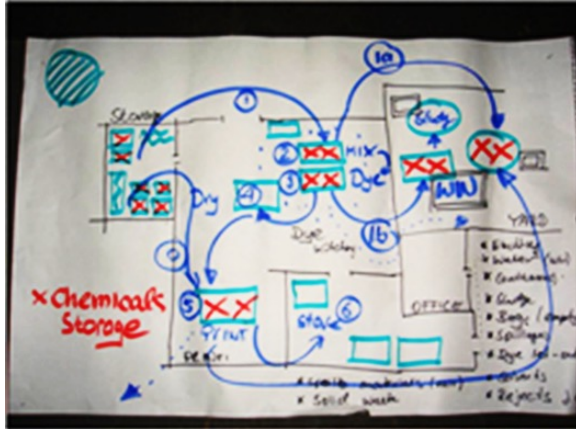




Understand the situation at hand

ANALYSING AND DOCUMENTING PROCESS AND ENERGY FLOWS IN YOUR COMPANY

In this session...



- Understand purpose and concept of process flow mapping
- Familiarise with practical mapping tools
 - Flow diagrams
 - Eco-mapping
 - E-Sankey
- Exercise
- Plan your next steps

Purpose of process flow mapping

- To lay **ground work** for tracking energy sources and **establishing energy management system framework** for promoting responsible usage and prevention of adverse impacts on environment
- To **support identification** and **documentation of energy losses** related to entire range of production processes, products, non-product outputs (NPO) activities under purview of your company



References

- Higg FEM Level-1 Question-1
 - Track all energy sources



Concept of process flow mapping

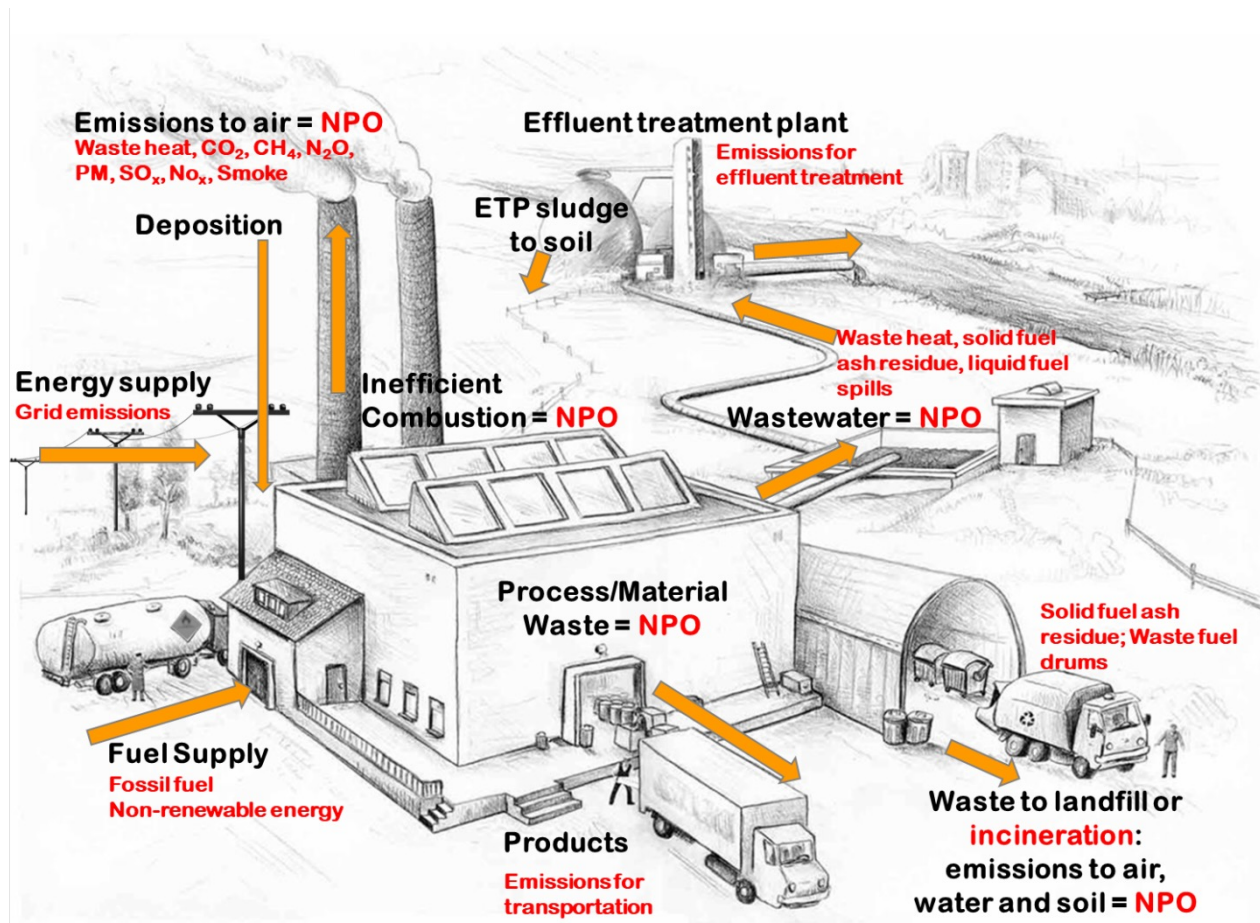
- Apply **systematic step-by-step approach** towards understanding process and energy flows;
- Understand **which energy types are used and which are the energy users** within your site;
- Set boundaries regarding **external operations that your company can/should/wants to influence**

For example

- Energy produced by sub-contractor within premise of the company
- GHG emissions related to solid waste incineration by 3rd party
 - this might be needed to qualify for Higg FEM Level-3 in Air Emissions to divert solid waste from incineration without energy recovery or landfill

Mapping your processes and energy flows

Important: Set the boundaries of your system



Benefits of process flow mapping

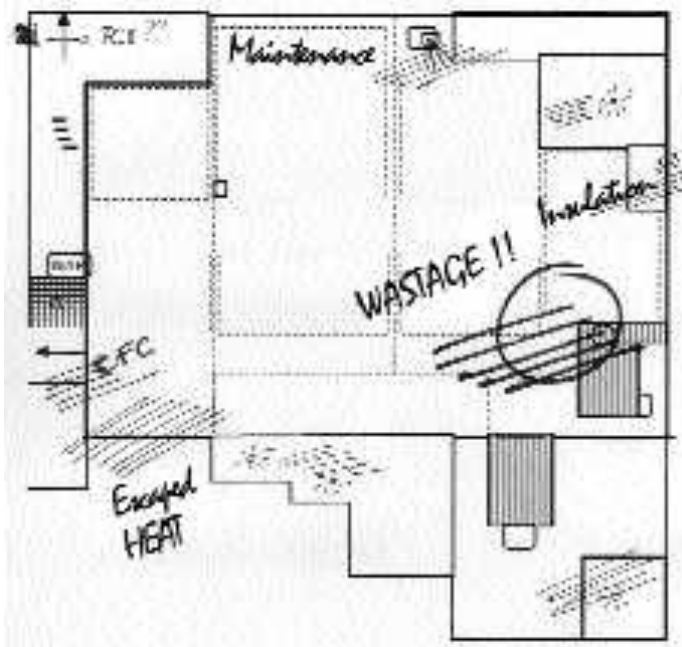
- Gain general overview of production process
- Identify all relevant process steps, intermediary products, most important and/or critical materials
- Create basis for
 - systematically analysing inputs and outputs (both desired products and NPOs/wastes)
 - visualizing quantities and costs (for mass balancing)
 - documenting GHG emissions
- Localize optimization potentials and areas
- Improve process communication inside your company
- Establish reference for planning, monitoring and reporting



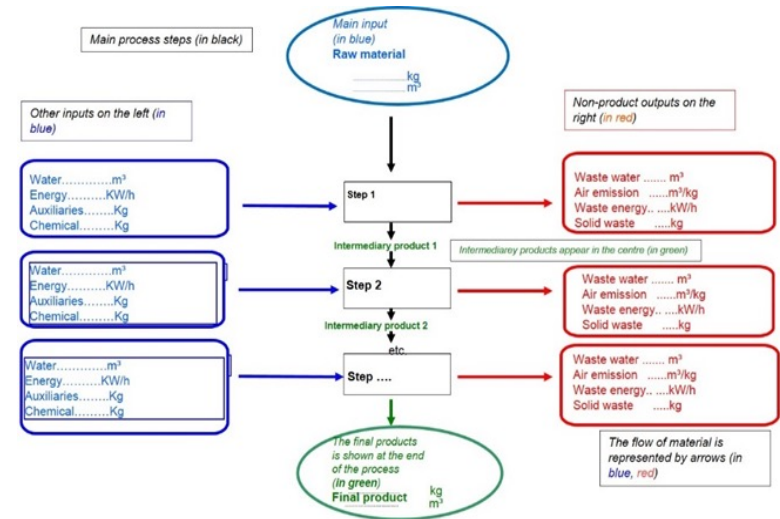
Practical mapping tools



Eco-mapping



Process flow diagram



Eco-mapping



- simple, practical tool for visualization of process flows
- good to use in resource efficiency, energy efficiency, OSH etc. for
 - identifying and documenting the prevalent situation and issues
 - identifying and analysing common issues and priority
 - selecting and planning areas for improvement
 - monitoring progress of implementation
 - auditing and reporting

How to proceed

- Use existing ground and floor plans to facilitate identification and visualization of environmental problems (“critical situations/ hot spots”) within a company
- Consider using different maps to create a useful multi layer set of graphical information (e.g. for chemicals, water, energy, air, wastes)
- Prepare or verify during an initial company/site walk-through
- Collect and fill in additional information, using guiding questions and observations on site



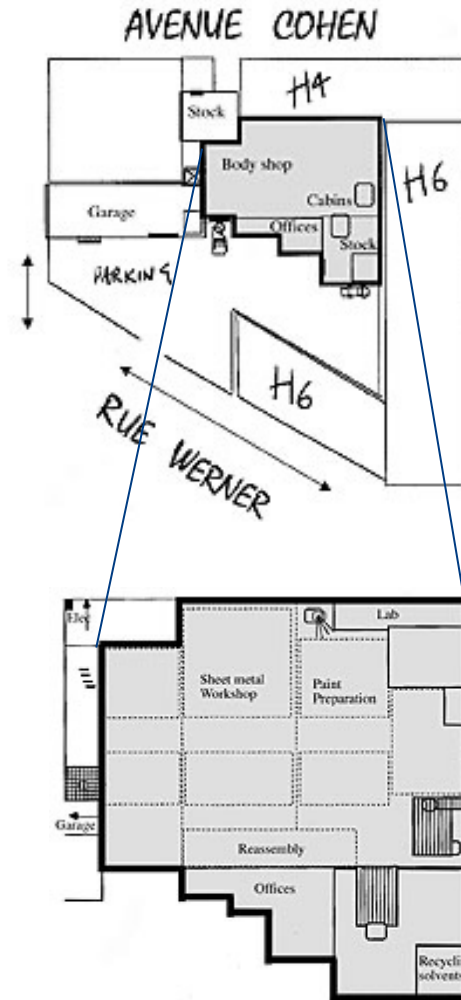
Involve staff and workers on-site in different processes or production areas

How to proceed

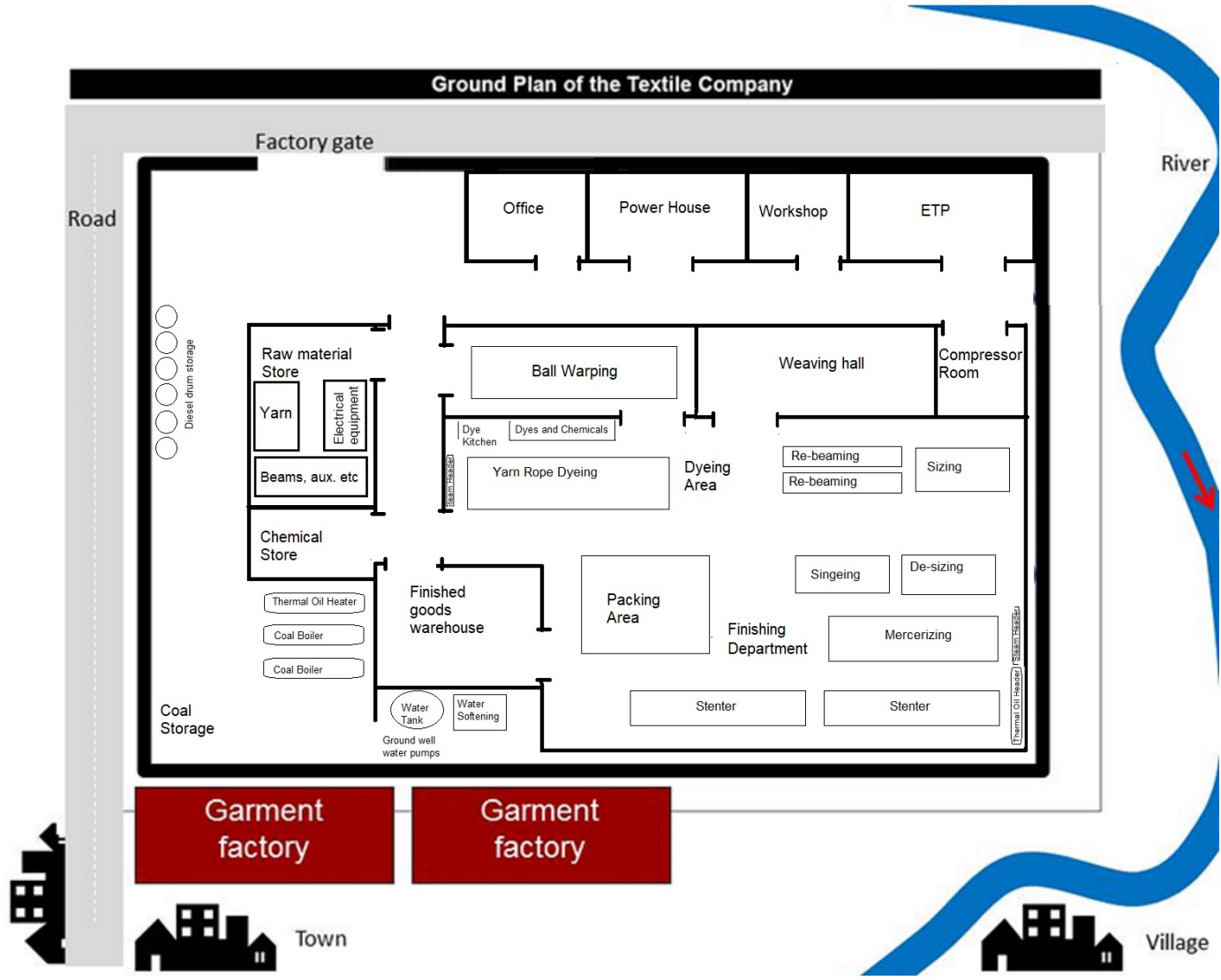


Practical tips

- Also take into consideration general location of your company in the area
 - Any water bodies around the compound?
 - Housing areas? Schools?
 - Neighbouring industries?
 - Roads used by company
 - Other...



Example

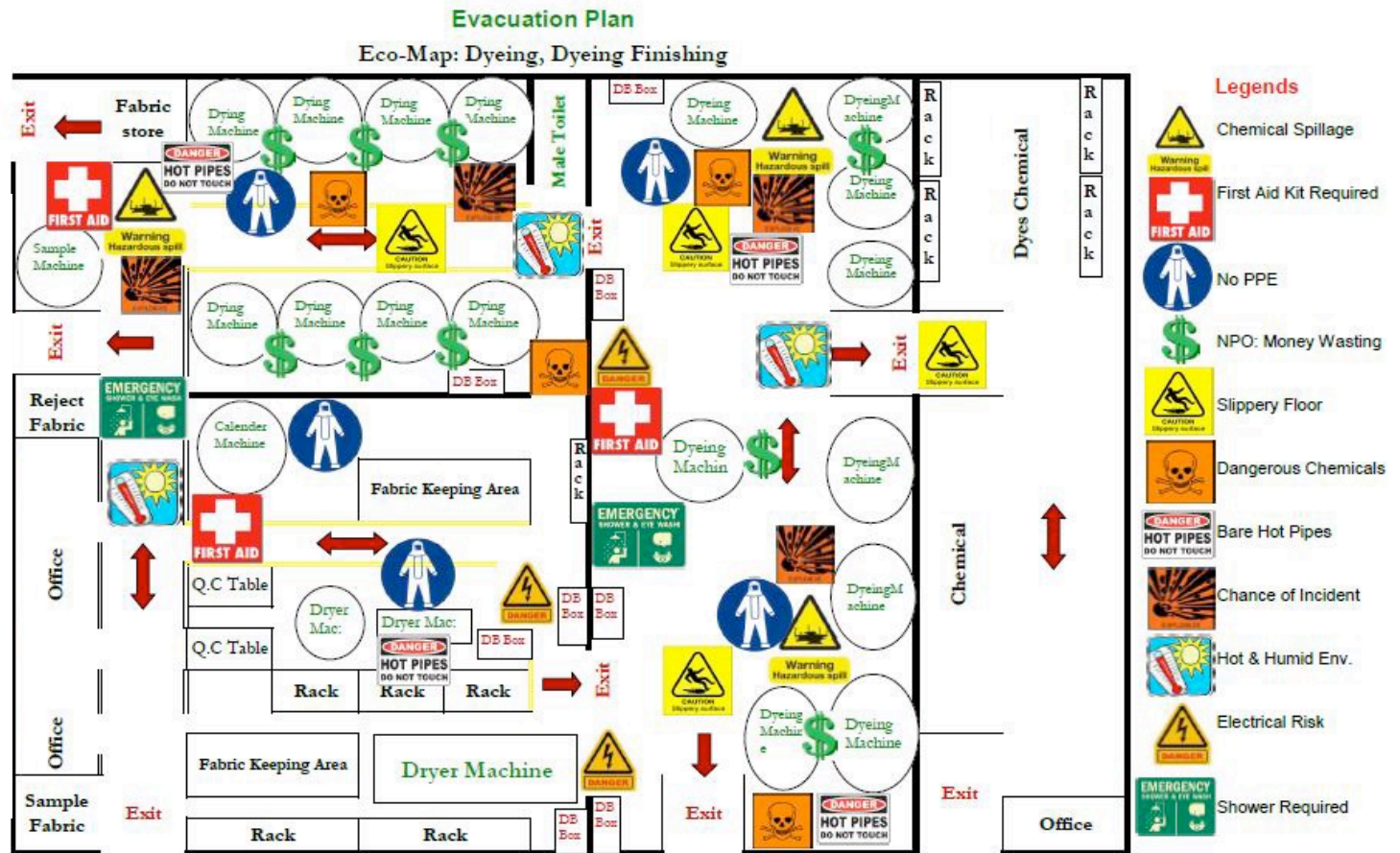


Practical tips

- Decide and agree on your own standard symbols beforehand
- Use consistently in all maps
- Indicate gravity of observed “hotspots”
 - Hatched lines: small problem (area to be monitored, problem to be studied)
 - Circle: large problem (stop, corrective action)
 - The more serious the problem: the thicker or larger the circle or symbol



Example: Textile unit, Narayanganj, Bangladesh

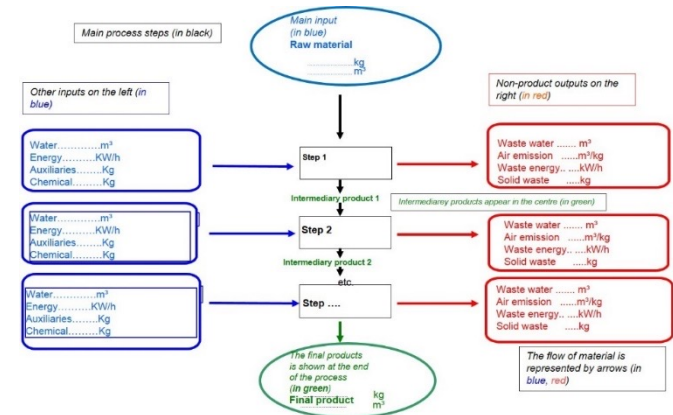
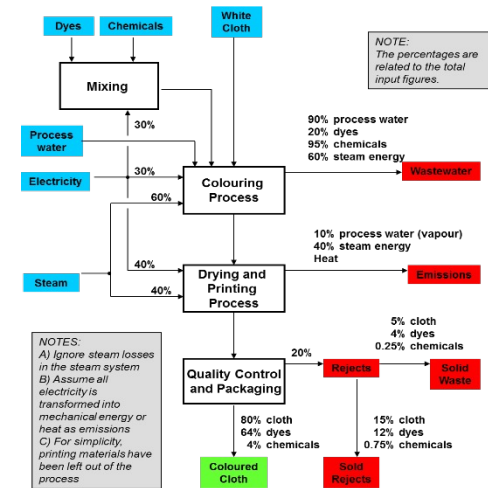


Process flow diagrams

Used to

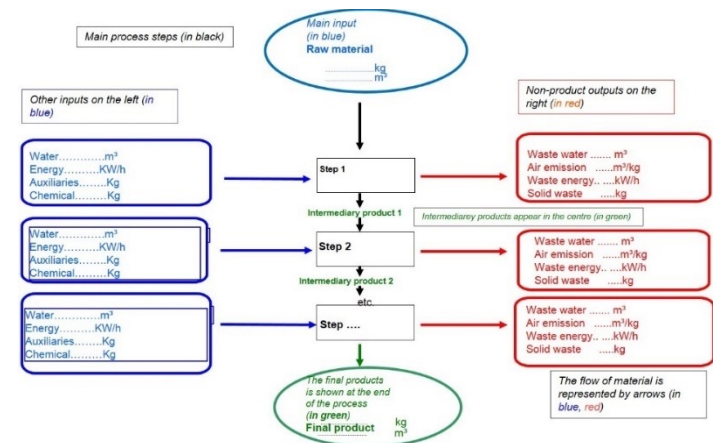
- Document...
 - Processes/process steps
 - Interconnection between process steps
 - Process inputs
 - Intermediary and final products
 - Non-product outputs (NPOs)

- prepare mass balance and/or cost analysis
 - Indicate quantifies and/or value of inputs, outputs, non-product outputs

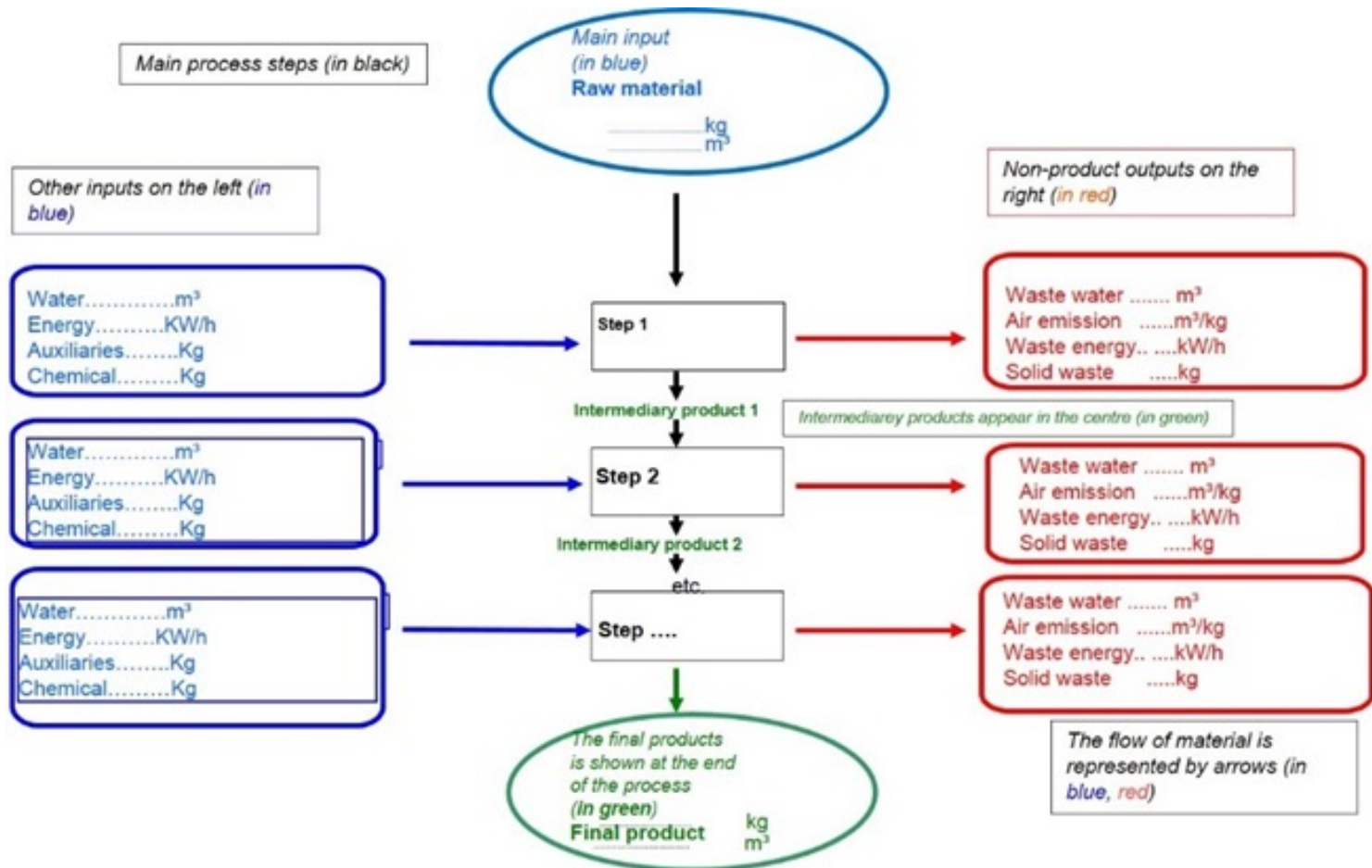


Practical tips

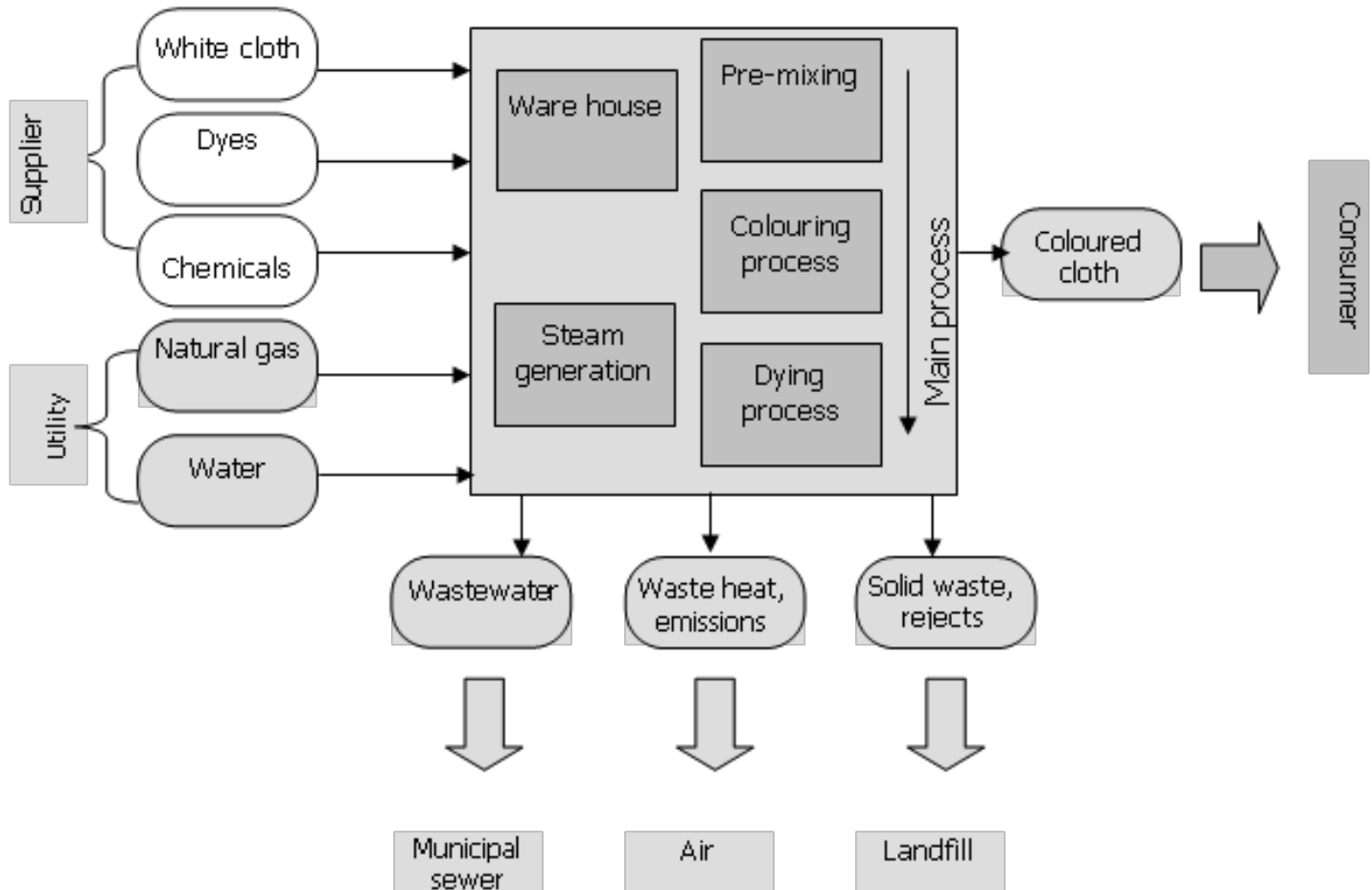
- Processes/process steps represented by squares
- Flows represented by arrows
- Inputs (raw materials, water, energy, chemicals) on one side
- Main input comes from above
- Intermediary products located below each process
- NPOs as output to right side
- Final product leaving process



Practical tips



First get an overview ...



Source: UNEP RP

... then a blow up of major process steps...



white cloth >
dyes
chemicals
water
steam



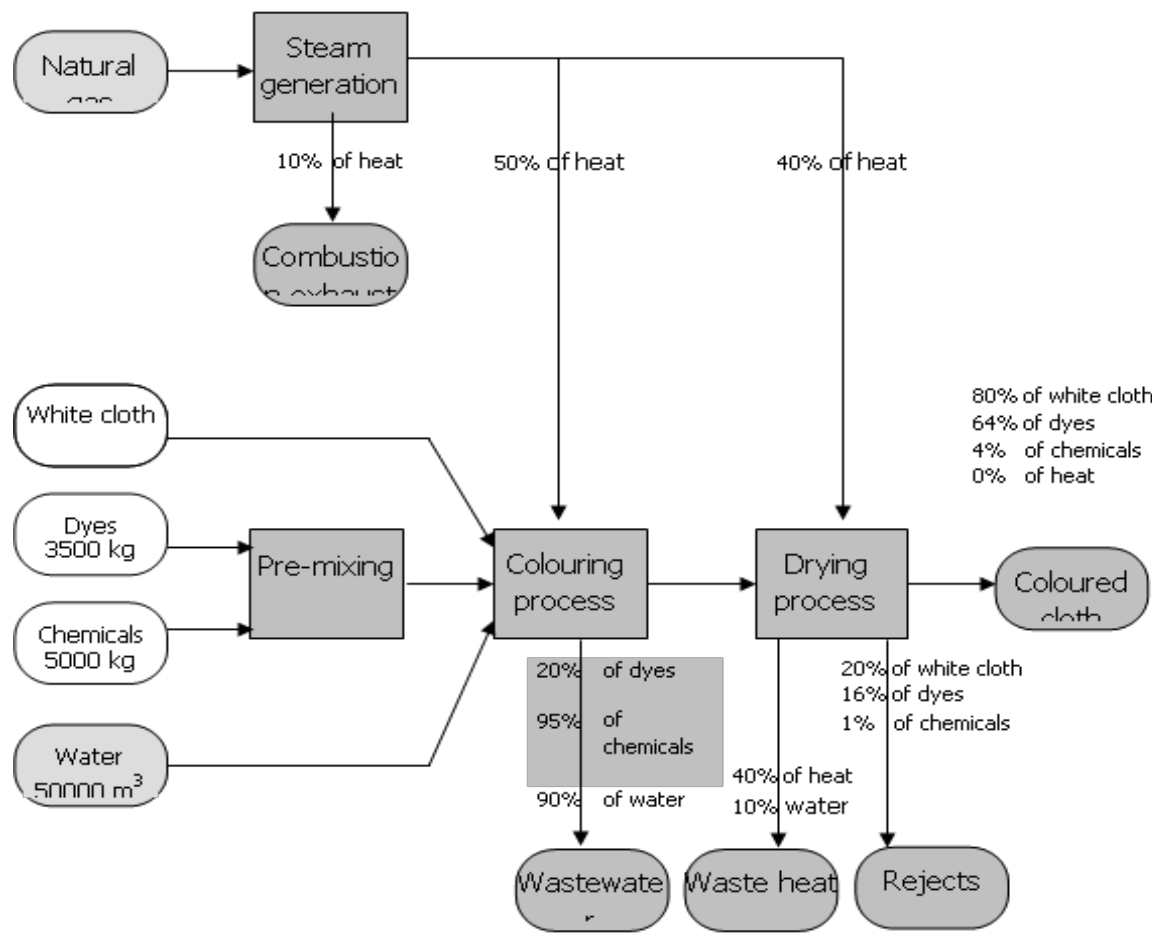
coloured cloth
dyes
chemicals in cloth
moisture in cloth



Wastewater
dyes/chemicals
(in wastewater)
heat/energy (in
wastewater)

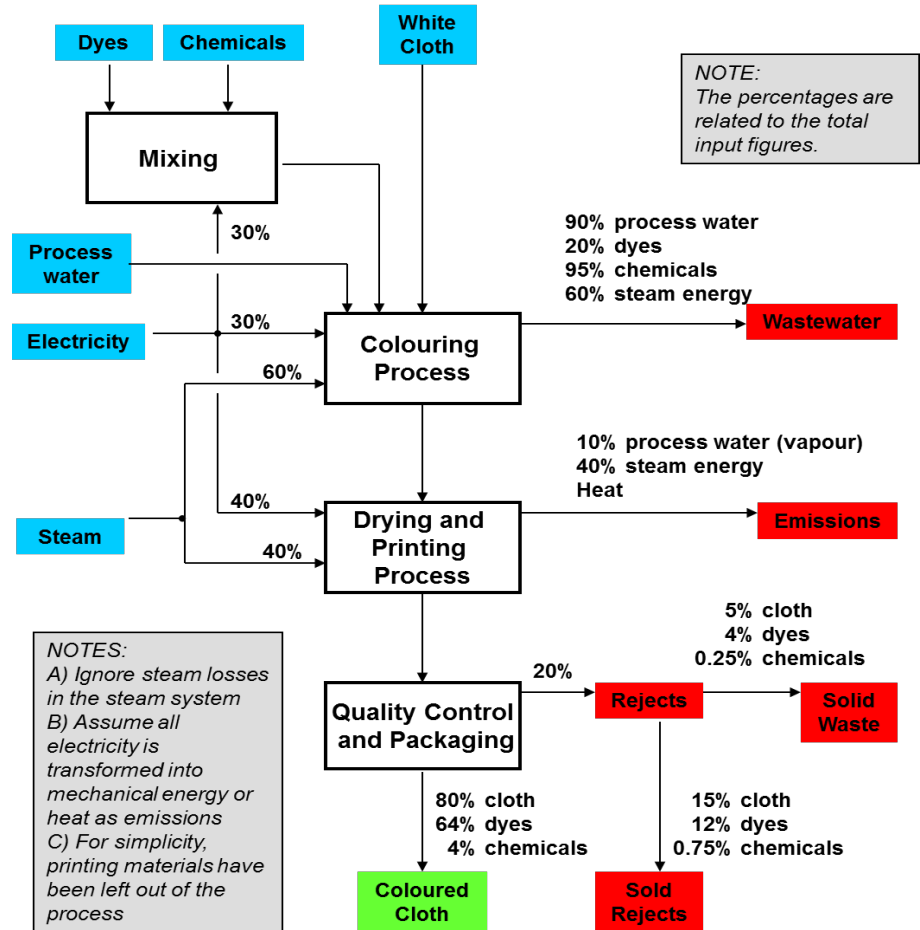
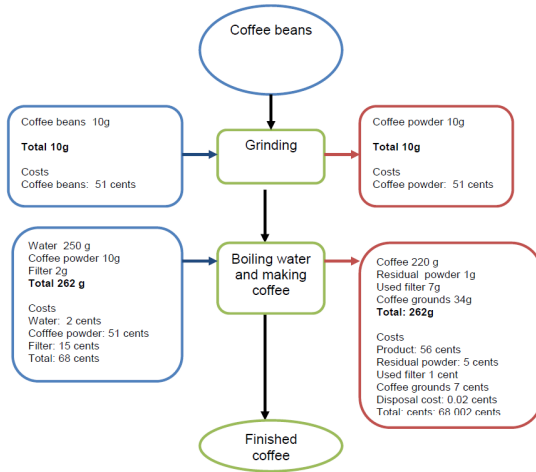
Source: UNEP RP

... and finally allocate percentages and absolute quantities to flows...



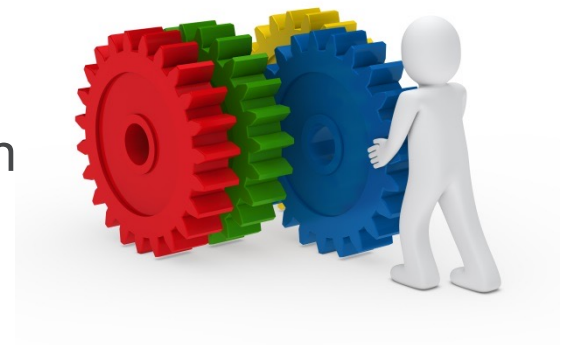
Source: UNEP RP

Using your flowchart information



Plan next steps

- Conduct company/site walk-through
- Prepare eco-map(s)
 - Involve your staff and workers on site
- Compile process flow diagram
 - showing inputs, outputs, processes, process boundaries, products and non-product outputs



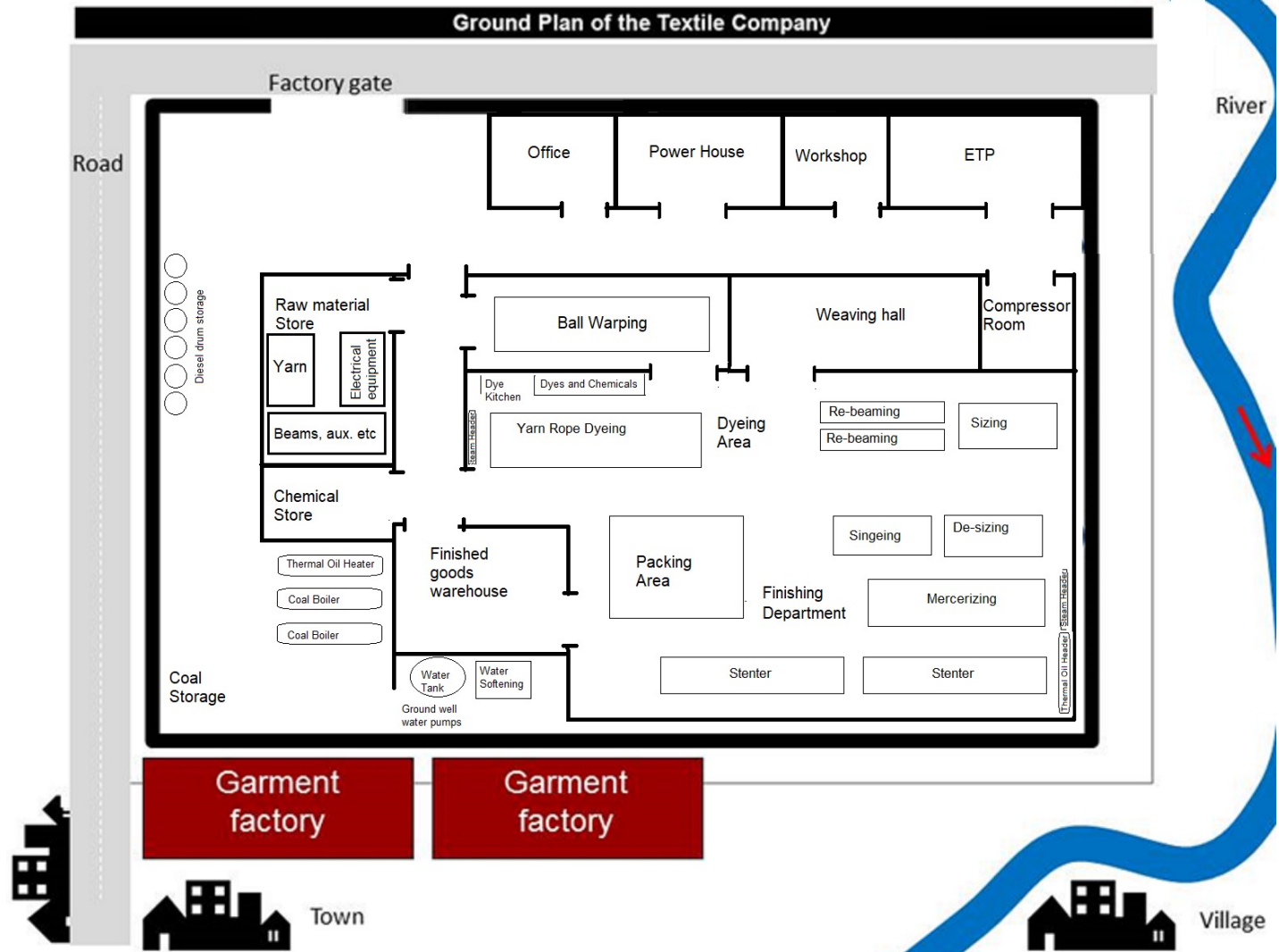
Exercise – „The Textile Company“

Objective

- To identify and map energy flows in a company`s operations
 - using tools such as flow diagrams and eco-maps for visualization and documentation



Exercise (layout of Textile Company)



Exercise

Tasks in your group

1. Document the process & energy flow
2. Point out possible NPOs and energy hotspots in an Eco-map (defined as areas which represent energy losses or immediate risk to environment)
3. Identify the internal key stake holders and decide who should be involved into the company`s energy management team
4. What changes would you make to your on-site assessment plan?
5. Point out areas where you need in depth analysis
6. Present your findings in plenary

Total time 90 minutes

Exercise - optional

For further consideration regarding NPOs

- Which inputs (raw materials, energy, water, others) are used in production process?
- Which of these inputs do not end up in the final product (i.e. are Non-Product Output)?
- Who is directly or indirectly involved in the generation and handling of which of these NPOs?
- What are the potential environmental, safety & health and other impacts of these NPOs?
- Which possible costs are caused by the NPOs?
- Which information is required inside the company to assess the impacts and quantify the costs of NPOs?

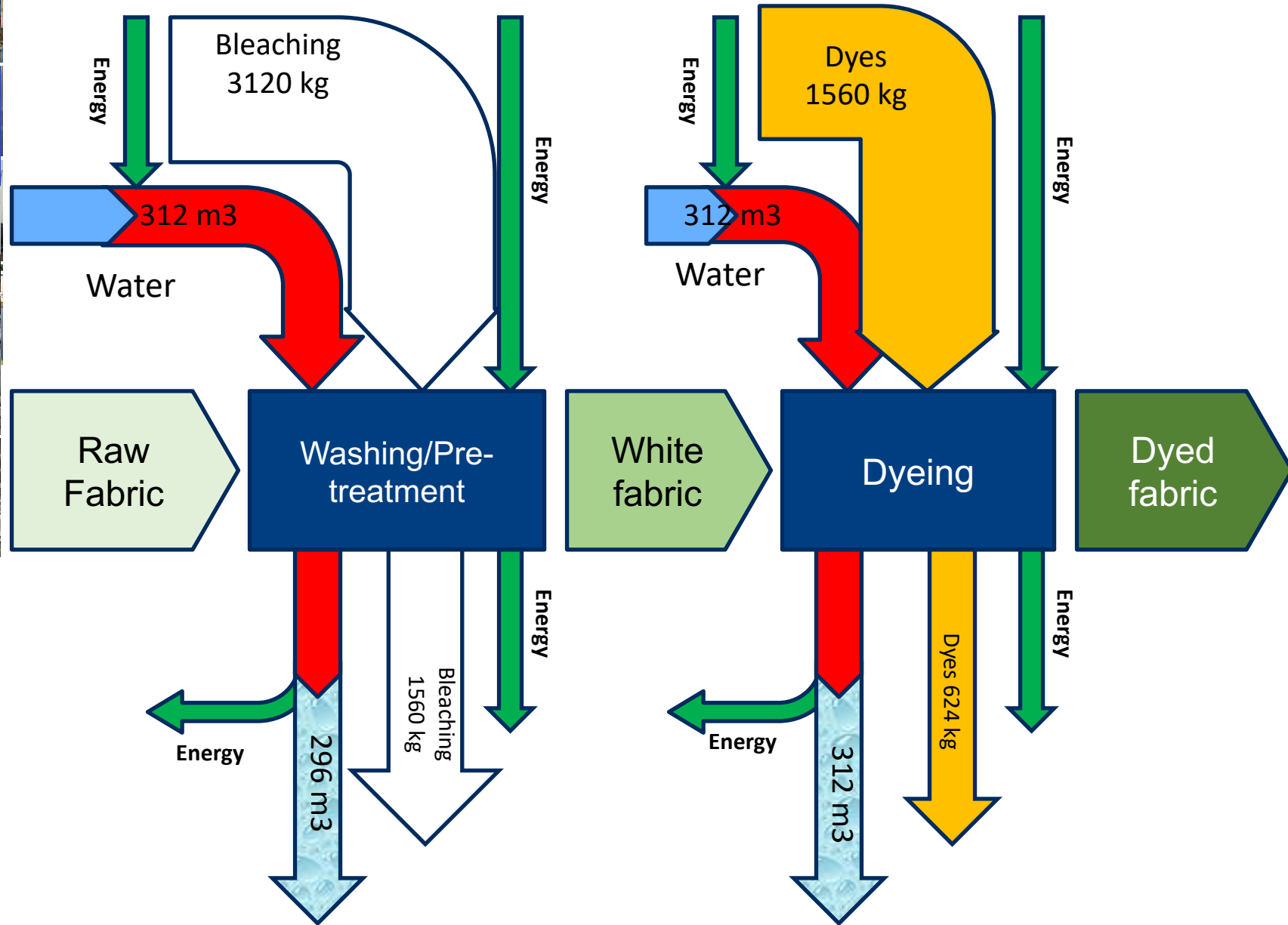
For your further guidance...

In your training materials, refer to...

- Eco-mapping handbook
- EMAS/EMS Easy handbook



Input/Output flow – Sankey Diagram, by quantities



Input/Output flow – Sankey Diagram, by value

