of Tesla to innovate, high working capital and large customer base gives it high power. For Eneco it is high working capital, diversification in energy business and large customer base. They both have urgency because they are aware of benefits of flexibility services to their business.
- Hvaler community like stakeholders have legitimacy, and they have shown urgency in such services as they want to be self-sufficient and become independent from the grid. When many BOs come together they also gain element of power, thus such communities also hold power.

### 5.2.2 Power-Interest-Attitude map #1

#### Legend

##### Attitude

- Positive = (P)
- Negative = (N)

##### Power

- High = +++
- Medium = ++
- Low = +

##### Impact on existing regime

- Stabilizing
- De-stabilizing

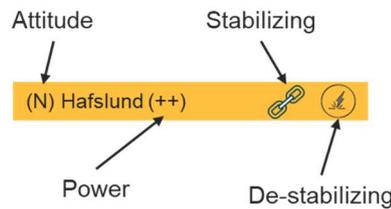


Figure 15: Legend for reading Power-Interest-Attitude maps.

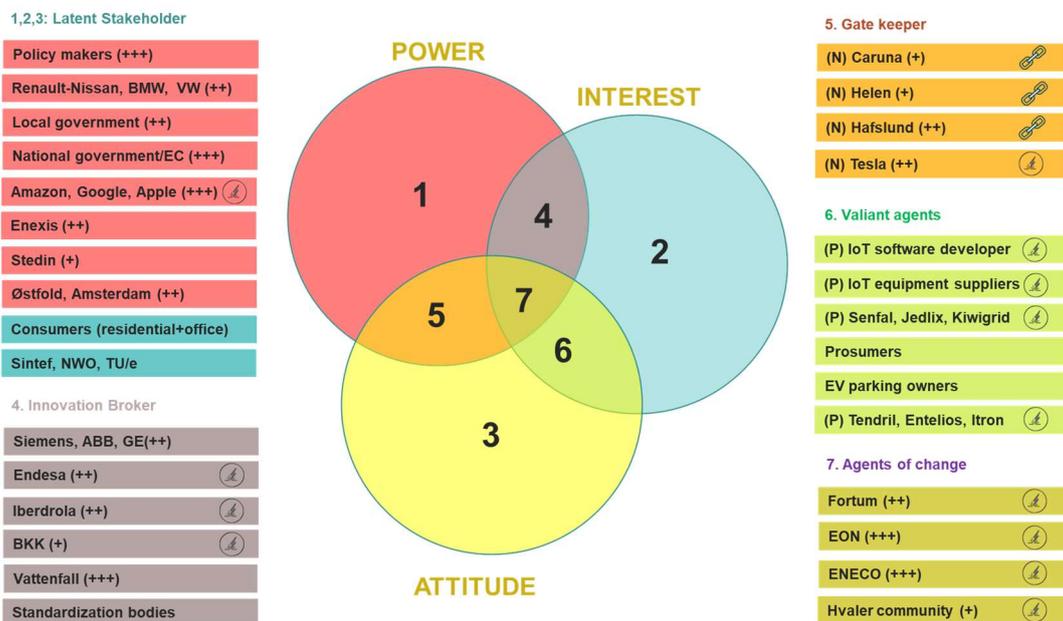


Figure 16: External stakeholder mapping based upon attributes: Power, Interest, and Attitude.

#### Latent stakeholders

- Platform giants, as mentioned previously, have high power. They have de-stabilizing impact on existing regimes as they are disrupting existing business. Their new technologies related to IoT and energy management platform might show that they are interested in flexibility markets, however their focus is more on better comfort, security and energy savings. This is not same as playing active role in the energy markets. Currently they are also not venturing into flexibility platform or in FO role, thus we assume that they do not have attitude or interest.

- Policy makers, local/national/EC are stakeholders that have only power, as was the case in previous mapping. They can start having other attributes based upon how they are influenced by other stakeholders like BOs.
- Consumers, educational and research institutes are classified as only having interest. In the beginning of project, it is usually not clear to consumers what direct benefits they will get by providing flexibility services, thus it is assumed that consumers do not exhibit attitude. D5.2 from WP5 assess different value of flexibility for different stakeholders in INVADE ecosystem. The value of flexibility in D5.2 are only qualitative. Quantitative value can be assessed once the pilots begin and new business models are created in WP9. With quantified incentives, it will be lot easier to convince consumers. It is important that consumers (who are also suppliers of flexibility) are made aware of value of flexibility and how they can capture this value through participating in INVADE flexibility market.
- EV manufacturers are currently characterized as only having power. As they are not into energy business yet they considered having no interest and no attitude towards flexibility market. EV manufactures have developing technologies to enable V2G and V2B operation. However, they have not shown interest in getting involved into energy business. They do not exhibit any destabilizing effect on existing regime. Tesla is shown as having negative attitude because being from USA it is going to powerful competitor to the INVADE FO.
- DSO's like Stedin and Enexis have not shown attitude and interest in flexibility market and thus have only power in this map. Being conservative they have stabilizing effect on existing regime.

### **Innovation brokers**

- Standardization bodies, in general, do not hold any attitude towards innovations. The standardization bodies, like ISO if they see that innovation has big potential, they are likely to be interested in creating standards. As through our innovation we are going to support development of new standards, such bodies are likely to show interest in the project. However, to develop interest, they need to be made aware of it. Thus, exploitation activities should make such stakeholders aware of our innovation. Many standardization bodies do not always need push from other authorities, like governments, to develop standards. They are thus classified as innovation broker.

- MNC's like Siemens, ABB, and GE have been developing products/solutions for energy management and demand response, thereby showing interest in flexibility market, and these players also have power. They currently lack attitude to play active role in the flexibility market and see themselves as supplying products/solutions to active players of such a market. This makes them innovation brokers. Their attitude will be determined once they formulate business strategy with respect to flexibility and what market category (according to Porter's model) they see for themselves in the ecosystem. Having traditional B2B type business model they are targeting industries to provide energy management solutions and currently do not see themselves as playing the role of FO. Activities of such companies are neither stabilizing nor de-stabilizing to existing regime. Although it is easier for them to operate under business as usual scenario but they can move fast and adapt as and when the regime shifts.
- DSOs like Iberdrola and Endesa are progressive, have power and have shown interest in energy management and demand response (thus are also categorized as having destabilizing effect). Thus, they are likely to have interest in the flexibility market. They currently don't have any attitude towards such market as they are not yet know sure about the potential of such ecosystems.
- Electric utility Vattenfall, is also placed here as they play multiple role as DSO, retailer and energy producers

#### **Gate keepers**

- Conservative DSOs like Helen, Hafslund and Caruna have power and negative attitude towards flexibility market. They are likely not to have any interest in our innovation. Thus, these are gatekeeper who would like to block entry of flexibility market in the region they operate. Such stakeholders have stabilizing effect over existing regime.
- Tesla on the other hand has power and positive attitude towards flexibility market. Currently we classify it as having no interest in the project. They are gatekeepers who could push for our innovation in the market.

#### **Valiant stakeholders**

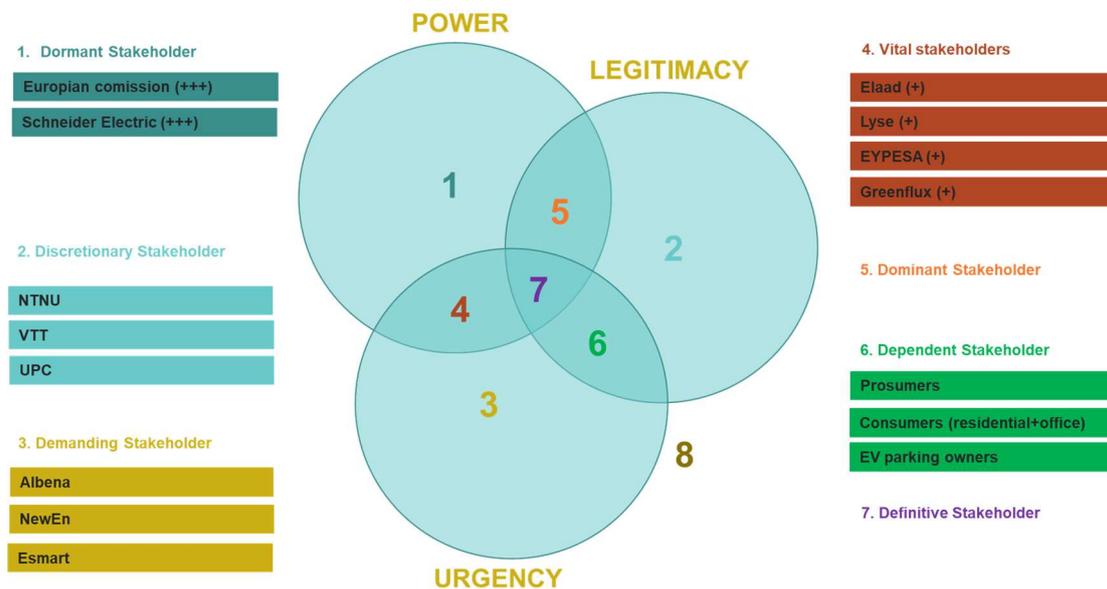
- IoT software developers, and equipment suppliers come under valiant stakeholders who have interest as well as positive attitude towards our innovations as flexibility market is likely to provide them with new business opportunities.
- Energy management solution providers also have attributes of interest and attitude. They can either have positive or negative attitudes, if they have positive attitude they will facilitate INVADE market entry and growth. Whereas if they have negative attitude they are going to be risky stakeholders.
- Prosumers and EV parking owners as mentioned before do not have power but have interest and positive attitude because of the benefit that a flexibility market would bring to them.

### **Agents of change**

- Fortum, EON, and ENECO have all three attributes with positive attitude towards flexibility market. As mentioned previously, their efforts in the direction of energy management platforms and motivation makes them agents of change.
- Energy communities because of reasons mentioned in a previous map have all the three attributes and fall in this category.

## 5.3 Mapping internal stakeholders

### 5.3.1 Power-Legitimacy-Urgency map #2

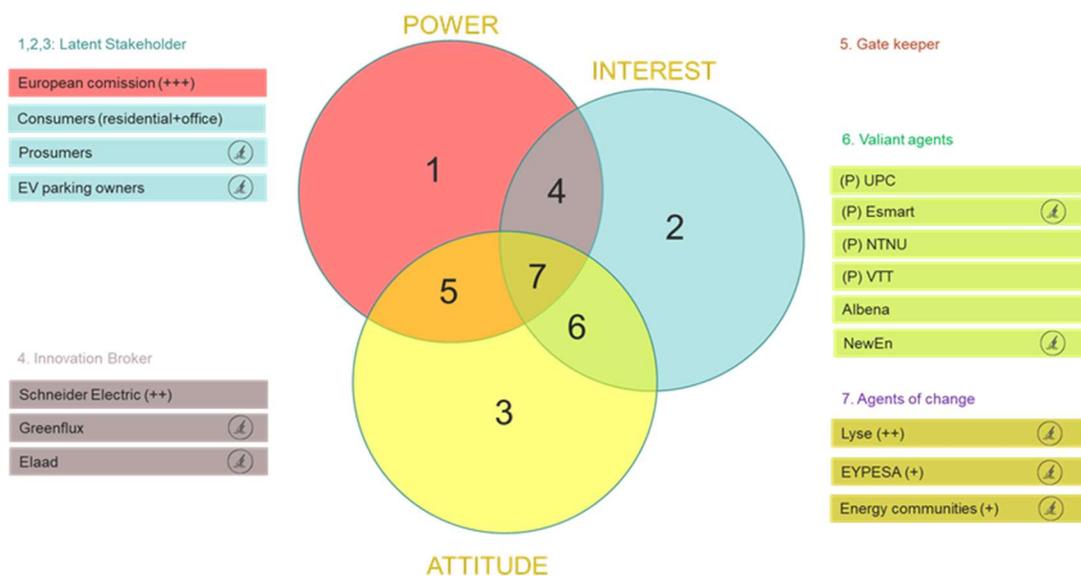


**Figure 17:** Mapping internal stakeholder on adapted Mitchell's map.

- As consumers, prosumers and EV parking owners have shown interest to participate in the project we classify them as dependent stakeholders having interest and urgency but no power. As mentioned previously individual prosumer, consumers and EV parking owners have no power however when they unite under communities they gain power. There are currently no communities involved in the project.
- Albena, NewEn and eSmart systems (eSmart in short) want to get benefited in the business using flexibility and are actively looking for such market. However, they lack power and legitimacy. These are therefore classified as demanding stakeholders.
- Elaad and Greenflux from the Netherlands have power as well as urgency. Urgency as mentioned before comes from commercialization of flexibility. And element of power for Greenflux comes from their market presence in the Netherlands. Elaad is a collaborative initiative of DSOs and TSO in the Netherlands which have come together to tackle challenges faced by EV's. This collaboration of powerful players in electricity regime gives Elaad the power attribute.

- Schneider Electric and the European commission both have the element of power. Schneider Electric has an interest in the project but does not see any urgency. Urgency for them will arise once the flexibility market develops and full market potential of the innovation is realized. Moreover, as mentioned about other MNC’s, Schneider electric envisions itself as the suppliers of equipments to other businesses in flexibility market rather than becoming FO themselves. The EC as with other government bodies has only power. Urgency and legitimacy for them are derived from citizens’ will. Thus, both the are classified as Dormant stakeholders.
- Lyse, and EPESA are electric utilities in their respective countries, thus they hold power as well as urgency. Urgency for them, as for any other DSO, comes from the fact that they need to provide reliable and stable power supply in a system where demand is increasing and more intermittent renewables are being introduced. They want to be reliable and stable in an economic way without heavily investing in existing grid infrastructure.
- We do not have any partners in the project consortium who fall into dominant and definitive stakeholder category.

**5.3.2 Power-Interest-Attitude map #2**



**Figure 18: Power-interest-Attitude map of partner stakeholders.**

- We have four latent stakeholders. The EC has only power. Consumers, prosumers and EV parking owners involved in the project only have interest, these stakeholders are also destabilizing the existing regime.
- Schneider Electric, Greenflux, Albena and Elaad are Innovation brokers as they have both power and interest attributes. Currently they do not have any attitude towards the innovation, this will arise when it is clear to them how actually it can/cannot benefit their business. The business of Greenflux as local ecosystem manager and the objective of Elaad as an association results in destabilization of the existing regime.
- eSmart, NTNU, UPC, and VTT are valiant stakeholders having positive attitude towards flexibility market. Business activity of eSmart results in destabilizing effect on existing regime.
- NewEn, Lyse, EPESA and energy communities have all three attributes with positive attitude and thus are classified as agents of change. These are also characterized by stakeholders which destabilizes the existing regime.
- In this project, we currently don't have any gatekeepers. However, this might change in the future as attributes are dynamic in nature. We elaborate more on this in discussion section.

## 6 Discussion

Previously we analysed relevant stakeholders in the flexibility market across various attributes. This has exposed sources of support and resistance to our innovation and flexibility operator (FO) which in the future would want to establish itself in the new market.

From previous maps we can derive generic maps which can then be used to analyse other stakeholders belonging to similar categories as created previously. In the next two sub-sections, we show generic maps and discuss on how various stakeholders can be influenced to develop fertile grounds for FO and how different stakeholders by coming together can block the functioning of FO.

It is natural to first generalize stakeholders and create generic maps. With this approach, we would not be able to realize that similar type of stakeholders can belong to different typologies. As such we have first mapped individual stakeholder firms and then created a generic map. It is always important to keep in mind that such maps are not static and will change over time.

### 6.1 Generic map based on Mitchell's theory

Based upon Mitchell's theory DSOs and energy utilities fall into three classes: dormant, vital, & definitive stakeholders. DSOs have monopoly in the area they operate and this brings power attribute to them. Their power increases with number of customers they serve. With power, they can influence policy makers to have regulations in their favour. Utilities with multiple business portfolios enjoy even more power than DSOs, this additional power comes from high capital and research and innovation capabilities. DSOs and energy utilities belonging to definitive and vital class should be primary target of FO to form alliances in the market, as they will be more open to the innovation. Such stakeholders should also be primary targets for exploitation activities. And once they adopt the innovation they will also influence indirectly other dormant DSOs and energy utilities to adopt the innovation. Parallely dormant DSOs can also be influenced by motivating BOs to take part in flexibility market.

Stakeholders can move from one class to another by forming and breaking alliances with other stakeholders. This dynamism is important to know for both our consortium partners and future entrepreneurs taking our innovation to market.

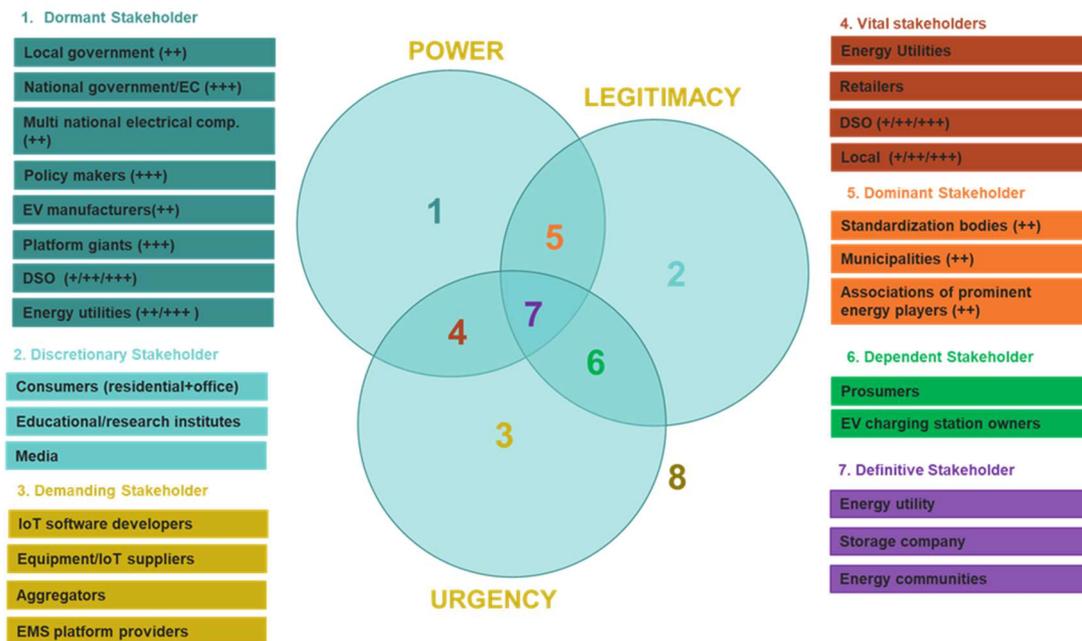


Figure 19: Generic map adapted from Mitchell's typologies.

IoT suppliers who only have urgency today for new business via flexibility can form alliance with stakeholders having power and move to become vital stakeholders or they could increase their customer base or become dependent stakeholders by gaining legitimacy. For example, Albena can form alliances with environmental cautious tourists (who are BOs of hotel) to gain legitimacy and move towards dependent stakeholder class. Albena can also form alliances with DSO to gain power and become dominant stakeholders, however it has come to light that the local DSO and Albena have conflict of interest. The DSO wants to manage the load from their side and not give this authority to Albena. In this case DSO in Bulgaria is having a negative attitude towards deregulated flexibility market.

By realizing the impact of flexibility market on national/regional environmental goals, urgency can be developed in government bodies and policy makers to act in favour and promote such markets. By gaining urgency they will become vital stakeholders. With support from BOs, their actions will have legitimacy and thus become definitive stakeholder. Creating such strategic moves will provide suitable conditions for FO to operate. Keeping track of such developments could also provide new market regions to target.

BOs who see added benefits in flexibility market can also influence local governments and regulators and thus gain power to become vital stakeholders. It is important for dependent stakeholders to form alliances with powerful stakeholders. By connecting

BOs to powerful stakeholders' window of opportunity can be created for FO to enter the market.

It is also possible that stakeholders having urgency and power come together but BOs are not supportive. Such alliances will not have any legitimacy and lead to unfavourable market conditions for the FO. This highlights the importance of involving user from the beginning, making them feel important and creating awareness. Acceptance by BOs is most crucial factor for the success of any innovation.

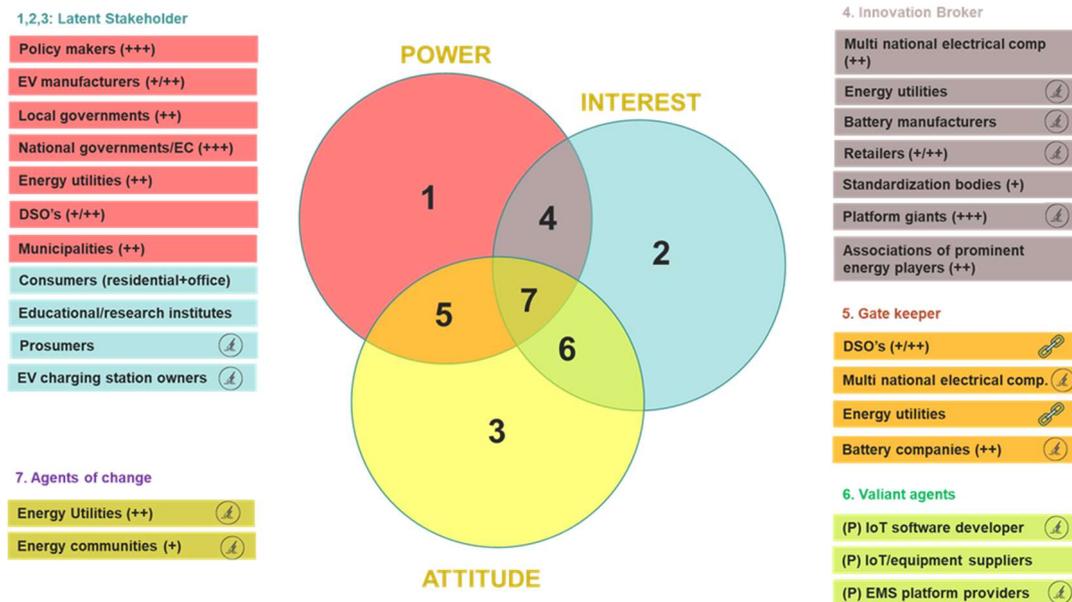
Another scenario which can happen is a place where grid is strong and doesn't require flexibility services. In such case the innovation can still be successful if motivated BOs and powerful stakeholders like regulators are bought on-board.

Regions where definitive, dominant and dependent stakeholders exist are most attractive for the FO to start business. Association of prominent energy players like GEODE, and ENTSO-E should be kept informed very well and if targeted to be included in TAG.

Local EMS platform providers are crucial stakeholders for the INVADE ecosystem and deserve a special discussion sub-section. They are discussed in the last section of this chapter.

## **6.2 Generic map: Power-Interest-Attitude**

As Mitchell's work explores a project stakeholder which are already on board it does not consider their attitude and interest. While for innovations these attributed are important as they reveal sources of friction from stakeholders. Thus, a new map consisting power, interest and attitude was created. This map reveals which stakeholder would be rivals and which would be easy to partner with. As such this map complements the previous one to complete the stakeholder analysis for innovations. **Figure 20** presents a generic map of stakeholders derived by analysing all the maps from Results chapter.



**Figure 20:** Generic map based upon Power-Interest-Attitude attributes.

DSOs and energy utilities fall into four categories: latent, gate keeper, innovation broker and agents of change. As mentioned before DSOs and utilities always have attribute of power with them. If they also show interest in our innovation they will be innovation brokers. Whereas if they do not have interest in the innovation but have certain attitude towards it, they will be gate keepers for the innovation to enter the market. For example, the Finnish DSO Helen is conservative and wants to continue its business as usual. As such it will show no interest and is going to have a negative attitude towards our innovations. It might act to block innovation in the region it operates, thereby acting as a gatekeeper. It is unlikely that a DSO will have positive attitude towards our innovation but not interest. DSO's and utilities are one of the key consumers of flexibility in the INVADE ecosystem.

Utilities, especially multi-nationals, could become most important strategic partners if they do not themselves want to become FOs. If they aspire to become FOs themselves would be powerful FOs and entrepreneurs who want to take FOs roles would find it challenging to compete against them. As platform based business are characterized by 'winner takes it all' economy, the only way for entrepreneurs to tackle utilities would be to enter and grow faster in market to reach critical mass first.

Platforms giants, when they see an opportunity, are likely to be competitors of both the INVADE platform and the FO. If they move fast in the market they would likely act as a gate keeper to our innovation and block FO from entering the market. Platforms giants must be tracked closely as they have high digital presence, high potential to innovate,

and move fast by mobilize big capital. Platform giants from the USA are considered as potential rivals to innovation happening in Europe. A defence strategy to protect our innovation is an important consideration for the exploitation plan.

Policy makers, local/national governments, and the EC need to see the benefits of our innovation. Especially how it can help them achieving their ambitions. Generating interest in them will move them to become innovation broker. As such they can be motivated to provide support and transform policies in favour of our innovation. If policy shift happens they would become agents of change. However, they can also be influenced by conservative DSOs and could become a gate-keeper with a tendency to keep gate closed for our innovation. This can be tackled by forming alliances with stakeholders having legitimacy which could then form counter influence on policy makers.

EV manufacturers, storage manufacturers, and IoT suppliers are currently not in the electricity business and thus fall into intruder's category according to Porter's model. Intruders are likely to venture into energy business, especially EV and battery manufacturers. These can be roped in to becoming potential partners in the business. Alliances with companies like Panasonic could prove fruitful.

Tesla is an interesting case as it is not a conventional EV and battery manufacturer. They have high focus on digitalization and behave more as technology companies. With their investment in solar city and an already existing EV charging platform, they are going to be key competitors who are very powerful. They are much like Google and Apple.

Stakeholders having destabilizing effect on the existing regime should be priority to form alliances with. However, these can also be competitors and such competition could be avoided by forming strategic partnerships. This will also depend upon what business models these stakeholders choose to follow for flexibility.

Energy communities have all three attributes and are agents of change which do not pose any threat to the FO. They are one of the most crucial stakeholders which could provide market entry to FOs and for our innovation. Thus, exploitation activities must ensure that as many as possible energy communities are targeted to create awareness about our innovation. Energy communities should be actively kept involved in the progress of the INVADE project and invited to all relevant events. Energy communities should be managed closely.

It is of prime importance that various possible business models are clear to future FO's to form right alliances and avoid unwanted resistances.

BRP are important stakeholders which have been not explicitly discussed before. This is because most of the BRPs are mostly producers or utilities and thus are indirectly covered. An important aspect about BRP is that their whole business is around providing reserve capacity, i.e., supply side flexibility. At times activating demand side flexibility (which INVADE aims at) would be cheaper than supply side. When it is economic for everyone it's a win-win situation. However, if BRP lose their business with demand side flexibility they are likely to see FO as competitor and make it difficult for the FO to survive in the market. Thus, BRP can be strategic partners or competitors. And if they are powerful it would be difficult to compete against them. Their role will be clearer when there will be concrete business plan in place which quantifies the value of demand flexibility.

### **6.3 Building/property owners (BOs)**

The BOs are further divided into consumers and prosumers of electricity in this study to provide clear understanding of their behaviour. In the INVADE ecosystem they are the key suppliers of flexibility. While prosumers can sometimes also be buyers of flexibility. These are the stakeholder who have legitimacy but lack power (and interest in case of only consumers of electricity). BOs are very crucial to engage because through their acceptance governments and regulators can be influenced to develop policies in support of INVADE. And bringing them onboard is also important to create the 'network effect' necessary for platform based business model to succeed.

Engaging such stakeholders requires correct designing of incentives and generation of awareness of existence of such incentives. D5.2 and D4.1 provide value of flexibility for prosumers qualitatively. This needs to be developed further together with development of business models in WP9. With business models, it would be possible to quantify value of flexibility for such stakeholders and such information will be useful to generate their interest in flexibility market.

Along with incentives it is important to understand their behaviour. This is where inputs from T9.2 will be needed.

### **6.4 EMS platform provider (local ecosystems)**

EMS platform providers often known as DR platform providers are crucial stakeholders who have interest, urgency, and positive attitude. In the generic INVADE ecosystem map such stakeholders are referred as 'local ecosystems'. These are considered separate

from platforms giants as they are local and specialize in the energy sector. There are multitude of local EMS platform providers who have emerged in the market. Some of them gaining momentum in the market are: Tendril, Entelios, Smartly, Itron, Senfal, Jedlix, and Kiwigrid. These platform developers are growing rapidly in the market. These platforms are data driven and provide insights to customers on their energy consumption and production (if present). They also allow demand response functionality where customers are alerted about price rise to take decision or if allowed they can optimize connected loads without any external command. Some of them, like Tendril, have APIs which allow external parties to build new functionality over them. These functionalities are common to the INVADE platform and thus these companies are likely to feel threatened by our platform. However, there is a basic difference between these platforms and INVADE platform. Our platform will create a market place to allow trading of flexibility between suppliers and consumers. Thus, with our platform a true platform based business model (double sided, often described as disruptive business model) can be implemented. Already existing platforms that do not have such feature and business around them are traditional ones.

According to Porter's model, they are going to be key supplier/consumers of flexibility in the INVADE ecosystem. Such platforms form the connecting link between market and BOs and are essential for the INVADE ecosystem to thrive. Stakeholders of this type should be primary targets for exploitation activities. Involving them from beginning will assist in developing trust.

An important factor on bringing such stakeholders together would be to show them how our innovation can mutually benefit them. One of the key advantage of adopting INVADE ecosystem is that they can rapidly scale-up their business and consolidate business with different customer segments. Knowing and clarifying differences in business of FO and the local ecosystems operators is key to form alliances with them. Currently our value proposition is qualitative but to convince such stakeholder there is a need for quantitative assessment. At this stage of project there is no clarity on revenue and cost structure of business around INVADE which makes it difficult to convince such stakeholders. If the business model is not clear there is a high risk that such stakeholders instead of becoming strategic partners may see us as competitors and provide tough market condition for the FO to survive or even enter the market. To avoid such conflict right business models are needed a claim which stresses the importance of WP9.

There is still possibility that local EMS platform providers might become competitor and, with their technical know-how they can replicate our system. Thus, a careful protection

strategy needs to be devised against such competitors while developing exploitation plan. Based upon their importance to success of INVADE the following engagement strategy is recommended: monitoring (MON), workshops and project events (WPE) and exploitation partnership building (EPB).

## **6.5 General discussion**

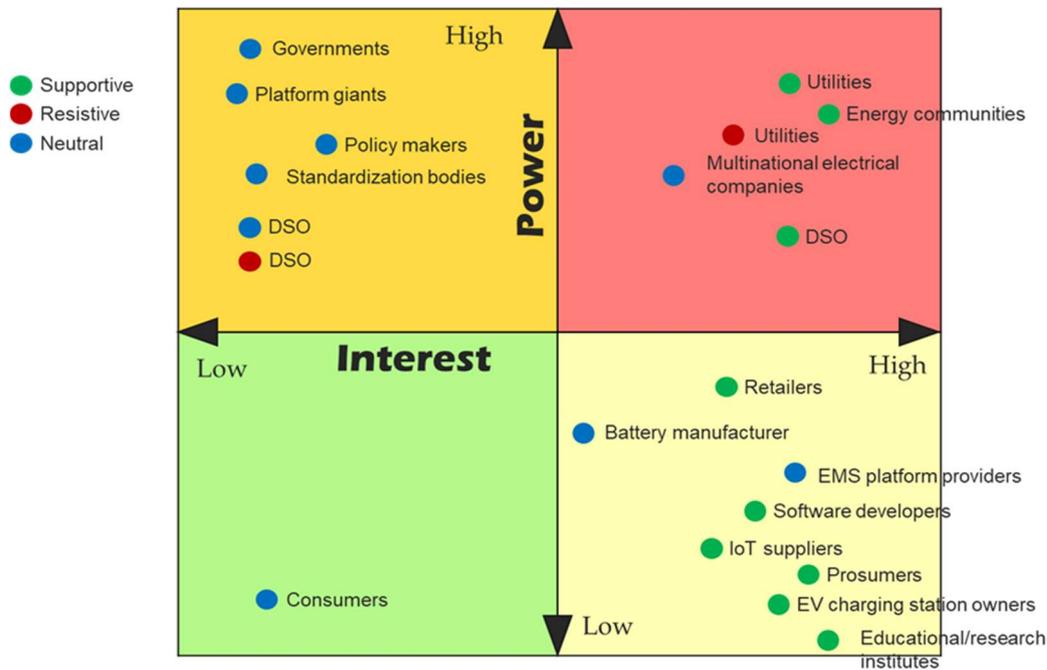
With the proposed stakeholder maps the FO can observe how different stakeholders can come together to become important or how actions of one stakeholder can create additional attributes in another stakeholder. This provides the FO information to form strategic alliances between and with stakeholders which would benefit its business. A right and strong network can thus be created which could provide protection and nourishment to the innovation in volatile and competitive market. This also provides insights on resistive stakeholders and opportunity to make proactive decision to mitigate or avoid any possible negative impact could be caused by them.

It is important to note that this stakeholder analysis is for overall INVADE outcomes. What stakeholders are important for individual internal stakeholders depends upon what role they foresee in INVADE ecosystem and what business model they adopt.

Important for any innovation is to move from market push to market pull. This will happen when there is large interest from BOs which requires large scale deployment if IoT based home appliances. This is likely to take time. At this stage, it would therefore be smart to influence progressive utilities and DSOs to adopt the innovation. Such move will provide faster market entry.

An interesting stakeholder which came out from this study are IoT software developers who are currently working as hobbyist. These are the stakeholders who are going to create new platform based services for the BOs. The more such stakeholders jump in, the more services would be created which will result in more user being hooked up to platform giving rise to 'network effect'. Exploitation activity should consider reaching out to these special community as early as possible.

Creating interest among stakeholders with legitimacy should be criteria for both exploitation activities and for the business of the future FO. Getting interest of high legitimacy stakeholders would help the FO to compete with strong players who exist in the energy market.



**Figure 21:** Generic Power-Interest map.

It is recommended to reach out to definitive and agents of change stakeholders to get regular feedbacks on the design of the platform, and to form recommendations on standardization and policies. Such stakeholders are important for exploitation activities.

## 7 Recommendations

The results and discussion sections provide in-depth analysis of stakeholders and recommendations on how they should be dealt with. We have exposed all the stakeholders and assessed their behaviour to the INVADE ecosystem. In this chapter summarizes the recommendations on key stakeholders.

- EYPESA is the partner which has shown interest in becoming FO. EYPESA is valiant stakeholder which lacks legitimacy and was mapped as agent of change having power, interest and positive attitude. It is recommended that the company reaches out to its existing customers (BOs) and convince them on benefits of such a market. Supporting EYPESA to reach BOs should be priority in exploitation activities. With the support from BOs, they can influence policy makers in their favour. Another area where EYPESA need expert support from INVADE consortium is to develop fitting business model. Entering the market current regulatory restrictions should be kept in mind.

- Greenflux with its platform and business with platforms (which is not same as platform based business model) is highly equipped to become a FO. Greenflux currently lacks legitimacy and attitude. The company's close relationship with Elaad can help to bring acceptance from DSO's and even TSOs to develop local flexibility market. Currently it is not clear to Greenflux what are monetary and strategic advantages of being a FO. Therefore, they don't have any attitude towards outcomes yet. Parallel activities in WP9 are already assisting Greenflux with this. With regards to exploitation it is recommended that they reach out to their existing customers to make them aware and assess their interest in flexibility market. An exploitation plan on how to enter the market and shielding from competitors is required.
- Lyse shares same mapping as EYPESA, but having Smartly (EMS platform provider) as a spin-off gives Lyse additional advantage for becoming FO. They also have strategic option to incorporate FO role in Smartly's business line. Lyse has a business portfolio of electric utility like EYPESA and has platform business through its spin-off. With such combination of energy businesses, it can be said that they are strongest candidate to exploit the FO role. Lyse need to reach out to BOs (existing customers and municipalities) and thus require support from exploitation activities.
- Definitive and agents of change stakeholders should be primary target for the exploitation activities. Getting them on-board would be instrumental to achieve the expected impact.
- EMS platform provider are important players in INVADE ecosystem and thus need to be targeted in the right way so that they do not feel threatened by the FO's business. Complimentary relationship needs to be established. This can be done by having the right business model, which again this highlights the importance of WP9.
- Stakeholders having legitimacy, i.e., BOs need to be informed and motivated to participate in local flexibility market. Regulatory barriers are the main roadblock in success of project outcomes. Influencing BOs in our favour is one of the ways to get attention of regulators, and politicians to draft policies in support of the project outcomes.
- DSO's can facilitate market entry and growth of FO. DSO's which are progressive needs to be engaged first.

- A defence strategy to protect our innovation against incumbents and existing market forces is an important consideration for exploitation plan.
- Regulatory barriers are major roadblock which requires a strategic exploitation plan.
- Based upon the Power-Legitimacy-Urgency map recommendations are made on what engagement form should be used for different typologies of stakeholder and this is summarized in Table 3.

**Table 3:** Engagement form recommendations based upon typologies derived from Mitchell et al. (1997).

Stakeholder typology	Engagement form
Dormant	MON, WPE, DEM, GDA
Discretionary	SUR, INR, DEM, EPB
Demanding	INR, GDA, DEM
Dominant	DEM, INT, MON, PIE, FFC, EPB
Vital	PIE, EPB, FFC, MON, WPE, INR
Dependent	FFC, EPB, WPE, INR
Definitive	FFC, SUR, EPB, WPE, INR, DEM, TAG, MON

Based upon Power-Interest-Attitude following engagement forms are recommended:

**Table 4:** Engagement form recommended based upon Power-Interest-Attitude typologies.

Stakeholder typology	Engagement form
Latent	MON, WPE, DEM, GDA
Innovation broker	SUR, INR, DEM, EPB
Gate keepers	MON, INR, GDA, DEM
Valliant	DEM, INT, MON, PIE, FFC, EPB

Definitive	FFC, SUR, EPB, WPE, INR, DEM, TAG, MON
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## 8 Future work

- In this report, we have identified characteristics of different types of stakeholder and how they are expected to react to INVADE (both innovation and ecosystem). Stakeholders which are important for exploitation purpose for individual internal stakeholders depends upon what role internal stakeholders want for themselves in the INVADE ecosystem and what business model they accept. This forms the future work to be done in WP3 under the umbrella of exploitation plan.
- It is evident that BOs need to be engaged from early on. This highlights the importance of T3.4, T3.5, T3.6, and task 9.2 (user practices and behaviour analysis). Inputs from T9.2 would be crucial in engaging BOs for future exploitation efforts in WP3. Prosumer acceptance studies from parallel H2020 project EMPOWER also form concrete basis to develop effective engagement strategies.
- It is realised that to create a sustainable flexibility ecosystem important stakeholders must be made aware of benefits of flexibility (incentives). Inputs from WP9 would be essential as it caters to the development of business models. With business models established, it will be clearer where the value lies and how it can be captured by various stakeholders. This will also be crucial for attracting important stakeholders into the INVADE ecosystems. Activities in WP3 will be focusing on working closer with WP4, WP5 and WP9 in the future.
- Finally, there are regulatory barriers which need to be tackled for INVADE to achieve its full potential. This is focus of task 3.8 in WP3 where policy and regulatory bodies will be targeted to share comprehensive knowledge gained through the project on good practices associated with the flexibility management platform.

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