VENTYX™
AN ABB COMPANY

Smart Grids for a Sustainable Society

The next-generation control room

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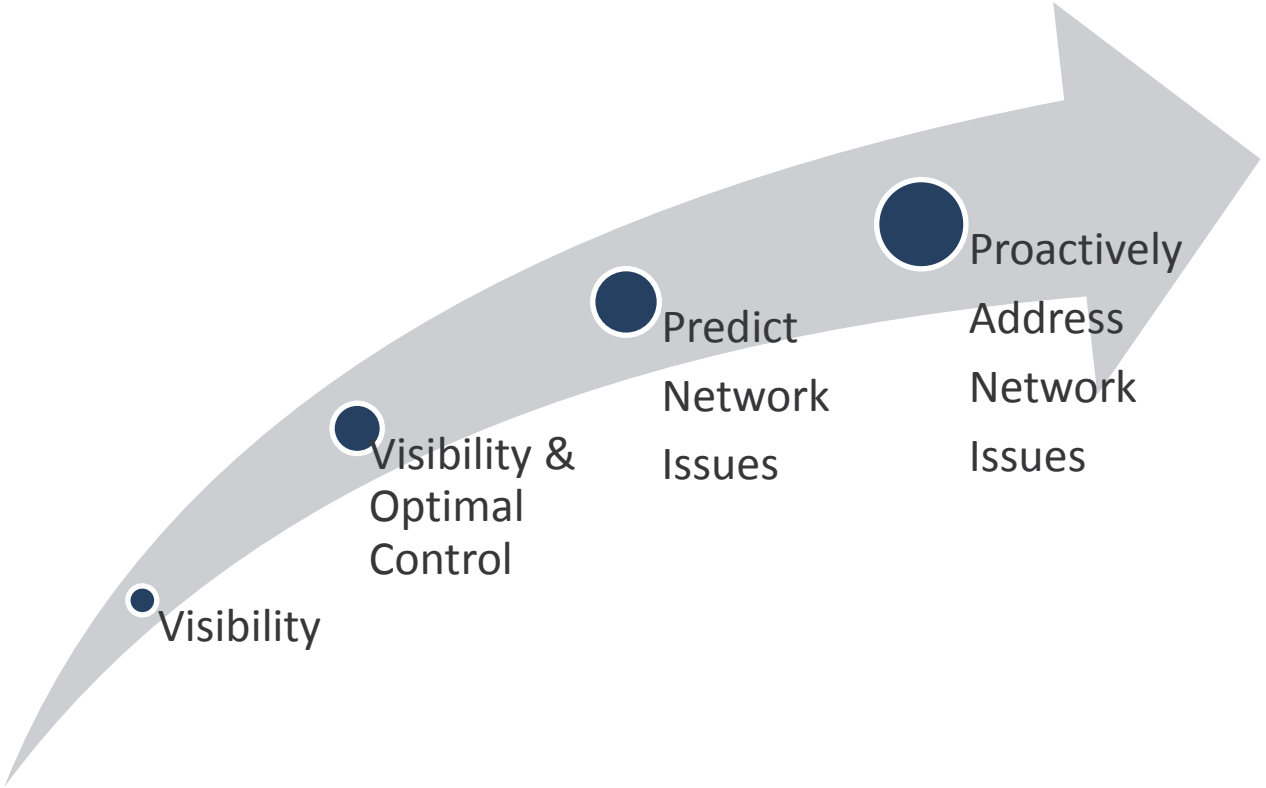
Agenda

- **Case Study for Integrating Renewable Energy**

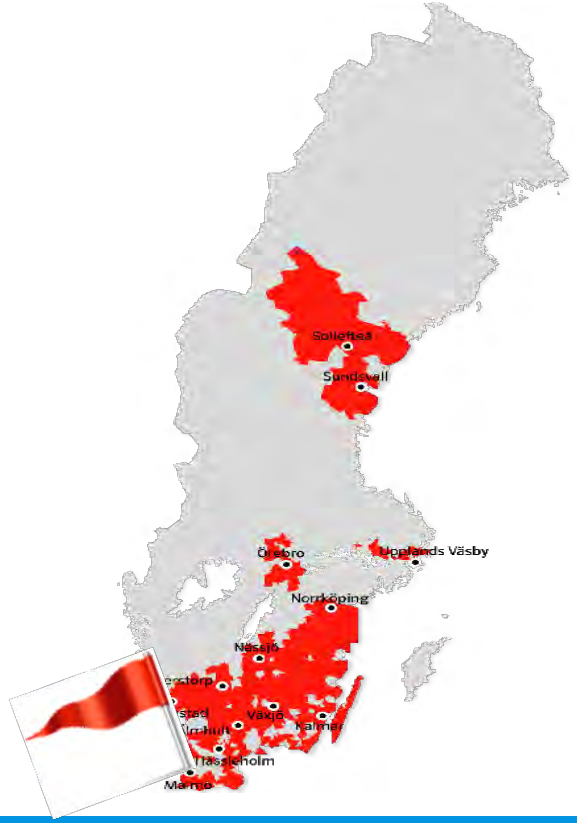
Distribution system optimization



The Customer

Customer Bio　Bio社

- EON Elnat is the E.ON distribution division in Sweden　スウェーデンの配電子会社
- They supply energy to approx. 1,000,000 customers in Sweden　百万軒
- They are the main distributor of South Sweden and are headquartered in Malmo　本社マルモ　南部の主要配電事業者
- Distribution responsibilities in Sweden include also of a portion of the HV network (400 MV)ー部の40万V級送電線を運用



Project Scope

In E.ON's own words… E.On社によると、

”…

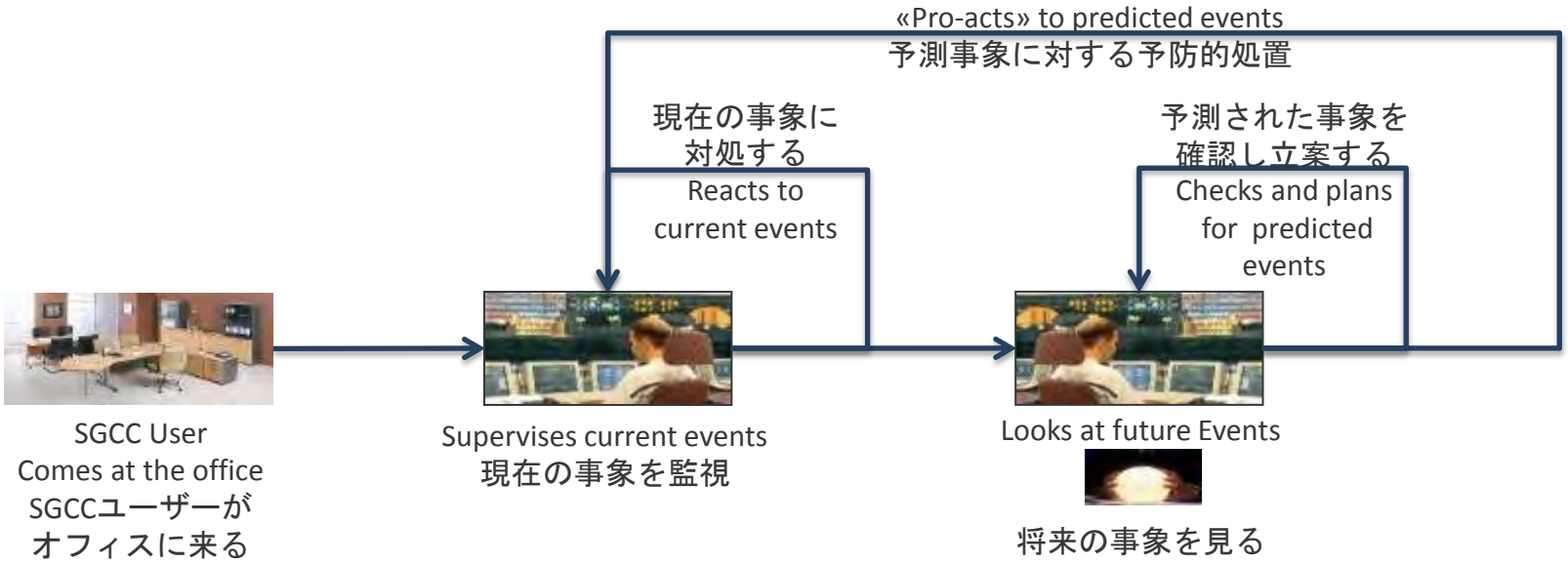
Due to a more complex power system environment with increasing generation and consumption variations, automation and control, the task of ***the future Smart Grid Control Centre (SGCC)*** *will be significantly more extended compared with today's traditional control center task.*

…” 現在の在来型のセンタ業務と比べ、発電と負荷の変動が増えつつあるより複雑化する電力系統においては、自動制御やスマートグリッドコントロールセンタ（SGCC)が重要になるだろう

Source: E.ON's SGCC Project Definition

SGCC Project Goal　SGCCプロジェクトのゴール

- Becoming proactive…　予防的に、先取りするとは



The Scenarios シナリオ

Business Scenarios　事業面のシナリオ

Goal	Name	Metrics　指標
Reduce Losses	Transformer Mode Switching Optimization 変圧器モード切替最適化	Hourly Data　毎時データ Daily Calculation　日計算
Reduce Peak Demand/Losses	Voltage-Reactive Power Optimization 電圧無効電力最適化	15 mins data　15分データ Hourly calculation毎時計算
Reduce Financial Penalties	Subscription Exceeding and Demand Response　需要超過とデマンドレスポンス	Hourly data　毎時データ Hourly calculation毎時計算
Manage Congestion	Congestions and DLR　混雑監視、動的回線レーティングDynamic Line Rating	15 mins data　15分データ Hourly calculation毎時計算

Scenario #4 – Dynamic Line Rating

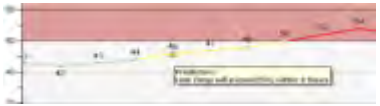
DLRとは、気温や導体温度に応じて送電線の送電可能量をダイナミックに評価するもの

Transmission line can be equipped with Dynamic Line Rating (DLR) system to **measure congestion** level and dispatch load excess. This scenario looks at alleviating the congestion in transmission lines based on forecasts. 送電線の熱的容量を推定し、送電線の混雑を軽減する

1 Input

- **connection lines** with DLR system.
- Wind farm generation forecasting
- 風力発電量の見込

2 Analysis



- Compute the line temperature in a similar way as the DLR but based on wind generation forecast.
  風力発電量も考慮してDLR計算する

3 Actions

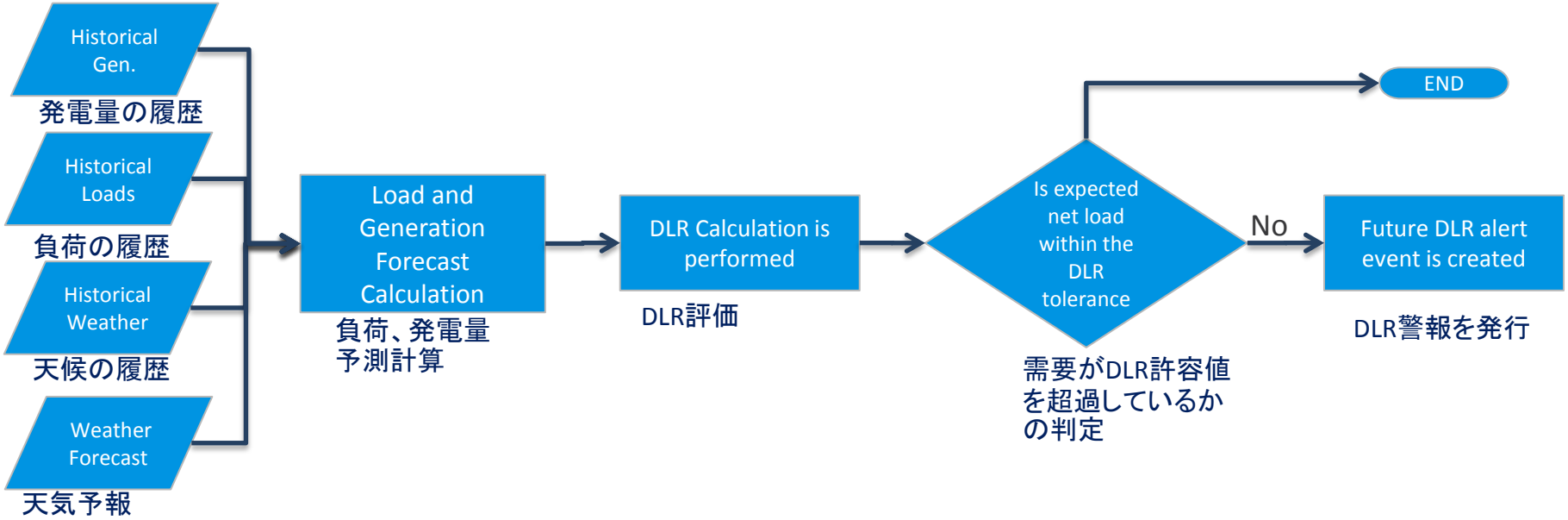
Assess forecast quality against DLR measurements **Display control recommendations** to manage the congestion at the connection line.

Achieve:

- Operational Performance
  - Experience for future projects.
  - Introduce monitoring and DLR system in a more structured way in the future based on lessons from the DLR.
    DLRの活用

Scenario #4 - Flowchart

- **The solution**
  - **The calculation is done every hour with 15 mins data**
  - **Check is performed for the identified lines**



Volt-VAr Optimization - Savings

Voltage Reduction at Capacity Peak			
Transformer Load at Capacity Peak		37	MW
Improvement to load at peak		2%	% Improvement
MW Improvement		0.74	MW
Hours at peak		100	Hours 1.1% of the year
MWH in a year		74.00	MWH
Energy Prices at Peak $/MWH (Less Ave Rate)	$	73.50	$/MWH
Annual Savings	**$**	**5,439**	
Present Value		**$41,782**	

VVO – Emission Reduction

Voltage Reduction System		
CO2 Summary		
CO2 Saved from voltage reduction (Capacity)	45	Metric Tons per year
CO2 Saved from voltage reduction (Economics)	338	Metric Tons per year
Total CO2 Saved (Tons)	**383**	Metric Tons per year
Value of CO2 Saved ($)	**$3,827**	
Present Value	**$29,402**	

Key Message

Network optimization can be used as a grid-based demand response tool to lower peak demand, reduce losses and decrease capacity costs

Distribution optimization tools enable utilities to effectively manage and integrate distributed energy resources to increase use of renewable generation, lower peak demand, and engage customers

Thank You!

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