

Master Training Program on Water (Water Supply, In-house Processing, End-of-Pipe) in Textile and Garment factories

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

Day 1: Presentation 1

Basic concepts of water efficiency in Textile Processing

Mohammad Abbas Uddin Shiyak, PhD, CText FTI
Assistant Professor and Head
Department of Dyes and Chemical Engineering
Bangladesh University of Textiles

Md Anwarul Islam, MSc
Consultant, Reed Consultancy



Contents

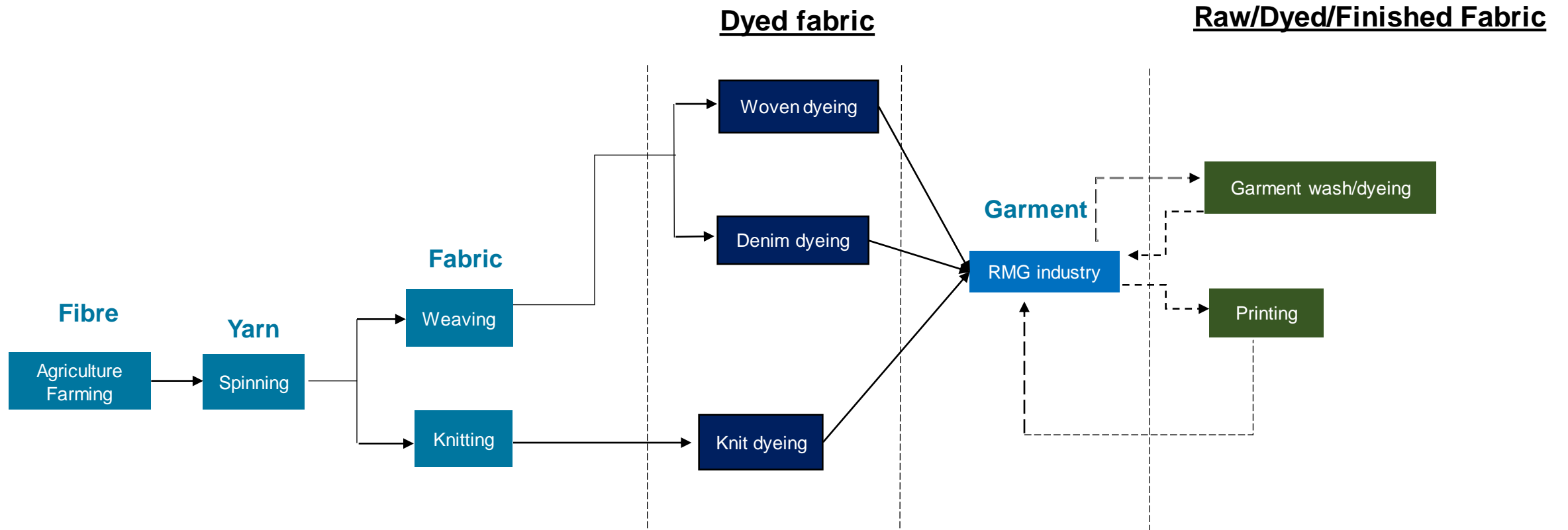
- Textile supply chain flowchart
- Water requirements in different part of supply chain
- Water KPIs in Textile factory Water quality requirements for processing
- RFT - Lab to bulk and bulk to bulk RFT
- Process flow mapping

Background



- The global textile and apparel industry, represents approximately USD 2.5 trillion to USD 3 trillion annually
- Globally the textile sector uses an estimated five trillion litres of water in dyeing and estimates up to 20% of water pollution coming from this industry, with nearly 280,000 tons of non-biodegradable dyes directly or indirectly into the environment.
- In addition, 48 to 144 billion square yards of fabric go to the landfill in each year, with less than 1% is recycled, representing loss of USD 1 billion worth of resources.
- The sector is also expected to contribute around 26% of global carbon emission by 2050.

Textile Supply Chain



Textile processing: Wet and dry processing

Concept of water requirement

Dry processing

- Fibre to yarn
- Yarn to greige fabric
- Dyed fabric to garment
- Drying and other technology

Wet process

- Dyeing/printing/finishing
- Garment washing

Why do we need water in textile processing?

Role of Water in a factory

- a solvent to dissolve chemicals
- a carrier of dye to the textile materials
- Heating medium in process e.g. steam
- Cooling for lowering temperature
- Washing
- Cleaning floor and machine
- Dilution in process or in ETP

Group Task

Task 1: Draw a hypothetical layout of a factory where water has been used



- a. Fabric dyeing
- b. Garment Washing
- c. Yarn Dyeing
- d. Denim Processing

Task 2: Identify water hotspots with 3 Star for most water use and 1 star for least amount of water use

Water Efficiency in Textile Factory

- Domestic Use
- Housekeeping
- Process Use
- Utility
- Wastewater

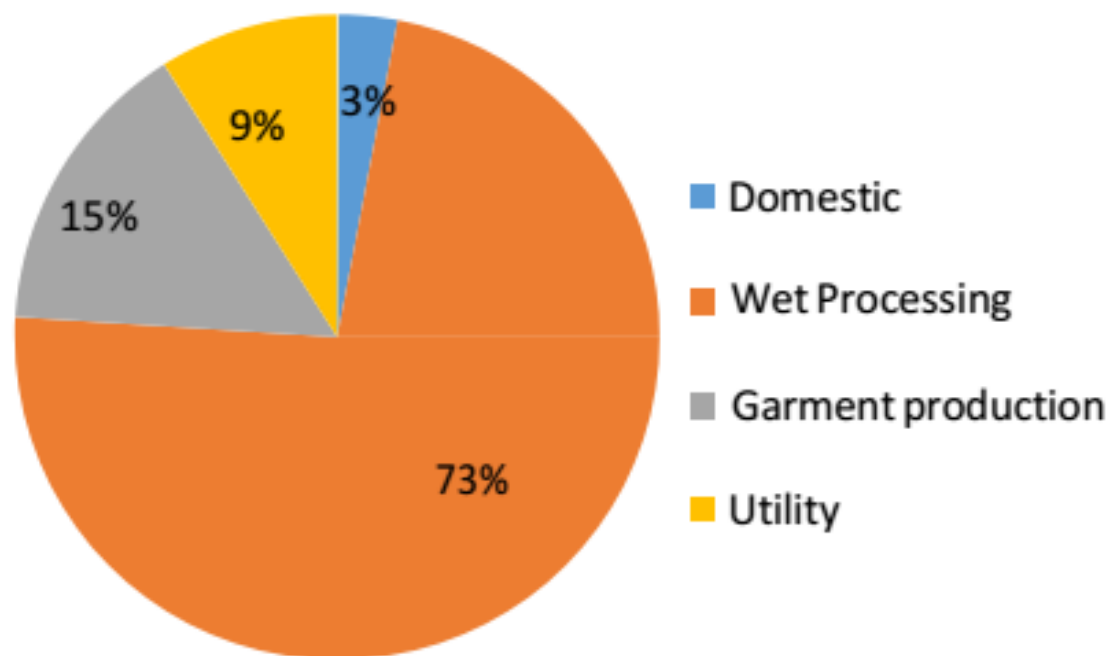
Key Performance Indicators (KPIs)

Task 3: What Could be KPIs in those are of the factory

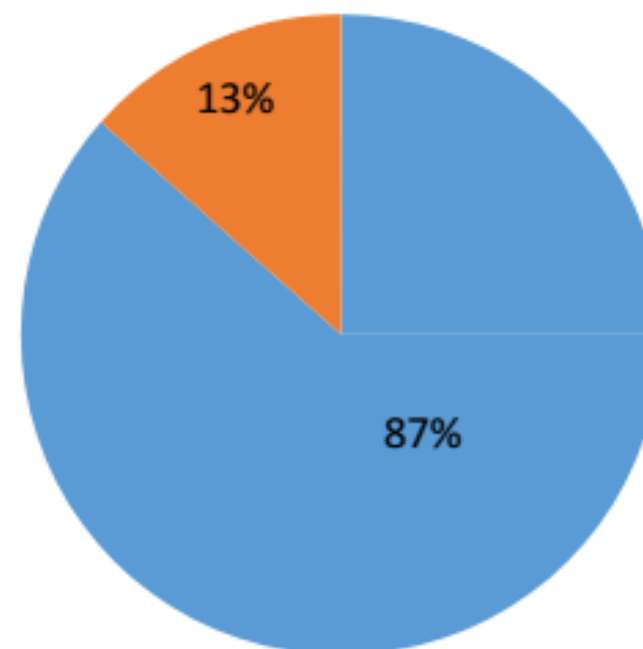
| KPI | Unit |
|-----|------|
| | |
| | |
| | |
| | |

Water consumption in Knit composite and RMG unit

Water use in a Knit Composite unit



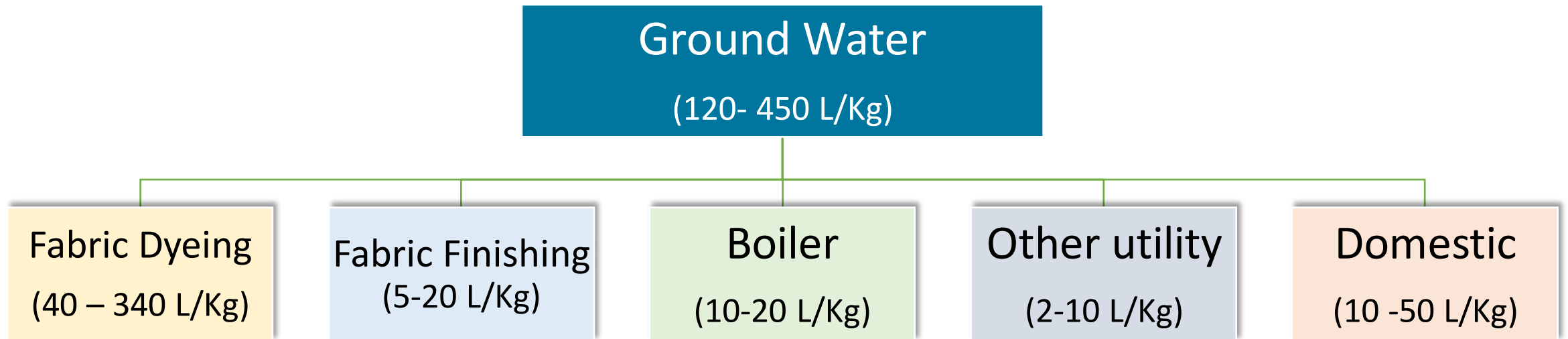
Water use in a RMG Unit



Source: Reed Consultancy reference database 2016

Water use in Textile processing

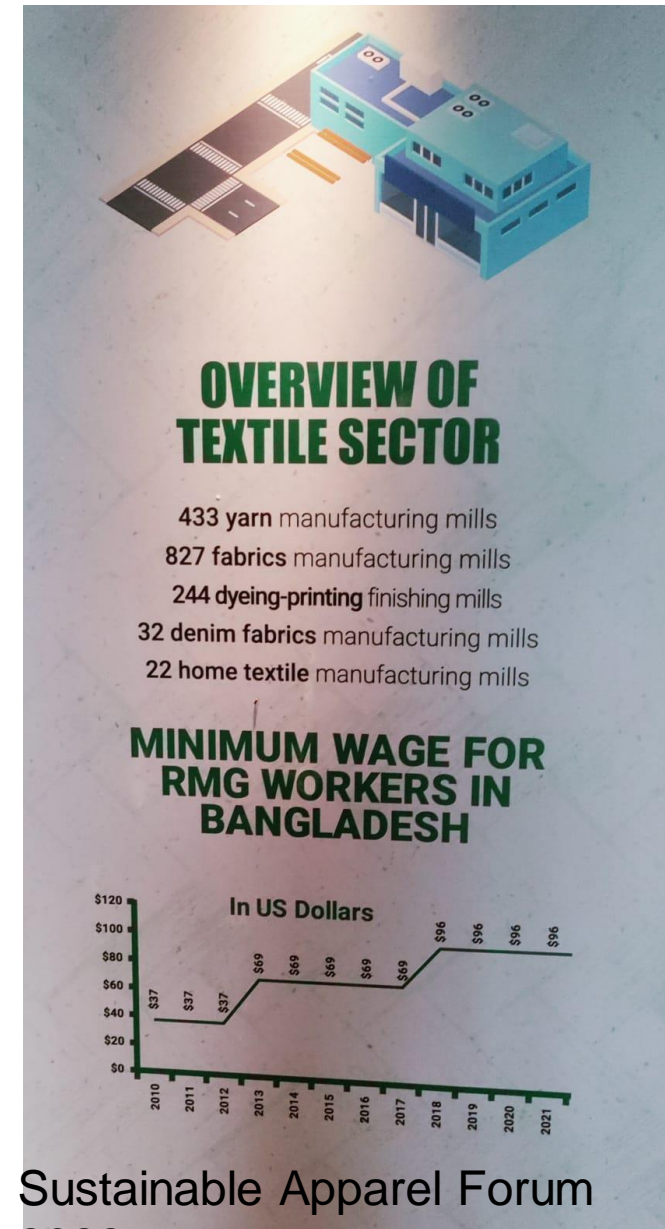
Water Consumption pattern in a knit composite industry



Source: Reed Consultancy reference database 2016

Water use in Textile processing

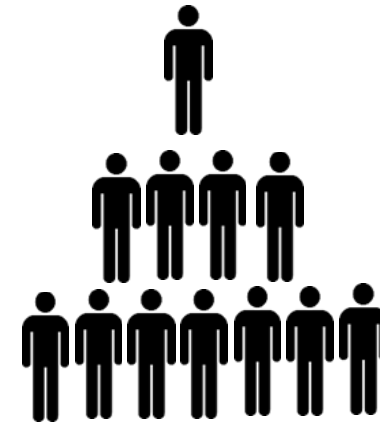
Calculate the water consumption in a day by Textile dyeing-printing-finishing mills.
Assume Daily Capacity, say 20 tons, with conservative use 100 L/kg



Water use in Textile processing

- 244 + Dyeing, Finishing
- Daily Capacity, say 20 tons = 20,000 kg
- Conservatively, say uses 100 L/kg

So total water use in a day could be in
 $244 \times 20,000 \text{ Kg} \times 100 \text{ L/Kg} \sim 488,000,000 \text{ L}$
~ 49 Cr L of water/day



**Appx 100 lac of persons
equivalent daily consumption**

Wastewater

- Technically, Wastewater generated should be at least theoretically the same as water use in the processing **49 Cr L of water/day**
- This water then mix with river water, canals, ponds, goes to land and use for irrigation

RFT (Right first time)

What is Right First Time (RFT)

- A Common Question
- Common Reply:

As long as material is not unloaded it is RFT

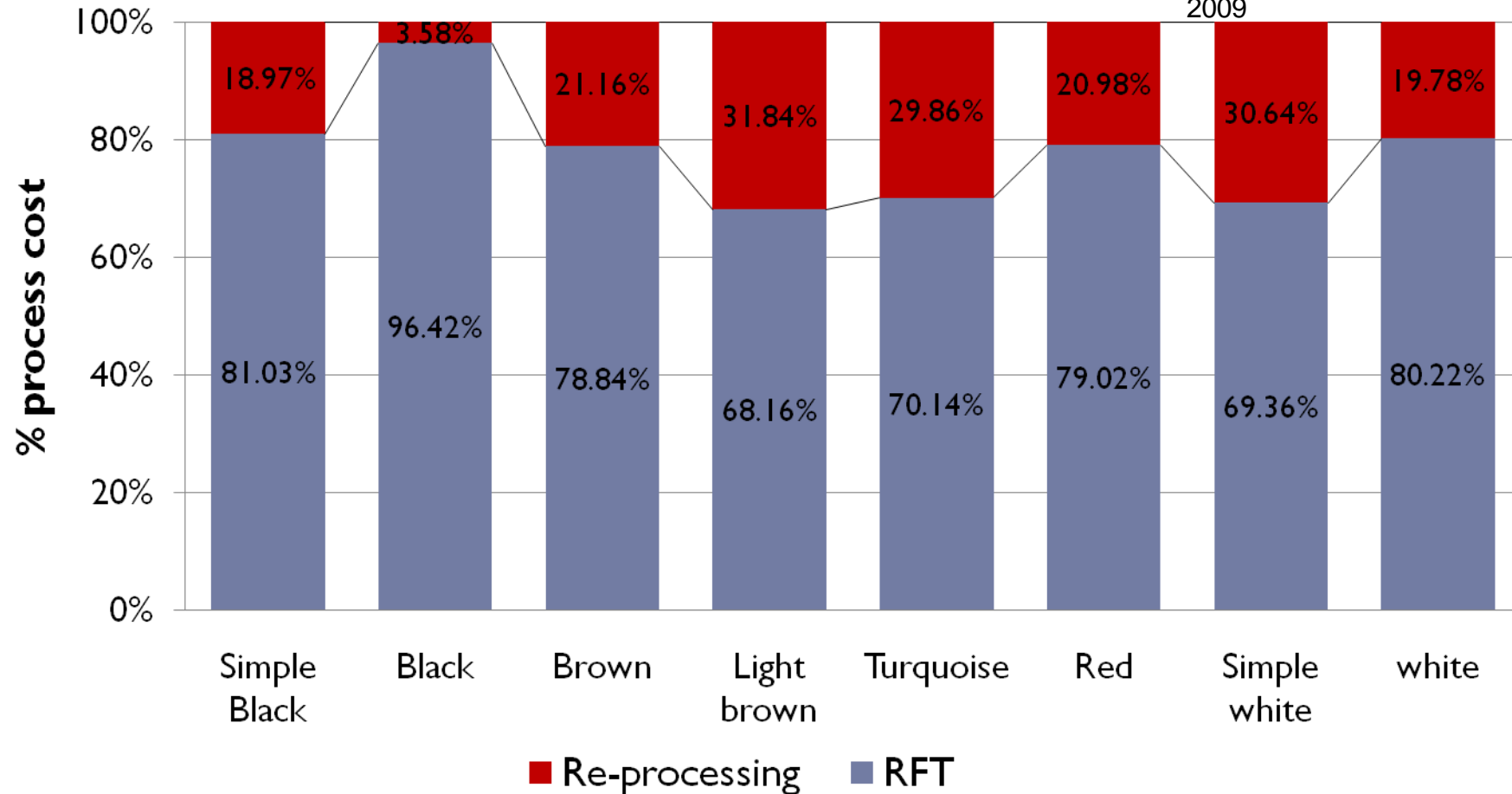
- RFT is no further deviation from the recipe or process route once the material is loaded and subsequently unloaded.
- Achieved the right shade in First time
- Similar to **Blind Dyeing**

Lab to bulk RFT

RFT approach

NON RFT – Impact on Process cost

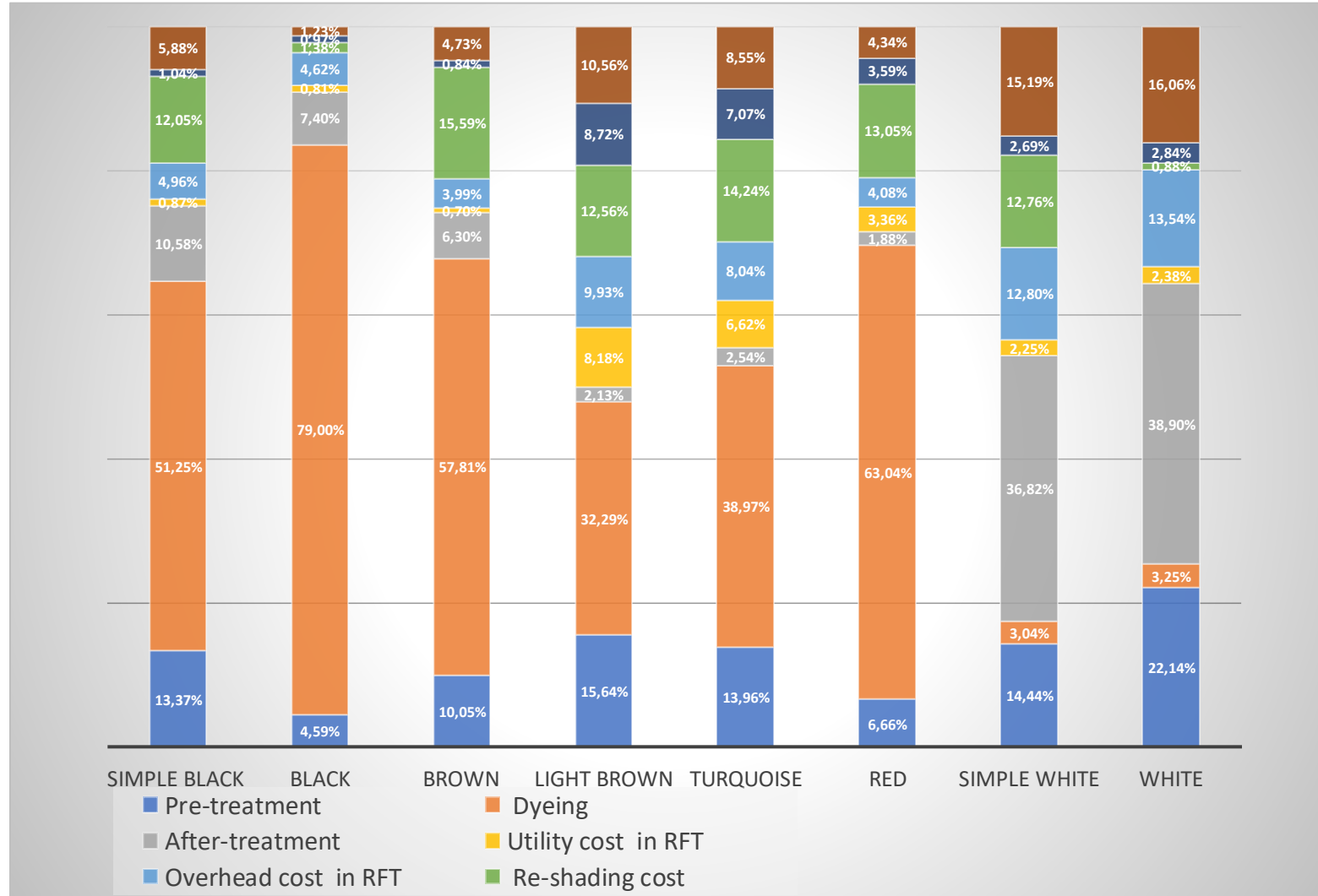
Source: Mohammad Abbas Uddin
2009



Lab to bulk RFT

RFT approach

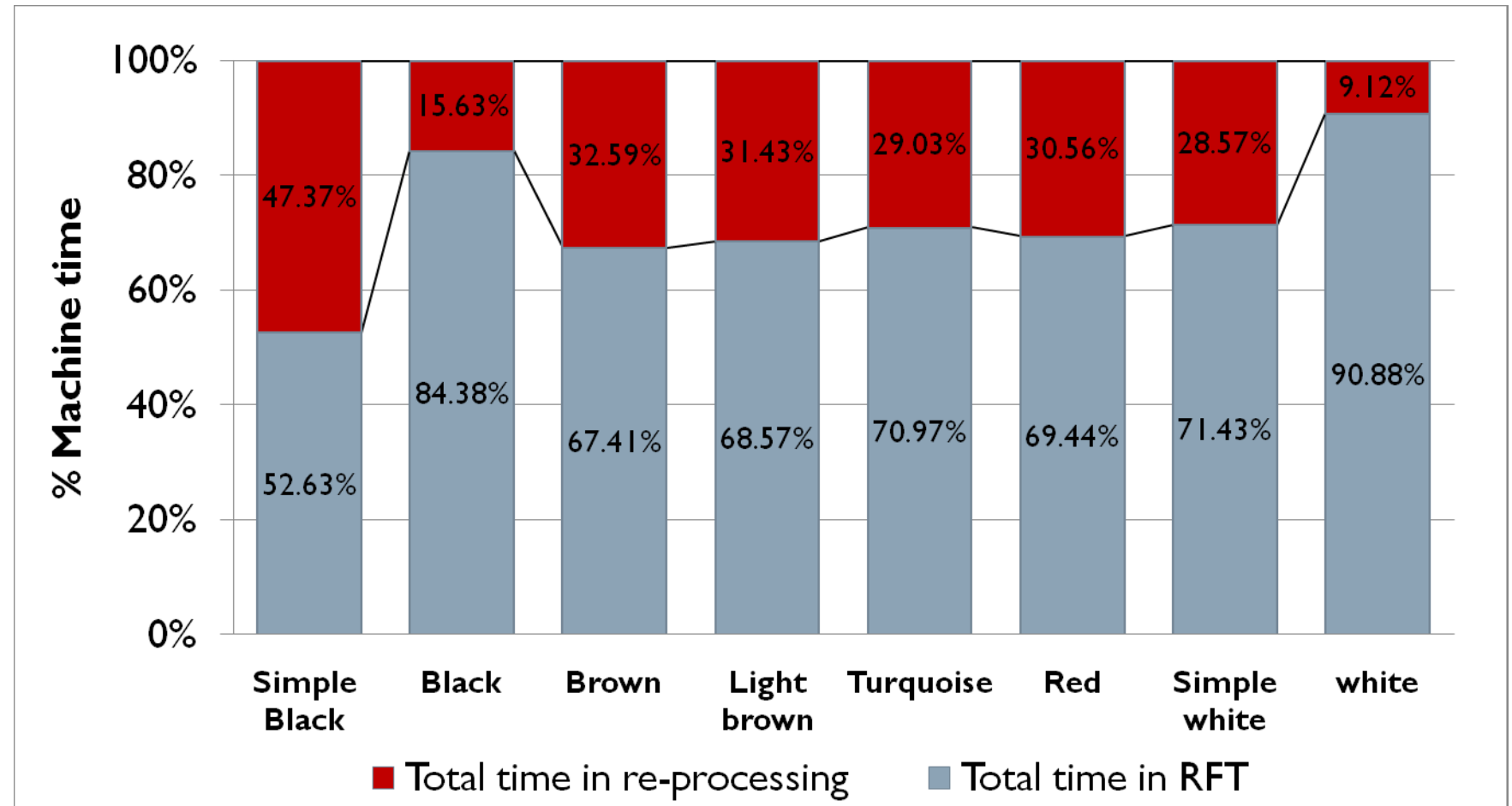
NON RFT – Breakdown of Process cost



Lab to bulk RFT

RFT approach

NON RFT – Impact on Productivity



Source: Mohammad Abbas Uddin
2009

Few Things to Consider before starting

- Reactive dye (Still is the King) for Cotton
- Medium to Dark Shades (Most water consuming)
- Exhaust Dyeing for knit fabric
- There is no Single Technology that could offer all the benefits 😊

Specific wastewater volume for entire textile production

| Specific Wastewater Volume (L/KG Textile) | | | | |
|---|----------------------------------|--------------------------------------|---|---|
| >250 | 200-250 | 150-200 | 100-150 | 50-100 |
| Housekeeping can be improved Short term action is needed | Very high-water saving potential | Water saving potential in most cases | Potential for saving, depends on type of processes (often detailed work necessary to identify the interesting process) | Company with good housekeeping and/or modern machines and/or processes with a low consumption |

The table gives a brief overview, but it needs to be kept in mind that water use depends on fibre, colour, dyeing process, machinery, etc.

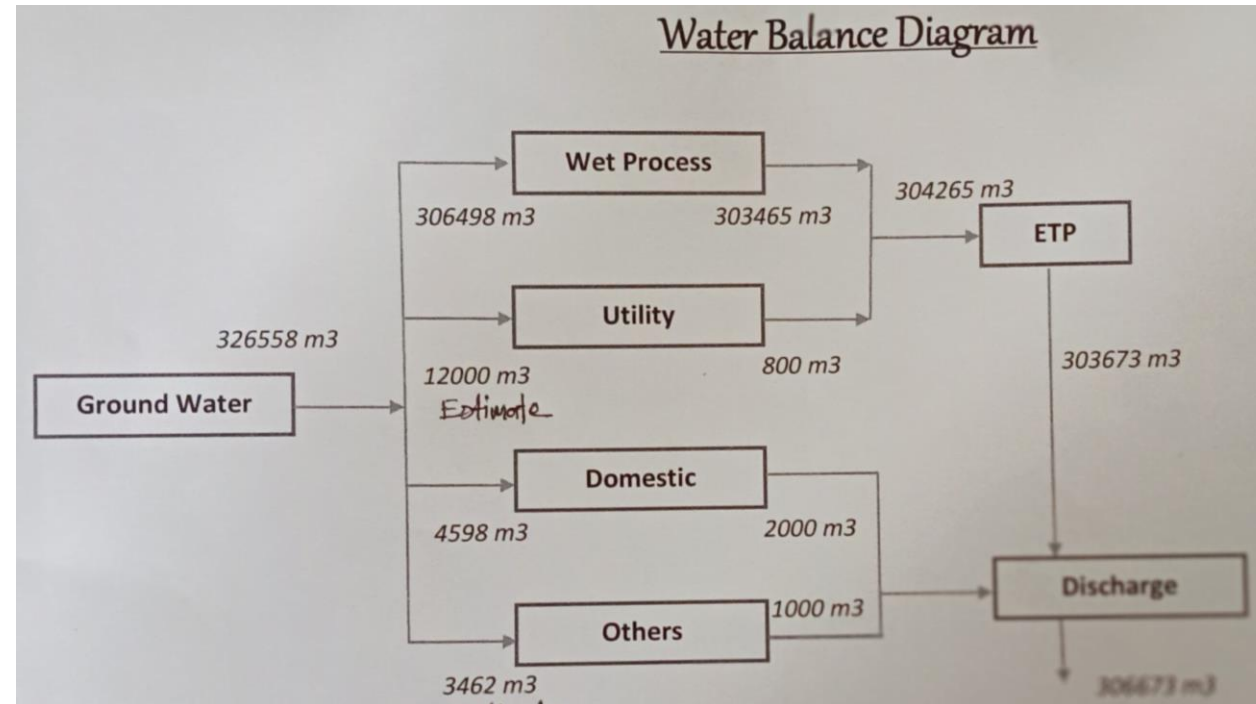
Source: STWI Guidelines for Sustainable Water Use in the Production and Manufacturing Processes of Textiles | 2014

Let's do it

Calculate the RFTs and KPI

1. In first quarter of 2022, Beautiful Colour Textile Ltd produced 2000 t of coloured fabrics from the dyeing of 1200 batches. 175 batches was reprocessed to same colour and 15 batches converted into black. What was the RFT % ?
2. Calculate the groundwater and process water KPIs?

Time: 30 minutes



**Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH**

Registered offices
Bonn and Eschborn

Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Germany
T +49 228 44 60 - 0
F +49 228 44 60 - 17 66

Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn, Germany
T +49 61 96 79 - 0
F +49 61 96 79 - 11 15

E info@giz.de
I www.giz.de