

Sekretariatet for Energitilsynet

Carl Jacobsens Vej 35
2500 Valby

Energinet.dk
Tonne Kjærsvvej 65
DK-7000 Fredericia

+45 70 10 22 44
info@energinet.dk
CVR no. 28 98 06 71

Please note: This translation of the original Danish text is for informational purposes only and is not a substitute for the official Danish text. The English text is not legally binding and offers no interpretation on the Danish text. In case of inconsistency, the Danish version applies.

Date:
20 December 2017

Author:
SUD/STO

Method notification of connection principles for grid connection of electricity consumers to the electricity transmission grid

In accordance with Executive Order no. 1085 of 20 September 2010, Energinet must submit for the approval of the Danish Energy Regulatory Authority the methods used to calculate or set terms and conditions for Energinet's services.

This method notification for connection principles concerns the notification of:

- The cost allocation between the consumer and Energinet for grid connection to the transmission grid.
- The expansion of the transmission grid as a result of the expected electricity supply requirement from the consumer connected to the transmission grid.

Energinet believes that the notified methods can be recommended for approval by the Danish Energy Regulatory Authority as they meet the requirements of the Danish Electricity Supply Act concerning fairness, non-discrimination, objectivity, transparency, and open and equal access for users of the public electricity supply grid.

The notified methods will be applied at the time they are approved by the Danish Energy Regulatory Authority.

Contents

1. Obligation to notify	3
2. Background.....	3
2.1 Grid connection agreement and terms and conditions for consumer grid connection to the transmission grid	5
2.2 The need for the methods	6
2.3 Legal basis	6
3. Cost allocation	7
3.1 The direct grid connection	8
3.1.1 Grid connection to existing substation.....	9
3.1.2 Grid connection to a new substation	10
3.2 Underlying reinforcements and expansions	10
3.3 Ongoing operation and maintenance	11
4. Dynamic expansion	12
5. Economic consequences	15
6. Consultation of market participants	16
6.1 Summary of consultation comments and Energinet’s responses to consultation comments	16
6.2 Changes, additions and corrections following the consultation.....	16

Appendices:

- Appendix 1: Consultation list
- Appendix 2: Consultation comments
- Appendix 3: Energinet’s response to consultation comments

1. Obligation to notify

According to the Danish Electricity Supply Act (DESA), Energinet as a collective electricity supply undertaking must set prices and conditions for the use of the transmission grid according to published methods approved by the Danish Energy Regulatory Authority, cf. section 73, litra a, of the Danish Electricity Supply Act. Section 1 of Executive Order no. 1085 of 2010¹ specifies that Energinet must submit for approval by the Danish Energy Regulatory Authority the methods used to calculate or set terms and conditions for Energinet's services, including tariffs.

This means that in order for Energinet to use a method to calculate or set terms or conditions for Energinet's services, it is a requirement that the Danish Energy Regulatory Authority has approved this method.

The method for allocating the costs of grid connection of consumers to the transmission grid (hereinafter "cost allocation") and the method for Energinet's dynamic expansion due to the grid connection of consumers to the transmission grid (hereinafter "dynamic expansion") concern the calculation and setting of terms and/or conditions for the use of Energinet's transmission grid. The choice of method is not directly apparent from applicable law, including the provisions of the Danish Electricity Supply Act. The methods therefore require notification to and approval by the Danish Energy Regulatory Authority.

2. Background

Energinet took over the regional 132/150 kV transmission companies in 2012 as part of a consolidation of Denmark's transmission companies. Energinet is currently the only transmission company in Denmark with an electricity supply grid above 100 kV, i.e. at 132/150/400 kV level.

Historically, in terms of size and characteristics, the connection of consumers to the Danish electricity supply grid was such that the vast majority of consumers were connected to the distribution grid. Today, only a few consumers have the size and characteristics to be connected to Energinet's transmission grid and supplied with electricity from Energinet in that way. Among these, Banedanmark's electricity supply requirement for third rail current was such that the technically and financially most appropriate connection was a grid connection to the transmission grid. In recent years, data centres with very large electricity supply requirements have also had the size and characteristics that make the technically and financially most appropriate connection a grid connection to the transmission grid.

Fundamentally, when a request is received from a consumer about grid connection, there are three matters that need to be clarified:

- Determination of voltage level for connecting the consumer.
- Cost allocation (the allocation of costs between the consumer and Energinet for grid connection to the transmission grid).

¹ Executive Order no. 1085 of 20 September 2010: Executive Order on grid companies', regional transmission companies' and Energinet.dk's methods for setting tariffs etc.

- Dynamic expansion (the need for expansion of the transmission grid as a result of the expected electricity supply requirement from the consumers connected to the transmission grid).

Historically, determining the voltage level at which consumers are connected to the grid has not been particularly problematic. Generally, as stated above, the size and characteristics of the connected consumers have so far been such that it has been clear – when the point of connection is chosen on the basis of the technical and financial aspects associated with the connection – that the consumer should be connected to the distribution grid, i.e. not at the 132/150/400 kV level. Only in very few cases have the technical and/or economic aspects associated with the grid connection meant that the consumer's connection was considered suitable for connection to the transmission grid rather than the distribution grid. The decision about grid connection in these cases took place in dialogue and following joint discussion between the consumer, the local grid company, and Energinet, during which the consumer's requested capacity and power requirements, the physical condition and expansion possibilities of the distribution grid and the transmission grid as well as the total associated costs were analysed, discussed, and assessed. The decision regarding the choice of voltage level is therefore not a decision made by the grid company or Energinet itself but has historically in fact been made in cooperation between the parties.

In the light of recent experience whereby consumers with a significantly larger capacity requirement than in the past have requested grid connection to the electricity supply grid, Energinet and grid companies have learned that there will be a need for more transparency around determining voltage levels when consumers are connected in future. Energinet and the grid companies in the joint grid collaboration committee (netsamarbejdsudvalg) between the parties have therefore started work on a more detailed analysis and description of generally applicable and objective principles for choosing a voltage level for future consumers. Energinet expects that these principles for the choice of voltage level will also have to be submitted for method notification.

The choice of voltage level for the consumer must be made in cooperation between the grid companies and Energinet and will therefore not be covered by this method notification, as this method notification concerns conditions set by Energinet. In the methods listed below, it is thus important to note that they are based on the assumption that the decision to connect the consumer to the transmission grid has been made.

This method notification concerns only cost allocation and dynamic expansion. In formulating these methods, Energinet wanted as far as possible to determine and follow the corresponding methods for connecting large consumers to the distribution grid (50/60 kV), and how cost allocation and expansion are handled for consumers comparable to consumers in the transmission grid.

2.1 Grid connection agreement and terms and conditions for consumer grid connection to the transmission grid

When a consumer intends to establish a grid connection to the transmission grid, the formal process involves entering into the following agreement with Energinet:

- Grid connection agreement
 - o Establishment terms and conditions for demand facilities
 - o Grid connection terms and conditions for demand facilities.

The grid connection agreement is the formal agreement document containing the specific technical and financial aspects relating to the specific consumer. The grid connection agreement is supplemented by the terms and conditions of establishment and grid connection, which contain all references to the general technical and economic regulations and the terms and conditions applicable to the connection of demand facilities to the transmission grid and the subsequent supply of electricity from the transmission grid.

In general, grid connection establishment is divided into a maturation phase, an establishment phase and then the subsequent grid connection. After the end of the maturation phase and when the consumer decides to establish a grid connection to Energinet's transmission grid, the above grid connection agreement including terms and conditions must be entered into. The general terms and conditions of this grid connection agreement state that the establishment phase will primarily be governed by the establishment terms and conditions. These establishment terms and conditions will set out the terms and conditions that apply between Energinet and the consumer when Energinet establishes the grid connection for the consumer, e.g. the allocation of costs, the scope of documentation for Energinet's costs, provision of security, etc. After the grid connection is established, and when the consumer plans to commission its demand facility, the grid connection terms and conditions specify the general technical requirements, the general process, and the scope of technical documentation which the consumer must provide.

In order for the consumer to be able to connect its facility to the grid, the consumer must conclude an interconnection agreement and provide Energinet with documentation. Once Energinet has approved the submitted documentation and the consumer has performed sufficient tests under the interim operational notification, Energinet will issue the final operational notification. After commissioning, the grid connection terms and conditions also specify the terms and conditions and the responsibility under which the grid connection and access to the electricity supply from the transmission grid will be operated.

In summary, the grid connection agreement, the establishment terms, and the grid connection terms are the applicable terms when it is planned to connect the consumer's facility to the grid. The grid connection agreement and the grid connection terms are primarily relevant when the consumer's facility has been connected to the grid.

2.2 The need for the methods

The consumer connected to the transmission grid needs a clear cost allocation, with transparency about the allocation of costs for establishing the grid connection and for subsequent operation and maintenance.

Furthermore, there is a need for objectivity and transparency regarding Energinet's methods for expanding the transmission grid serving Danish electricity consumers in general, in order to ensure that Energinet's reinforcements and expansions of the transmission grid due to the electricity supply requirement of consumers connected to the transmission grid are carried out according to fair and transparent criteria. Furthermore, Energinet must not overdimension the transmission grid in relation to the actual electricity supply requirement of individual consumers connected to the transmission grid.

2.3 Legal basis

The Danish Electricity Supply Act does not explicitly regulate the allocation of costs between the consumer and the transmission company when a consumer is connected to the transmission grid.

The Danish Electricity Supply Act requires Energinet, as a transmission company, to guarantee sufficient and efficient transport of electricity, including connecting purchasers of electricity to the transmission grid and making the necessary transport capacity available to users of the public electricity supply grid, cf. section 20(1) of the Danish Electricity Supply Act.

However, according to the principles of the Danish Electricity Supply Act, consumers are entitled to connection to the electricity supply grid in return for payment of the necessary costs associated with the grid connection. In addition, as a transmission system operator and transmission company, Energinet is responsible for ensuring that the transmission grid has the necessary and sufficient capacity, and as the owner, Energinet must bear the costs of reinforcing and expanding the underlying transmission grid.

As regards the costs of expanding and reinforcing the transmission grid, Energinet will be able to include necessary electricity transmission costs in its prices, cf. section 71 of the Danish Electricity Supply Act, cf. section 70 a.

However, Energinet's price setting methods must, in accordance with the principles of Executive Order no. 1085 of 2010, include a clear division of consumers into categories of purchasers and a description of how costs are attributed to and shared between these purchasers. In this case, consumers will not be divided into categories of purchasers – as all consumers connected to the transmission grid are treated equally in relation to cost allocation and dynamic expansion.

3. Cost allocation

Energinet has chosen the following method for cost allocation because, in Energinet's opinion, this method follows the principles of the Danish Electricity Supply Act and corresponds to the existing sector-specific guidelines for the calculation of contributions for A customers for connection to the distribution grid, according to which A customers pay actual costs for grid connection or an average, based on the specific situation².

Historically, the Danish electricity supply grid was created as a public electricity supply grid in which the community (all electricity consumers) pays for the general and collective reinforcements and expansions of the electricity supply grid that are necessary for society as a whole and that benefit the community. In this model, the individual users pay the direct cost of connecting to the public electricity supply grid. The basic idea behind this model is that a reinforcement or expansion of the underlying (public) electricity supply grid has a social value which benefits the community, for example in the form of increased security of supply and coordinated, economically sound, and long-term planning of the common electricity supply grid.

In addition, this collective model also has the advantage that users are placed on an equal footing, regardless of whether the user is the first to be connected, or the last to join, thereby creating a need for major reinforcement or expansion of the underlying electricity supply grid. This last new user creating a need for grid expansion would in principle have to pay for new underlying transmission lines if the collective model were not used. With the collective model, it is the community that pays for these underlying reinforcements or expansions. It is also the community that will benefit from the transmission grid in the short or long term.

The above principles set out in the Danish Electricity Supply Act, existing practice in the distribution grid, and the historical collective model for the structure of the electricity supply grid formed the basis for Energinet's choice of method. Energinet considers this method to be fair, objective, and non-discriminatory.

The market participants affected by this cost allocation method are Energinet on the one hand and, on the other, the consumers for which a grid connection to Energinet's transmission grid has been agreed. Energinet considers that the method is of no importance to other market participants.

Basically, the cost allocation method operates with a division into three categories:

- Costs of the direct connection.
- Costs of underlying reinforcements and expansions.
- Costs of ongoing operation and maintenance.

² https://www.danskenergi.dk/sites/danskenergi.dk/files/media/dokumenter/2017-07/Vejledning_til_model_for_tilslutningsbidrag_November_2011.pdf page 6

3.1 The direct grid connection

The costs of the direct connection are the immediate changes made in order to be able to connect the consumer to the nearest or a new 132/150/400 kV substation³. The situation is shown below.

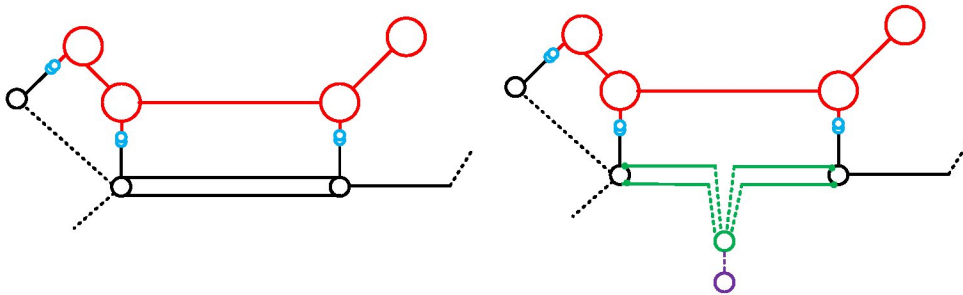


Figure 1 The figure shows the transmission grid without the new grid connection on the left and the new grid connection (in purple) on the right. The 400 kV grid is in red, and the 132/150 kV grid is in black. The direct changes resulting from the consumer's grid connection are shown in green (grid connection to new substation).

In general, a distinction can be made between a grid connection to an existing substation and a grid connection to a new substation, i.e. when the consumer's electricity supply requirement requires a completely new substation to be built.

Generally, the fundamental principle is that from the consumer's demand facility, the consumer must bear all the costs of connection to and within the nearest existing substation. This fundamental principle is described in more detail below for situations in which the grid connection is to an existing substation, and in which the grid connection makes it necessary to establish an entirely new substation.

Data centres or other similar large electricity consumers to be connected to the transmission grid will as a general rule be connected to a new substation, as their electricity supply requirement at this location is so great that the best solution from an economic and technical point of view is to establish a new substation for this large consumer. Banedanmark's characteristics are different from the data centres, as Banedanmark's large electricity supply requirement is not concentrated at a single location, but over longer geographical distances, implying that the best solution from an economic and technical point of view is a grid connection to several existing substations along the Danish railway.

³ A "substation" is a high-voltage substation consisting of switchgear, components, instrument transformers for current and voltage as well as the necessary management and control systems required to operate the various equipment. All high-voltage switchgear is interconnected by a common busbar comparable to a "multi-socket adapter" used to plug several appliances into a single outlet in ordinary households. The common busbar can be used to connect high-voltage lines connecting the substation with other substations, or to connect transformers to supply lower or higher voltage levels.

3.1.1 Grid connection to existing substation

The situation in which the grid connection is to an existing substation is shown below.

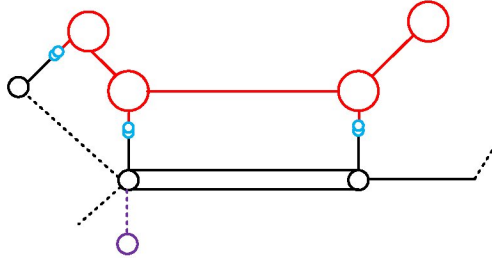


Figure 2 The figure shows a grid connection to an existing substation. The 400 kV grid is in red, and the 132/150 kV grid is in black. The direct changes resulting from the consumer's grid connection are shown in purple (grid connection to existing substation).

If the consumer is connected to the grid in an existing substation, the direct connection for which the consumer must bear the costs will be the substation upgrade which is necessary to meet the consumer's electricity supply requirement. The following cost allocation applies:

- The costs of Energinet's maturation, design, and engineering work on establishment of the grid connection must be paid in full by the consumer.
- The costs of upgrading the existing substation must be paid in full by the consumer. This includes:
 - o Costs of purchase and development of necessary additional substation areas.
 - o Costs of construction of necessary additional substation buildings.
 - o Costs of relocation of existing/installation of new bays, including busbars, disconnectors, circuit breakers, earthing switches, transformers, monitoring, and protective equipment for the bays in question.
 - o Costs of installation of facilities and equipment required for grid connection compliance with applicable regulations.
- Costs associated with the installation of additional substation components and other equipment necessary to provide the security of supply requested by the consumer, over and above what is required by the grid dimensioning criteria, must be paid in full by the consumer. This also applies even if these components or equipment are not physically part of the direct connection.
- Costs of the direct grid connection representing an additional cost associated with or caused by bringing forward Energinet's investments compared to published grid development plans must be paid in full by the consumer. The consumer's share of these costs, including the maturation costs, will be calculated in accordance with an allocation key which ensures that the consumer pays the additional costs of bringing forward Energinet's investments.

3.1.2 Grid connection to a new substation

If the consumer's grid connection is to a new substation, the consumer's grid connection will create changes due to the establishment of the new substation, and changes will have to be made from the new substation to existing substations. The following cost allocation applies:

- The costs of Energinet's maturation, design, and engineering work on establishment of the grid connection must be paid in full by the consumer.
- The costs of establishing the new substation must be paid in full by the consumer. This includes:
 - o Costs of purchase and development of the substation area.
 - o Costs of construction of necessary substation buildings.
 - o Costs of installation of busbars, disconnectors, circuit breakers, earthing switches, transformers, monitoring, and protective equipment.
 - o Costs of installation of facilities and equipment required for grid connection compliance with applicable regulations.
- Costs of new cables and overhead lines to/from the new substation and/or rerouting of cables and overhead lines as a direct consequence of the establishment of the new substation must be paid in full by the consumer.
- Costs of upgrading affected existing substations (black ring touched by green lines in figure 1) must be paid in full by the consumer. This includes:
 - o Costs of purchase and development of necessary additional substation areas.
 - o Costs of construction of necessary additional substation buildings.
 - o Costs of relocation of existing/installation of new bays, including busbars, disconnectors, circuit breakers, earthing switches, transformers, monitoring, and protective equipment for the bays in question.

3.2 Underlying reinforcements and expansions

An underlying reinforcement or expansion is defined as the less directly connected changes necessitated by the connection of a consumer. The situation is shown below.

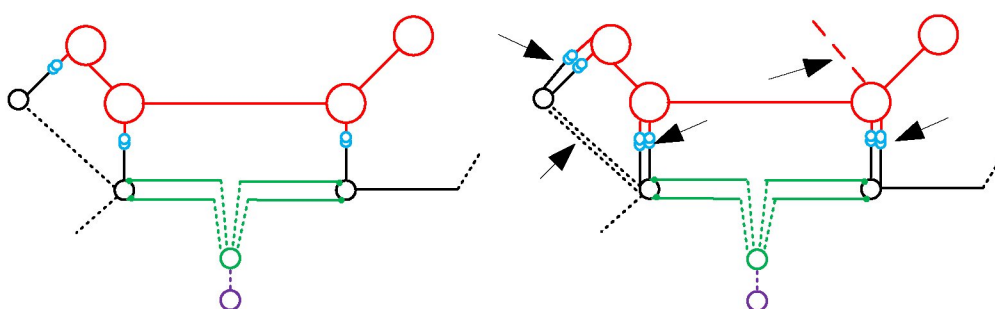


Figure 3 The figure on the left shows the transmission grid with the new grid connection (in purple), but without any underlying reinforcements. 400 kV grid is in red, the 132/150 kV grid is in black, and the direct changes resulting from the consumer's grid connection are in green. The arrows in the figure on the right indicate the underlying reinforcements/expansions necessitated by the consumer's grid connection, e.g.

a new connection to the 400 kV grid and additional connections in the 132/150 kV grid.

As shown above, the underlying reinforcements and expansions are the reinforcements and expansions beyond the affected existing substation(s). Costs of underlying reinforcements and expansions to be borne by Energinet include:

- Costs of expansion and reinforcement in affected existing substations which are not part of the consumer's direct connection (section 3.1) and which therefore constitute an increase in supply capacity to the affected existing substation must be paid in full by Energinet. This includes:
 - o Costs of purchase and development of necessary additional substation areas.
 - o Costs of construction of necessary additional substation buildings.
 - o Costs of relocation of existing/installation of new bays, including busbars, disconnectors, circuit breakers, earthing switches, transformers, monitoring, and protective equipment for the bays in question.
- Costs of installation of new transmission lines to affected or surrounding/adjacent substations must be paid in full by Energinet. This includes:
 - o Costs of installation of new 132 kV, 150 kV and 400 kV overhead lines and/or cables, including substations expansion and upgrade.
 - o Costs of installation of new HVDC connections.

3.3 Ongoing operation and maintenance

Once the grid connection has been established, the boundaries of ownership, operation, and maintenance will generally be at the point of connection. According to current practice, this basic assumption has not changed. This means that if Energinet has to establish a new substation to supply the consumer, and if this substation is used as part of the public electricity supply grid, Energinet bears the costs of operation and maintenance. Energinet bears these operating and maintenance costs because the new substation will be part of the public electricity supply grid and Energinet can use the substation in its operations and planning as a transmission company. Alternatively, the consumer will have to pay either a current or capitalised value for the operating and maintenance costs of the direct connection. However, the consumer already pays an energy-dependent tariff, which includes operation and maintenance of the public electricity supply grid, including the new substation. As the consumer is assumed to be of a certain size to be connected to the transmission grid, the consumer's actual electricity consumption is also expected to be high, and therefore, through this tariff, the consumer will pay a proportionate share of Energinet's operating and maintenance costs. The principle underlying the pricing of Energinet's grid tariff is therefore that all costs for the operation and maintenance of the public transmission grid, including any new substation, are included in the applicable grid tariff, which is paid by all electricity consumers.

The point of connection is defined depending on the type of Energinet substation:

- Single circuit breaker substation: The point of connection will be the outlet on the line bay.

- Double circuit breaker substation: Energinet creates a connection from the centre tower out to the property boundary, where the point of connection is defined (to avoid the consumer having an electrical connection across Energinet's facilities).

In summary, the boundaries of ownership, operation, and maintenance (i.e. the point of connection) are as shown below.

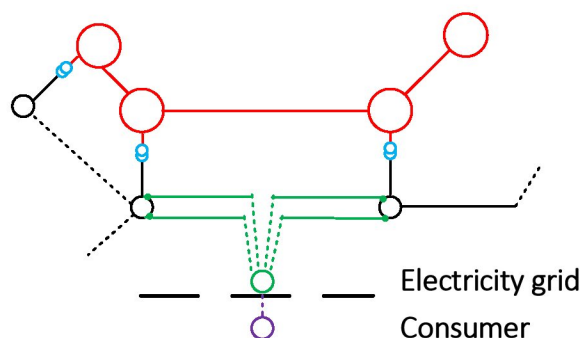


Figure 4 The black dotted line in the figure shows the boundary of ownership, operation, and maintenance between Energinet's transmission grid and the consumer's demand facility. This means that Energinet owns and is responsible for operation and maintenance above the line (the entire transmission grid, including a new substation in green), and the consumer owns and is responsible for operation and maintenance below the line (the consumer's own demand facility in purple).

The costs and mutual allocation of future and ongoing operation and maintenance include:

- Costs of operation, maintenance, and land management of an owner's facilities and land are borne in full by that owner.
- Costs of transmission tariffs and costs of setup, calculation, and payment handling for settlement metering must be paid in full by the consumer.

4. Dynamic expansion

When a consumer is connected to the transmission grid, the consumer concerned and Energinet must conduct studies of the consumer's impact on the existing and future transmission grid. The purpose of these studies is to identify the necessary direct grid connection costs but also any future underlying grid expansion costs.

As a general rule, after detailed dialogue and discussion with the consumer, Energinet's plans must be based on the capacity requirement and expansion which the consumer can objectively foresee.

Studies of the electricity supply requirement of these consumers and potential consumers to be connected to the transmission grid in future are basically divided into four parts:

1. Screening studies analysing available capacity without underlying reinforcements at potential points of connection.

2. A maturation projects performs in-depth grid analyses for the point of connection and the underlying consequences for the electricity supply grid.
3. An establishment project executes the grid connection agreement and creates the agreed connection.
4. Continuous follow-up of electricity supply requirement after commissioning.

In the first part, the screening studies, Energinet collaborates with potential consumers and provides guidance on which parts of the electricity supply grid are best suited for grid connection of the potential consumer's demand facility. The potential consumer has its own wishes as to the expected power draw, the expected rate of expansion and potential locations, and the technical security of supply.

The guidance in these screening studies may therefore mean that the potential consumer makes investments so that it can immediately access the requested capacity, without the need to wait for major underlying reinforcements and expansions by Energinet. On the other hand, it also means that Energinet can guide potential consumers towards creating a grid connection at a location that does not entail major investments in the transmission grid. Major underlying investments in the transmission grid may in that case delay the time when Energinet can meet the consumers' requested electricity supply requirements.

A subsequent maturation project will perform generation adequacy analyses, which are in-depth analyses of the generation adequacy at the point of connection, now and in the future, and the consequences for the underlying transmission grid. This part ends with the conclusion of the grid connection agreement, in which Energinet and the consumer determine the consumer's expected rate of expansion (ongoing capacity requirement) and any dependencies on Energinet's underlying transmission grid.

Following the construction project and commissioning, there is continuous follow-up of the consumer's actual electricity supply requirement in relation to the agreed capacity and the need for any underlying reinforcements and expansions in the transmission grid. This ongoing follow-up is carried out by Energinet by tracking changes in consumption via online recording and logging of measured values. These recordings and measured values are compared with the capacity requirement stated in the grid connection agreement. In addition, Energinet will engage in ongoing dialogue with the consumers about the consumers' own need for Energinet to postpone or bring forward its capital investments.

During screening and subsequent maturation, the consumer's expected capacity requirement and the current capacity at the point of connection are determined. If Energinet's available capacity is below the consumer's expected capacity requirement, Energinet will need to reinforce and expand the underlying transmission grid in order to connect the consumer. This situation is shown below in Figures 5 and 6, which show developments over time. Figure 5 illustrates the situation shortly after grid connection, whereas Figure 6 illustrates the situation in which the consumer's expansion is close to the total expected requirement.

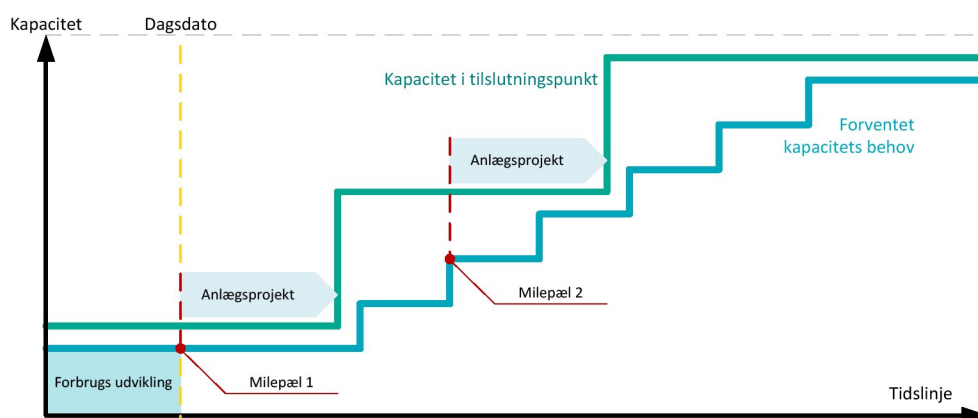


Figure 5 The figure shows Energinet's capacity at the point of connection (green) and the consumer's expected capacity requirement (blue). In terms of time, the figure shows the situation shortly before the grid connection.

For Energinet to ensure that the consumer's supply requirements are met in time, Energinet needs to start the construction project sufficiently in advance (at milestone 1 and milestone 2 respectively in figure 5). Energinet needs to launch the first construction project because the consumer anticipates a supply requirement that exceeds Energinet's available capacity. When milestone 1 is reached, a grid connection agreement is signed with the consumer. The grid connection agreement entails the start of a construction project that guarantees the consumer sufficient capacity to accommodate supply requirements and the rate of expansion. The grid connection agreement contains dependencies (milestone 2) on the demand growth that must be achieved before Energinet will initiate further reinforcements in the transmission grid.

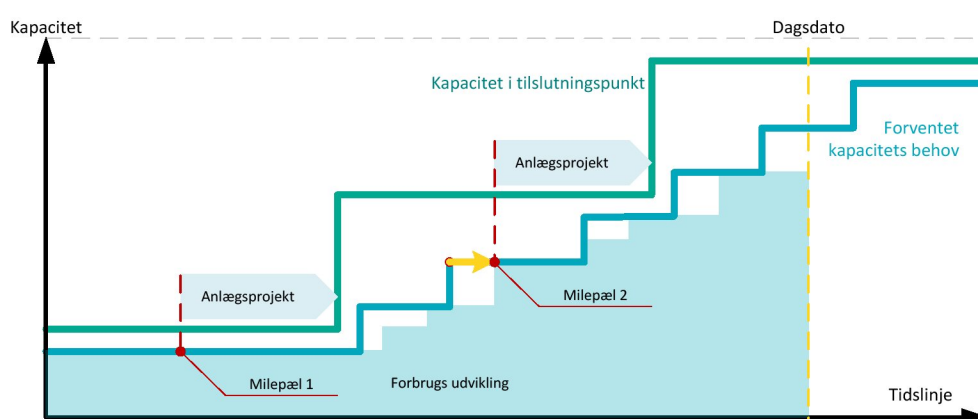


Figure 6 The figure shows the developments over time according to Figure 5 after Energinet has collected observations about the consumer's demand growth. The demand growth, which represents the actual requirement, does not necessarily coincide with the expected capacity requirement.

Energinet still needs the second construction project in milestone 2, figure 6, in order to meet the consumer's expected future capacity requirement, but Energinet will not make this investment until the actual demand growth for the consumer as well as the general transmission grid is at milestone 2. Milestone 2 is the latest possible start of the construction project that allows Energinet to complete this reinforcement or expansion in time and before the consumer expects the capacity requirement. As a result, construction projects (yellow arrow, figure 6) are postponed compared to the plan because the consumer's actual consumption requirement did not match the expected capacity requirements. This postponement of construction projects in relation to actual consumption requirements is called dynamic expansion.

Energinet's dynamic expansion method shown in Figure 6 implies that Energinet will carry out reinforcements and expansions of the underlying transmission grid which meet the transmission-connected consumer's capacity requirement over time on the one hand, and on the other, limit the risk to the remaining consumers, as Energinet will only reinforce and expand the transmission grid when the consumer's actual electricity consumption has reached a certain level. In this way, Energinet minimises the risk of overdimensioning the underlying transmission grid compared to the transmission-connected consumer's uncertain but qualified and anticipated capacity requirements. The consumer's expected capacity requirement is dependent on a number of factors, including elements over which the consumer has no control or is subject to certain uncertainties, e.g. future developments in the consumer's business models and future technological developments and/or developments in the consumer's relationships with its customers.

5. Economic consequences

The cost allocation method means that consumers connected to the transmission grid must bear the costs as described above in sections 3.1 and 3.3.

In addition, the cost allocation method means that Energinet must bear the costs described above in sections 3.2 and 3.3 when a consumer establishes a grid connection to the transmission grid. The method will increase Energinet's ongoing operation and maintenance costs as Energinet has to operate and maintain new substations/substation components – costs which will be offset by a larger basis of consumption, which will be included in the tariffs collected by Energinet. Moreover, consumers with extremely high demand or located in limited capacity areas may require Energinet to invest in reinforcing and expanding the transmission grid.

The dynamic expansion method is intended to minimise the risk of unnecessary expansion and reinforcement of the underlying transmission grid (overdimensioning) and of potentially unnecessary capital investments.

At the same time, the dynamic expansion method must ensure that any reinforcement and expansion of the underlying transmission grid is carried out in time for the consumers to meet the capacity requirement, given Energinet's responsibility as transmission system operator and transmission operator.

6. Consultation of market participants

Energinet consulted the market participants listed in appendix 1 on this method notification for three weeks from 15 November 2017 to 7 December 2017. Danish District Heating Association and the Danish Energy Association submitted consultation comments, which are enclosed as appendix 2. Energinet responded in detail to the market participants' consultation comments, see appendix 3. Energinet summarises the consultation comments below, with Energinet's responses to the consultation comments as well as subsequent changes, additions, and corrections to the method notification following the consultation.

6.1 Summary of consultation comments and Energinet's responses to consultation comments

Regarding this method notification, the Danish District Heating Association commented that connecting an end consumer (hereinafter "consumer") to the transmission grid should not differ from connecting an electricity distribution grid to the transmission grid, and that it is concerning that a consumer has to finance investments beyond the point of common coupling and that Energinet has introduced a marginally lower transmission tariff for transmission-connected consumers.

Energinet replied to the Danish District Heating Association that connecting a consumer and connecting an electricity distribution grid (a grid company) to the transmission grid are not comparable. The consumer and the grid company are subject to different regulations, they have different corporate purposes, and the background and assumptions for connecting to the transmission grid are different. The consumer's financing of "investments beyond the point of common coupling" is a consequence of applying the same principle as when consumers are connected to the distribution grid, and of the fact that Energinet must own the transmission facilities necessary to meet the consumer's requested security of supply. Energinet has obtained approval for a marginally lower tariff for transmission-connected consumers as the consumer transforms the electricity to the lower voltage level itself.

Commenting on this method notification, the Danish Energy Association stated that from its point of view, it is crucial that grid connection requests are first sent to the grid company, regardless of voltage level, and that the choice between voltage levels is made in cooperation between the grid company and Energinet. The Danish Energy Association had no further comments.

Energinet replied to the Danish Energy Association that the work on voltage level selection and who the grid connection request is sent to take place under the auspices of the grid collaboration committee (Netsamarbejdsudvalget) and is independent of this method notification, which only concerns a situation in which it has already been decided by Energinet and the grid companies that the consumer is to be connected to the transmission grid.

6.2 Changes, additions, and corrections following the consultation

As a result of the Danish District Heating Association's consultation comment, Energinet added an illustration with introductory and explanatory text to section 3.1.1 (figure 2), which shows

the grid connection to an existing substation (the “normal connection”). Energinet also corrected references to ensure consistency with the new figure 2.

Energinet then added the consumer’s facility as a purple symbol in all figures in section 3 and corrected the explanation to ensure consistency.