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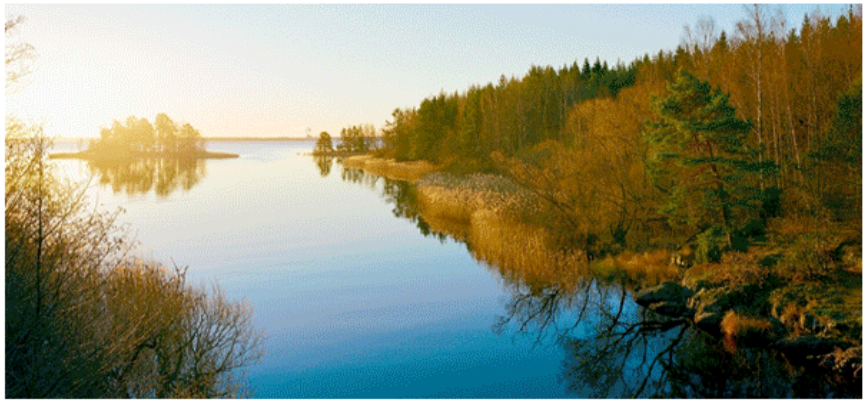
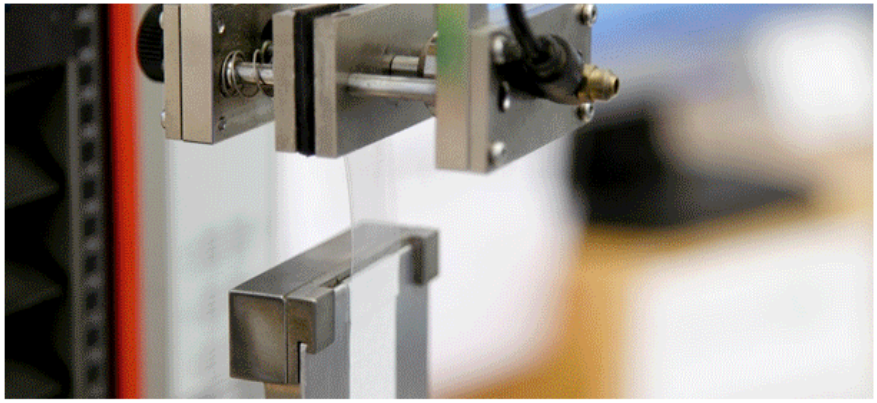

POWER QUALITY IMPACT ON PRODUCTION

2016-06-14 | Bengt-Arne Walldén

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PULP AND PAPER INDUSTRY

- **45 mills in Sweden**
- **Consuming about 18 Twh**
- **Self-sufficiency level various between the mills from 0 to 100 %**
- **A branch with a very exciting future**
  - **Intelligent paper**
  - **New areas**

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PULP AND PAPER INDUSTRY

- **Can be divided in 3 areas:**
  - **Pulp production**
  - **Newsprint and magazine paper**
  - **Board and packaging paper**

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PULP AND PAPER IS A PROCESS INDUSTRY

- **Running 24/7**
- **Through continuous optimization and production increases, equipment's are heavy loaded**
- **Start up time for a mill is 1-3 days**
- **If a critical section/equipment in the production line stops, the total downtime will be at least start up time**

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ELECTRICITY QUALITY PARAMETERS

- Interruptions
- Harmonic distortion
- Flicker
- Voltage variations
- Voltage transients
- Electric and magnetic fields
- Nonlinear loads
- Frequency variations
- Voltage dips

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SENSITIVITY FOR DISTURBANCE FROM POWER NETWORK

- **Voltage dips is the parameter that gives us high costs**
- **Is their any technical possible solutions to get rid of the problems?**
  - **Yes, both inside and outside the mills**
- **Is it cost efficient to get rid of the disturbances?**
  - **Yes, but the investments have to be done in the right places**

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WHERE IS THE PROBLEM IN THE MILL?

- **Control/computer-systems**
  - **Solved by UPS systems**
- **Frequence converters**
  - **Settings for undervoltage protection.**
  - **Ageing electrolyte capacitors in DC-link**

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IMMUNITY CURVE

- **Our mills can operate down to 65% of nominal voltage without any problem**
- **150 ms is the time that our process can run at 65 % of nominal voltage**

- **This gives an immunity curve:**
  - **All dips down to 65 % in less than 150 ms can be handled by the mill, which in practise is the main part of all dips**

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ECONOMICAL RESULTS

- **To be able to follow the immunity curve, a maintenance program has to be set up:**
  - **UPS-system for all critical control/computer systems**
  - **Program for changing all electrolyte capacitors in frequency converters, according to life cycle dimensioning from manufacture (Normal lifetime 100.000 hours)**
  - **After each disturbance, follow up and see what happened**

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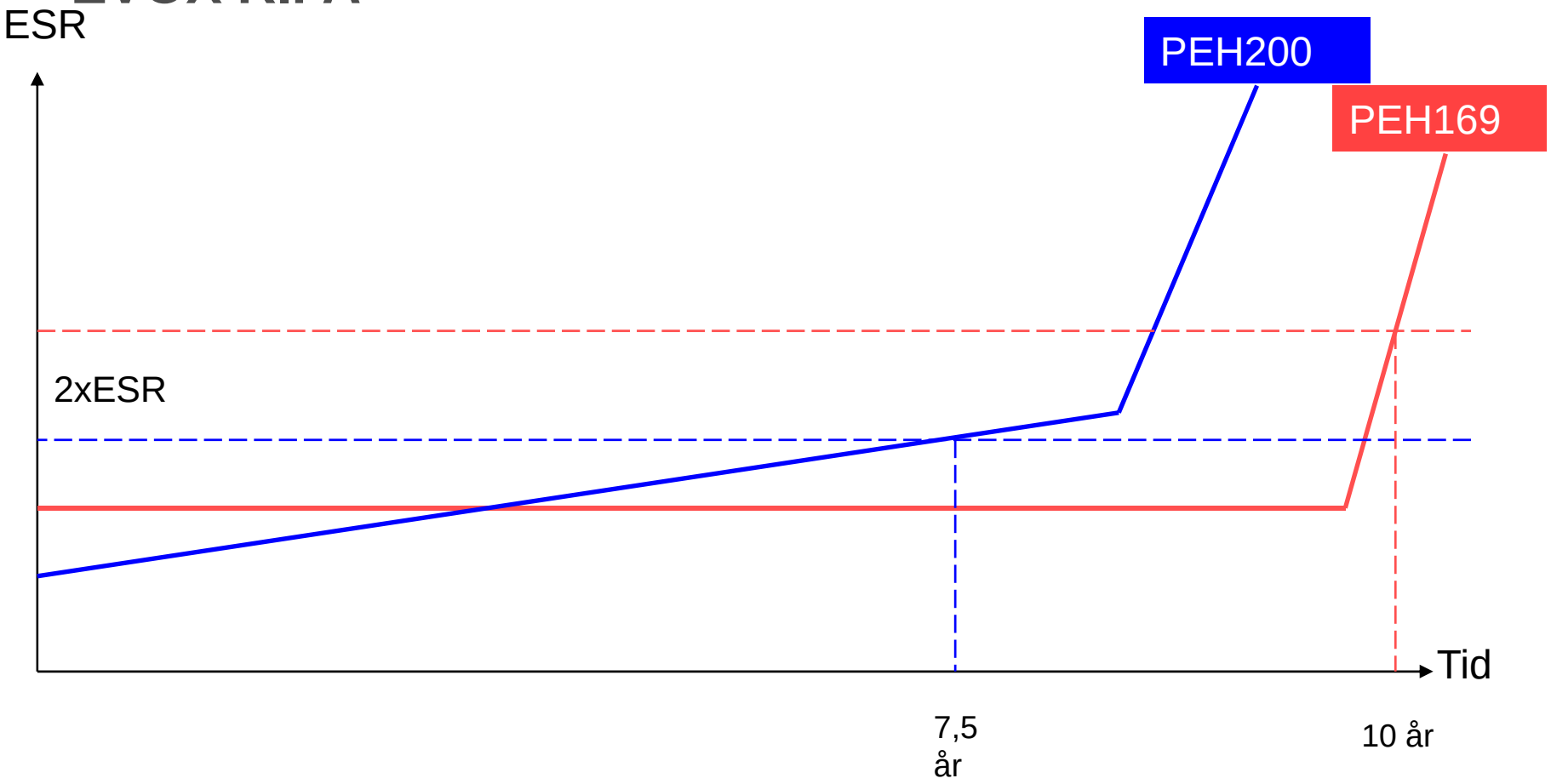
EVOX RIFA



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ECONOMICAL RESULTS

- **Experiences in pulp and paper industry shows that these two actions has decreased production losses according to voltage dips with 75 %**

- **Depending on type of mill, and where it is located, the amount of saving various from 0,1 up to 2,5 MEURO per year**

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ECONOMICAL CONSEQUENCES

- **Production losses:**
  - **About 30 MEURO a year for Swedish Pulp and Paper industry**
- **Indirect cost by broken equipment and bad good will and similar are not included**

- **Before action where taken 2005-2010, production losses about 50 MEURO**

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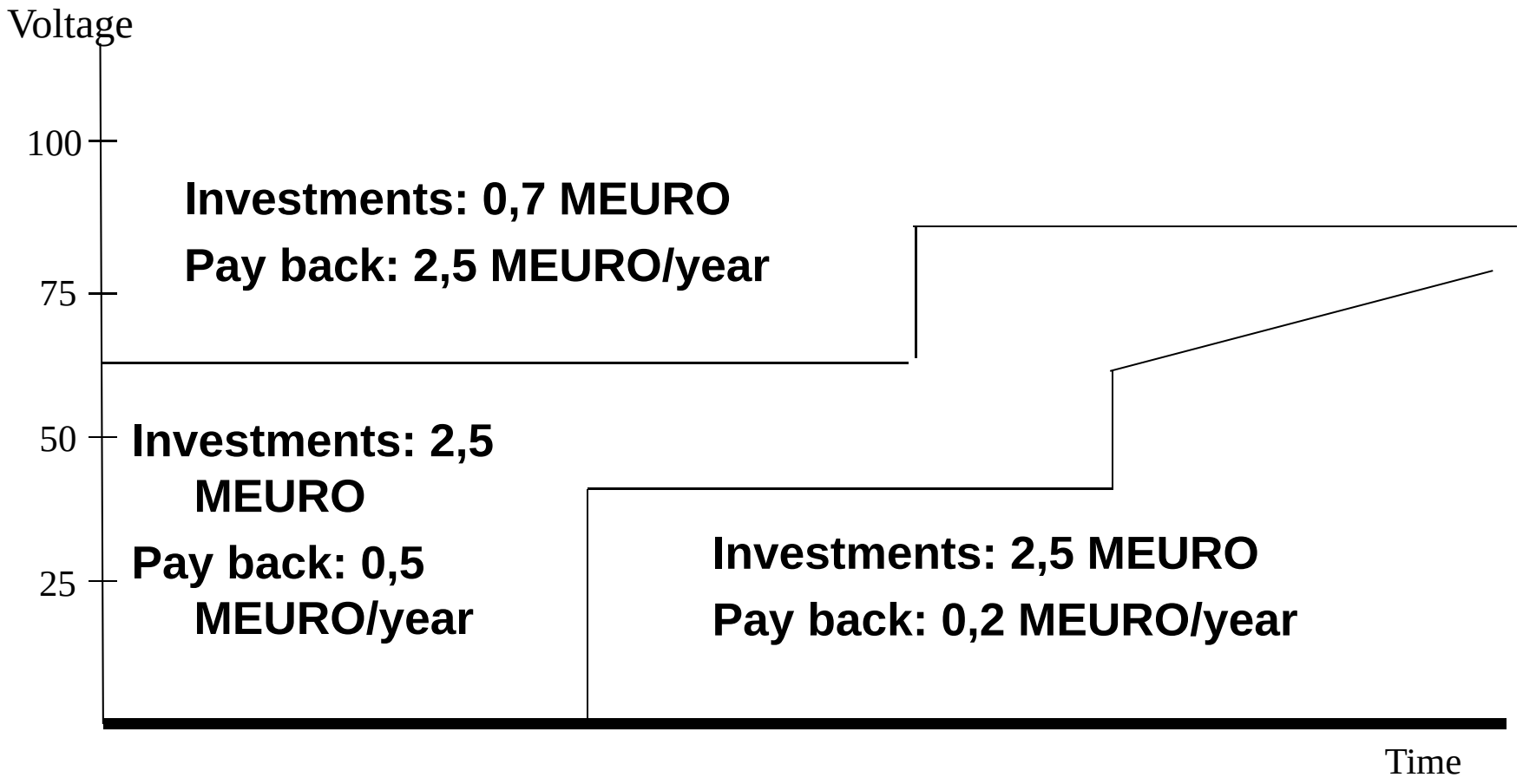
COSTS AND PAY-OFF FOR INVESTMENTS AT END-CUSTOMER

EXAMPLE FROM TWO MILLS



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RESEARCH ON A SUBTRANSMISSION NETWORK

- A region with combination of heavy and light industry was chosen for a complete study
- Involved in the study were Fortum, (network operator), STRI AB and a number of pulp and paper industries
- Link to report

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SUMMARY

- A responsibility sharing curve is needed
- EI:s Författningssamling EIFS 2011:2 gives the possibility for this
- ..\..\Energimarknadsinspektionen\EIFS_2011_2.pdf

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