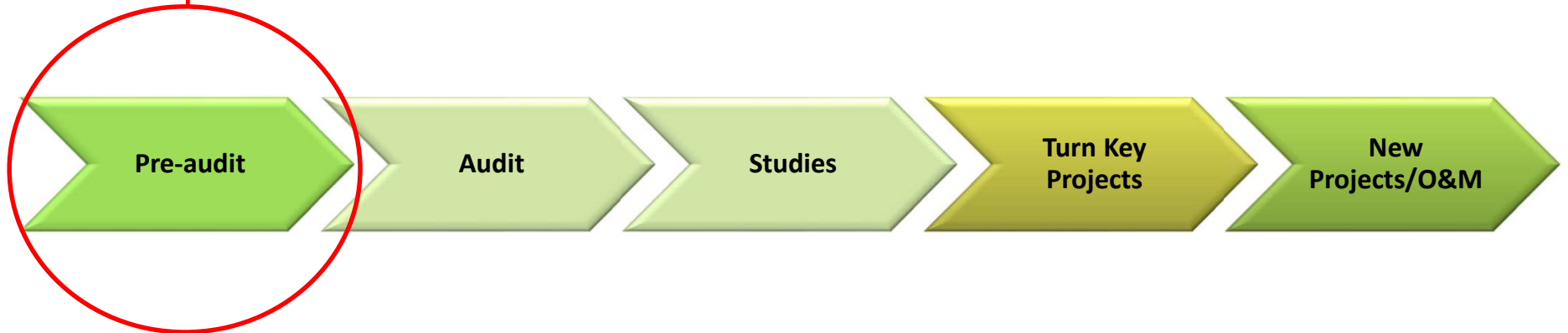


PRE AUDIT & ENERGY MANAGEMENT – STEAM SYSTEM

SIDDHARTH RAIKAR – ENERGY SERVICES

Armstrong Methodology for Existing Plant

First step in any plant assessment



What's the goal of a Pre-audit?

- **Scope:**
 - Understand customer's processes
 - Define problems that need to be studied
 - Define total potential of savings (give a warranty)
 - Define future **Actions** needed (Qualification step)

Pre – Audit & Deliverables

Description	Pre-audit
Definition of problem	yes
Definition of solution	no
Savings	≈ yes
Investments	≈ yes/no
Specs	NA
Drawings	no
Control philosophy	no
Equipment datasheets	no
Hazop	no
Tie-in points	no
Start up procedures	no
Bill of material	no
Stress analysis	no
Support and hanger definitions	no
Visit with subcontractors	no

What is Analyzed?

- **Steam Generation**

- Boiler efficiency and operation (if data available)
- Blow down rate (if water treatment data available)
- Blow down heat recovery
- Economizer
- Condensate return (if flowmeters or data available)



What is Analyzed?

- **Steam Distribution**

- The steam pressure levels will be analyzed
- Visual inspection (insulation, external leaks) of the distribution lines
- Quality of the condensate drainage of the steam mains



What is Analyzed?

- **Steam Use**

- Potential malfunctions of the heat exchangers related to the condensate drainage along with other sources of heat will be assessed
 - Water Hammer
 - Unstable temperatures
 - Flooded heat exchangers



What is Analyzed?

- **Condensate Recovery**

- Potential improvements of the condensate and flash steam recovery systems will be assessed
- Water hammer issues will be highlighted



What is Analyzed?

- **Hot Water**
 - The facilities hot water generation and consumption processes will be evaluated



What is Analyzed?

- **Heat Recovery**
 - Heat Recovery Potential
 - Compressor cooling
 - Ovens stack
 - Process Water drained
 - Process cooling



A Pre-audit Deliverable


A report containing:

- A description of steam and condensate systems
- Annual steam consumption and the cost of steam per ton, based upon the data supplied by the facility personnel
- A summary of potential improvements that should be studied and developed further
- Based on the conclusions of the Pre-Audit report, an additional proposal for more in depth engineering development will be discussed
- An estimation of the minimum energy savings that could be achieved

Analysis of a Pre-audit



Check and analyze collected data


Armstrong
Intelligent System Solutions™
STEAM • AIR • HOT WATER

Report on

Pre Audit – Steam & Condensate System

At

GlaxoSmithKline Pharmaceuticals Ltd

2nd Bokhara Road
Thane – 400601
Maharashtra INDIA
Tel: (022) 2534 1176/4176/0578

Date: 20th July 2010

Prepared By
ARMSTRONG INTERNATIONAL PVT. LTD.
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www.armstronginternational.com

Write the report in Armstrong
format



Keys of Success

- Before Study Collect Basic Data
 - Baseline datasheet
- During the Study:
 - Focus on
 - Energy Savings
 - Maintenance Optimizations
 - Process Optimizations
 - Safety Issues
 - Listen to customer, collaborate as much as possible with customer



Keys of Success

- In Report
 - Give an Estimation of total Energy Budget
 - Give an estimation of potential savings if further study is implemented
 - Use photos
 - List also the positive points!
- Presentation
 - Always Present Report to Customer (within a week)
 - Insist to have the plant manager at the presentation
- Maintenance Manager will not have the possibility to send you to the next step



Typical Workflow of Pre-Audit

Step	Activity		Tools Available
1	KICK-OFF MEETING WITH CUSTOMER ON SITE	Collect Basic Data: - Baseline Data - Drawings - Understand customer process, - Understand customer problems and drivers	Baseline datasheet Request for Information letter
2	PLANT VISIT	Involve customer	
3	DEBRIEFING	Explain key finding	
4	CREATION OF REPORT BY ENGINEER	Layout of report will need to be adapted	Templates for Pre-audit Reports
5	REPORT PRESENTATION TO CUSTOMER	Presentation Or Webinar presentation	

Tools available

- Base line datasheet
- Checklist for assessments
- Pre-audit guideline
- Pre-audit report template

Few expectation from Customer

- Permission to enter inside factory premises and study boiler, steam distribution, steam usage and condensate recovery system
- To provide assistant at the time of study
- To provide plant steam generation / steam consumption details, boiler fuel consumption etc
- To provide drawings / manuals of Boiler & Equipment's (if available)
- To provide plant P & I Diagram for Steam & Condensate lines

Conclusion

“Pre audit” does not mean an Energy Audit of the plant

- No Special Tools required
- Completely based on the DATA furnished by the customer
- It is basically a collection of the relevant DATA (Baseline data sheet)
- Verifying DATA with concern plant engineer
- On the basis of the DATA collected and your observation, identify major gray areas with estimated saving potential
- Submitting report and presenting it to the customer
- Submitting Tech-Commercial offer for detail Audit or for the products

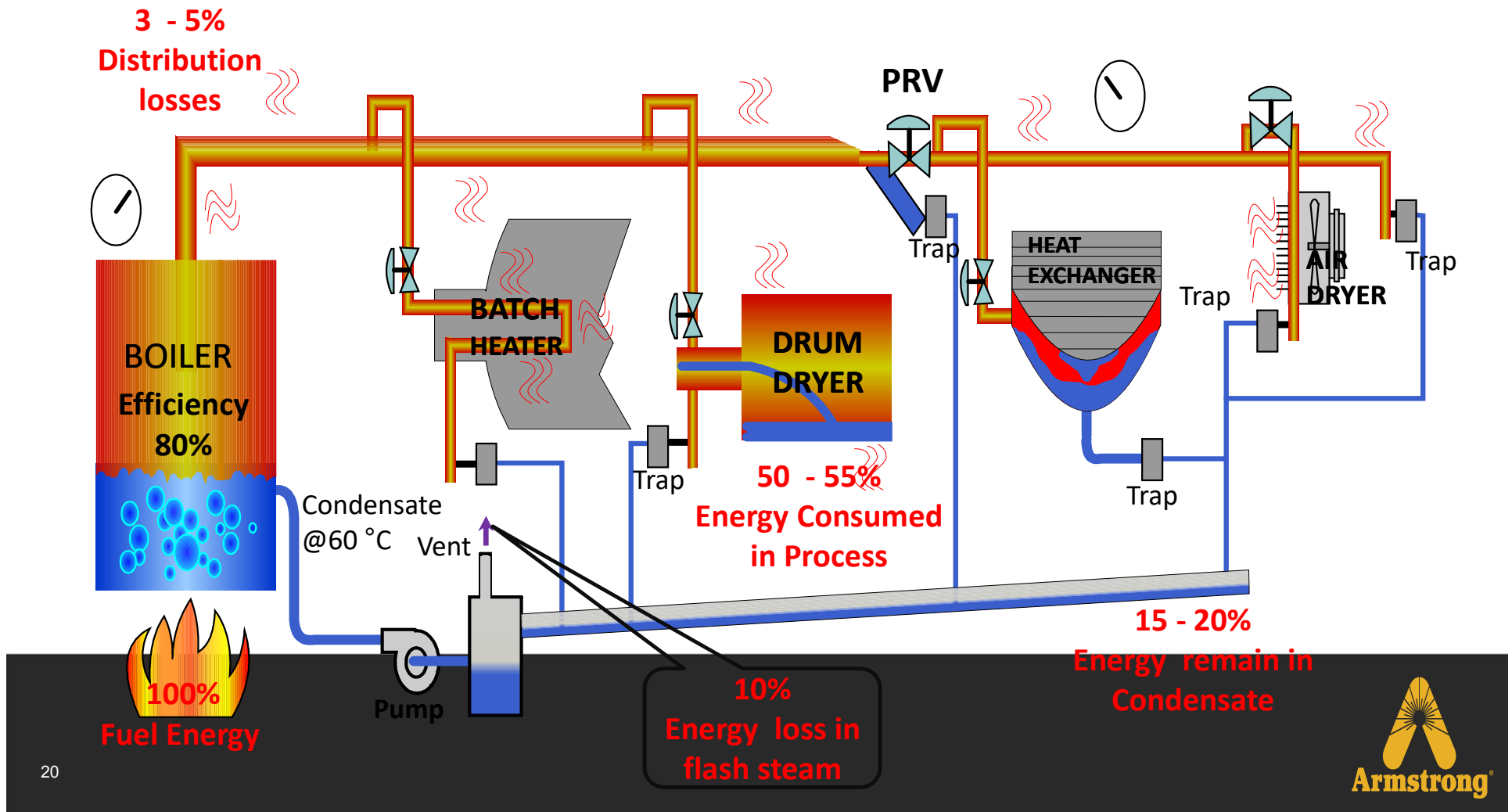


Now
What to look for in steam
system?



Typical Steam System and Energy Loss

■ Condensate ■ Steam ■ Vapor



Boiler House

- Higher flue gas temperature, lower boiler efficiency
- High stack oxygen, lower boiler efficiency
- Boiler and boiler accessories insulation
- Boiler blowdown rate, boiler blowdown heat recovery
- Steam meter
- Plant energy bill and steam cost



Steam Distribution

- Uninsulated steam pipe line, piping accessories like flanges, valve, strainer, PRV etc
- Drip leg sizing, trap selection for line condensate drain and redundant steam lines
- Steam leakages
- Steam pressure drop, steam starvation issues, working of installed PRV's
- Steam quality issues
- Air vents
- Water hammer in steam pipeline.

Steam Utilization

- Steam pressure to process equipment's
- Process temperature control
- Stalling of heat exchange
- Steam traps installation, selection and their working condition
- Water hammer in process equipment's



Condensate and Flash Steam Recovery

- Condensate recovery status
- Flash steam recovery status
- Issues in condensate recovery like condensate draining, contamination, back pressure, low temperature condensate recovery etc
- Condensate and flash steam recovery line insulation
- Water hammer in condensate and flash steam line
- Condensate recovery temperature



PRE-AUDIT - CASE STUDY

- Customer

Premier Fine Linens Pvt Ltd
SIPCOT Industrial Growth Centre
Perundurai T.N. – 638 052

PREMIER
Fine Linens

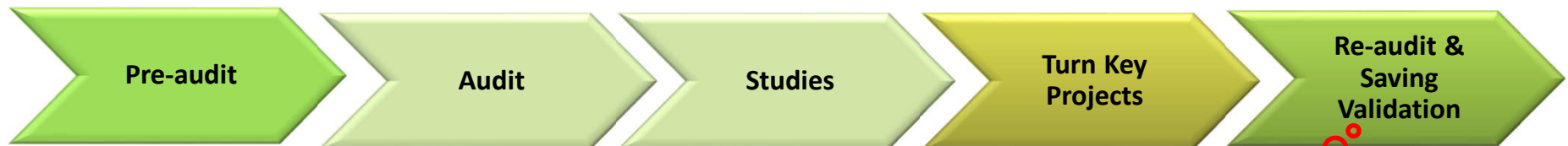
Balki and Sathiya
submitted Turnkey
proposal to the
customer **May 2012**

Audit conducted by
Venky in **Feb 2012**

Received product
order worth **Rs 80
Lac**

Anand, Sujit and
team completed I&C
in **Jan 2013**

Re-audit conducted
by Venky and Varun
in **April 2015**



Pre-Audit conducted
by Sathiya **Aug 2011**

EA Order received
PO value **Rs 3.9 Lac**

Venky and Sujit
submitted drawing
to customer **Aug
2012**

**Achieved Savings
Rs 26.3Lac/year for
last 2 years**



Armstrong Team



Our efforts Paid !!!!!

PREMIER FINE LINENS PVT LTD
Process House

Please Refer Invoice as follows :
Premier Fine Linens Pvt. Ltd.,
Factory Address :
Plot No. 173, SIPO Industrial Growth Centre,
P4 Palani, Perundurai - 636 024,
Tamil Nadu - 636 024

PREMIER FINE LINENS PVT LTD
Process House

Please Refer Invoice as follows :
Premier Fine Linens Pvt. Ltd.,
Factory Address :
Plot No. 173, SIPO Industrial Growth Centre,
P4 Palani, Perundurai - 636 024,
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Tamil Nadu - 636 024

Armstrong
PURCHASE ORDER

ECM Implementation Validation Report
Premier Fine Linens Pvt Ltd
Project ID: 90029
For the Attn: Mr. R. Mahiyazhagan (Vice-President)

16th April 2015
Revision: 01
Page 2 of 35
Prepared by: JNY

Executive Summary
Armstrong conducted Energy Conservation Measures (ECM's) validation study at Premier Fine Linens Pvt Ltd, Perundurai during the period of 8th to 11th April 2015. The objective of the study was to validate the performance of implemented ECMs.

During the validation study various efficiency trials had been conducted to evaluate the conditions after ECM implementation. The overall summary of implementation validation study is given in Table 1.

ECM Implemented	Savings projected (In Lacs)	Savings achieved (In Lacs)
ECM 2: Insulate the bare steam lines, valves, flanges & strainers	5.1	4.25
ECM 3: Arrest all identified direct steam leakages	7.3	7.06
ECM 5: Provide steam through Pressure reducing station to the process equipments	6.9	6.9
ECM 7: Installation of correctly sized steam traps on identified leaking & waterlogged locations	1.5	8.1
ECM 8: Recover the condensate from hydraulic jiggers & Sanforser		

Table 01: Summary of savings achieved after ECM implementation

For Premier Fine Linens Pvt Ltd
R. Mahiyazhagan
VICE PRESIDENT (OPERATIONS)

REVENUE
(R. VENTKATESH)
Gen. Manager - Energy Services

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Few Other Examples

- Detco Textile Pvt Ltd, Tarapur Maharashtra
 - Pre audit followed by Energy Audit in 2009
 - Received product order for ECM implementation worth **Rs 6.0 Lac**
- Nestle Manufacturing (M) SDN BHD, Chembong Malaysia
 - Pre audit followed by Energy Audit in 2010
 - Received product order for ECM implementation worth **33,000 USD**
- Reliance Industries Ltd, Patalganga Maharashtra
 - Pre audit followed by Trap Management contract for 5 years in 2010. Contract extended for one more year in 2015
 - Received product order for implementation (till today) worth more than **Rs 2 Cr.**
- Sree Rayalseema Hi Strength, Karnool Andhra Pradesh
 - Pre audit followed by Energy Audit in 2013
 - Received product order for ECM implementation order worth **Rs 58 Lac**

Think now
how it can help you???



Armstrong Promise

We provide intelligent system solutions that improve utility performance, lower energy consumption and reduce environmental emissions... while providing an “enjoyable experience”!



Armstrong International

North America • Latin America • India • Europe / Middle East / Africa • China • Pacific Rim

armstronginternational.com



Thank You !!