AFRY Steam Balance™

AFRY Steam Balance™ EPC PACKAGE
TURN-KEY STEAM ACCUMULATOR INSTALLATION

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AFRY
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AFRY Steam Balance™ – a new approach to steam accumulator utilisation

STEAM ACCUMULATOR USAGE

Although there are steam accumulators in use today, the full potential of the technology remains largely unrealised

Traditionally, steam accumulators are employed as

- a steam reservoir: steam is discharged only during periods of extreme demand or severe boiler upsets
- a reducing station

AFRY employs accumulators as an active steam buffer

- accumulator stabilises steam headers as well as turbine and boiler loads
- accumulator reduces unnecessary steam venting and condensing
- in many cases, an installation will reduce annual costs by more than EUR 2 million

STEAM ACCUMULATOR

SCENARIO 1: PULP/PAPER MILL

Utilising steam accumulator to balance the gap between steam demand and supply differences typically results in substantial annual savings

TYPICAL CHALLENGES IN PULP/PAPER MILL

Paper machines and batch digester operations create disturbances in the steam system: steam consumption shifts continually, causing header fluctuations

Operating Profile:

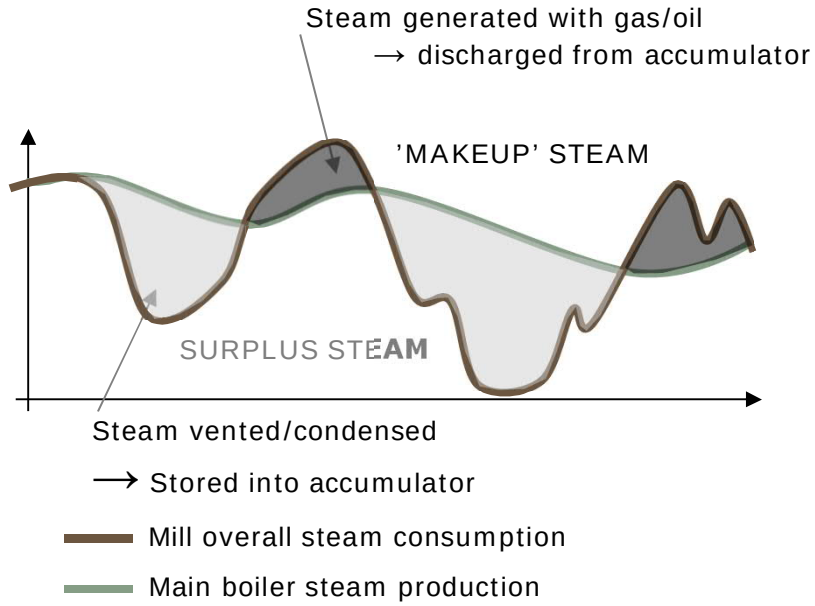
- Gas is used extensively to stabilise the headers and secure the steam supply (many times an auxiliary boiler is kept running for 'throttle', even though the Primary Boiler has the raw capacity to meet demand)
- Excess steam is vented/condensed during process disturbances

Typical annual savings of a AFRY Accumulator System Installation conforming to the profile outline above

(*Local economic 'idiosyncrasies' can influence results)

1. Reduction in gas/oil usage (fuel, CO2): EUR 0.5 million – EUR 2.0 million
2. Reduced steam venting/condensing: EUR 0.1million – EUR 0.3 million
3. Improved boiler efficiency: EUR 0.1 million
4. Increased back-pressure production: EUR 0.15 million

STEAM DEMAND CHANGES FASTER THAN STEAM SUPPLY



SCENARIO 2: BREWERY

Active use of steam accumulator decreases costs in both the surplus and the ‘makeup’ steam scenarios, resulting in substantial annual savings

Processes typically generate effluent gases, which are fired to produce a constant flow of inexpensive steam

At the same time, batch processes cause overall steam demand to fluctuate:

– There are long periods, during which the excess steam is vented

– During consumption peaks the shortfall is generated with expensive alternatives, such as gas and/or oil

Solution:

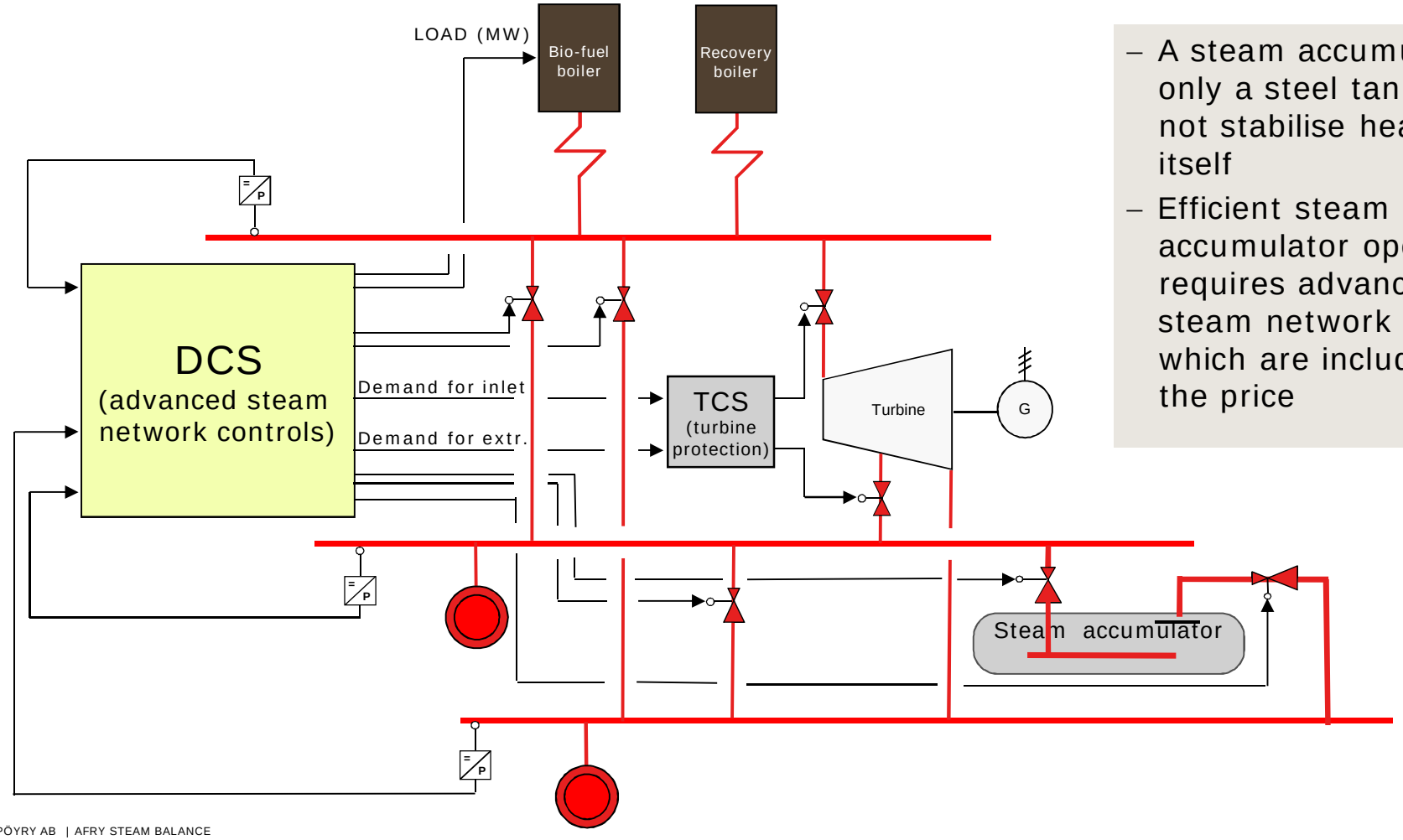
– Collect the excess steam into the accumulator

– Discharge the accumulator during the peaks instead of producing steam with purchased gas or oil

Estimation of annual savings potential of AFRY’s accumulator installation (*Local economic ‘idiosyncrasies’ can influence results)

1. Reduction in gas/oil usage (fuel, CO2) EUR 0.2 million – EUR 1.0 million
2. Reduced steam venting/condensing: EUR 0.1 million – EUR 0.2 million
3. Improved boiler efficiency: EUR 0.05 million

AFRY Steam Balance™ EPC package includes a steam accumulator together with advanced controls

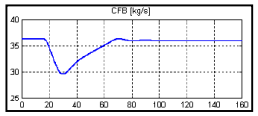


- A steam accumulator is only a steel tank; it does not stabilise headers by itself
- Efficient steam accumulator operation requires advanced steam network controls, which are included in the price

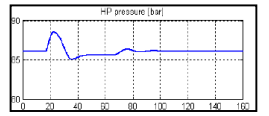
AFRY Steam Balance™ accumulator installation improves industrial power-plant operation in multiple ways

Boiler
- More stable boiler load → better **η**
- Lower usage of marginal fuels → Less CO_2 production

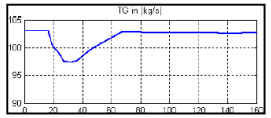
CFB

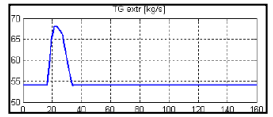


HP header
- Less pressure variation → less stress to HP header and thick-walled boiler components



HP



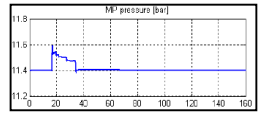


TG

G

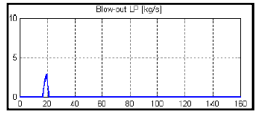
Turbine
- Slower turbine controls → more stable load → more power
- Lowered back-pressure → more power

MP header
- Stability goal ± 0.3 bar



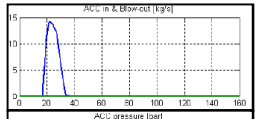
MP

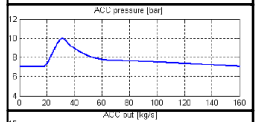
Blow-out and condenser
- Reduced usage → improved **η**

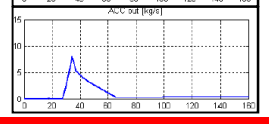


Accumulator
- Active balancing of steam net
- During PM web break, excess steam is stored in the accumulator
- During PM restart, accumulator is discharged
- Accumulator also improves the overall stability

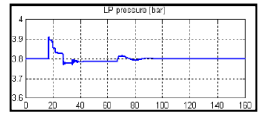
ACC





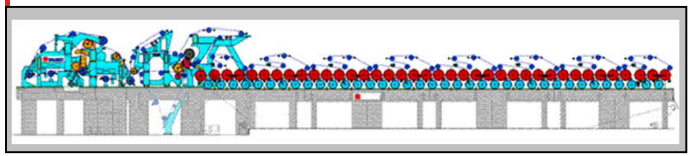


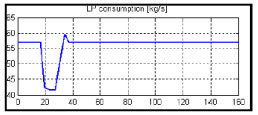
LP header
- Stability goal ± 0.05 bar during normal operation, ± 0.1 bar during a PM break



LP

Paper machine
- Stable steam input → better paper quality





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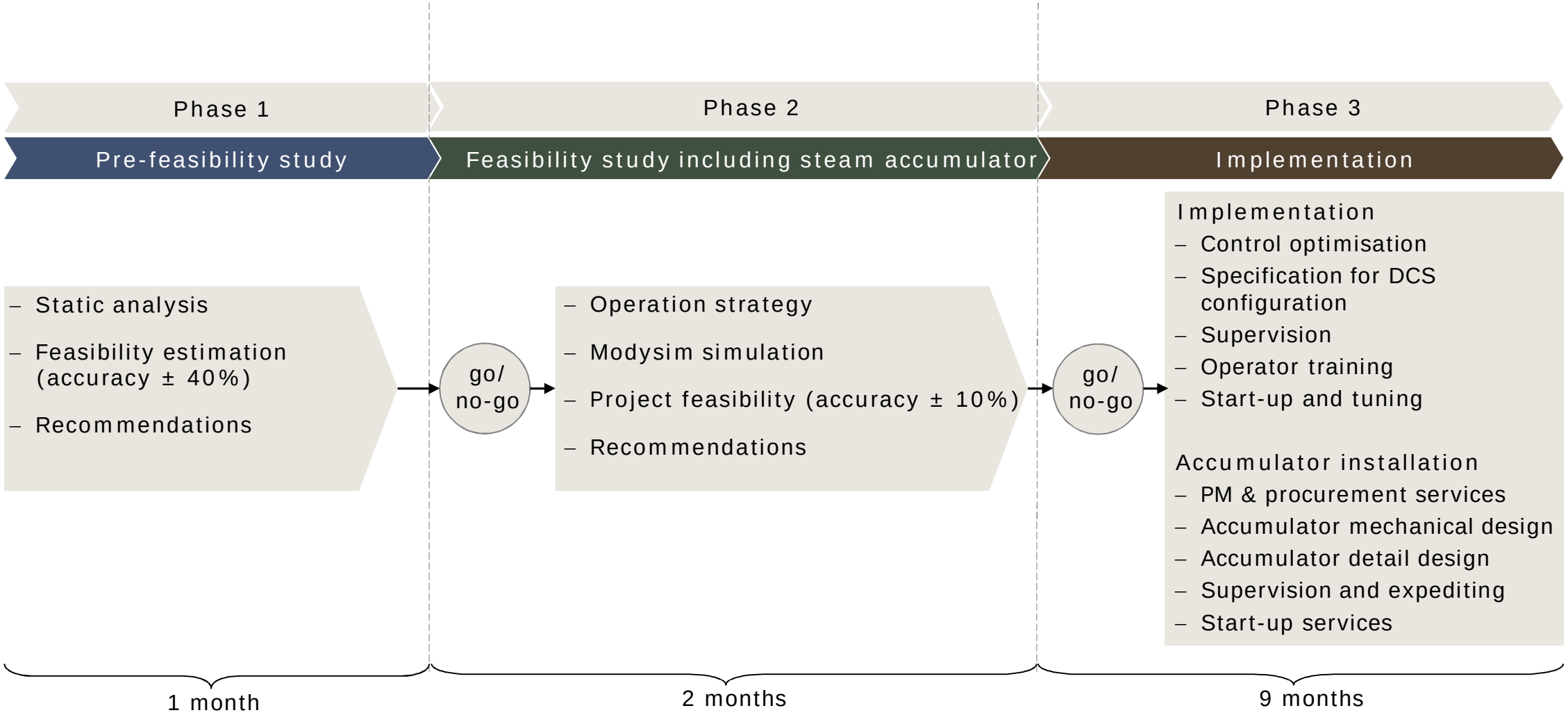
PROJECT FLOW CHART

AFRY Steam Balance™ project flow



REFERENCES

AFRY has over 20 years of experience in steam accumulator installation projects globally

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2010-2012	Stora Enso, Ostroleka, Poland
2008-2010	Stora Enso, Maxau, Germany
2007-2009	Mondi, Swiecie, Poland
2007-2009	UPM Caledonia, United Kingdom
2006-2008	Domtar, Marlboro Mill, SC, USA
2006	UPM Chapelle Darblay, France
2005	UPM Shotton, United Kingdom
2005-2006	Södra Värö, Sweden
2004-2006	Alizay, France
2003-2005	Veracel, Brazil
2001-2001	Sunila, Finland
2001	UPM Kaukas, Finland
2000	UPM Jämsänkoski, Finland
2000	Frantschach Swiecie, Poland
1997	Metsä-Serla, Kirkniemi, Finland

REFERENCE

Domtar, Marlboro mill, South Carolina USA, 2008

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