

The CES Risk Assessment Framework for distribution companies

Climate risk assessment in
distribution companies in Denmark

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Objectives

- VTT developed risk assessment framework for hydro power generators
- Ea Energy Analyses role to adapt the framework for use by grid companies

Methodology

- Qualitative methodology
- Case studies
 - Two Danish grid companies
 - Interview with Danish Energy Association
- Multi criteria analysis
 - Well suited to initial identification of consequences of risk elements
 - Identifies most important risk elements for further analysis

Multi criteria analysis

- Based on two elements
 - i. Priority criteria for assessment
 - ii. A character scale given to each risk factors influence on the priority criteria

Priority criteria for distribution companies

Influence climate change will have on:

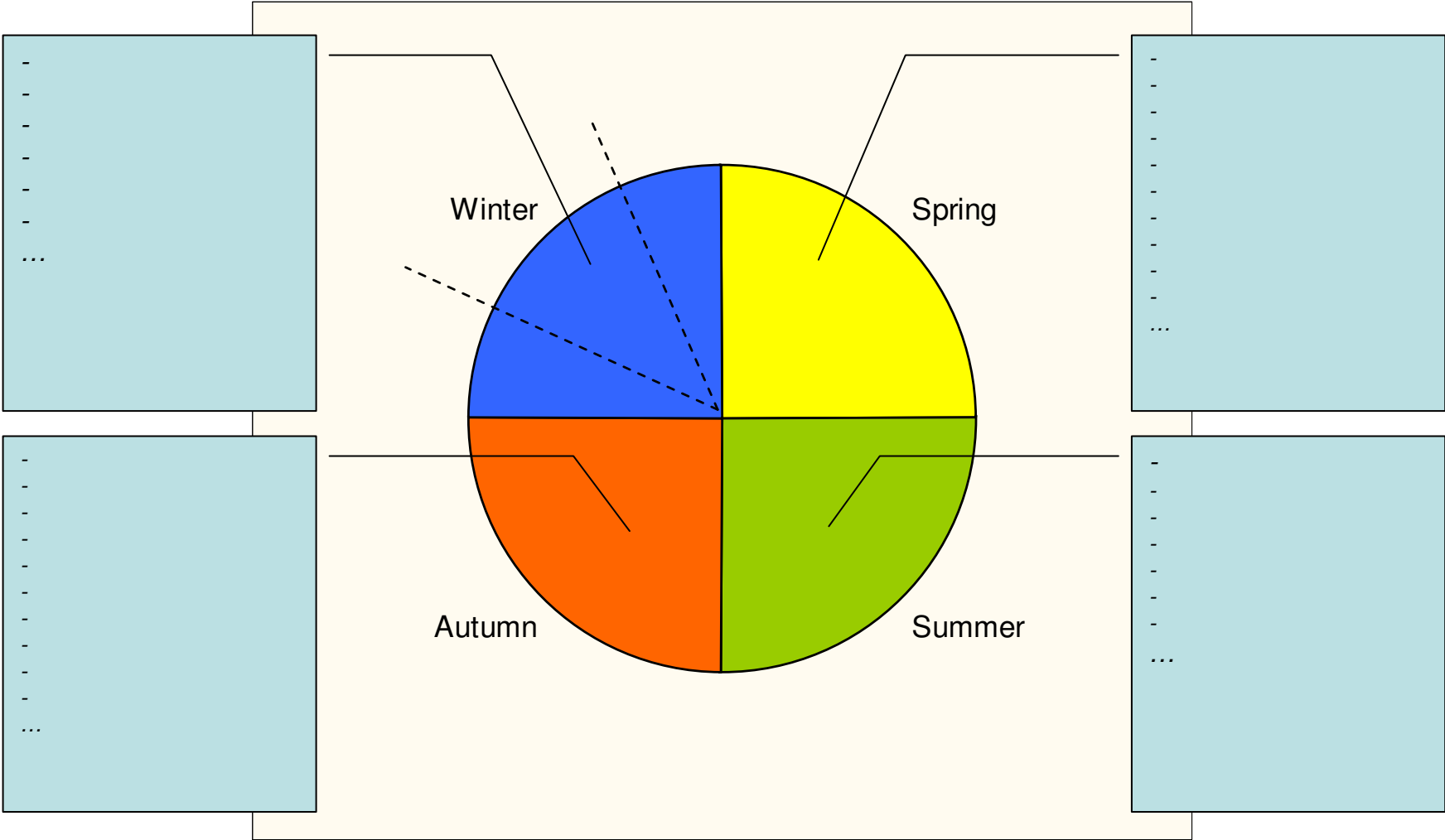
- Infrastructure/security of supply
- Distributed generation
- Demand
- Income

Character scale

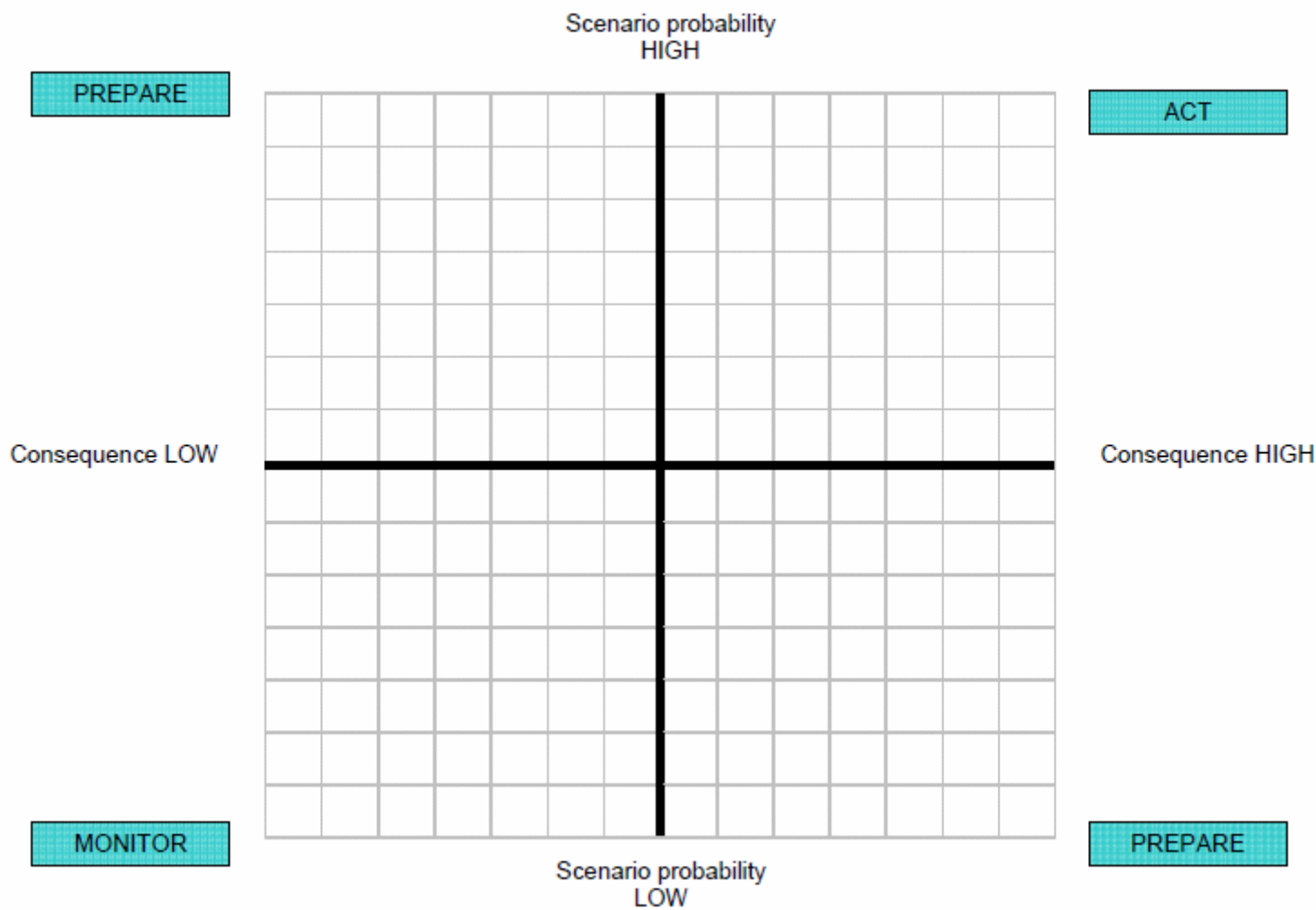
- -10 for very negative influence
- 0 for no influence
- 10 for very positive influence

	Probability	Consequences				Adaptation	Risk estimation
		Infrastructure	Security of supply	Demand	Economy		
1. Temperature							
1. Increased winter temperatures; milder, wetter winters							
1. Increased summer temperatures							

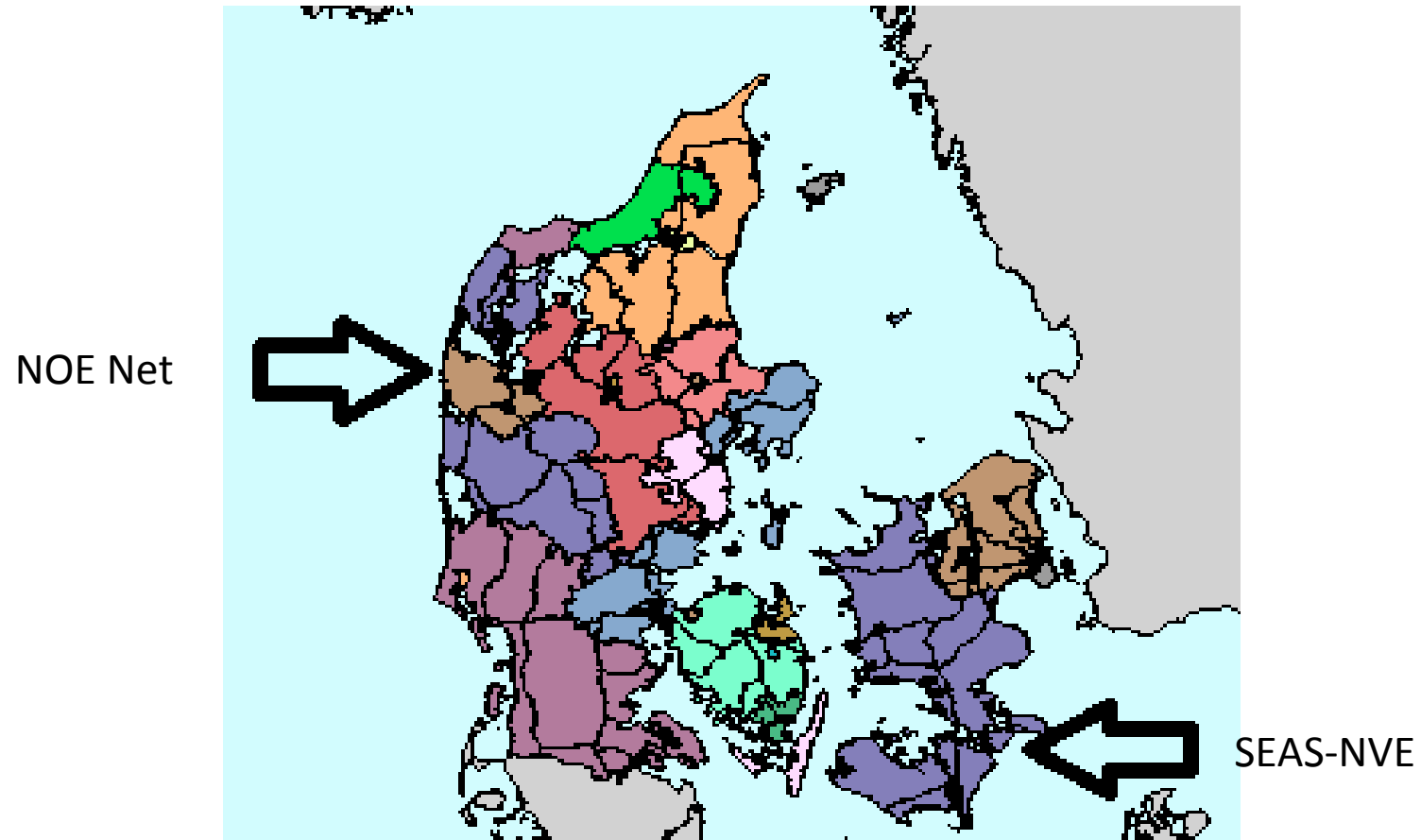
Inclusion of climate element - seasonal clock



Risk opportunity evaluation



Case studies



Findings of case studies

- Distribution companies generally well equipped for climate change
 - Cabling of all overhead lines well under way
 - Distribution boxes in areas with increased risk of flooding are elevated already
 - Salt spray further inland is becoming an increasing problem for substations and transformers

Cabling in Denmark

	Kabler i km			Luftledninger i km		
	2006	2007	2008	2006	2007	2008
400-132 kV						
Hele landet	1 022	1 035	1 042	5 267	5 263	5 238
heraf søkabler	216	213	213			
60-30 kV						
Hele landet	2 745	2 891	2 957	5 745	5 736	5 754
heraf søkabler	113	115	115			
20-6 kV						
Hele landet	53 784	55 382	57 097	8 135	6 710	5 215
heraf søkabler	168	181	185			
0,4 kV						
Hele landet	85 114	87 415	90 462	8 372	7 112	6 054
Hele landet	142 665	146 723	151 558	27 519	24 821	22 261
heraf søkabler	497	509	513			

Infrastructure

- Greatest challenge is changing political targets for addressing climate change
- Increased levels of wind power
 - Grid companies must pay connection costs
 - Grid dimensioned according to wind production, 80 % of demand in winter – increased storm strength could be a problem
 - Maintenance in Spring and Autumn – sensitive to increased wind and fluctuations in demand

Demand

- Demand
 - Increased efficiency - fewer kWh to distribute costs between
 - Increased temperatures – lower demand
 - Danish system not dimensioned for electric heating – increasing use of heat pumps could put pressure on 0.4 kV
 - Political goals for electric cars will put great pressure on 0.4 kV grid in some areas
 - Increased summer demand – better income

CES Risk Framework

- Distribution companies are not climate aware as hydro companies are – do not have own climate scenarios
- They are load aware – climate changes must be included in framework
- Conservative organisations – only the large distribution companies develop “strategies” – small ones implement practical necessities – keep it as simple as possible
- Everyone loves the seasonal clock!

Seasonal clock – SEAS-NVE

