SWEDEGAS

2018-04-30
Oskar Finnerman

Periodic Consultation Document on the Network Code for Tariffs

Summary

The Swedish gas transmission system stretches from Dragør in Denmark to Stenungsund north of Gothenburg and has a branch inland to Gislaved in Småland. There is no cross-border transit as all gas injected in the system is consumed domestically. Of the injected gas at the transmission level over 99,5% goes through Dragør.

The Swedish gas market is comparatively small. Annually about 800 million normal cubic meters is transported through the transmission system, but it varies between different years due to temperature and market conditions for CHP plants. There are 5 Distribution System Operators connected to the system and 5 directly connected end consumers.

The suggested reference price methodology (RPM) is the postage stamp method. The postage stamp is easy to understand, and the reference price obtain from it can easily be reproduced. Further it is cost-reflective, non-discriminatory and is assessed to have a positive impact on the Swedish market, compared to RPMs that have distance as a cost-driving factor.

The proposed entry/exit split is 0/100 as it is today. Having entry tariffs at Dragør would not lead to any improvements for the costumers since over 99,5% of the gas is injected at Dragør, which would not change the cost for the transmission costumers for gas transport. Rather the administration cost for the costumers would increase, since capacity bookings would have to be made at both entry and domestic exit points.

The Swedish Transmission System and Gas Market

The Swedish gas transmission system stretches from Dragør in Denmark to Stenungsund north of Gothenburg and has a branch inland to Gislaved in Småland. There is no cross-border transit as all gas injected in the system is consumed domestically. Of the injected gas at the transmission level over 99,5% goes through Dragør, the point connecting Sweden to the transmission system in Denmark. The remaining injection presently comes from a reverse-flow point in Trelleborg situated in southern Sweden. Apart from these points gas can be injected from the GoBiGas biogas production plant located in Gothenburg and from the Skallen storage facility. The former plant is currently being put into mothball and the latter is in a light mothball in storage year 2018/19. There is no LNG entry to the transmission system.

See Figure 1 for a map depicting the Swedish transmission system.

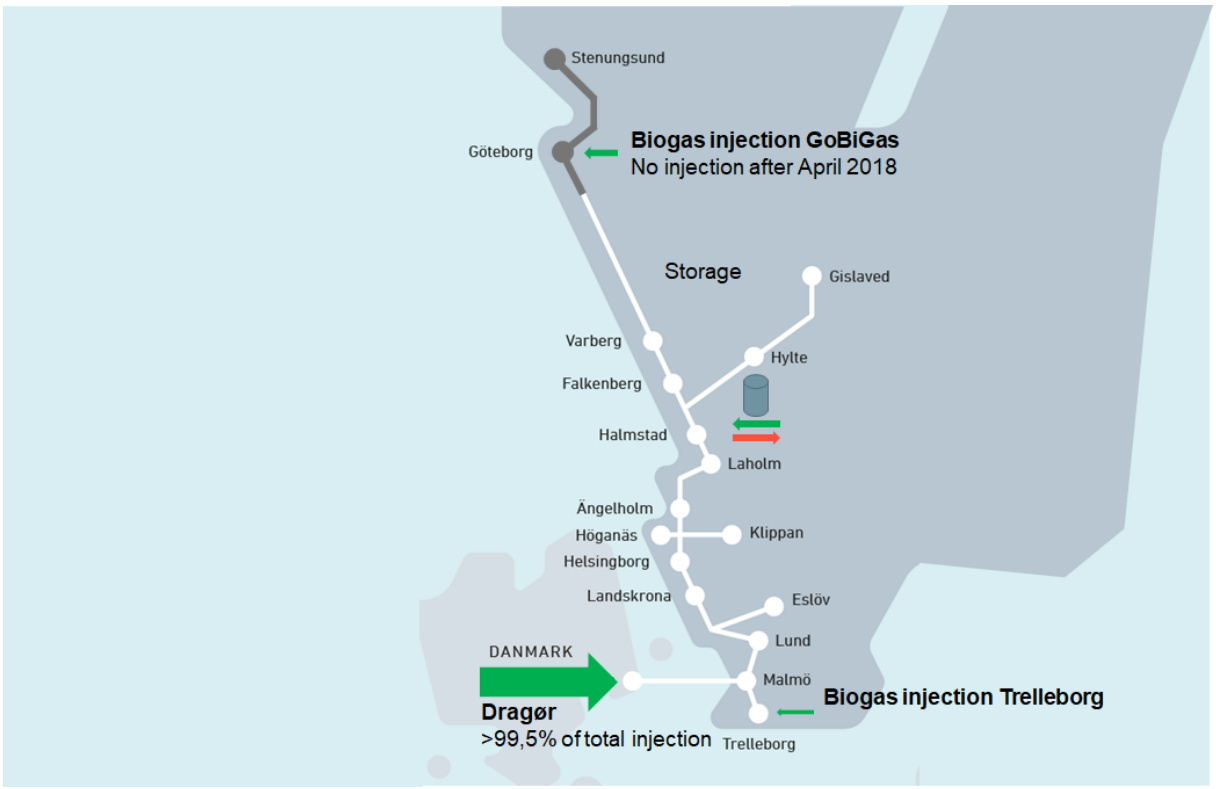

Figure 1 Swedish transmission system

Annually about 800 million normal cubic meters is transported through the transmission system, but it varies between different years due to temperature and market conditions for CHP plants. There are 5 Distribution System Operators (DSOs) connected to the system and 5 directly connected end consumers. The directly connected end consumers are located in the northern part of the system. The Swedish transmission system is wholly owned by Swedegas, the sole Transmission System Operator in Sweden.

Due to provisions in the Swedish Natural Gas Act all entities holding domestic connections to the transmission system pays for the transport of gas though the Swedegas transmission tariff. This is contrary to many EU member states where the transport is booked and payed for by shippers. Consequently, Dragør is not subject to booking procedures by users and therefore not considered as an interconnection point as defined in network codes.

The supply of gas to end users are provided by the gas suppliers. The gas supplier must, for each offtake point, appoint a balance administrator. The latter is financially responsible for ensuring that the offtakes have a corresponding supply. The gas supplier can either accept the role as balance administrator themselves or appoint another company.

The gas year stretches from 1st October to 30th September. The yearly contracted capacities are therefore booked in the last days of September for the upcoming gas year. An ex-ante revenue cap regime was introduced in 2015. Each regulatory period is 4 years. The next regulatory period will begin at the 1st of January 2019.

1. Information on the parameters used in the proposed RPM related to technical characteristics of the transmission system

Art. 26(1)(a)(i), Art. 30(1)(a)

1.1 Description on the proposed reference price methodology

Art. 26(1)(a)

1.1.1 Reference price method

The suggested reference price methodology (RPM) is the postage stamp method. In the postage stamp method, the allowed transmission service revenue is divided with the forecasted contracted capacity to give a reference price see Equation i.

$$\frac{allowed\ tranmsion\ service\ revenue}{forecasted\ capacity\ bookings} = reference\ price \qquad Eq.\ i$$

The postage stamp method leads to a uniform reference prices throughout the system. The cost driver of the postage stamp method is the forecasted contracted capacity.

The suggested reference price methodology (RPM) is the postage stamp method. The postage stamp is easy to understand, and the reference price obtain from it can easily be reproduced and predicted. Further it is cost-reflective and non-discriminatory. These properties are explained in chapter 5.

The most decisive factor for choosing the postage stamp method is that it gives uniform reference prices which, in turn, is assessed to have a positive impact on the overall market volumes, since there won't be an uneven distribution of reference prices where some parts of the market have very low reference prices and some parts unreasonably high reference prices. An RPM that results in too high reference price for parts of the market will have a negative impact on the market as a whole, which would lead to a decrease in market volumes and higher reference prices for the remaining transmission costumers.

A comparison between the reference prices from the postage stamp method and the capacity weighted distance method is described in chapter 6. There it is seen that the CWD method leads to large differences in reference price, which is not a surprising result since the entry into the Swedish transmission system is in the southern part.

None of the secondary adjustments listed in Art. 4(4) are proposed to the RPM.

1.1.2 Entry/exit split

Art. 26(1)(a)(i), 30(1)(a)(i-ii)

The proposed entry/exit split is 0/100 as it is today. Having entry tariffs at Dragør would not lead to any improvements for the costumers since over 99,5% of the gas is injected at Dragør, which would not change the cost for the transmission costumers for gas transport. Rather the administration cost

for the costumers would increase, since capacity bookings would have to be made at both entry and domestic exit points. Also, having entry tariffs would make a transition to a shipper model and a complete market reform necessary. Considering how the Natural Gas Act is written, it would also have to be updated to make an entry/exit-split other than 0/100 compliant with Swedish law.

1.1.3 Capacity/Commodity split

Art. 26(1)(a)(i), 30(1)(a)(iii)

No commodity tariffs are proposed, the proposed split is 100/0. The most cost-driving factor is capacity, which is why this split is proposed.

1.2 Justification of parameters used that are input to the RPM and the CWD calculation

Art. 26(1)(a)(i), 30(1)(a)(i-v)

The parameters used as input to the RPM and the CWD methodology are:

- Allowed revenue
- Forecasted capacity
- Entry/exit split
- Distance (CWD only)

The allowed revenue is based on the technical aspects of the transmission system, since it should cover reasonable costs to conduct transmission business and give reasonable return on the capital required to conduct the transmission business. Because a decision on the allowed revenue for the second regulatory period will not be taken until October 2018 by the Swedish Energy Market Inspectorate (Ei), the allowed revenue used for calculating the reference price for the gas year 2019/2020 is the allowed revenue decided for the first regulatory period.

The forecasted contracted capacity for the tariff period 2019/2020 are aggregated per offtake area that are seen below in Figure 2. The forecast is based on the historical demand on customer level and takes into account trends and any known expected changes in the consumption. The forecasted contracted capacity is expressed as a yearly firm contract. It is 148 299 $Nm^3/h/y$ for the tariff period.

The capacity for the storage is forecasted to be 0 $Nm^3/h/y$ for the tariff period 2019/2020 for both injection and withdrawal, since it has mothball status. The biogas injection from GoBiGas is also forecasted to 0 $Nm^3/h/y$ due to its mothball status. The small injection supplied by the reverse flow point in Trelleborg is forecasted to 646 $Nm^3/h/y$.

The proposed entry/exit split is 0/100 as it is today. For comparison purposes the resulting reference price for 50/50 entry/exit split is also presented in chapter 6.

The distance between the entry and exit points is also a parameter in the CWD methodology. The distances are based on pipe lengths. To simplify the CWD calculation, the exit points are aggregated into different offtake areas according to Figure 2 below. The distance between the entries and the offtake areas is calculated as the mean distance between the entry and each exit point in the area.

Figure 2 Different offtake areas of the transmission System. The clustering is aggregated according to the same areas.

1.3 Structural information of the transmission network

Art. 26(1)(a)(i), 30(1)(a)(iv-v)

The transmission system on the western coast of Sweden stretches between Dragør in Denmark to Stenungsund north of Gothenburg with a branch inland to Gislaved in Småland.

There are 41 metering and regulation stations throughout the gas the 601 km long transmission system. At these stations, the pressure is reduced before entering the distribution system, where it is distributed to the end-users.

The gas system is built up of steel pipelines with a polyethylene coat to protect against corrosion and active corrosion protection to ensure that the pipes do not rust. The dimensions of the pipes are set and checked to ensure a gas pressure of 80 bar. The pipeline diameter from Denmark to Ängelholm is 600 mm and from Ängelholm to Gothenburg it is 500 mm. From Gothenburg to Stenungsund the pipeline diameter is 400 mm. The diameter of the branch pipeline from Halmstad to Gislaved is 500 mm. The pipelines in the gas system are laid underground with a minimum soil cover of 1 metre. Posts have been placed to mark the route taken by the pipeline.

A map of the transmission system with connections to directly connected costumers and marked TSO-DSO interfaces can be seen in Appendix I. Note that the relative distances and locations are approximate in the map.

2. Proposed adjustments for capacity based transmission tariffs

2.1 Proposed discounts at entry/exit points from and exit points to storage facilities

Art. 26(1)(a)(ii), 9(1)

The proposal is to retain the discount of 100% at entry/exit from/to the storage.

2.2 Proposed discounts at entry points from LNG facilities

Art. 26(1)(a)(ii), 9(2)

N/A, no LNG entry in Sweden.

3. Indicative reference process subjected to consultation

Art. 26(1)(a)(iii)

The indicative reference price is 3 074 SEK/Nm3/h/y

4. Cost allocation assessment

Art. 26(1)(a)(iv), Art 5

The cost allocation assessment aims to evaluate whether any cross subsidisation occurs between transit and domestic consumption. Since there is no possibility to transit gas in Sweden the result from the cost allocation assessment was infinity.

To make the cost allocation as relevant as possible, the cost allocation assessment is based on the same cost driver as the proposed RPM, which is forecasted contracted capacity.

For calculation details, see Appendix II.

5. Assessment of the proposed reference price methodology

Art. 26(1)(a)(v)

5.1 Reproduction of the calculation of the reference price and accurate forecast

The postage stamp method is easy to understand, reproduce and forecast. It consists of only three input parameters: the allowed revenue, the entry/exit split and the total forecasted contracted capacity expressed as firm one-year capacity.

The allowed revenue is decided by Ei and is fixed for the whole regulatory period. The entry/exit split is also fixed and would only change following a public consultation. The forecasted contracted capacity for the whole system is available on an aggregated level. Since these parameters are simple and public it also allows the transmission costumers to do their own predictions of the evolution of the reference price.

The reference price for gas year 2019/2020 is calculated according the method described below.

The allowed revenue is for the whole regulatory period is 1 826 MSEK, since the regulatory period is 4 years, the allowed revenue for one year is 456 MSEK.

The entry/exit split is 0/100.

The bookings forecasted for gas year 2019/2020 expressed as a firm booking with a duration of one year is 148 299 $Nm^3/h/y$.

According to the Equation i, 3 075 SEK/Nm3/y/h for all exit zones is received. Please see the calculation sheet Appendix III for calculation details.

5.2 The proposed RPM and the actual cost incurred for the provision of transmission services considering the level of complexity of the transmission network.

The three variables used in the postage stamp method are analysed separately to determine the cost reflectivity of the RPM. The variables are, as seen in Equation i, allowed revenue and forecasted contracted capacity.

Allowed revenue

According to chapter 6, section 10 of the Swedish Natural Gas Act, the revenue cap, which the allowed revenue is based on, shall cover reasonable costs to conduct transmission business and give reasonable return on the capital required to conduct the transmission business, wherein the complexity of the system is reflected.

Since the allowed revenue is used to calculate the reference price the postage stamp method is, by definition, cost reflective.

Booked capacity

The other variable in the postage stamp method is the forecasted contracted capacity. It is also a cost-driving factor which is accounted for in the proposed reference price model.

Entry/exit split

The proposed entry/exit split is 0/100. Not having any entry tariffs in Dragør is cost reflective since almost all gas that is introduced into the Swedish transmission grid must pass through Dragør anyway. Any other split would not lead to any changes in cost distribution between the transmission costumers, just more administrative work.

5.3 How the RPM ensures non-discrimination

As can be seen in equation i, the parameters for determining the reference price using the postage stamp method is booked capacity and allowed revenue. These parameters are objective and the postage stamp method results in the same reference price for all transmission customers and is hence non-discriminating.

5.4 How the RPM prevents undue cross-subsidisation

The Swedish transmission system does not transit gas, therefore no cross subsidisation occurs between intra, and cross system users with the postage stamp method.

The Postage stamp method, and any tariff elements stemming from it, does not subject the domestic transmission costumers to cross subsidisation when it comes to what kind of costumer they are (i.e. directly connected costumer, industrial costumer, DSO) or how much capacity they utilise. It is due to the reference price is the same for all users and the cost for transport being proportional to the capacity booked, i.e. no small consumers cross subsidises large consumers.

6. Comparison with the CWD method and indicative reference prices

Art.26(1)(a)(vi)

6.1 Indicative reference prices at each entry point and at each exit point from the CWD method

Art.26(1)(a)(vi), Art. 8

In this chapter the indicative reference prices for the capacity weighted distance method is presented. Results are shown for both 50/50 entry exit split, which is the contrafactual entry/exit split, as well as results from 0/100 entry/exit split to show the indicative reference prices for the proposed entry exit split.

Due to the mothball status of GoBiGas and Skallen gas storage and their forecasted contracted capacities being zero, the resulting reference prices are zero and therefore excluded from the results.

6.1.1 Results from 50/50 entry exit split

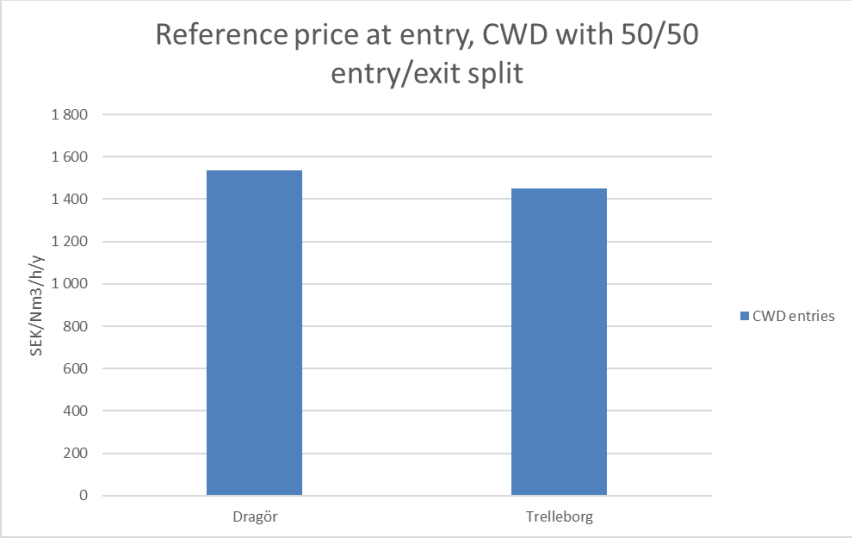

Figure 3. Reference price at entry from CWD-calculation with 50/50 entry/exit split

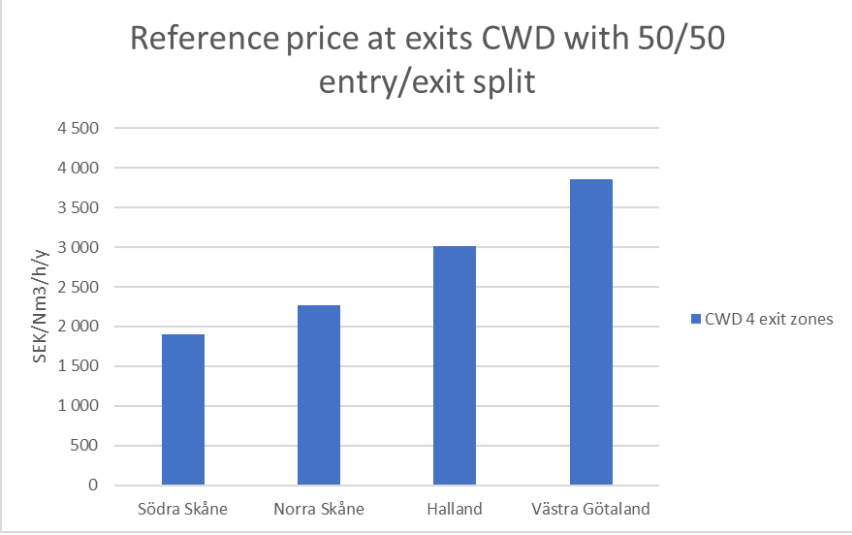

Figure 4. Reference price at exits from CWD-calculation with 50/50 entry/exit split

6.1.1 Results from 0/100 entry exit split

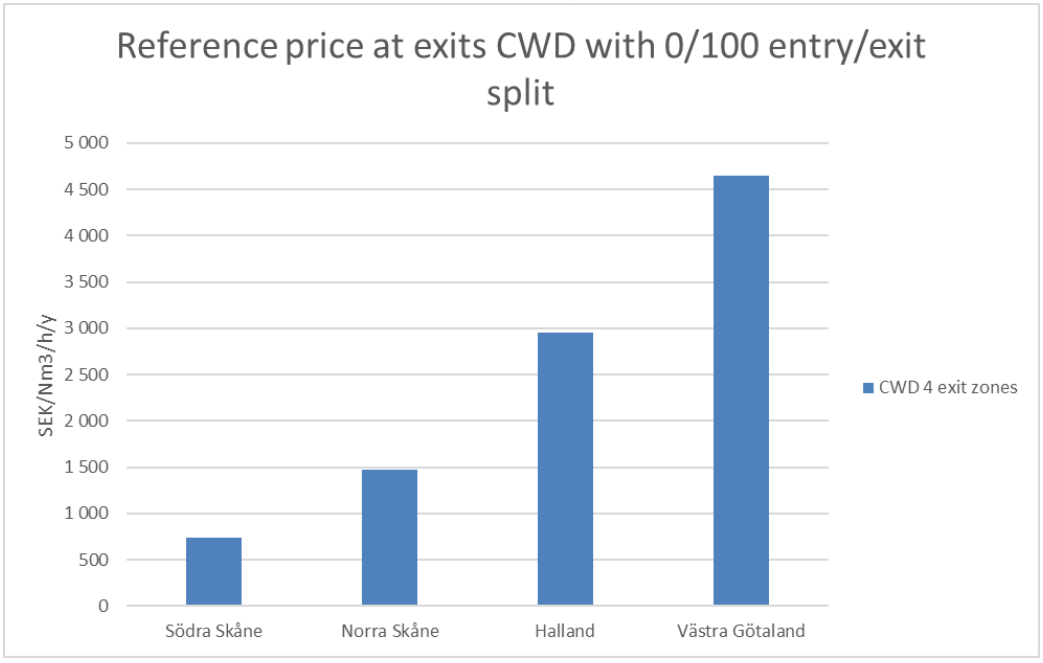

Figure 5. Resulting reference price from CWD-calculation with an entry/exit split of 0/100 for domestic exit points

6.2 Comparison between CWD methodology and proposed RPM

Art.26(1)(a)(vi), Art. 8

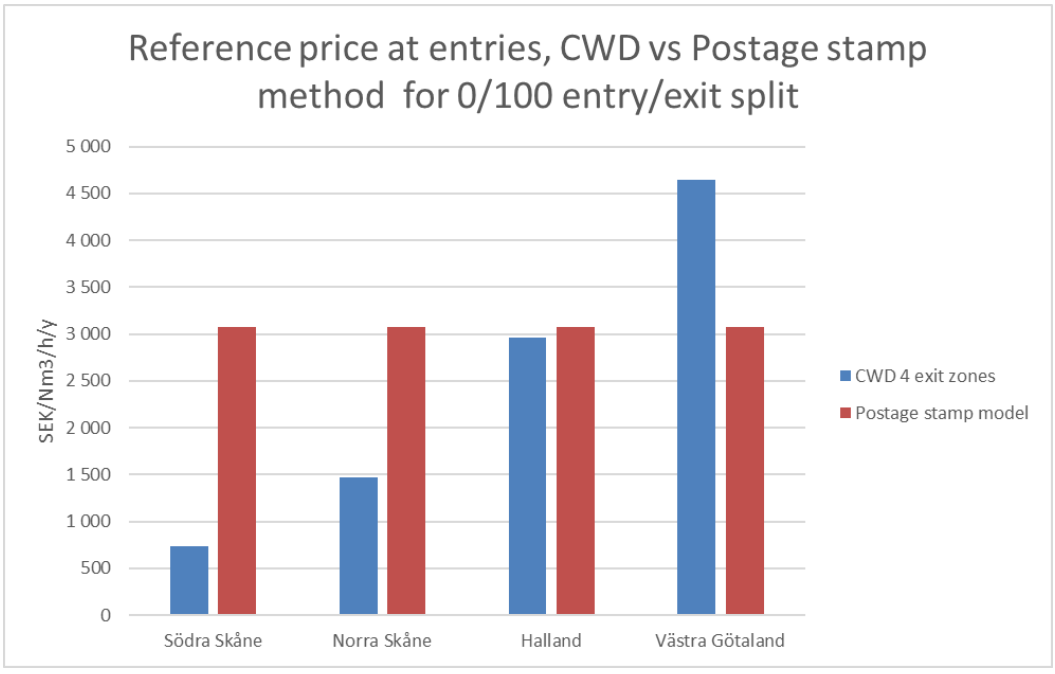

Figure 5. Comparison of the reference price for transporting gas from Dragør to exit points with a entry/exit split of 0/100 with CWD and postage stamp method

Table 1. Comparison between Postage Stamp Method and CWD with 0/100 entry exit split

Criteria	Postage Stamp method	CWD
Reference prices SEK/Nm3/h/y (Transport from Dragør to Exit area)	3075	735/1471/2956/4646
Differences in the manner that each of the methodologies reflects the complexity and technical characteristics of the system	Price is based on allowed revenue and forecasted contracted capacity.	Price is based on allowed revenue, forecasted contracted capacity and distance.
Discrimination	Objective parameters, same price for all users	Objective parameters.
Cross subsidisation	No cross subsidisation between different kind of transport costumers.	No cross subsidisation between different kind of transport costumers.
Reproduceable	Easy to understand, three parameters.	Acquiring data for distance (pipeline lengths) can be difficult to access. Distance need to be adjusted when the topography of the system is changed.
Impact on the market	Same as today	Results in substantial differences in reference price for different offtake areas. High risk of negative volume effect.

As can be seen from Figure 5, the capacity weighted distance method gives reference prices that differ a lot between the four areas used to cluster the domestic exit points. The northernmost area has a reference price that is 6 times higher than the area furthest to the south for 0/100 exit split and 2,1 for the counterfactual comparison with 50/50 entry exit split.

Such large difference in reference prices would lead to the transmission costumers to the north having unreasonable high reference prices. That in turn would have a negative impact the market and lead to decreased market volumes. With a decreased market volume, the reference price would be higher for the remaining costumers.

The calculations for the different methodologies can be seen in Appendix III.

7. Allowed revenue of the TSO

Art.30 (1)(b)(i),(iv),(v)

7.1 Allowed or target revenue

Art. 26 (1)(b), Art.30 (1)(b)(i)

The allowed revenue for 1st of January 2019 is

456 MSEK per year

Note that the figure is based on the current decision for regulatory period 1 since the allowed revenue for regulatory period 2 is to be decided in October 2018 the latest.

7.2 Transmission service revenue

Art. 26 (1)(b), Art.30 (1)(b)(iv),

The transmission service revenue is around 98% of the allowed revenue i.e. 447 MSEK per year.

7.3 Entry/exit split, commodity split and intra-system/cross border split

Art. 26 (1)(b), Art.30 (1)(b)(v)(1-3)

In table 3 below the current and proposed entry/exit split, commodity split and intra-system/cross border split are presented.

Table 3. Entry/exit split, commodity split and intra-system/cross border split

Ref. TAR NC	Description	Proposal
Art. 30 (1) (b)(v)(1-3)	Capacity-commodity split	100/0
	entry- exit split	0/100
	intra-system/cross-system split	(No transit in Sweden)

8. Information on non-transmission tariffs provided to network users

Art. 26 (1)(c)

8.1 Information on non-transmission service tariff methodologies

The following non-transmission services are going to be provided:

i. Pressure reduction service
ii. Administrative charge

8.1.1. Pressure reduction service

When the gas is transferred from the transmission network to the DSOs or directly connected end consumers, the gas pressure often has to be lowered. The decrease in pressure leads to a decrease in temperature of the gas. To prevent the temperature decreasing to levels that would damage the equipment, the gas must be heated. The heating requires equipment in the form of boilers, piping and heat exchangers, also, gas is required to generate heat in the furnace. The pressure reduction service aims at covering these costs.

The pressure reduction charge is proportional to the number of pressure reduction steps.

Pressure reduction charge = price x number of reduction steps

Example: If Swedegas delivers gas to a transmission costumer at a delivery point and lower the pressure to 4 and 30 bar, it is counted as two reduction steps.

8.1.2. Administrative charge

The administrative charge is charged for all transmission costumers. It is proportional to the number of connection points to reflect the extra administrative work required at each connection point which can't be attributed to capacity and distance directly.

The charge is:

Administrative charge = price x number of delivery points

8.2 Share of allowed or target revenue forecasted to be recovered from non-transmission tariffs

The share of allowed revenue forecasted to be recovered from non-transmission tariffs is around 2%

8.3 Reconciliation of target revenue

Reconciled in the same manner as the transmission tariffs, no separate regulatory account.

8.4 Indicative non-transmission tariffs for non-transmission services

Administrative charge for gas year 2019/2020

Administrative charge [in SEK] = 5 245 x number of connection points

Pressure reduction service for gas year 2019/2020 in SEK

Pressure reduction service [in SEK] = 158 800 x number pressure reducing steps

9. Comparing tariffs and tariff models

Art. 26 (1)(d)

9.1 Comparison between transmission tariffs applicable for prevailing tariff period and for tariff period which the information is relevant.

Art. 26 (1)(d), 30(2)(a)(i-ii)

Swedegas has not taken any decisions regarding future price adjustments. The price indications presented at the gas market council in June 2017 are used in the comparison, see Figure 6. The forecast is to recover 85 % of allowed revenues in regulatory period 1.

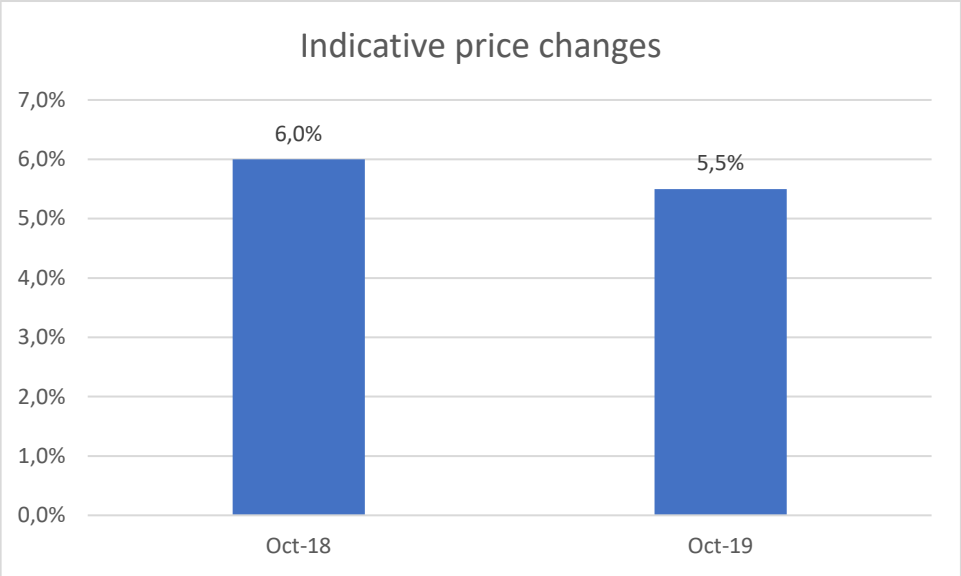

Figure 6. Price changes to adjust the revenue to the allowed revenues. The price change for gas year 2019 will be adjusted to accommodate for a change in gas quality when the Tyra fields will be down for maintenance.

Swedegas will not utilize the allowed revenue to 100 % in regulatory period 1. As a consequence, the tariff for a one-year firm capacity product is lower than the reference price. The tariffs applicable for the prevailing tariff period, gas year 2017/2018, is compared with the indicative tariffs for the gas year 2018/2019 to cover the price changes for the remainder of the current regulatory period. The indicative tariff level gas year 2019/2020 is also included, since it is the gas year which the consultation is relevant for. The rest of the tariff elements is assumed to follow the same price adjustments in percent seen in Figure 6.

Art. 26 (1)(d), 30 (2)(b)

Table 2. Indicative evolution of one-year firm capacity tariff.

Gas year	2017/2018	2018/2019	2019/2020
Firm one-year capacity product (SEK/Nm³/h/yr)	2063	2187	2307

9.2 Simplified tariff model

Art. 26 (1)(d), 30(2)(a)

A simplified tariff model exists on Swedegas website where the transmission costumer can calculate tariffs by inserting their yearly consumption, capacity need (highest daily average), number of offtake points and number points with pressure reduction. The calculator will then give an estimated annual cost in SEK/Nm³. The tariff calculator is updated yearly to provide the best possible estimate.

In order to predict the future tariffs, the user can simply multiply the calculated annual cost with the indicative price changes in this consultation document.

The calculator can be accessed at:
https://www.swedegas.com/Our_services/services/transmission/tarrifkalkylator