Sendes til postmar@erst.dk og chewan@erst.dk
CC.: soraag@erst.dk

Third draft LRAIC model - comments by Dansk Energi

Dansk Energi (DE) appreciates the invitation from the Danish Business Authority (DBA) to comment on the third draft LRAIC model for fixed networks.

Our contribution consists of the following two parts:

Part 1: Comments on third draft model
Part 2: Consultation questions: Q18-Q25 (Other operators)

Part 1: Comments on third draft model

Conflict with LRAIC principles, scorched node
The LRAIC theory operates with different degrees of optimisation possibilities. LRAIC models shall model an efficient operator, but the degree of optimisation is subject to the operator's actual network. Basically, there are three different types of LRAIC models; scorched node models, modified scorched node models and scorched earth / greenfield models.

The difference in the three types of models, are the allowed degree of optimisation.

Scorched node is the model approach with the most limited optimisation possibilities of the three. Scorched node means that the optimisation is subject to the actual operator's network nodes. The model's optimal scenario under the scorched node assumption is subject to the number of sites and their existing location. The size and type of equipment at the sites can be optimized with modern technology, but the number of sites, and their location is fixed.

Models subject to modified scorched node will also be based on the modelled operators' sites, but the modified scorched node assumption allows that the location for some of the sites can be changed, if inefficiencies are identified.

Scorched earth / greenfield models do not have limitations regarding the operators actual site locations, and the number of locations.

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The Model Reference Paper (MRP) states that the degree of optimisation in the model shall be based on the scorched node approach. Please see section 3.3.4. *Degree of optimisation:*

Supporting criterion 12: The choice of technology and degree of optimisation is subject to the scorched-node assumption and the requirement that the modelled network as a minimum should be capable of providing comparable quality of service as currently available on the modelled operator's network, and be able to provide functionality comparable to that of the existing services.

In MRP section 5.3.1 *The Scorched Node Assumption,* it is written that:

DBA interprets the Scorched Node constraint such that when modelling an "optimally structured network" under the scorched node assumption the locations for equipment are constrained by the existing number of sites and their existing locations. However, the scorched node assumption does not imply that the transport network - cables, duct/trench etc. - is fixed. Nor does the assumption imply that the same number and type of equipment should be placed at each of these geographical locations.

Supporting criterion 26: The LRAIC model should show the costs of a network with an efficient configuration operated by an efficient company, based on the latest proven technological solutions and an optimally structured organisation. However, the starting point should be the existing geographic network architecture in the modelled operator's network. This implies that equipment should be placed at the existing geographical locations of the modelled operator's network nodes (the scorched node assumption).

The above-mentioned quote on the Scorched Node assumption is in line with the decisions taken in NRA's - Rapport om Hybridmodellen, December 2002.
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DBA's efficiency adjustment in the Norlys model conflicts with supporting criteria 12. The performed optimisation (efficiency adjustment) adds nodes to the Norlys network, furthermore it changes the locations of Norlys' nodes. This is actually written by DBA in the 2nd Consultation report "*Further, this adjustment does not only mean that a few network nodes are added on top of the existing network nodes of Norlys. The adjustment also implies that the existing network nodes would be adjusted (moved) to consider a more efficient deployment overall.*". This means that the efficiency adjusted Norlys model is a mixture of the modified scorched node approach, and the greenfield approach, as the model disregards the location of all Norlys nodes.

In the 2nd Consultation report DBA writes that: *With regards to the validity of this adjustment in relation to the scorched node approach, we would like to note that such adjustments were already envisaged in the final MRP published in October 2019:*

"The LRAIC model should show the costs of a __network with an efficient configuration operated by an efficient company__, based on the latest proven technological solutions and an

optimally structured organisation. However, the starting point should be the existing geo-graphic network architecture in the modelled operator's network. This implies that equipment should be placed at the existing geographical locations of the modelled operator's network nodes (the scorched node assumption)." (emphasis added by DBA)

As DBA writes, it is true that the MRP mention that the model shall show the cost of a net-work with an efficient configuration operated by an efficient company. According to general LRAIC principles the optimisation possibilities are limited under a scorched node approach. As written above, the optimisation under a scorched node approach is subject to the number of sites and the location of sites. The optimisation can only be performed on the type of equipment, and on the size of the equipment placed on the sites. Furthermore, the cable routing between the sites can be optimised under the scorched node approach.

The limitation of optimisation under the scorched node approach should be well known by Axon. A description of the three LRAIC approaches can be found in earlier work performed by Axon[1]. In the description of scorched node, Axon writes:

*Scorched node: this approach uses the location of existing network nodes. The equipment estimated in each node will be calculated based on demand and efficient use of the network. This option is relatively simple to implement but **it may include potential inefficiencies in operators' networks.** (Emphasis done by DE)*

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The scorched node assumption has been essential to DE from the preliminary phase of the LRAIC project. DE commented in the MRP hearing, that the scorched node assumption should reflect the actual modelled operator. DBA confirmed in the MRP consultation report that:

As reflected in the MRP, the model will, to the extent possible, be based on a scorched node assumption that considers the locations of the nodes of the modelled operator(s).

As said, scorched node has been crucial for DE since the beginning of this LRAIC project. And DBA has previously confirmed the usage of the scorched node assumption for the mod-elled operator.

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The conclusion about the scorched node topic is that the model does not meet the MRP supporting criteria 12 which says that the choice of technology and degree of optimisation is subject to the scorched node assumption. DE urge DBA to omit the performed efficiency ad-justment, so that the model fulfils the MRP's supporting criteria 12.

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[1] Recommendations on new interconnection rates for ECTEL member states
Final guidelines report, 27 December 2016, Axon Partners Group Consulting

Transparency issue

DE finds it irrelevant to comment on the transparency issue related to the efficiency adjustment, as the adjustment is not in line with the MRP as already covered in this response. Nevertheless, we will comment on the transparency issue even as we do not see any reason to keep the MRP conflicting adjustment in the model.

The efficiency adjustment is based on TDC figures compared to Norlys figures. DE/Norlys does not have access to the TDC R-model and the confidential TDC excel model. So, the calculated efficiency adjustment of 15 pct. is a black box calculation, which DE/Norlys does not have any chance to validate.

In general, the LRAIC modelling performed by DBA is thorough and transparent, and operators are able check actual distances etc. in the R model. But when doing the efficiency adjustment, all distance calculations becomes a black box – conflicting with the aim of the model being as transparent as possible.

Isolated homes

DBA introduce the concept "isolated homes" in the Norlys model. DBA states in the consultation note regarding 2nd consultation on the Model:

Furthermore, in the case of Norlys, DBA identified that a relevant number of the homes covered by Norlys are located at a significant distance from the CO. Upon closer inspection, these homes are mostly isolated, requiring extensive network deployment to cover them. It is valid to expect that an efficient operator would only cover these homes if it is possible to co-deploy (for instance, with its own electricity division). Thus, for these specific, isolated, homes, the 3rd draft model considers that the trenches necessary to cover these isolated homes would always be shared with utilities (Norlys electricity infrastructure), to avoid an uneconomic outcome.

DE have several comments on this topic.

1) More than 400,000 households lost electricity during the Decemberstorm in 1999 - the worst hurricane in Denmark of the century. The power outages were mainly due to damage to overhead cables by fallen trees and flying objects. In continuation of the storm it was politically decided to give the distribution system operators (DSO's) the possibility to finance an accelerated deploying of overhead lines into the ground to make the electricity distribution network more resistant to future storms. From year 2000 an onwards, the DSOs initiated an intensified cabling of low-voltages cables (0,4 kV cables). Nearly 85% of the power cables were already deployed into the ground at the end of 2004[2].

Considering that a very large part of the low voltage cables in Denmark, connecting homes to the power grid, was deployed prior the utility companies decision in the mid 2000's to enter the broadband market and deploy fibre cables to households and businesses in their respective supply area, DE does not find that DBA's model assumption regarding co-digging between fibre cables and electricity cables to isolated homes is valid.

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[2] https://www.kfst.dk/media/49587/elselskabernes-udrulning-af-fibernet-08092005-analyse.pdf

2) The model clearly shows that DBA does not acknowledge the fact that fiber does not suffer from the limitations of copper: data signals over fiber can easily be transmitted more than 20 km from CO to the customers – reducing the number of needed CO's. The reach of data signals over copper is limited to about 3-4 km. demanding a higher number of CO's [3]. In this draft model, Norlys is penalized twice due to the longer distances on fiber between CO's and the customers

- DBA performs an efficiency adjustment, where Norlys's number of sites and their location mimics TDC's copper network, to reduce trenching distances
- Secondly DBA introduce Isolated homes, where it is assumed, that all homes longer than 7 km from the CO always use co-digging

The efficiency adjustment mimics TDC's network nodes in the Norlys coverage area. The efficiency adjustment is kind of a black box calculation, so we do not know the actual locations of the nodes. But as the adjustment is based on TDC's copper network, there is probably no addresses located more than 7 km from the CO. I.e. if the efficiency adjustment is done, there will be no Isolated homes in the Norlys network.

As the efficiency adjustment makes the Norlys model mimic TDC's network, the number of isolated homes will be identical for both TDC and Norlys (when Norlys reach 100 pct. HC). How come that the two operators are treated differently, when it comes to isolated homes? The distance from the CO to end user will be the same for the two operators.

Co-digging adjustment
DE is pleased to see that DBA acknowledge that there are additional costs when sharing a trench with a utility operator compared to a normal trench. The model now reflects this to a certain extent, as the operator bears 60% (instead of 50%) of the costs compared to a normal (non-shared) trench.

In the 2nd Consultation report DBA writes that:

DBA believes that an efficient telecom operator will, when possible, use co-digging (co-deployment) with not only other telecom operators but also with operators putting down other types of infrastructures in the ground such as electricity, water supply, gas supply, sewer, etc. At the same time DBA acknowledges that it can be difficult to co-dig with other operators. However, DBA believes it should be easier to make co-deployment if the same operator has activities across different infrastructures in the ground. This is also supported by a recent public article of an electricity company that replace electricity cables when laying down fibre in the ground. As Norlys both has electricity and telecom infrastructure DBA therefore set the percent of co-deployment for Norlys to 20 percent which is higher than the 10 percent used for TDC as TDC is a telecom "standalone" operator.

DE do not agree with DBA that it is easier for Norlys (more precisely Norlys Tele) than it is for TDC to make co-deployment across different infrastructures in the ground.

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[3] DBA has described the different characteristics of copper and fiber in the current market decisions from 2017 https://erhvervsstyrelsen.dk/sites/default/files/2019-02/afgoerelse_paa_marked_3b_0.pdf - see section 1.5.1.2 regarding upgraded copper and section 1.5.2 regarding fiber access networks.

All distribution system operators (DSO's), including the DSO at Norlys, are subject to monopoly regulation in accordance with the Danish Electricity Supply Act No. 119/2020, including §20a, §24 and §84a, in which the DSO-obligations in the Electricity Directive Article 35 are integrated. Together with executive order No. 933/2018 (compliance programme for DSO's, TSO's and Energinet) these legal acts define a number of obligations the DSOs have to fulfil to ensure that they will act unaffected by commercial interests of other vertically integrated associated companies. The DSOs are obliged to annually turn in a compliance program as well as a report describing the measures carried out to ensure their fulfilment of the compliance program

The provisions in the EU Broadband Cost Reduction Directive (2014/61/EU) on coordination of civil works (Art. 5), transparence concerning planned civil works (Art. 6) and permit granting procedure (Art. 7) was transposed into Danish Law in 2016 (Road Act – paragraph 74 and 75). From 1 July 2018, digging permits have been conditional on a prior documentation of the interest by other cable owners (telecom, electricity, local district heating, water supply etc.) to coordinate digging activities (co-digging) through the use of a co-digging module ("samgravning") in the Danish Register of Underground Cable Owners (LER) - securing a transparent and nondiscriminatory process on co-digging activities.

DBA refers to a recent public article of an electricity company replacing electricity cables when laying down fibre in the ground – not mentioning the author of the article. We have become aware of, that DE is actually the author of the article describing the DSO – TREFOR Elnet's – replacement of 50-60 years old medium voltage power cables (10 kV cables) in the central parts of Kolding and Middelfart. TREFOR Elnet is interested in co-digging with other cable owners (telecom, district heating, water supply etc.) - mainly to reduce digging activities in city areas, so that citizens are bothered as little as possible. TREFOR Elnet's call for co-digging is done through LER[4]. TREFOR Elnet completed the deployment of low power cables (0,4 kV cables) in 2008/2009.

DE therefore presupposes that the model assumption on co-digging will be aligned with Danish law and that Norlys Tele - and all other utility owned fibre operators – are considered "standalone" operators on equal terms as TDC.

Single installations
During the LRAIC modelling process different terms has been used to describe the addresses that is not connected from the beginning of the network roll out. Terms like 'delayed installations' and 'after connections' have been used. The characteristics for these installations are that they are done as a single installation. DE suggests that the model should use a more precise and less 'negative' term to describe this type of installation. DE therefore suggest that DBA use the term 'Single Installation' in the final LRAIC modelling.

DE supports that the model now covers an extra one-off fee reflecting the extra costs of doing single installations. With this implementation the model reflects a higher degree of reality. But DE request to make the calculation of the average installation cost transparent. In sheet 1B, cell D36, the weighted installation cost can be found as an entered number. DE suggest

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[4] https://www.danskenergi.dk/nyheder/fibernet-traekker-nye-elkabler-med-slipstroemmen

that the model contains the calculation of this number, including installation cost during roll out, single installation cost, and the percentage of single installations.

Furthermore, it is important to stress that the single installation percentage, and the costs of doing single installations are operator specific and should be defined for each operator. The calculation of the percentage of single installations should reflect the average share of single installation in the specific operator's fully deployed network in 2038.

Calculation of one-off fee for drop wires longer than 30 meters
The monthly fee calculated in the model is based on drop wires up to 30 meters. The model calculates an additional one-off fee which can be charged for customers with drop wires longer than 30 meters. It is DE's opinion, that the price decision shall reflect the actual operators pricing strategy. I.e. if the operator has chosen not to differentiate customers pricing according to the drop wire length, then it shall be possible to incorporate the +30 meters drop wire one-off fee, in the recurrent fee. This option is vital and necessary for the cooperative owned fibre companies as they treat all customers (owners) equally – independent of the location of address.

NGA risk premium
DE understand that the setting of WACC risk premium on fibre networks is not part of the LRAIC process but will be settled in the commitments procedure and/or consultations on draft price decisions.

Part 2: Consultation questions
Question 18: Do you agree, at a high level, with the inputs included in the Excel model?
Most inputs look reasonable at a high level, but as many prices are anonymized it is difficult to comments on these. As DBA knows from the answers to the data requests, the fibre operators face different prices on equipment, so the input evaluation will have to be done for each single operator, at the point of time they are modelled (if they are modelled).

Question 19: Do you agree with the methodology followed for the treatment of non-network overheads in the Excel model?
DE noticed that the differentiation between retail and wholesale has been removed, so that all the allocation goes to wholesale products. DE supports that change.
DE also noticed that some of the Norlys non-network costs has been changed from non-network costs to network costs. Due to confidentiality DE is not able to check if this re-categorization makes sense.

Question 20: Do you agree with the access and transmission network dimensioning algorithms implemented in the Excel model?
First, DE would like to state, that some algorithms are difficult to trace. So, there is a risk of undiscovered errors.

Question 21: Do you agree with the dimensioning algorithms/scripts implemented in the R model?

DE has not been able to perform a thorough review of the R model. Errors that may be found in the R model must be corrected in all R model versions, i.e. if errors are found in the TDC R model, they should be corrected in the fibre operator R model as well, and visa versa.

Question 22: Do you agree with the routing factors matrix defined in the Excel model?
DE has not found any errors in the routing factor matrix.

Question 23: Do you agree with the results of the wholesale access services produced by the
Excel model?
DE does not agree in the results of the wholesale access services. Some of the criticisms mentioned in this hearing response affect the results. DE believes that these issues will have to be changed before we agree in the results of the model.

Question 24: Do you agree with the results of the wholesale bitstream services produced by the Excel model?
The issues raised by DE will have to be dealt with, before we agree with the model results.

Question 25: Do you agree with the results obtained for the ancillary services?
N/A