



# Open Source Strategy

In the smart grid all players take part. An open market, demands open software



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## Management Summary

Open source is becoming a factor of importance for the IT industry in general, and also for TenneT. The open source model refers to the software development model that encourages open collaboration to create open source software. This is software for which the original source code (design, code, ingredients) is made freely available and may be redistributed and modified.

After we have chosen to go for the open source direction in 2017 for the TenneT Data Platform (TDP), we now want to further accelerate the adoption of open source for the following reasons:

- TenneT wants to drive the energy transition. Open Source is the dominant software model for open innovation efforts in the new digital economy.
- Open Source software is used within mission-critical IT workloads by over 90% of IT. TenneT increasingly uses Open Source and this will not change in the future.
- TenneT has a public task and is focused on lowering cost for society. Open Source provides opportunities to lower software costs.

These reasons closely relate to the renewed strategic goals for TenneT as TSO, meaning that our open source strategy is fully supportive for the TenneT strategic direction.

The open source vision we have formulated is that in a smart grid all players participate in an open market. An open market demands open software. TenneT will therefore consume open source software and will actively contribute to the open source community.

We pursue this vision by following a step-wise approach, in which we go through stages of Consuming open source (using it in the software and systems we develop as IMC), via Participating in open source initiatives and communities, to actually Contributing in open source initiatives.

We implement this strategy by following the principles and values of our IT Way of Working which puts emphasis on empowerment of and ownership with our employees. The strategic themes for implementation focus on facilitating the teams that are already working with open source technology, instead of steering in a directive manner. The themes and associated actions are:

<i>Guidance and guardrails</i>	Rethink principles, policies and governance that are currently hindering or even prohibiting the use of open source and provide policies and guidance that support development of secure and reliable software.
<i>Organisational Structure and Governance</i>	Development of open source governance, joining the LF Energy initiative to get involved in the open source community and identify current usage and potential usage of open source.
<i>Culture and Values</i>	Foster the open source culture and associated values, by stepping away from command-and-control structures and put more trust in engineers. Combine effort with IT Way of Working program and agile transition and interact with open source community to learn.

As IMC, we are confident that with this strategy, we can fulfil the formulated vision, and that we can have a sustained and continuous contribution to our business ambitions and goals.

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## 1. Introduction

### 1.1 Background

TenneT is the sole transmission system operator (TSO) of the national high-voltage grid of the Netherlands. In Germany, TenneT is the biggest TSO among the 4 TSOs, connecting the North Sea with the Alps.

We are therefore responsible for a number of additional tasks that may not be performed by other grid operators in the Netherlands. This includes system services (e.g. maintaining the balance between electricity supply and demand) and ensuring the security of supply. TenneT also acts as a market facilitator, ensuring that all players in the industry have access to the market.

In Germany, TenneT performs the same tasks, alongside three other TSO's, who each cover their own designated areas. What makes TenneT's role in Germany particularly challenging is its obligation to connect and transport electricity generated by offshore wind farms to the onshore high voltage grid.

In 2019, the TenneT Executive Board have revised the strategy and the following strategic goals were formulated:

- Ensure security of supply, today and tomorrow
- Drive the energy transition
- Unleash the full capabilities of our people and our organisation: people are at the heart of TenneT
- Safeguard our financial health

TenneT Information Management Corporate (IMC) strongly believes that open source (OS) and the open source model can contribute to the pursuit of the renewed strategic goals and objectives, and thus is supportive to the mission and vision of TenneT.

### 1.2 Open Source

TenneT draws a distinction between the open source model and open source software.

The *open source model* refers to the software development model that encourages open collaboration to create open source software. The combination of a transparent development community and access to public source code enables organisations to think differently about how they procure, implement, test, deploy, and maintain software. This has the potential to offer benefits, including reduced development costs, faster product development, higher code quality standards, and more.

#### **What open source is not**

- Open Source is not synonymous with shareware or freeware software.
- It is not free software with closed source (like freeware).
- It is not trial software with restriction (like shareware).
- It's not software without obligations. Open source always has a license

*Open source software* is software for which the original source code (design, code, ingredients) is made freely available and may be redistributed and modified. The following rights are the most relevant in defining open source:

- **See** the source code that was used to create the program
- **Share** the code with other people so they can see it too
- **Use** the source code and modify it or combine it with other specific code to make something new which is shared (may be under the same license as the source)

### 1.3 Why Open Source for TenneT?

Traditionally, IT organisations have relied heavily on IT vendors to be able to deliver IT solutions to the business. This is not different for TenneT. Nowadays, open source is an integral element of the IT industry. For TenneT, there are three major factors and trends which urge us to set-up an open source strategy:



TenneT wants to **drive the energy transition**. Open Source is the dominant software model for open innovation efforts in the new digital economy.



Open Source software is **used within mission-critical IT workloads** by over 90% of IT. TenneT increasingly uses Open Source. To be compliant and stay in control guidance and guardrails are needed.



TenneT has a public task and is **focused on lowering cost for society**. Open Source provides opportunities to lower software costs.

A successful open source strategy and implementation of this strategy will therefore directly contribute to the overall TenneT strategy.

### 1.4 Reading Manual

To come to an open source strategy, we have followed an outside-in approach. Next chapter therefore focuses on market insights and trends, explaining why open source is becoming an increasingly important factor for TenneT, and how some trends are interconnected. In chapter 3 we present our open source vision, based on confronting TenneT strategic goals with market insights and trends. In chapter 4 the strategy is described, where we plot our strategic steps and choices on a commonly used strategic framework. Chapter 5 finally describes the implementation and steps we foresee for the strategy. This chapter also includes the roadmap for the coming 4-5 years.

## 2. Market Trends and Insights

Years back, in the beginning days of software development, it was quite common that developers and programmers would share source code, just as ‘sharing recipes is as old as cooking’. However, in the late 70’s and early 80’s, companies involved in software development increasingly copyrighted their technologies, withheld source code, and required licensed use of software. Proprietary software took over market share in the world of technology. Later again, in the eighties, this started to change again, as fuelled by the Internet (which can be considered as an open source software initiative in itself) the "free software" movement took off. This movement further matured in the 1990s to become the Open Source Software (OSS) movement we know today.

Although open source therefor is not new by itself, there are some trends which are interconnected, that make open source more than before a significant development for TenneT:

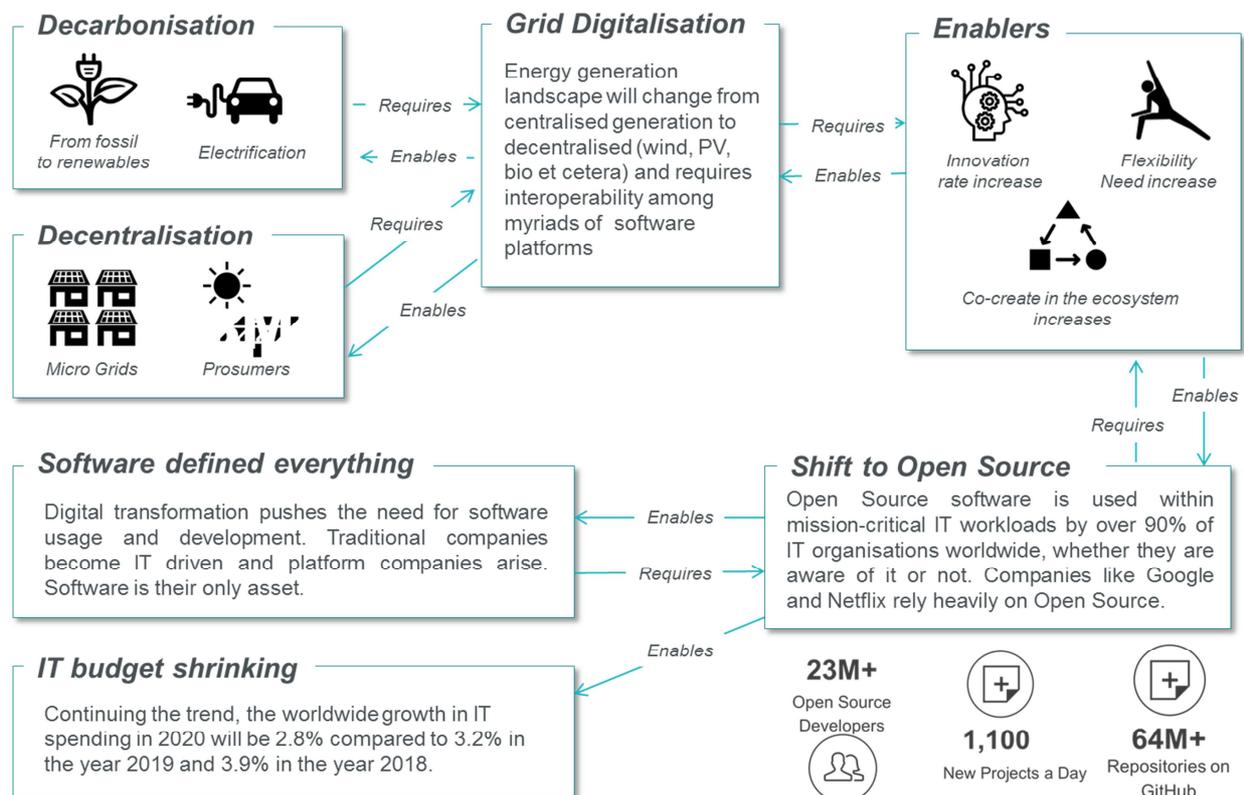


Figure 1 Trends

Besides the 3 D's that act as main drivers for change in many industries today (decentralisation, decarbonisation and digitalisation), we see the trend of Software defined everything as significant. This trend means that digital transformation pushes the need for software usage and development, and we see traditional companies becoming IT-driven, and in the past decade we have seen the rise of platform companies such as AirBnB, Uber, Facebook, Google and Spotify. What all these companies have in

common is that not only they rely heavily on the usage of open source software, but that they have also contributed to the open source movement by "giving away" their software to the open source community. This has further contributed to the development of new platforms, and the emergence of ecosystems around these platforms. We feel it is therefore safe to say that the emergence of open source has contributed to a fast innovation rate in a wide range of sectors, such as transportation, media, music and IT itself. We have no reason to believe that this trend will pass the utility industry by.

At the same time, Gartner forecasts show that IT budgets in the coming years will see a decrease in growth. Where growth in IT spending was 3.9% in 2018, it is expected that it will be 2.8% in 2020. In a situation in which IT budget growth is decreasing while at the same time most TSOs and DSOs are accelerating on their digital transformation we should look for opportunities to lower IT costs. Open source might deliver these possibilities, if applied properly.

### 3. Open Source Vision

In the previous chapters the TenneT context and trends have been described. Based on our analysis and the opportunities that open source offers, we have formulated the following vision for Open Source in TenneT:

***In a smart grid all players participate in an open market. An open market demands open software. TenneT will therefore consume open source software and will actively contribute to the open source community.***

Our vision is constructed from the following elements:

- *In a smart grid all players participate in an open market.* The TenneT strategy is to drive the energy transition. We need to co-create with the ecosystem to make this change possible, as we cannot do this alone.
- *An open market, demands open software.* TenneT must be open. By being connected, we will co-create with the ecosystem the energy market in the most efficient way.
- *TenneT will consume Open Source software.* Digitalisation is an important enabler for the energy transition. Open source is applied accordingly to accelerate TenneT's rate of innovation needed for the energy transition.
- *And actively contribute with the Open Source communities.* TenneT will also, depending on business value and required investment, participate in and contribute to Open Source communities.

The following chapter will describe how this vision has been translated into the strategy for the coming period (2019-2024).

## 4. Open Source Strategy

### 4.1 Open Source Strategic Model

One of the key elements of any open source strategy should be reuse, as argued before in this document. It is for that reason that we have reused an already existing model to plot our open source strategy. This is the Open Source Strategic Stages from the Linux Foundation:

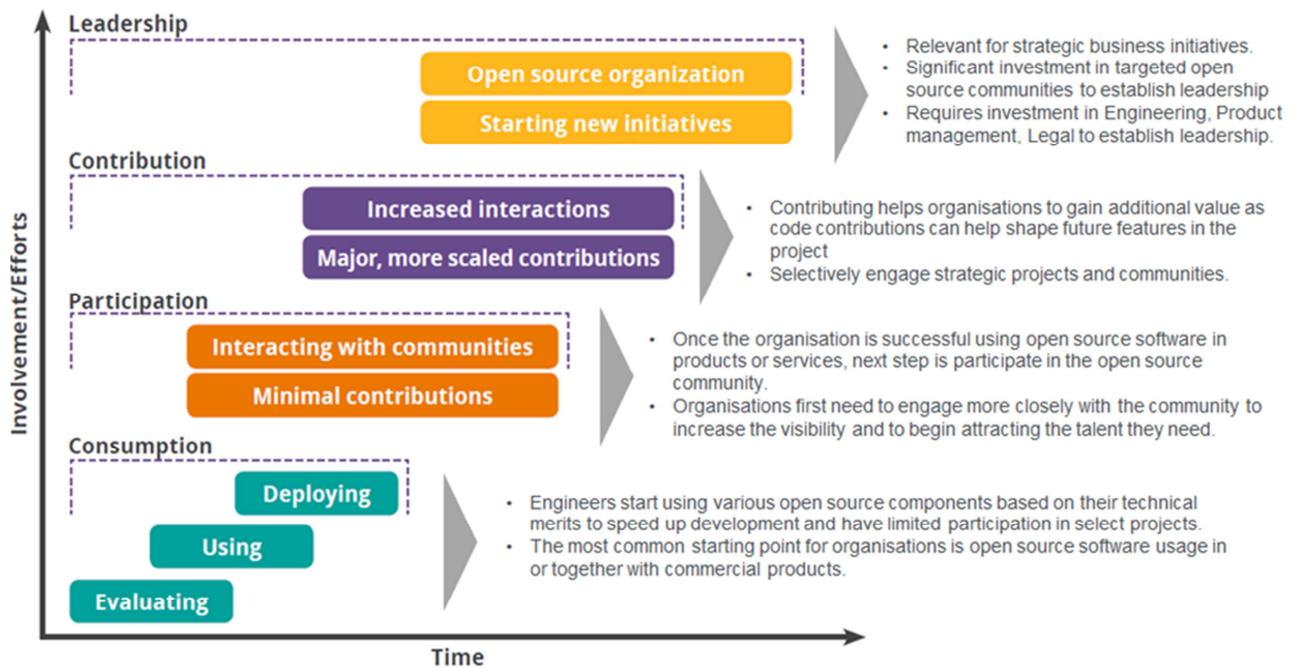


Figure 2 Open Source Strategic Stages (adapted from Linux Foundation)

In this model, there are four primary stages when it comes to open source software: consumption, participation, contribution and leadership. Each stage requires you to be successful at the previous stage, just like in plateau-planning. The figure above also describes the key characteristics of each stage.

### 4.2 TenneT Open Source Strategy

The TenneT Open Source strategy is that we will aim for at least the level of "Contribution", because we see a lot of potential in participating in and contributing to relevant open source initiatives. Aiming for the Contribution level, with all associated necessary capabilities, fits best with our vision on open source as presented in the previous chapter.

However, as explained in paragraph 4.1, TenneT will not be able to directly be at this level. Our current assessment is that we are at the Consumption level: in many of our projects we are already using open source components, and for our TenneT Data Platform (TDP) we have in fact already made the strategic choice for open source technology (SMACK-stack) over technology delivered by commercial software

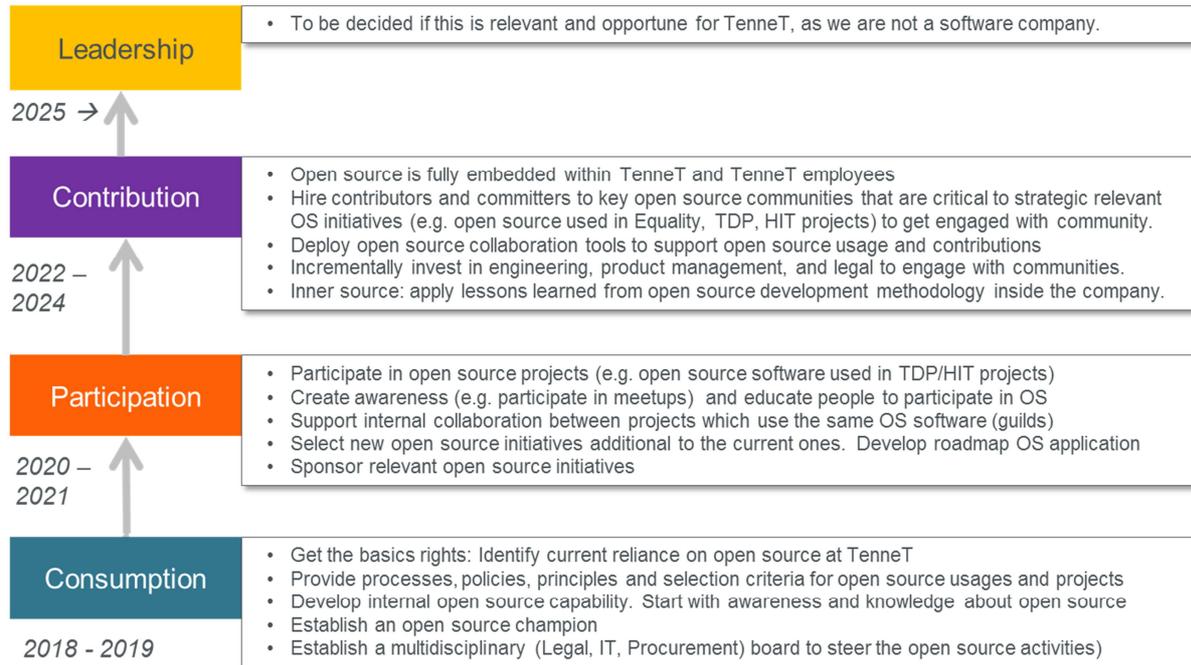
vendors. In the Consumption phase, TenneT becomes affiliated with one or more open source initiatives, to learn from the other members in these initiatives, and to gradually grow the capabilities and skills necessary for this level. TenneT has therefore chosen to become an associate member of the LF Energy initiative, an open source initiative to grow and sustain open source in the energy and electricity sectors driven by the Linux Foundation. The choice for this initiative is based on the vendor-neutrality of the initiative, the clear focus on our industry, and on the long experience and understanding the Linux Foundation has with setting up and fostering open source initiatives.

Next step in our strategy is to move to the Participation level. An important step in this move would be that TenneT expands its contribution in open source initiatives, for example to move from associate member to general member for LF Energy. We will then sponsor the initiative. In this phase, we will also further develop our internal skills, create awareness and set-up open source governance. We will also select new open source initiatives additional to the current ones. It is our estimation that we will be in Participation level in the period 2020-2021.

The final stage in our strategy will be that of Contribution, in which we actually will engage in open source projects and contribute to initiatives. We will deploy open source collaboration tools to support open source usage and contributions and incrementally invest in further setting up relevant processes and governance, such as product management, engineering and legal support. We will enter this stage between 2022 and 2024 it is estimated.

At this time it is uncertain if TenneT will go to stage Leadership. As TenneT is a TSO and not a software or platform company, it is unsure if this stage will ever become opportune or relevant given our current strategy and business model.

The figure below summarises the steps we foresee in our strategy:



**Figure 3 TenneT Open Source Strategy**

In the next chapter we describe how we will further implement this strategy.

## 5. Open Source Strategy: Implementation

The IT Way of Working (IT WOW) which we advocate in IMC puts a lot of emphasis on empowerment of and ownership with our employees. For this reason, we will not attempt to implement our open source strategy in a directive way, but instead we will facilitate the teams that are already working with open source technology as much as possible. The themes on which we will facilitate our teams, are:

- Guidance and Guardrails
- Organisational Structure and Governance
- Culture and Values

In the remainder of this chapter, for each theme the gaps between current situation and to-be situation are identified and the action items are worked out based on the gaps.

### 5.1 Guidance and Guardrails

Current practice in TenneT is very much centred on traditional software delivered by a commercial vendor:

- Current principles and policies are mainly focused on traditional software delivered by a vendor.
- We have current policies that prohibit the usage of software without a dedicated support contract.
- Our methodology is mainly focused on assessing TCO of traditional software.
- The selection criteria or sense of value are mainly focused on traditional software.

If we want to further implement open source in TenneT, we must rethink principles, policies and governance, as these are currently hindering or even prohibiting the use of open source.

Actions items for this theme, to bridge this gap, are the following:

- Deliver and present guiding principles as living documents from Architecture. E.g. Rethink and stretch the principle “reuse, before buy, before make”: reuse is not only commercial software that I already available within TenneT, but also reuse of open source software which is already available in the market.
- Develop an open source policy, which covers the essentials and the obvious.
- Create or extend our TCO (Total Cost of Ownership) methodology for open source, which also includes knowledge and support.
- Create a simple set of selection criteria for open source projects, participate in meetups and experiment where possible.

### 5.2 Organisational Structure and Governance

Currently TenneT interacts with software vendors on a regular basis, ranging from strategic meetings in which trends and product roadmaps are discussed, to on-site support and troubleshooting from software vendors to our service teams. Most of our governance processes (including for example licensing, contract and vendor management, legal affairs) are also very much focussed on commercial software vendors. TenneT also lacks deep knowledge on open source introduction, license structures and communities.

If we want to take the next step in open source adoption, we have to overcome some gaps. Action items we foresee are:

- Identification of current open source consumption and determination in which open source communities we can participate. We will start small, for example by becoming associate member of the LF Energy initiative (see previous chapter).
- Ensure TenneT meets all obligations of the use of open source software. We will establish a chain of command for the request, analysis and approval of all open source assets.
- Development of open source governance, in which the Information Management Office (as responsible party for Plan-IT in TenneT) will be accountable for the open source obligations and commitments.

All governance and organisational structure arrangements should be aimed at facilitating and enabling teams and engineers to use open source technology where appropriate and opportune, not to steer on technology usage in a directive manner.

### 5.3 Culture and Values

For our current technology landscape, knowledge and value assessment is mainly provided by the traditional software development and software vendors, where the roadmaps of these traditional software are leading. Software contracts give TenneT trust for software maintenance and support.

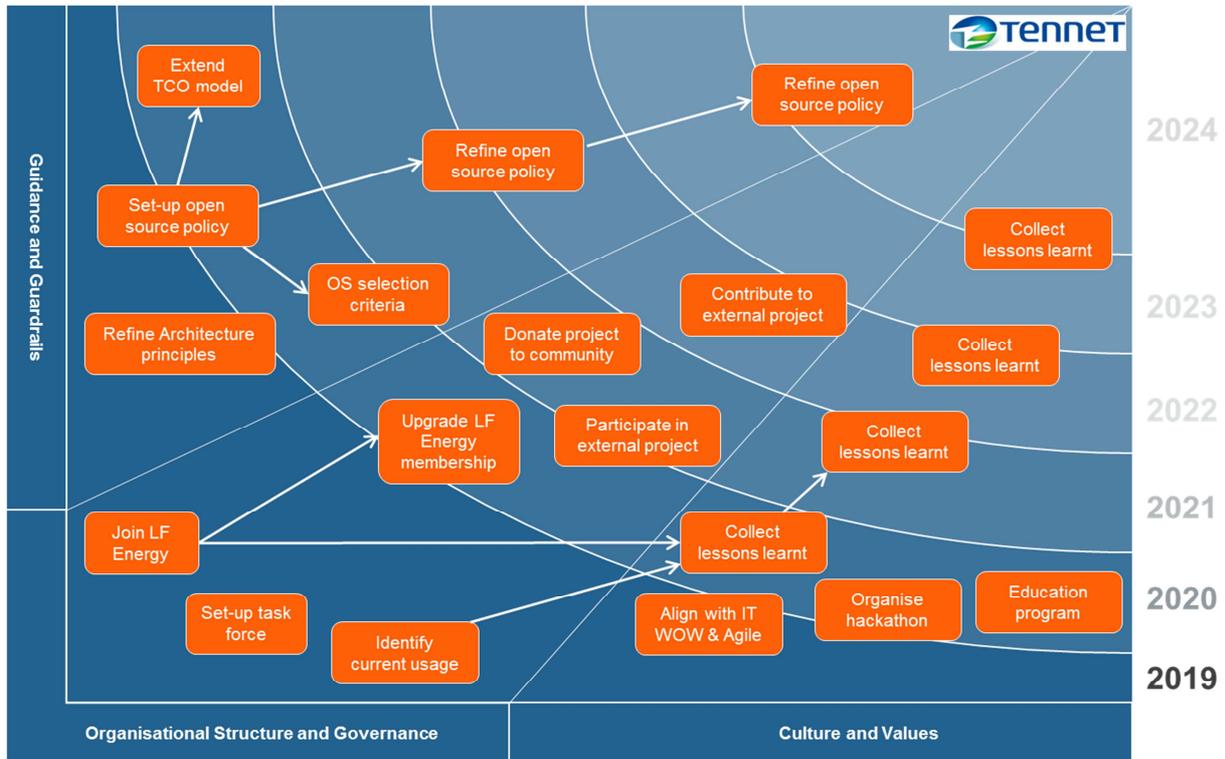
To become more open source minded, we should be more aware that development and usage of open source software is becoming a core competence of IMC. We must realise that for delivering software, knowledge is a big asset, arguably bigger than ever before. Investment will therefor shift from licenses and maintenance contracts to knowledge, training and service contracts.

To foster the open source culture and associated values, it is important to realise that we need to change and have more trust in engineers and less in command-and-control structures. For this, we need to create a safe environment to experiment and fail. The already running programs within IMC for IT Way of Working and Agile Transition, can be expanded to also take these factors and elements into account. It seamlessly fits with pursued cultural values such as *I Am Accountable* and *We Learn Together* from IT WOW. In the past period the awareness of the importance of software development has grown within TenneT, also as a result of our bi-modal strategy which combines packaged software usage with custom software development. These teams can further accelerate the adoption of open source, and should be facilitated and enabled.

We can further accelerate this development by propagating a knowledge investment culture, e.g. by organising and facilitating meetups, fail walls, think tanks and hackathons. We can support in organising internal collaboration between projects that use the same open source framework. From outside-in, we will collect and apply lessons-learned from open source development methodologies from other companies. Our involvement in an open source initiative, such as LF Energy, can greatly support this action.

## 5.4 Roadmap

The figure below is a projection of the roadmap for the period 2019-2024:



**Figure 4 TenneT Open Source Roadmap**

The roadmap provides an overview of the key activities and main dependencies between these activities for each of the three strategic themes in the roadmap. This roadmap is not fixed for the planning horizon, but will be updated periodically to reflect progress made and new insights coming from e.g. lessons learnt and our interaction with other parties in the open source community. On a more detailed level, with every iteration a milestone and delivery planning shall be delivered.