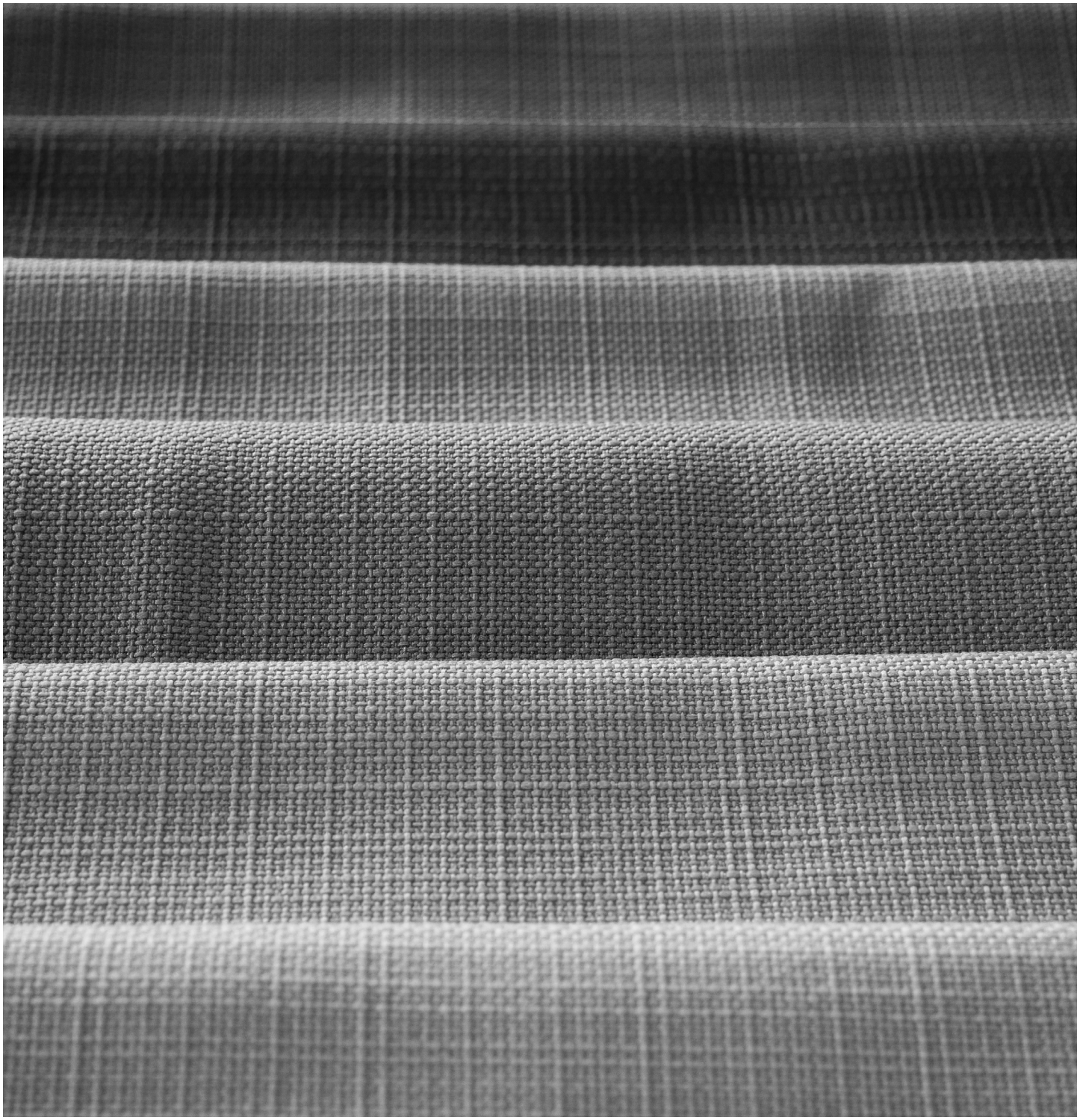

TEXTILE INDUSTRY

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The textile industry holds the record for one of the lowest efficiency in energy utilization and is one of the major energy consuming industry. About 34% of energy is consumed in spinning, 23% in weaving, 38% in chemical processing and another 5% for miscellaneous purposes. In spinning/weaving processes mostly electrical power is consumed, while thermal energy is the major energy in chemical processing. Electrical energy is mainly for running the various processing machinery, and there is a vast array of different processing machines used in textiles. The major consumption of electrical energy in the textile industry is in the manufacture of yarn and cloth, which uses 75—80% of the total power requirement in a textile mill.

OVERVIEW OF EXAMPLES FOR ENERGY SAVING AND RENEWABLE ENERGY INVESTMENTS IN TEXTILE PRODUCTION

GENERAL

— Building energy management systems
— Building insulation
— HVAC
— LED Lighting
— Occupancy sensors
— Solar PV
— Solar hot water

PRODUCTION PROCESS

Utilization and production machines (Textile production has a vast number of processes and sub—processes and accordingly a very wide variety of machinery
(these are not listed here in detail)

— Compressors
— Transformers
— Motors and drives Steam/ heat production
— Heat recovery
— Renewable energy and cogeneration (e.g. CHP)

QUICK—WIN MEASURES IN APPAREL MANUFACTURING

Installation of high—efficiency motors: Replacing old standard—efficiency engines with new high efficiency ones (reference: IE3/IE4) can produce 30% energy savings while generating the same power.

Compressed air distribution: reduction of network leaks in all pipe networks distributing compressed air can safe as much as 30% energy.

Compressed air: decrease of the temperature of intake air and decrease pressure. Lowering the air temperature and pressure reduces the amount of energy necessary to pump air through the distribution network.

LED lighting: On average, replacing previous generation lighting system with LED lights may offer payback in time of as little as 18 months. Install inverter (VSD's) on motors with variable regimes. Inverters reduce the engines' speed to guarantee the minimum amount of energy is used, for instance to ventilate rooms. Energy savings can easily be 50%.

Cold Water Storage: Cooling system can use stored cold water (7° degrees), which is cooled down when energy is cheaper. When energy prices changes throughout the day, it may be convenient to cool a large amount of water, store it and use it in a time when the energy price is at its highest.

Insulation of steam pipelines: Appropriate isolation of pipes can reduce heat losses by 90—95%.

Power factor correction: functioning electrical engines generate reactive energy, which is to be neutralized by power factor correction. This can be done either by the energy producer or by the company using energy. Costs to address this point can be very high in some countries and can be avoided if companies invest in the installation of power correction devices. Replace flat belts with V belts in electrical engines. V belts are more efficient than fat belts.

Install low—loss transformers: Efficient electrical transformers can minimize losses due to constant power supply.

ENERGY EFFICIENCY INVESTMENTS WITH BIGGER WINS IN TEXTILE MANUFACTURING

Introducing Point—of—Use Water Heating in continuous washing machine: Point—of—use gas fired water heaters can be used to enable processes to be run independently of plant central boiler systems. This means that boiler and distribution losses associated with centralized systems can be eliminated. Up to 50% energy savings can be expected.

Heat Insulation of high temperature/ high pressure dyeing machines: Insulation of pipes, valves, tanks and machines is a general principle of good housekeeping practice that should be applied in all steam consuming processes in textile plants. The insulation material may be exposed to water, chemicals and physical shock. Any insulation should therefore be covered or coated with a hard—wearing, chemical/water resistant outer layer. Savings of 2% in steam

consumption per kilogram of dyed yarn. Use of solar energy for de—sizing and scouring enables almost 40—50% energy saving.

Proper pump sizing and multiple pump arrays: Replace oversized pumps against correctly sized pumps and save 15% to 25% of electricity consumption for pumping. Also, invest in multiple pumps for varying loads by installing parallel systems for highly variable loads and your savings go up to 50% of the electricity consumed for pumping.

Discontinuous dyeing with airflow dyeing machine: Airflow dyeing machines have lower liquor ratios than conventional jet dyeing machines. To achieve those low liquor ratios, within the jet dyeing machine, the fabric is moved by moisturized air or a mixture of steam and air only (no liquids), aided by a winch. The prepared solutions of the dyestuffs, auxiliaries and basic chemicals are injected into the gas stream. Up to 60% can be saved on the machine's fuel use.

Vacuum impregnation squeezes out the air from the cloth and provides better dye or chemical impregnation and more uniform application. That means you improve quality AND generate 60—65% fuel saving compared to conventional system.

Vacuum roll extractors save 70—75% in energy. If you are planning improvements in your production process consider a reduction in processing steps by combining some of the constituent wet processing operations in a given processing sequence. This may help reducing the number of e.g. washing and dryings steps. Here are some examples:

— One bath bleaching may reduce electrical inputs by 70%.
— A lower number of ends/ turns jiggers may help in saving around 20% electrical input.
— Eliminate curing in printing and save 100% electrical input for the curing step.

CASE EXAMPLES:

LIGHTING

As a pilot project, a textile company tested the installation of LED lighting in a separated area, which covers about 20% of their production facility. With 58% the electricity savings were very satisfactory. The test also confirmed that there was no negative influence on the microclimate and that the new lighting improved the quality of the working conditions. The company has rolled out the conversion to LED lighting throughout the plant.

MICROWAVE DYEING EQUIPMENT

A textile company invested approximately USD 360,000 in Microwave dyeing equipment and saved 90% energy in comparison to the old beam dyeing machine.

HEAT RECOVERY EQUIPMENT

A company that invested around USD 300,000 into heat recovery (air/water), where exhaust air heat is now used to heat up service water for wet finishing (for example washing, dyeing, and bleaching saved 30% of stenter energy used).

INVERTERS

Adjustable speed drives better match speed to load requirements for motor operations, and therefore ensure that motor energy use is optimized to a given application. Up to 60% of energy can be saved per motor.