

# Statnett's Move to the CIM

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## Statnett in brief

- Is the Norwegian TSO (Transmission System Operator)
- Statnett owns and operates:
  - approx. 10.000 km power lines (87% of main grid)
  - 140 transformer stations
  - one national control centre
  - three regional control centres
- Number of employees : 750
- Offer International consultancy service
- Operating revenue 2008: 659 mill USD



## Strategy

### Vision

- Statnett shall be recognized as Europe's most innovative and environmental responsible grid operator.

### Business Idea

- Statnett shall facilitate a well functioning electricity market with a high degree of security of supply



# The power grid in the Nordic countries



**Norway:** (2008-Nordel)  
Peak load: 23 994 MW  
Installed capacity: 30 789 MW  
Hydro: 29 474 MW (96%)  
Thermal (gas): 890 MW (3 %)  
Wind: 425 MW (1 %)

**NORDEL:** (2008-Nordel)  
Peak load : ~ 70 000 MW 1)  
Installed capacity: ~ 90 000 MW 1)  
Hydro: 58%  
Nuclear: 20%  
Thermal: 19%  
Wind: 3%

1) NORDEL synchronous 50 Hz interconnected power system of Finland, Sweden, Norway and East-Denmark.

# Motivation for

## CIM:

- A common communication language
- Support for network model exchange using industry-standard for internal and external exchange
- Support of the ENTSO-E exchange for planning and operation

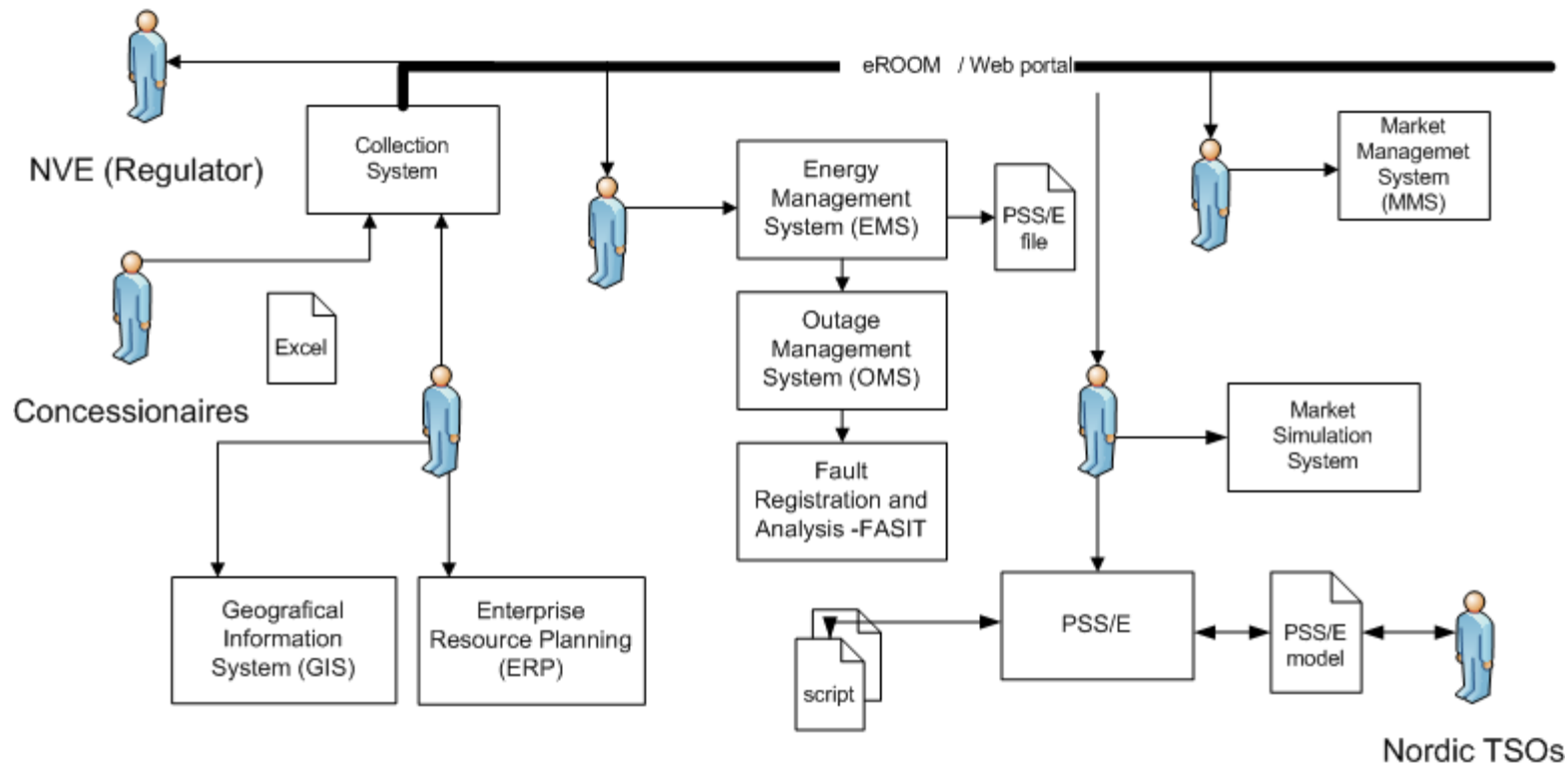
## Project:

- Implement a commercial of the shelf (COTS) that will continually be developed by the vendor
- A single common repository for grid planning, protection and operations
- Centralized maintenance network asset model system that supply other corporate application with changes
- Solution for full temporal model for modelling future network and analyzing historical network with measurement data

## Current Situation

- Collects changes in the main and regional network asset model from other grid owners (concessionaires) using an In-house bespoke solution
- Use Siemens PTI PSS®E for long term grid planning and protection
- Maintain grid planning and protection model separately from the operation model
- Maintain a common grid planning model in PSS®E file with the other Nordic TSOs
- Current EMS system is updated to support import and export of CIM – but not incremental
- Statnetts total network asset model has a distributed maintenance

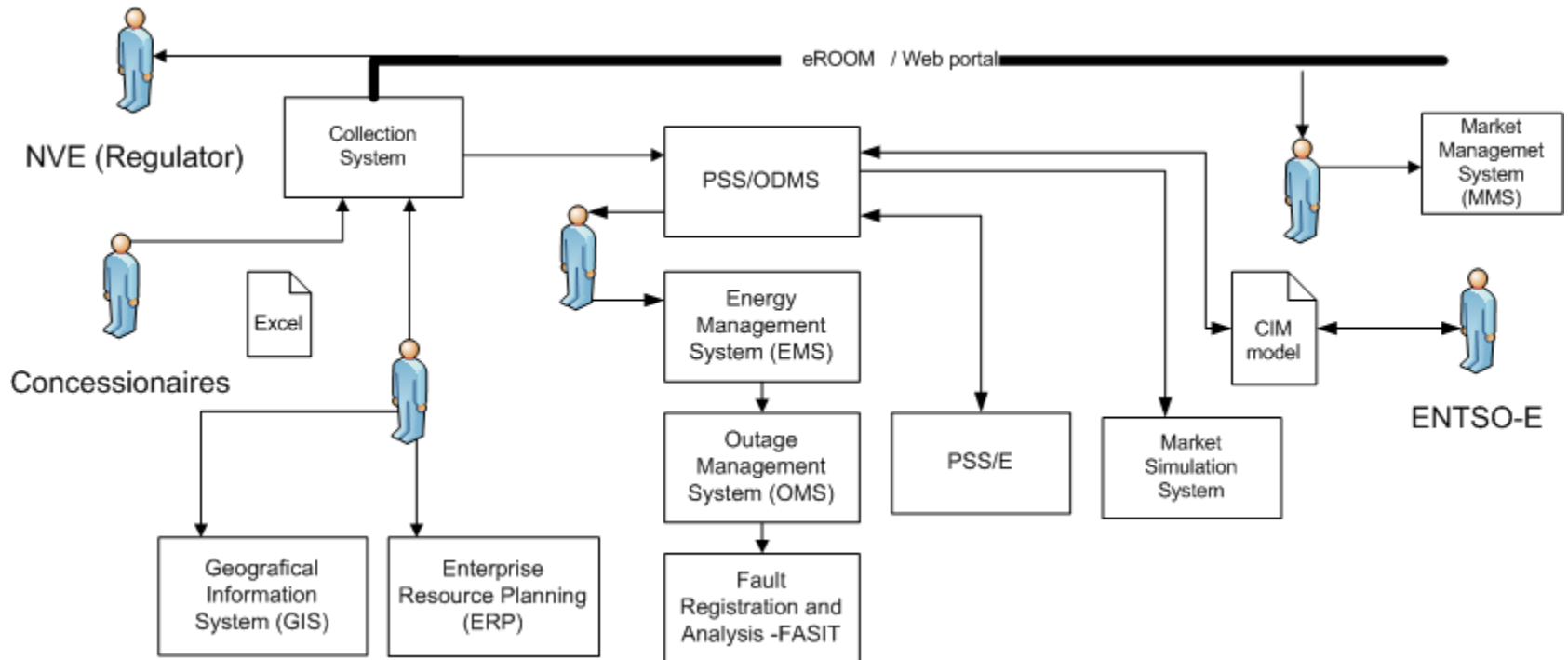
# Today's update of operation and planning data



## First steps

- Selected Siemens PTI's PSS®ODMS software after a specification and tender process
- Current version of PSS®ODMS software does not meet all the requirements
- All CIM development shall be based on the ENTSO-E profile
- PSS®ODMS is scheduled to participate in the ENTSO-E CIM IOP in July and will fully support CIM14v13 by Fall 2010.
- Initiate a pilot phase with a subset of the network model

# Phase 1 - Solution



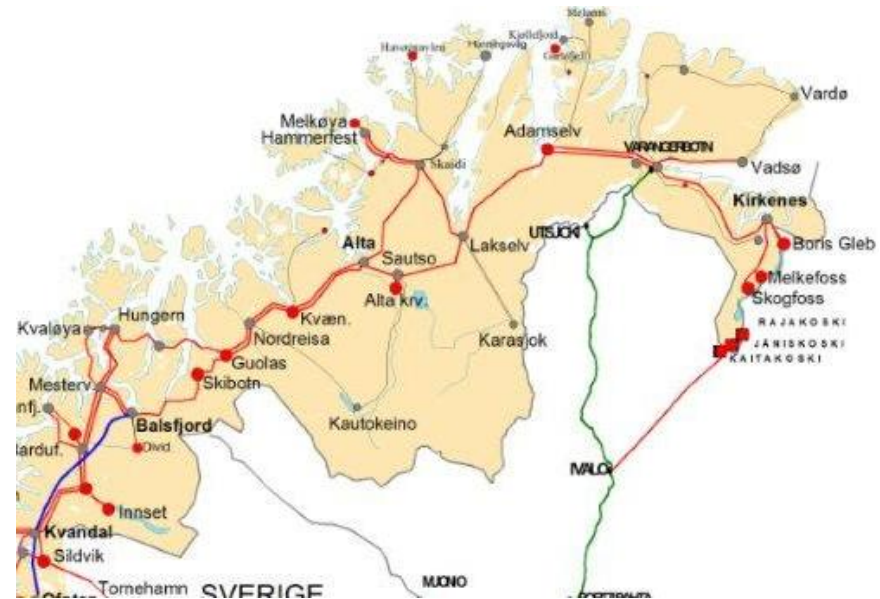
## Finnmark Pilot

The goal of the pilot:

- Find out how can we merge two grid planning models and one operation model into one common unified model
- How should PSS®ODMS support different modeling equivalents based on the unified model (collected, EMS, PSS®E, etc)
- How will PSS®ODMS support the ENTSO-E profile in regards to exchange of models; equipment, topology and state variables
- How should the collected changes to the main and regional grid be imported to PSS®ODMS
- Identify potential changes needed in PSS®ODMS to support Statnett
- Create a work process model based on the use of PSS®ODMS
- Validate the integration with PSS®E and EMS

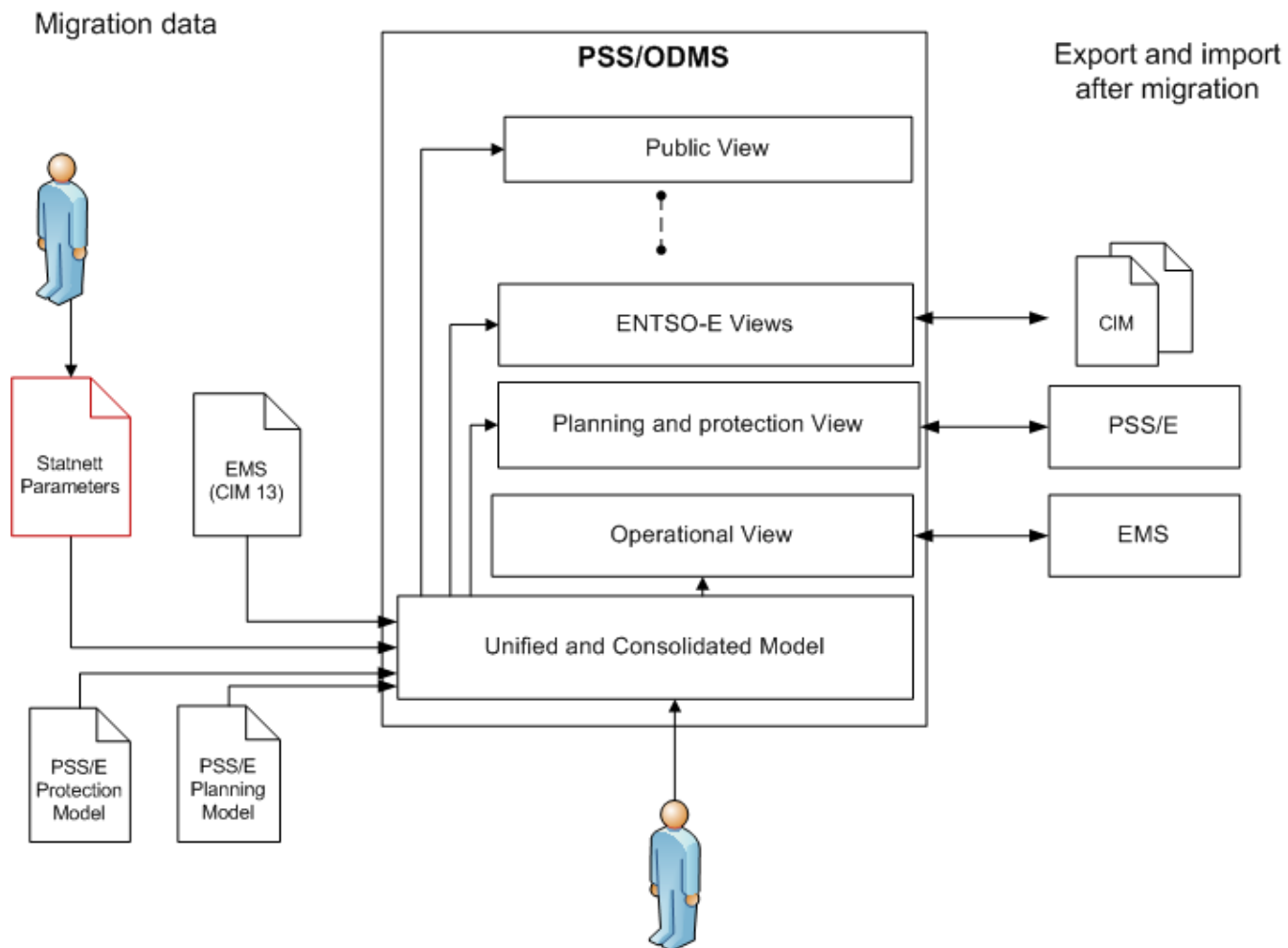
## Finmark Pilot – Operation Model size

Equipment	# Elements
ConnectivityNode	1672
ACLineSegment	128
Breaker	595
ConformLoad	103
NonConformLoad	10
HydroGeneratingUnit	51
PowerTransformer	115
Substation	91



Ca. 10 % of the total grid

# One model with equivalents



# Project - Network asset model Lifecycle

- Remove the need for script file management solution
- Create projects and phases
- Create scenarios that combines projects and phases
- Export scenarios to PSS®E for modelling
- Import asset model changes from PSS®E into PSS®ODMS
- Commit projects and phases to the base model

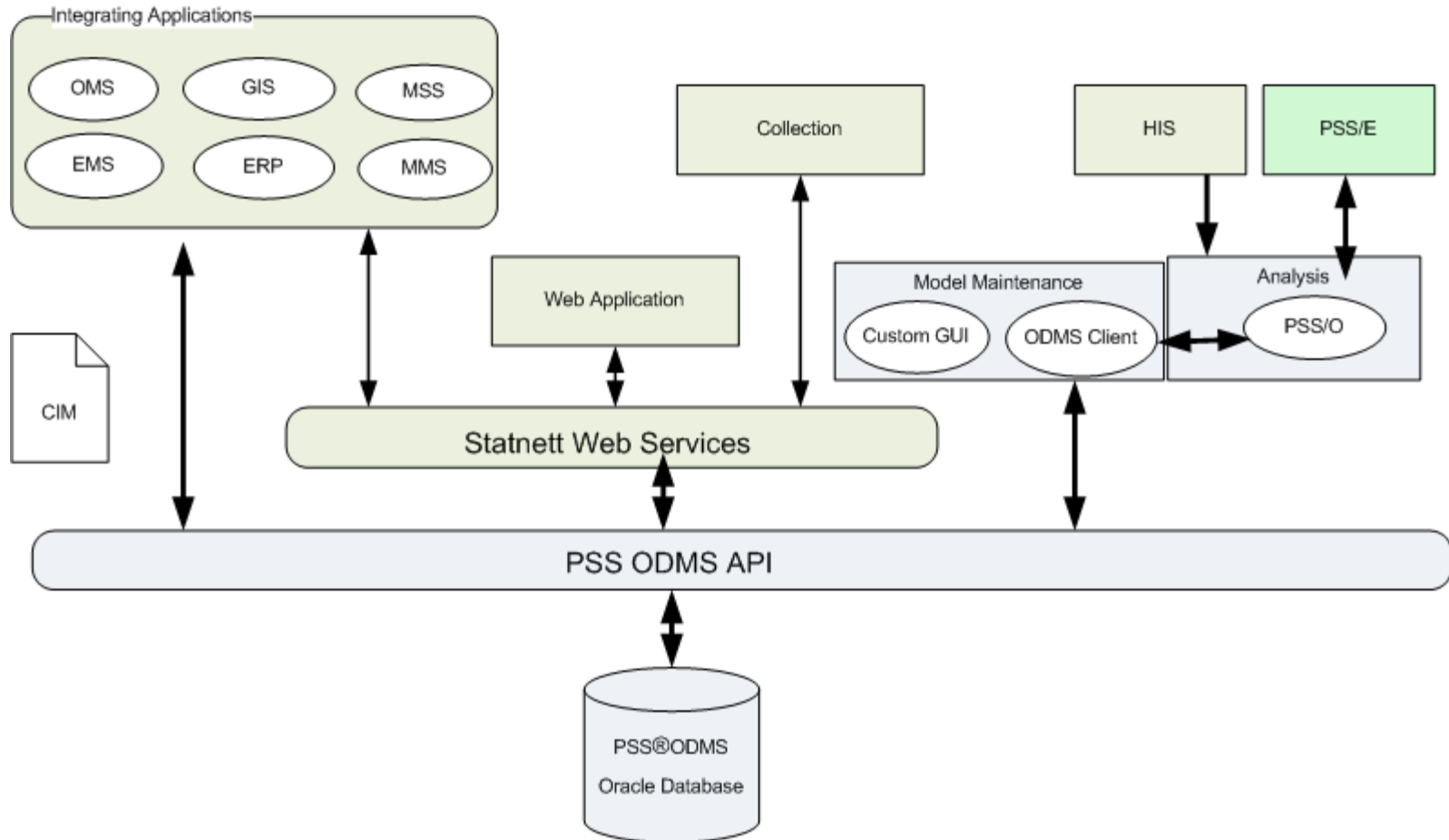
The screenshot shows the 'Manage Projects' window. On the left is a tree view with 'Projects' expanded to show 'My Project' and 'Scenarios' (with a sub-item '2010-01-01'). A context menu is open over the tree, listing options: 'Set Commission Date...', 'Import Model Changes...', 'Export Model Changes...', 'Commit to Model' (highlighted), 'Delete', and 'Refresh'. A tooltip for 'Commit to Model' reads: 'Commit model changes in the selected phase to the base model'. To the right is a table with project details:

Property	Value
Name	Phase One
ID	1
Description	Initial project phase.
Creation Date	3/21/2008 11:13 AM
Created By	WW003\STYPH5a1
Commission Date	1/1/2010 11:09 AM
Committed To Model	No

Below the table is a change log table:

Change ID	Action	Class	ODMS ID	Name
1156	Added	BusbarSection	1156	\$New\$
1156	Changed	BusbarSection	1156	\$New\$
1159	Changed	ConnectivityNode	1157	\$New\$
1159	Added	ConnectivityNode	1157	\$New\$
1156	Added	Terminal	1158	\$New\$
1156	Changed	Terminal	1158	\$New\$

# Potential Software Architecture



## What is ahead related to CIM?

- Collecting and exporting data to concessionaires in CIM/XML
- Implementing a new EMS solution that fully supports CIM
- Implementing a new Market Management System (MMS) – potential support for CIM Market Extension
- R&D project related to SmartGrid

**Thank You for Your Attention ! Questions?**

