



Reliability Studies in Powerfactory V14.1

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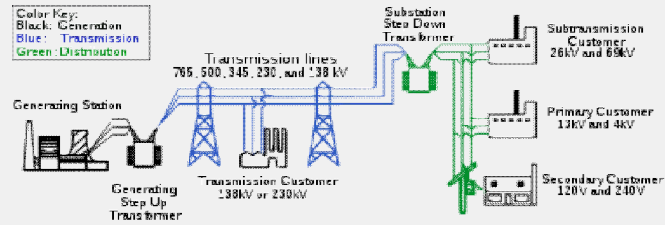


What is a Reliability Assessment?

- Reliability assessment involves determining, generally using statistical methods, the total electric interruptions for loads within a power system. The interruptions are described by several indices that consider aspects such as:
- the number of customers;
- the connected load;
- the duration of the interruptions;
- the amount of power interrupted; and
- the frequency of interruptions.



Raw Data Collection



Transformer Failures

Number of Transformers in Network = 350

	Number of Failures	Duration (hours)	
Year 1	5	32.5	
Year 2	12	60	
Year 3	7	56	
Year 4	15	67.5	
Year 5	21	63	
Total	5	60	279

$$\lambda = 60 / (5 * 350) \text{ 1/a}$$

$$= 0.034 \text{ 1/a}$$

$$TTF = 1/\lambda = 29.41 \text{ a}$$

$$TTR = 279/60 \text{ h}$$

$$= 4.65 \text{ h} = 0.00053 \text{ a}$$

$$\mu = 1/TTR = 1/a = 1887 \text{ 1/a}$$

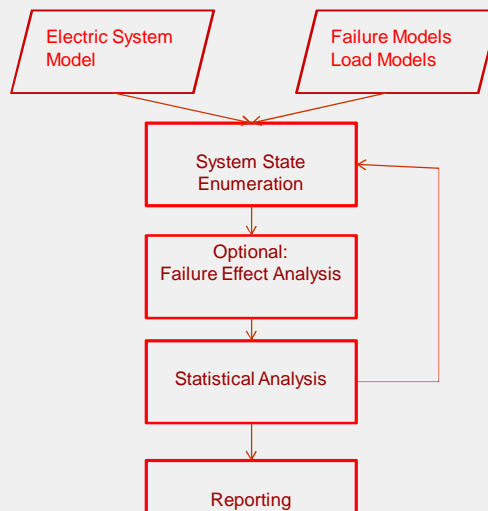
$$P = TTF / (TTF + TTR) = 0.999982$$

$$Q = 1 - P = 0.000018$$

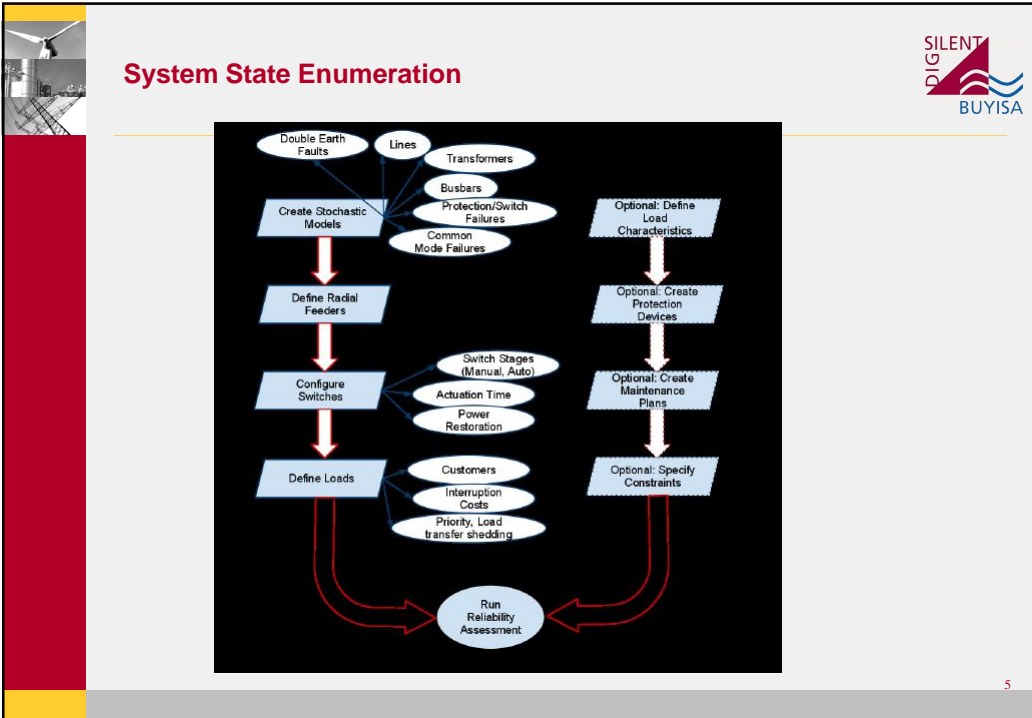
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Reliability Assessment Process



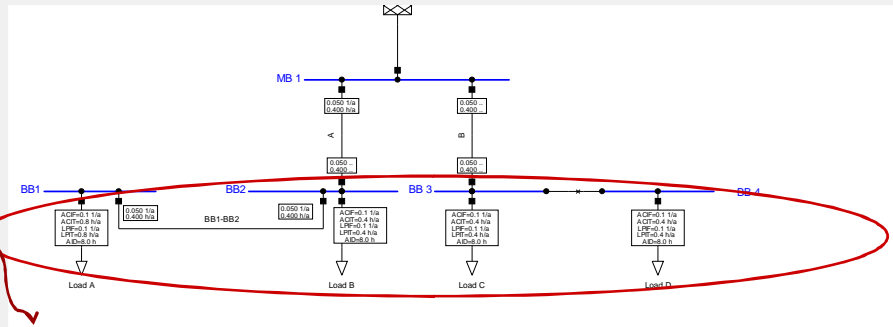
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- ## Failure Effect Analysis in Reliability Assessment
- Fault Clearance
 - Fault Isolation
 - Power Restoration
 - Overload Alleviation
 - Voltage Constraint Alleviation
 - Load Transfer
 - Load Shedding
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Load Point Frequency and Expectancy Indices

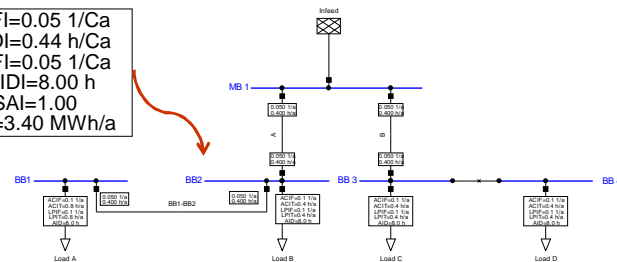


ACIF: Average Customer Interruption Frequency
 ACIT: Average Customer Interruption Time
 LPIF: Load Point Interruption Frequency
 LPIT: Load Point Interruption Time
 AID: Average Interruption Duration




System Indices

SAIFI=0.05 1/Ca
 SAIDI=0.44 h/Ca
 CAIFI=0.05 1/Ca
 CAIDI=8.00 h
 ASAI=1.00
 ENS=3.40 MWh/a



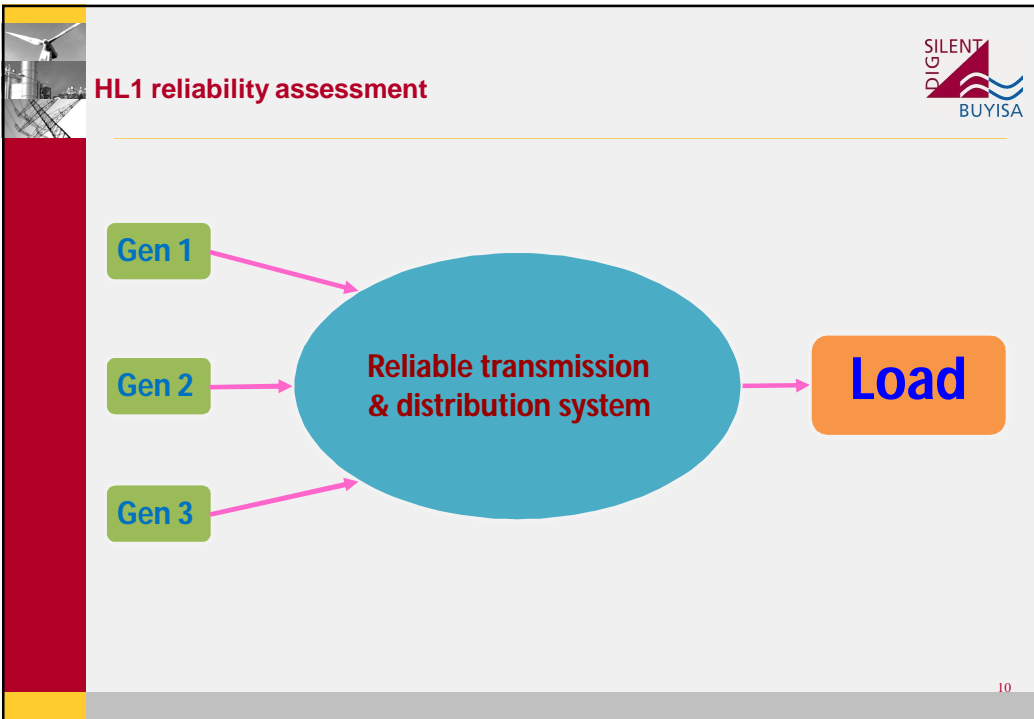
SAIFI: System Average Interruption Frequency Index
 SAIDI: System Average Interruption Duration Index
 CAIFI: Customer Average Interruption Frequency Index
 ASIFI: Average System Interruption Frequency Index

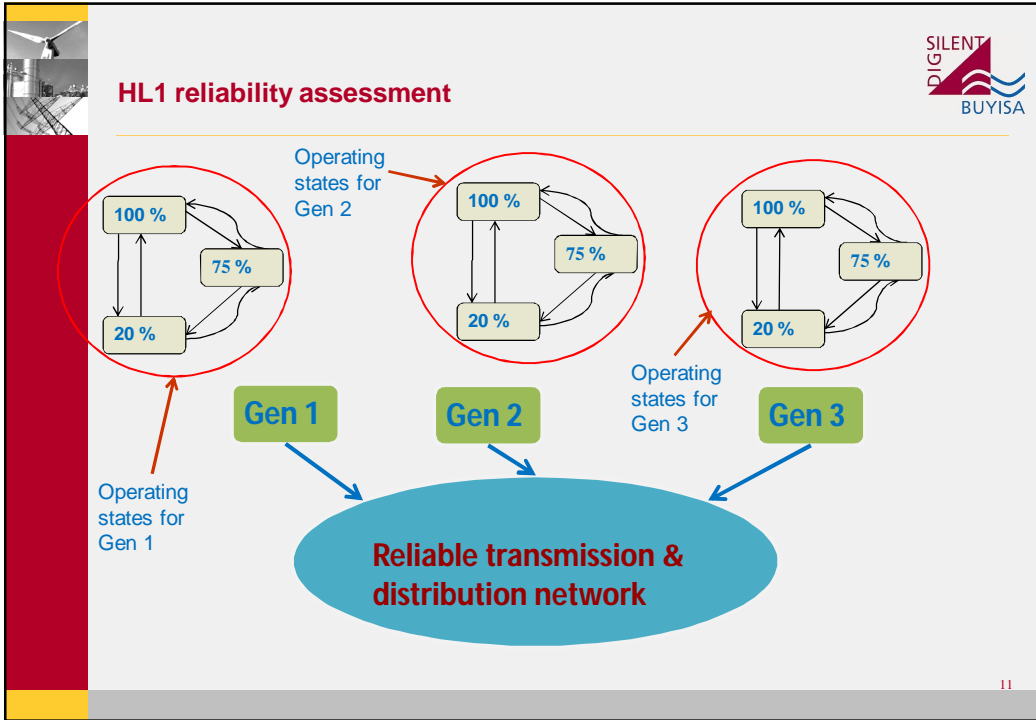


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