Summary report (referat), dialogue conference

The presentation that was held can be found here: The future of power market models and model frameworks.pptx Under "Notes" for each slide is the script that what was presented.

Below is the summary report of the questions and inputs that were given during the conference and the answers given by the project. Due to poor audio quality we are releasing this as a summary report instead of as part of the recording itself. Most questions and answers are written verbatim, however some questions/answers have been recreated as best we could based on notes and memory.

Question/input from participants	**Answers from the project**
Who will use the model/model framework, only NVE, Statnett and Statkraft or others too?	No measures have been decided yet. The parties will of course want to use any potential models/model frameworks that are developed, however we wish to include everyone and the goal is to elevate the entire industry.
An input - I agree with your presentation of the future but I'm lacking distributed energy sources and the role flexibility will play in the future. It is not just about the flexibility that hydropower and other renewables will give us but balance. When we talk about power market models today we mostly look at today's market, but flexibility will be far more important in the future.	
With "models" it wasn't clear if you referred to IT models made to show systems or mathematical models used to simulate market behavior. Could you please clarify?	With "models" we refer to mathematic «calculators», mathematic models that simulate market behavior based on input data.
Is there a common data model?	No, not yet
A possibility others are looking at is collecting electricity, hydrogen and heat-markets, at least in geographies where that is possible. Are you looking at something like that? Integrated markets are being discussed where not just electricity is produced but things like hydrogen and pure industrial fuel, that these activities come together. Do you have any thoughts about that?	When speaking about hydrogen, it's about storage. How this works with and affects the market. It's important to understand how this works and we need to understand how it affects power prices. (the real answer was a bit longer but due to audio quality it is not possible to hear what was said).
Is the quality of the data feeding the models in focus/on the agenda?	The focus of this collaboration are the commonly used models. Data sets are considered business secrets, having good data is very important but data is not shared between companies. How detailed data it is possible to collect, maintain and use is important. There are some trade-offs there that we need to have in mind.
Have you considered information/data security?	Information security is very important. There are both legal and organizational demands related to security. As said, data sets aren't

	shared between companies. Being able to use models without sharing data sets is important.
What data are you looking at in the data model?	The first answer is that a future common data model doesn't exist yet. We use several types today, power plants and production capacity, power lines etc.
Do you want signals, measurements from the grid etc? (the question was a bit longer but due to poor audio quality it is not possible to reproduce)	We are mostly looking at structured data. We have a lot of data, power usage for all countries in Europe for instance. We also need flexibility to be used in the models. One benefit of a common model framework with APIs is the possibility to allow data collection from points on power plants and other sources of data to help us describe reality.
Question about data – companies have a lot of data that isn't available for providers. Openness is difficult here. To elevate the industry have you considered developing data sets to illustrate the challenges in the future as you see them, for instance network data which is difficult for the providers? To get more openness from providers might be difficult. Have you considered making a "benchmark" data set to be used in a competition for instance?	As we said data sets are considered business secrets, to have the best data set is considered a competitive advantage. We are very focused on data security going forward. We know there has been a discussion about public data sets, the key word for us is compliance. We are not allowed to share our data sets.
To clarify the last question, I meant not-real data to illustrate how the systems work.	That is something we can do. NVE as a directorate does not have to worry about competitive advantages, on the other hand NVE gets data from producers and can't share everything. We need something representative, we have more knowledge about some questions than others that we are able to share. It should be possible to create a type of simple data set to illustrate the data we feed into the models. We should find a way to do it and we are positive to the idea of example data sets.
Are there standards for data sets you can base the architecture on?	We don't know of any such standards today.
Which open license models are you considering for the models?	Right now everything is on the table. We want to hear from you, if you have any suggestions we would love to hear them.
Do you anticipate machine learning as a way to use the data?	As I said everything is on the table. That is an exciting thought. Note added after the conference to clarify: We need open algorithms that we can understand and machine learning is often "black box", so it's not a perfect solution. Machine learning can be used as decision support but not as the main basis for solving the mathematical problems.

I am wondering if it's a good idea to split the project into several parts. On one hand you should define what data should be, how to communicate around data between data sets and models, define an API. What types of models is a different question. If you succeed with creating a standard for data it is much easier for model providers to see what everyone needs to automate. That could be an idea to consider.	Absolutely, thank you. Note added after: Our project and slides are divided into model framework and models. The data model will probably be defined when working with the model framework.
As a mathematician, when you model a problem you can transpose the problem. There is a discussion in Europa about going over to capacity and values. Change the market design, changing the mathematical model you are trying to solve. The argument is that it will be a more robust method and give incentives to solve intermittence or price intermittence. Is that something you are considering?	You can find new models and change the market design, absolutely. The most important thing for us is to have an explanation. You can't have a system that is too complex, that you don't understand. We are looking into what happens, on one side it is robust and you need optimalization as a reference for what is done, how resources are used. On the other side you need data to optimize, if it is too complex no one understands it and that creates its own problem. Transparency is important in itself. That can change if you go back to central planning which is a different usage pattern. You need optimalization and the system and the resources have been robust for 70 years, it could be useful in the future too.
Will current model specifications, strengths and weaknesses be distributed?	The models we use today are owed by different companies and we have no intention of distributing specifications for proprietary software. We also believe that focusing on weaknesses is not a good basis for a fruitful discussion, but would rather focus on our needs in the future.
Which incentives will drive innovation in the ecosystem?	To create a better world? We have talked about how a model framework will make it easier to use data from new sources for information and benchmarking. We must share what we can share. An incentive for innovation, as we said each company has its own data set which is secret but the tool, the models, are being used by everyone. If we can cooperate about making the models better at analyzing the power market, in theory it will make all companies analyses perform better. Every analysis will be more correct. For the government which is heavily invested in this project through NVE and Statnett, how you invest and develop the power market will potentially have hundreds of millions of kroner in value. So we believe the incentive is there.

With grid simulation there are standardized ways of doing modelling. For example CIM (common information model) and CGMS which is a specific way of modeling using CIM. This is used across Europa and the USA. Energi Norge has a dedicated work force called “Digin” (https://diginenergi.no/se-webinar-digin-release-grunnprofil-v-1-0/). They are working on using CGMS to look at distribution modelling. This is mainly for grid simulation, not real-time. I am struggling to understand your user stories, what are you trying to achieve? I understand you want a model but is the right way forward to consider it a common model? There are several models that need to communicate with each other and collaborate. Real-time-data have different topics or domains compared to statistical data from equipment. If you look at slide 11 (model frameworks) we have defined a data model as a single unit. We understand the vision but are worried as a supplier about if this is considered a system or a collaboration between several systems. For instance there will be a lot of traffic on a server if all data is going through a single system.	
To follow up on the previous input, data architecture is a question to consider. What to centralize, what to decentralize	Both these inputs are very valuable that we will take with us. We can’t decided any measures yet, that is why we are here, to listen to your valuable inputs about how we should move forward. So we haven’t decided to create a model or a common data set, nothing is decided yet. No one should leave the conference thinking we are going to do this or that, we only want to show our needs and gather your inputs as to how we should move forward to try to solve them.
I want to build on the previous inputs. A starting point for building the future of data and data models is to map the user stories. What are the user stories from NVEs point of view, what is the most important to get out of this from Statkrafts point of view? Different companies have different needs. It is a good starting point to map out who the user is and their user stories and then you can have a more technical discussion about which data to be shared, what needs to be protected and other technical discussions.	
To add to that, it would be good to reuse as much as possible. If Norway decides to do something and Sweden does something else it	

will be a nightmare for providers to handle different standards. The good thing about CGMS is it is a broad spectrum. There is not one provider owning the data or how the data should be delivered. Please keep that in mind.	
We can also mention several initiatives in other countries, you could try cooperating across borders. Sweden and Austria for instance.	
Mapping user stories can also help you solve the question of incentives that came up earlier.	Absolutely, a win-win.
Have you considered how to start? Will you build a proof of concept, will you build a detailed specification?	Figuring that out is our next step. Right now we are gathering information with open minds, when we have learned everything we can decide on the best way forward. So we don't have an answer right now.
Do you have a timeline for when you wish to have a model, a proof of concept?	When is the future? The future is now. A timeline is a difficult question, we of course want the perfect model as fast as possible. But we need to move forward at an appropriate speed and not make rushed decisions. Right now we are working on gathering data and then we will make decisions going forward. I can't share details other than that. We can say that the power market is changing rapidly. There are many things coming the coming years. We have many questions we need answers to.
Have you defined success criteria for the process or a minimum viable product?	We haven't defined that yet. We have defined some high level needs, we are still early in the process. This is very early. We will be doing all the things you are asking of going forward.
Have you planned a delivery model for he tools? I assume these are tools that won't be sold by the suppliers to many customers, that could be a challenge from a commercial standpoint.	We have no thoughts yet. You input is valuable! I would like to challenge you, in stead of asking if we have thought about, tell us how we should do it. So I will ask back, what do you think the best delivery model is? We want to learn from you. These might be difficult questions to ask in a big room?
You should look at the industry and have multiple suppliers implement different measures. You should have common data sets but specialized smaller solutions. And a logic for cooperation between these.	
Have I understood correctly that this meeting is to show needs and cover everything to set up 1-1-meetings to discuss specialized solutions we think can be appropriate?	Yes, that is correct.