

Standard datakommunikation med energianlæg

Præsentation af EURISCO
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Substation Automation & Protection Brugermøde 2020





EURISCO ApS

softwareudvikling for energisystemer

- ✓ Dansk virksomhed etableret i 1994
- ✓ Specialister indenfor standardiseret datakommunikation
- ✓ Læs mere om hvad vi kan tilbyde på www.eurisco.dk

Hvad er standard datakommunikation?

A standard is a **technical document designed to be used as a rule, guideline or definition**. It is a consensus-built, repeatable way of doing something.

Standards are created by bringing together all interested parties such as manufacturers, consumers and regulators of a particular material, product, process or service. All parties benefit from standardization through increased product safety and quality as well as lower transaction costs and prices.



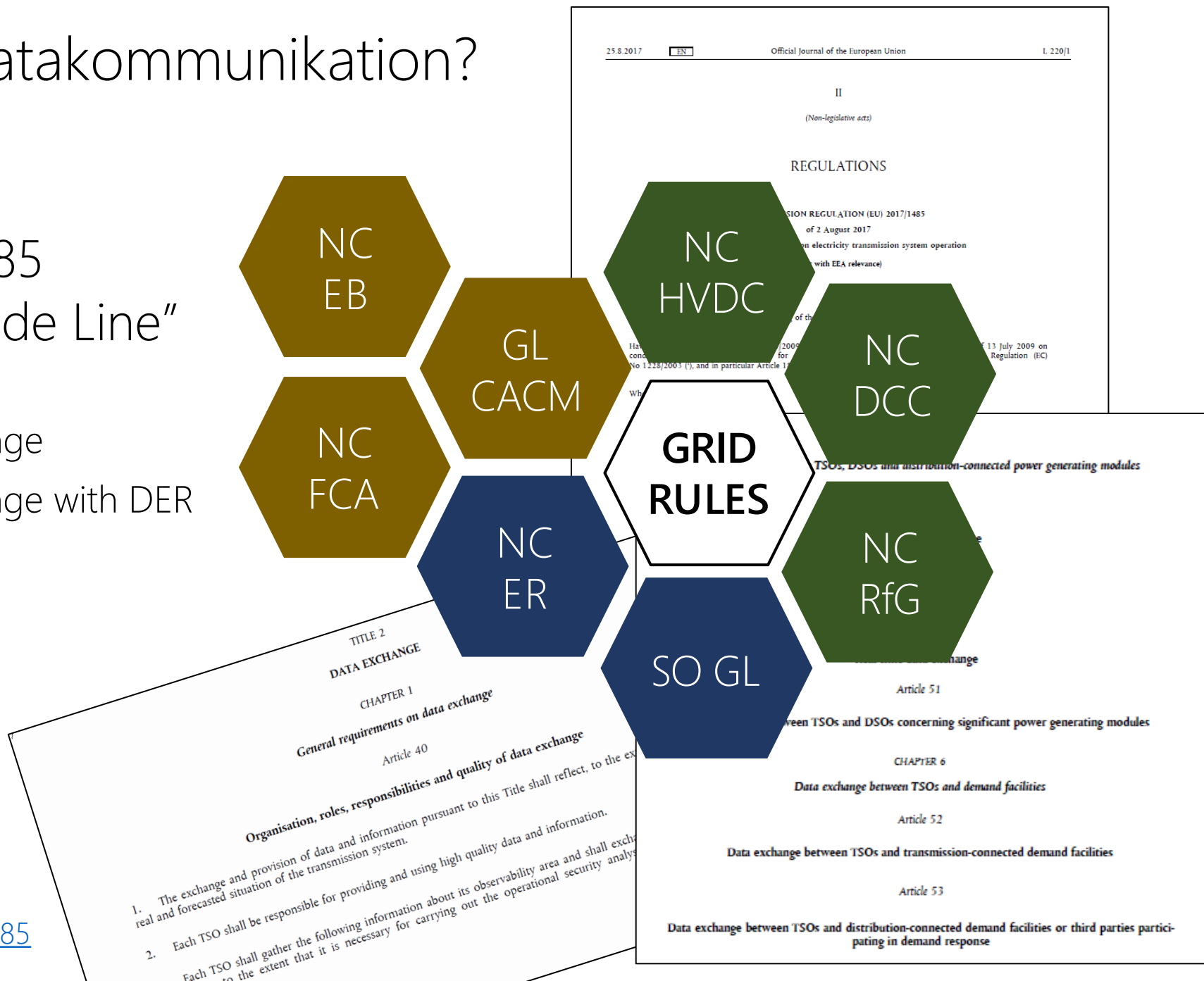
European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Hvad er standard datakommunikation?

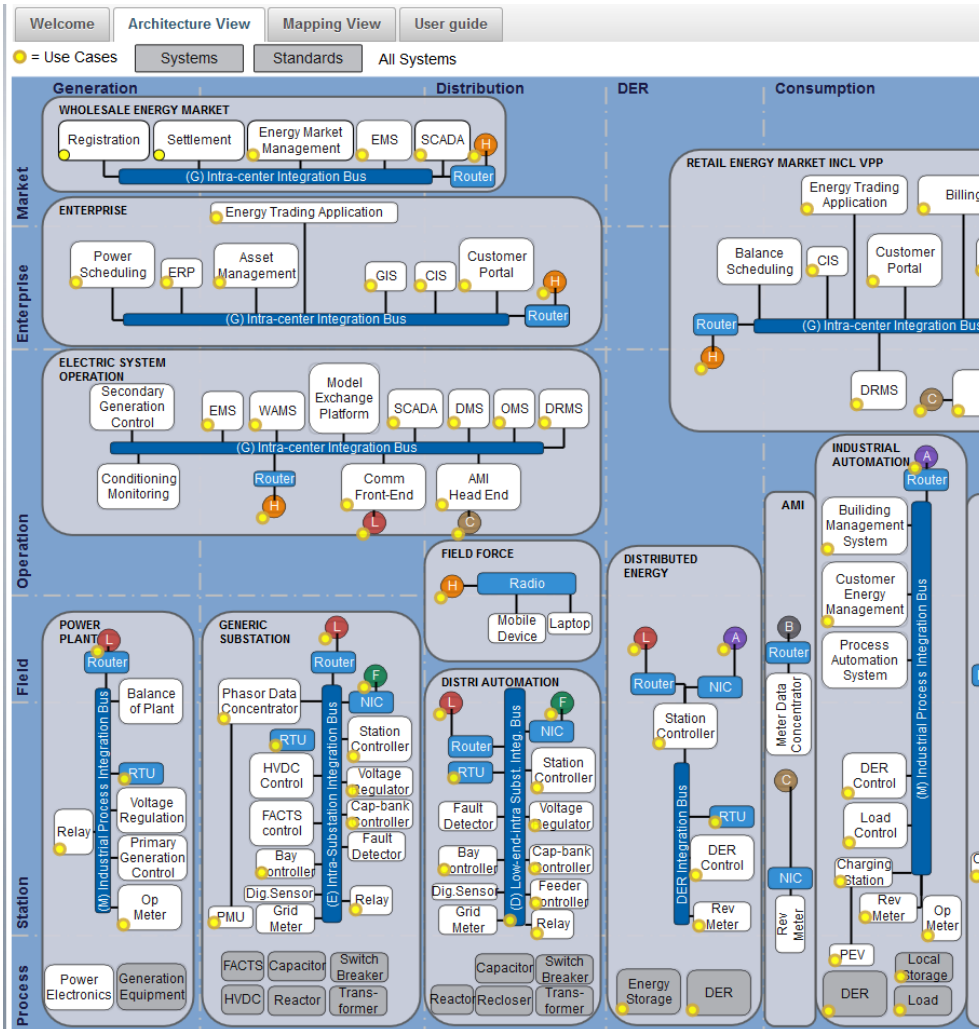
EU Regulation 2017/1485 "System Operation Guide Line"

- Article 40-53 on Data Exchange
- Article 48-53 on Data Exchange with DER
- Data Exchange includes
 - Structural data
 - Scheduled data
 - Real-time data

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R1485>



Hvad er standard datakommunikation?



IEC

SMART GRID
STANDARDS MAP
INTERNATIONAL ELECTROTECHNICAL COMMISSION

Welcome | Architecture View | Mapping View | User guide

Component

Information

Communication

Not Classified

Withdrawn

Replaced

User Name Password

Login

Selection

Components

Standards

Revenue Meter

Router

CABLE OVERHEAD LINES

Cable

GIL

High Temp Wire

COMMERCIAL HOME AUTOMATION

Subscriber Access Network

Appliances

Home & Building Integration Bus

Building Management System

Charging Station

Customer Energy Management

DER Control

Distributed Energy Resource

HAN Gateway

Load

Local Storage

Neighborhood Network

Network Interface Controller

Operation Meter

Plug-in Electric Vehicles

Router

Smart Plug

COMMUNICATION INFRASTRUCTURE

Subscriber Access Network

AMI Backhaul Network

Backbone Network

COMMERCIAL HOME AUTOMATION

DER Control

Control of a DER that allows the adjustment of its active or reactive power output according to a received setpoint

| | | |
|------|------------------|--|
| 2730 | IEC 61850-7-410 | |
| 2731 | IEC 61850-7-420 | |
| 2732 | IEC 61850-8-1 | |
| 2733 | IEC 61850-8-2 | |
| 2734 | IEC 61850-90-10 | |
| 2735 | IEC 61850-90-11 | |
| 2736 | IEC 61850-90-12 | |
| 2737 | IEC 61850-90-15 | |
| 2738 | IEC 61850-90-2 | |
| 2739 | IEC 61850-90-7 | |
| 2740 | IEC 61850-90-9 | |
| 2741 | IEC 62282 | |
| 2742 | IEC 62351 series | |

33 item(s)

Use Cases

(From external world wide web)

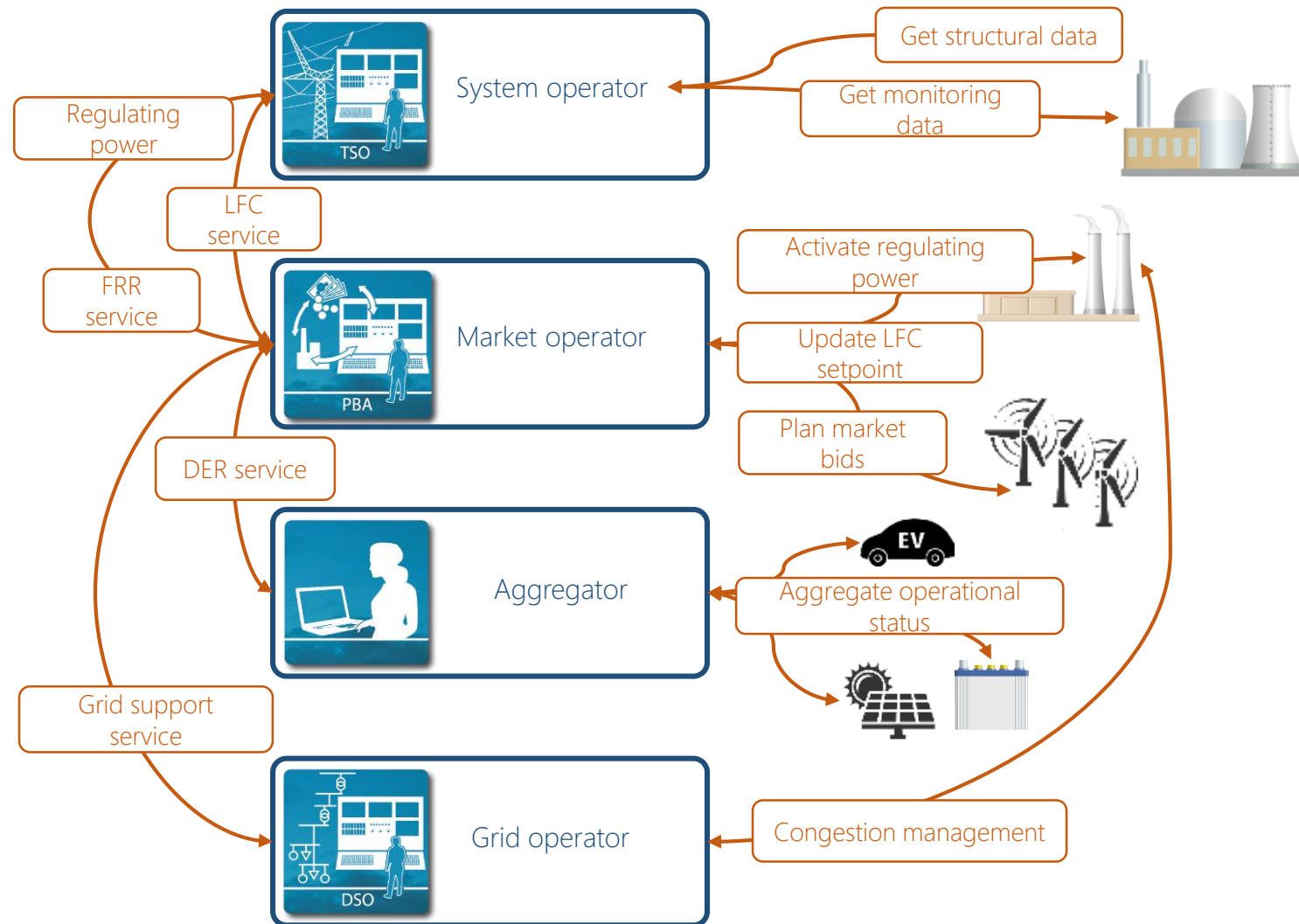
| Use Case Id | Use Cases |
|-------------|--------------------------|
| 51 | DER Management |
| 52 | DER Islanding |
| 53 | DER Equipment Interface |
| 54 | Earth Fault Localization |
| 55 | ISO/DER Interface |

IEC 61850-7-420

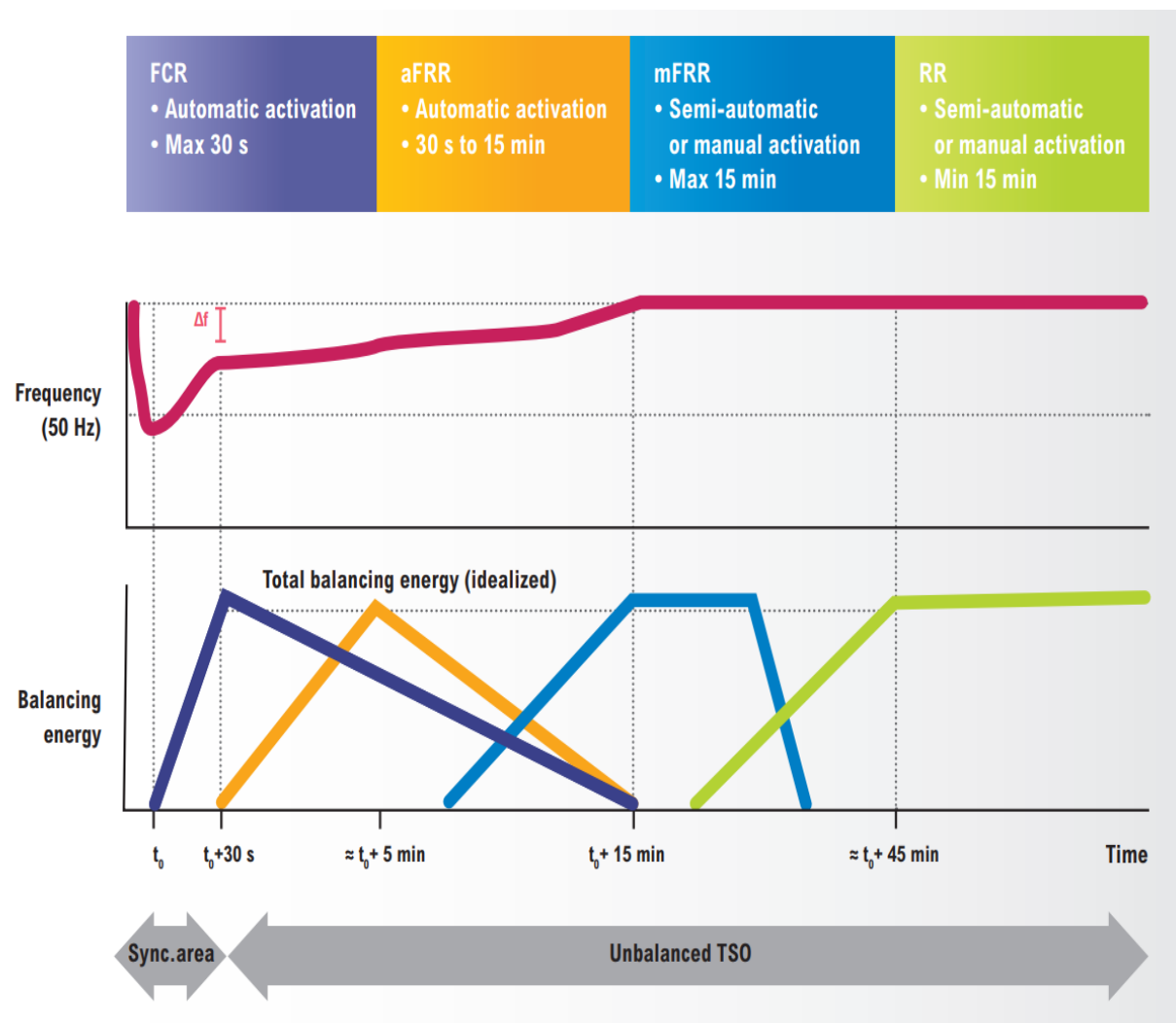
IEC 61850-7-420:2009(E) defines IEC 61850 information models to be used in the exchange of information with distributed energy resources (DER); which comprise dispersed generation devices and dispersed storage devices; including reciprocating engines; fuel cells; microturbines; photovoltaics; combined heat and power; and energy storage. Utilizes existing IEC 61850-7-4 logical nodes where possible; but also defines DER-specific logical nodes where needed.

<http://smartgridstandardsmap.com/>

Hvorfor datakommunikation med anlæg?



Hvorfor datakommunikation med anlæg?



| RESERVE POWER TYPE | DEFINITION | PURPOSE ¹ |
|---------------------|---|--|
| FCR | The active power reserves available to contain system frequency after the occurrence of an imbalance. | The frequency containment process stabilises the frequency after the disturbance at a steady-state value within the permissible maximum steady-state frequency deviation by a joint action of FCR within the whole synchronous area. |
| FRR (aFRR and mFRR) | The active power reserves available to restore system frequency to the set point value frequency and, for a synchronous area consisting of more than one load-frequency control area (LFC area), to restore power balance to the scheduled value. | The frequency restoration process controls the frequency towards its set point value by activation of FRR, and replaces the activated FCR. The frequency restoration process is triggered by the disturbed LFC area. |
| RR | The active power reserves available to restore or support the required level of FRR to be prepared for possible additional system imbalances, including generation reserves. | The reserve replacement process replaces the activated FRR and/or complements the FRR activation by activation of RR. The replacement reserve process is activated in the disturbed LFC area. |

Eksempel fra Ribe Fjernvarmeværk



Eksempel fra Ribe Fjernvarmeværk



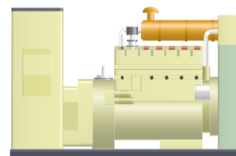
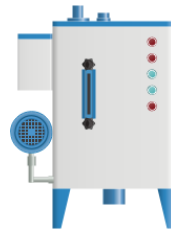
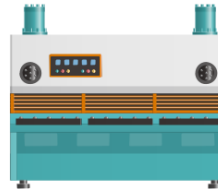
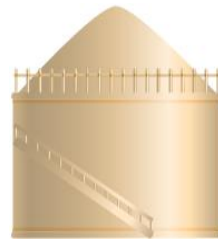
| |
|---|
| EIC45W000000000004Y_AF/MHET1.HeatOut.mag.f): |
| EIC45W000000000004Y_HD1CP1/DCTS1.ThmCapTot.mag.f): |
| EIC45W000000000004Y_HD1CP1/DCTS1.ThmIn.mag.f): |
| EIC45W000000000004Y_HD1CP1/DCTS1.ThmOut.mag.f): |
| EIC45W000000000004Y_HD2EB1/DCTS1.ThmOut.mag.f): |
| EIC45W000000000004Y_HD2EB1/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HD2EB1/DRCS1.CsmpRsvDn.mag.f): |
| EIC45W000000000004Y_HD2EB1/DRCS1.CsmpRsvUp.mag.f): |
| EIC45W000000000004Y_HD2EB1/DRCT1.MaxWLim.setMag.f): |
| EIC45W000000000004Y_HD2EB1/DRCT1.MinWLim.setMag.f): |
| EIC45W000000000004Y_HD2EB1/MMXU1.TotW.mag.f): |
| EIC45W000000000004Y_HD3EM1/DCTS1.ThmOut.mag.f): |
| EIC45W000000000004Y_HD4EM1/DCTS1.ThmOut.mag.f): |
| EIC45W000000000004Y_HG1GA1/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HG1GA1/DRCT1.MaxWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA1/DRCT1.MinWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA1GA/MMXU1.TotW.mag.f): |
| EIC45W000000000004Y_HG1GA2/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HG1GA2/DRCT1.MaxWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA2/DRCT1.MinWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA2GA/MMXU1.TotW.mag.f): |
| EIC45W000000000004Y_HG1GA3/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HG1GA3/DRCT1.MaxWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA3/DRCT1.MinWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA3GA/MMXU1.TotW.mag.f): |
| EIC45W000000000004Y_HG1GA4/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HG1GA4/DRCT1.MaxWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA4/DRCT1.MinWLim.setMag.f): |
| EIC45W000000000004Y_HG1GA4GA/MMXU1.TotW.mag.f): |
| EIC45W000000000004Y_HG1GA5/DRCC1.OutWSet.setMag.f): |
| EIC45W000000000004Y_HG1GA5/DRCT1.MaxWLim.setMag.f): |

Thermal storage

Electrical boiler

Gas boiler

Gas turbine



SCADA



Internet

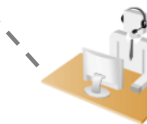
IEC61850



Transmission
System
Operator

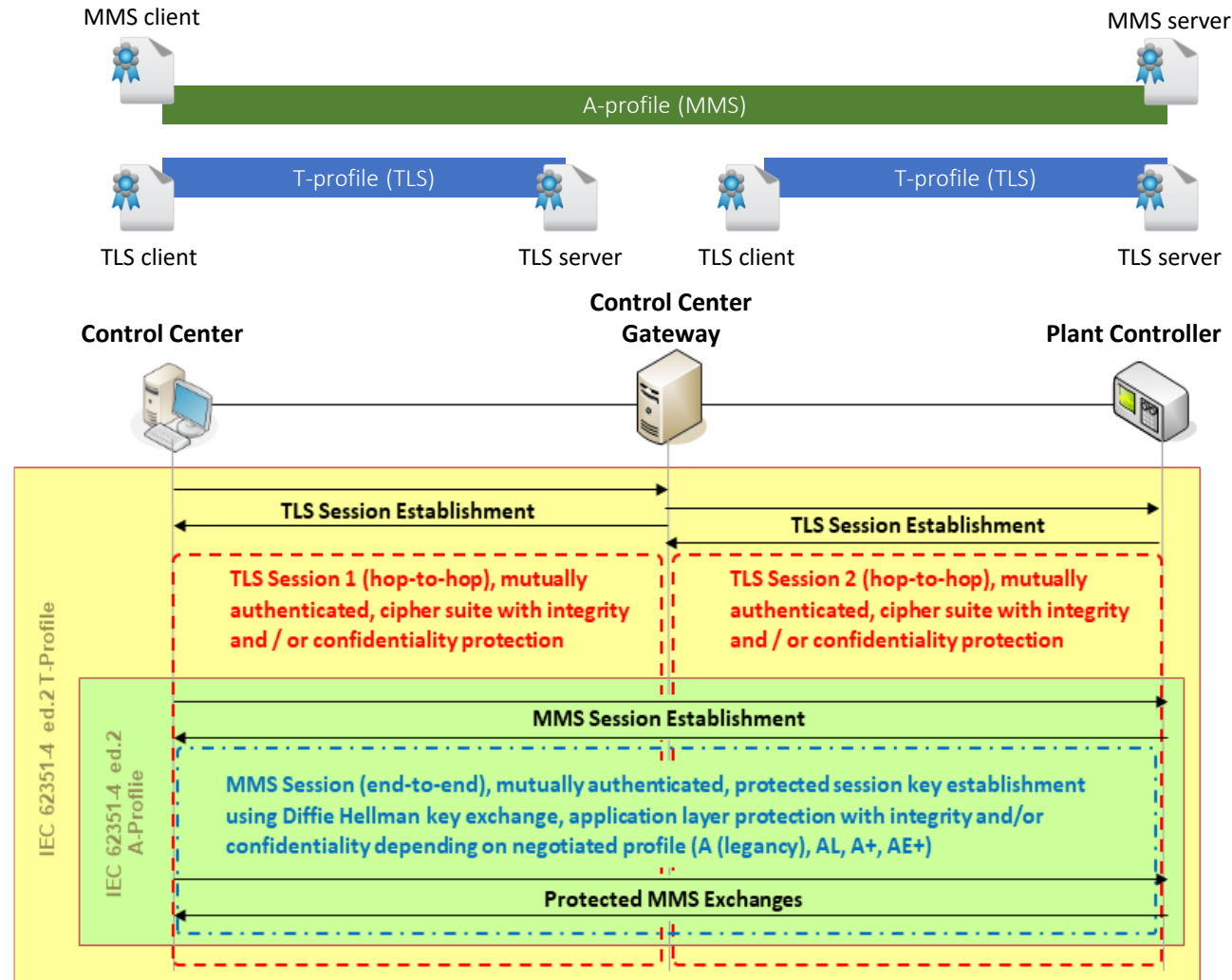


Balance
Responsible
Party

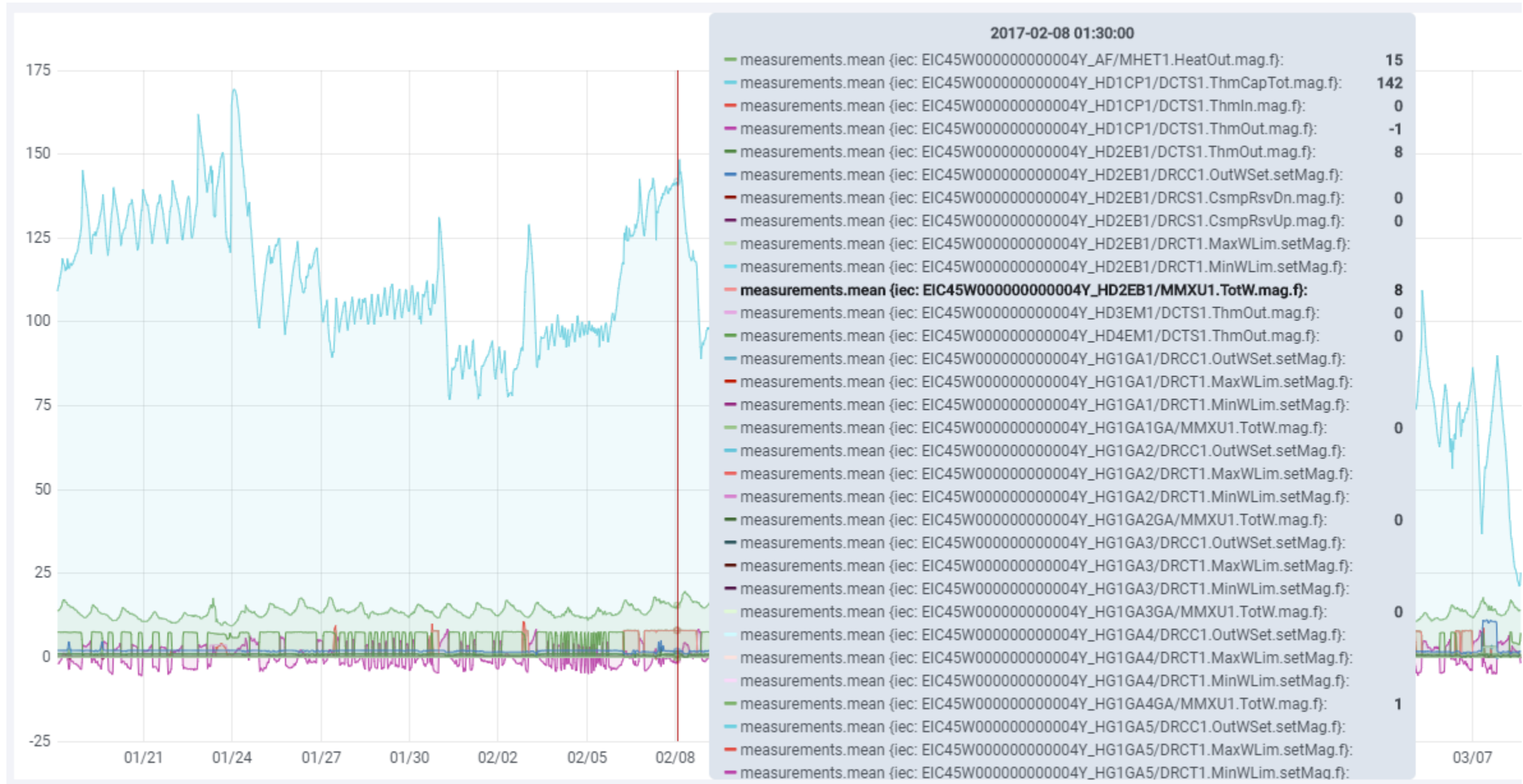


Distribution
System
Operator

Sikker datakommunikation



Data fra anlæg og enheder



IEC 61850 Signalliste for DER

- Fastlægger datapunkter der kan udveksles med et værk
 - Autogenerering af CID fil til 61850 server
 - generering af adgangskontrollister for aktører

▼ Motor-Generator anlæg (Relateret til: Kraftværksenhed) - 5 Instans(er)

+ Tilføj instans

Motor-Generator anlæg 1 (Relateret til: Kraftværksenhed 1)

Rediger instans

| Tilg. | Type | Navn | Beskrivelse | Symbol | SI enhed | M/O | 61850 tag | Interface Tag | SRO tag | Kommentar |
|-------|-------------------------------|--|---|--------|-----------------|-----|---|---------------|-----------------------|---|
| yes | Målinger/beregninger (output) | Generator start time | Det seneste starttidspunkt | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCC1.DERStr.t | | | Skal ikke mappes. Håndteres internt i 61850 server. |
| yes | Målinger/beregninger (output) | Aktiv-effekt måling | Måling af aktiv effekt på generator | | MW | M | EIC45W000000000004Y_HG1GA1GA/MMXU1.TotW.mag.f | | W_CHP_M1_P:Real | |
| yes | Status/indikator (output) | Motor-generator alarm | Sum alarm for alle motor-generatoralarmer, som resulterer i driftsbegrænsninger | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCS1.AlmSt.stVal | | W_CHP_M1_ALARM:bool | |
| yes | Status/indikator (output) | Auto/manuel kontrol | Motor-Generatorkontrol (Point of Control Feedback: Auto/Manual) | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCS1.AutoMan.stVal | | W_CHP_M1_AUTO:bool | |
| yes | Status/indikator (output) | Tændt og indkoblet | Motor-generator tændt og koblet ind | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCS1.ModOnConn.stVal | | W_CHP_M1_ON_GRID:bool | |
| yes | Status/indikator (output) | Aktiv plan | Angiver hvilken plan der er aktiv | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/FSCC1.ActSchdRef.stVal | | | Skal ikke mappes. Håndteres internt i 61850 server. |
| yes | Kommando (input) | Motor stop | | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCC1.DERStop.ctiVal | | R_CHP_M1_STOP:Bool | |
| yes | Kommando (input) | Motor start | | | (dimensionless) | M | EIC45W000000000004Y_HG1GA1/DRCC1.DERStr.ctiVal | | R_CHP_M1_START:Bool | |
| yes | Indstillinger (input) | Effektplan baseload | Effektplan for indeværende døgn samt op til 2 døgn frem (D, D+1, D+2) | | MW | O | EIC45W000000000004Y_HG1GA1/aFSCH1.ValASG[864].setMag.f | | | Skal ikke mappes. Håndteres internt i 61850 server. |
| yes | Indstillinger (input) | Effektplan reguleringsområde øvre grænse | Fastlægger den øvre grænse for reguleringsområde for indeværende døgn samt op til 2 døgn frem (D, D+1, D+2) | | MW | O | EIC45W000000000004Y_HG1GA1/aFSCH11.ValASG[864].setMag.f | | | Skal ikke mappes. Håndteres internt i 61850 server. |
| | | Effektplan | Fastlægger den nedre grænse for reguleringsområde | | | | | | | Skal ikke mappes. |

» Værker » Værk: [EIC45W000000000004Y] Ribe Fjernvarme amba » Liste: CDGs

✖ Vis tomme grupper

✖ Vis utilgængelige signaler

✖ Vis system signaler

Stamdata

Miljødata

Driftdata

» Værk - 1 Instans(er)

» Kraftværksenhed - 1 Instans(er)

» Motor-Generator anlæg (Relateret til: Kraftværksenhed) - 5 Instans(er)

» Termisk lager enhed - 1 Instans(er)

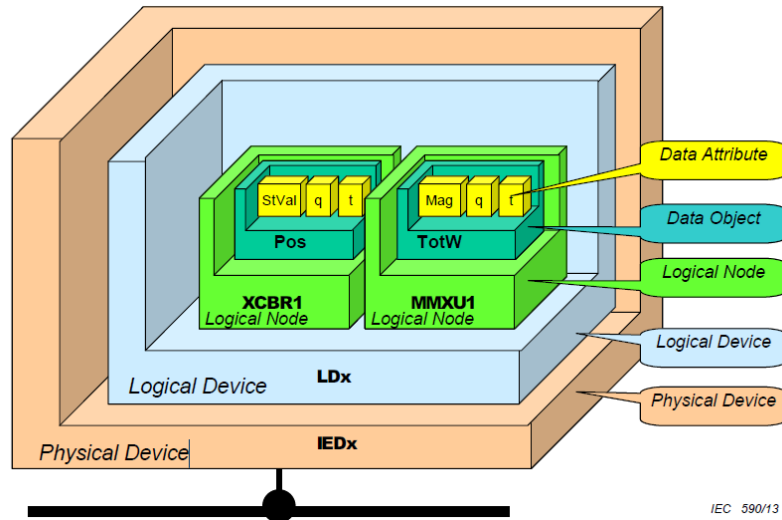
» Elkedel - 1 Instans(er)

» Kedel - 2 Instans(er)

IEC 61850 Signalliste for DER

61850 tags følger en fast struktur:

<Logical Device>/<Logical Node>.<Data Object>.<Data Attribute(s)>



IEC code: EIC45W0000000000004Y_HG1GA1/aFSCH11.ValASG[864].setMag.f

ISO/IEC 81346 struktur kode for motor-generator: aFSCH11.ValASG[864].setMag.f

logisk node for plan

data objekt array med analoge sætpunkter

data attributter for decimaltalsværdi for sætpunkt

EIC45W0000000000004Y_HG1GA1/DRCC1.DERStr.t

EIC45W0000000000004Y_HG1GA1GA/MMXU1.TotW.mag.f

EIC45W0000000000004Y_HG1GA1/DRCS1.AImSt.stVal

EIC45W0000000000004Y_HG1GA1/DRCS1.AutoMan.stVal

EIC45W0000000000004Y_HG1GA1/DRCS1.ModOnConn.stVal

EIC45W0000000000004Y_HG1GA1/FSCC1.ActSchdRef.stVal

EIC45W0000000000004Y_HG1GA1/DRCC1.DERStop.ctVal

EIC45W0000000000004Y_HG1GA1/DRCC1.DERStr.ctVal

EIC45W0000000000004Y_HG1GA1/aFSCH1.ValASG[864].setMag.f

EIC45W0000000000004Y_HG1GA1/aFSCH11.ValASG[864].setMag.f

Spørgsmål?

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