Textile industry energy requirements for today and the future

EUPMS
May 13, 2022

"Time for all industries, but especially the textile industry, to dig deep and focus on reducing their energy consumption. As the world pushes for more and more clean/green energy the cost of energy will continue to rise. Now is the time to invest in energy optimization technologies to be able to grow your companies to not only survive but to thrive."

– Russell Mims

Former vice president of Operations at Buhler Quality Yarns, Jefferson, Ga., USA

Submitted by EUPMS

The textile industry is among the most energy-consumptive industries in the U.S.

Energy consumption and its management is more of a critical parameter for the textile industry since energy costs average about 3 percent of the value of shipments. Therefore, energy represents a slightly greater expense for the textile industry than it does for many of other manufacturing industries. Energy costs average approximately 8 percent of the value added by manufacture and can be as high as 25 percent of total production costs for the textile mills.

The overall energy consumption in the industry is a function of plant production rate, plant capacity utilization and increased equipment modernization. The industry's energy efficiency is directly affected by the mill's capacity use. There's a noteworthy relationship between total production efficiency (specific energy use) and the industry capacity of power utilization.

The increase in fiber consumption results in a relevant increase in capacity of power utilization therefore reducing the specific energy consumption. Approximately 40% of the total energy used by the textile industry is consumed in dry processing. Dry processes use energy mainly electric power for machine drive. The other 60% is consumed in wet processing.

Approximately 40 percent of the total energy used by the textile industry is consumed in dry processing; opening, blending and picking or cleaning.

The first operation in a textile mill takes place in the opening room, where bales of cotton or manmade fiber staple are opened. Portions of the fiber staple are placed in opening machines, where the fiber is fluffed and some foreign matter is removed. Two or more fibers can be blended at this point. The fiber emerges from the opening machine as bits of fluff, which are then carried by air to a cleaning machine called a picker. Here, the fiber is beaten and further cleaned, and a loose, uniform sheet of fiber is formed.

Picking machines have historically been used for this purpose, but chute feeding machines have mainly replaced picking machines since they are less labor intensive. Depending on fiber, multiple cleaners may be needed.

Opening consumes approximately 954 Btu/lb of yarn. This is about 10% of the total energy consumed in the yarn formation component of manufacturing. The cotton portion of the opening process consumes almost twice the energy as the polyester component.

The Carding: The sheets of fiber so formed are sent on to card machines. Card machine contains many long, rectangular, slowly moving slats covered with fine teeth against a cylinder with fine wire moving very fast, being this action where extreme short fiber and sead coat fragents are removed. The carding process is designed to achieve a more intensive opening of the fibers, parallelism of fibers, to complete fiber separation and to gather the fibers into a rope-like form, called sliver. Carding consumes an average of 754 Btu/lb for coarse carded yarn with yarn counts of 3.0 to 31 (average of 18.5).

Specific energy consumption varies from 250 to 1,810 Btu/lb. In carding the production of a 55 grain per yard sliver takes 55 percent more energy per pound than does a 65 grain per yard sliver.

The Drawing follows either carding or combing and serves to further improve uniformity, fiber parallelism and fiber blending by doubling and drafting several individual slivers into a single composite strand. The drawing also reduces the cross-sectional area of the exiting sliver.

Drawing is a small component of the total energy consumed and increases somewhat with the finer yarn count. Drawing consumes an average of 163 Btu/lb for the coarse carded yarn (yarn count 18.5) and an average of 270 Btu/lb for the finer combed yarn (yarn count 35). The drawing of a 70 grain per yard sliver consumes almost twice the energy per pound than a 60 grain per yard sliver.

The Lapping (optional) consumes an average 462 Btu/lb for combed yarn (yarn count

of 35) and the range of specific energy consumption is 114 to 705 Btu/lb for a yarn count range of 25 to 49.

The Combing (optional), after lapping the fibers are combed with fine metal teeth. The combing process removes all fibers below a pre-determined length (fibers which are too short to effectively lend support to the body of the yarn), removes any impurities which have not been removed previously in the opening and carding processes, and arranges the fibers in a more parallel order, so as to obtain the characteristic smoothness and strength of fine yarns. Combing consumes on the average 1,074 Btu/lb for a 35-count yarn. This value can vary from 935 to 1,498 Btu/lb for a yarn count of 25 to 49.

The Roving.On the roving frame, individual slivers (either directly from drawing or after combing) are passed between a series of three or four rollers, and are compressed and greatly reduced in diameter. During this process the fibers are given a slight twist, which imparts the first man-made strength, and the resulting roving slivers are wound on bobbins. Roving of carded drawn yarn averages a specific energy consumption of 622 Btu/lb for a yarn count of 18.5.

This consumption ranges from 298 to 975 Btu/lb for yarn counts of 3.0 to 31. Roving of card blended yarns has been reported to have power requirements of 1,136 to 1,520 Btu/lb for yarn counts of 16 and 24, respectively.

Roving of combed yarn (finer counts) requires an average specific energy consumption of 985 Btu/lb for a yarn count of 35. This consumption ranges from 677 to 1,219 Btu/lb for yarn counts of 25 to 49. Roving of draw blended yarns (yarn count of 36) has been reported to have a power requirement of 1335 Btu/lb. The coarseness of the incoming carded or combed yarn has a great impact on the energy consumption in roving. A 1.0 hank roving takes more than three times the energy per pound than the production of a 0.6 hank roving.

The Spinning is the final step in spun yarn formation. In this process draft and twist are applied to the drawn or combed roving or sliver by employing one of the several spinning systems available.

Spinning operations are the most energy consuming steps in yarn manufacturing, comprising between 60 percent and 80 percent of the total energy used in the spinning component. Spinning takes approximately 10 times more energy of the nearest energy intensive process in this component, carding, on a per pound basis.

The average specific energy consumption for spinning carded yarn (18.5 yarn count) is 7,520 Btu/lb. The range of energy consumption is from 1,612 to 20,618 Btu/lb for yarn count s of 3.0 to 31. For combed yarn manufacturing the average energy consumption is 15,695 Btu/lb for a 35-yarn count with a range from 12,060 to 28,490 Btu/lb for yarn counts from 25 to 49.

The Ring Spinning. The most common spinning system today is ring spinning. In this system, the spinning machines draft the input form (roving) to the necessary dimensions, insert twist and form the yarn which is wound on a spinning bobbin. The rate of front roll feed and the spindle speed determine the amount of twist in the yarn. Ring spinning power consumption can be broken down into several components with spinning power, package power, secondary power, and ancillary power being the major components.

The Open-End or Rotor Spinning is significantly different from ring spinning systems in that the spinning operations are performed directly on drawl 1 sliver, i.e. roving is eliminated.

In this process, the staple fibers in the form of a sliver are fragmented as they are fed into a small spinning centrifugal mechanism. Within this mechanism, the fibers are oriented and discharged in yarn form with twisting added through the rotation of the rotor. Open-end spinning is essentially the only process applicable to the spinning operations which conserves energy.

Air-jet yarns have limited applications. This system is particularly suited for synthetic fibers and blends which have a minimum acceptable length and a very high bending modulus. Air-jet spinning does not require lapping, combing and roving. Air-jet spinning production costs are higher than rotor production costs throughout the yarn count range. Air-jet spinning requires more energy for the air compressor and the higher production speed however Air-Jet speeds have increased tremendously over the last years, bringing such difference closer together. Air-jet spinning can also produce finer yarn than rotor spinning.

The Texturizing process increases the covering power or apparent volume of continuous filament synthetic yarns so that their appearance more clearly resembles that of conventional (natural) spun yarns. A number of processes can be used for yarn texturing including torsional crimping, edge crimping, compression crimping and air texturizing. Texturizing consumes between 11,694 to 33,400 Btu/lb, and average specific energy consumption of 20,500 Btu/lb.

The Weaving component is one of the two principal methods of fabric construction. For weaving, it is necessary to coat most warp yarns with a plastic sheath (via sizes) to protect the yarn during the weaving operation.

Warping is a winding process in which the warp yarns (the longitudinal yarns in a piece of fabric) for either weaving or warp knitting are arranged side-by-side on a large spool (warp beam) to the desired width of the fabric to be woven. The average specific energy consumption in winding spinning bobbins to packages is 850 Btu/lb at a production rate of 5.5 pounds/hour/position.

This process is not considered a major user of energy, but as yarn counts becomes finer, energy consumption escalates. The lower counts consume less energy while the higher counts consume 2,150 Btu/lb or more.

The Slashing. Following warping, yarn which is used for weaving is commonly fed through the slashing (sizing) process. Slashing consolidates the proper number of warp yarns on the warp beam for the fabric construction, coats the yarn and then dries it. Slashing consumes less than 2,500 Btu/lb. A typical slasher 800 Btu/lb of electrical energy

In the weaving process, the warp (longitudinal) and filling (transverse) yarns are interlaced in a loom to form the fabric. In the simplest shuttle loom, harnesses raise and depress alternate warp yarns to form an opening called a shed. The electrical energy used in overall weaving, which includes an unspecified mix of weaving technologies, range from 3,540 to over 13,850 Btu/lb. The average energy usage in weaving is about 5,440 Btu/lb.

The Knitting is the second method of fabric construction. The fabric may be formed either by circular knitting, or by warp knitting, in which the fabric is formed by looping together warp threads as they are fed collectively from a warp beam. As result the supply yarns for knitting may be on cones for circular knitting or they may be on warp beams for warp knitting. Knitting consumes between 3,540 and 10,860 Btu/lb.

The Environmental Control in textile processing plants is very important maintaining satisfactory process efficacy, product quality and static control. Both relative humidity and dry bulb temperature must be controlled. It is strongly advised the use new technologies to optimize such energy requirement. Such energy efficiency constraint must respect the chilled water temperature set-point therefore guarantee normalcy in all process.

The HVAC System (chiller) is designed to remove the heat from the production area, cascade it back through the Air Washer loop, then through the evaporator and compressor loop, then into the cooling tower loop for dissipation to the outside atmosphere. The breakdown of the average

Power usage is 60% for the chiller, 10% for the cooling tower, and about 30% for the air washers. However not all components, such as the chillers or air washers, operate all year round.

Air compressors, balers, motors (fans, circulating pumps, etc.), air handlers (AHU), rooftop units (RTU), electrical boilers, electric steamers, should be connected to an intelligent energy optimization System that must respects Plant's process, equipment reliability and quality requirements in a preferably tailored, fully automated process that doesn't require local assistance.

Today's technology allows real-time power management interfaced with the utilities metering devices (eupms.com) therefore producing synchronized and simultaneous load optimization that, depending of the existing electric supply contract, may substantially reduce peak demand (kW) and active power or consumption (kWh).

A typical HVAC system (chiller) adds an average of 5,530 Btu/lb to Plant's energy consumption (+20%) in a greige Mill.

The following identifies energy consumption of individual processes accomplished on typical preparation ranges:

<u>The Scouring</u>. The fabric may be scoured in open width or rope form by applying a solution of caustic, some solvent (to remove waxes and some blended fabrics), a suitable detergent, and allowing adequate retention time for the solution to remove impurities from the fabric. The specific energy consumption of this operation varies from 850 to 1,090 Btu/lb.

Average energy consumption values are 95 Btu/lb for the caustic saturation process, 75 Btu/lb are consumed in the J-box, and washing can consume as much as 2,100 Btu/lb. This yields a total of 2,270 Btu/lbf or a rope batch range which should be considered a typical upper value. The scouring process on a rope preparation range consumes on the average 1,350 Btu/lb.

<u>The Bleaching</u> is required if the finished natural fiber or blended fabric is to be white or dyed.

Bleaching operations on a continuous open width preparation range includes bleaching, J-Box steaming and washing which consumes between 1,335 to 4,345 Btu/lb. Bleaching, steaming and washing on a rope preparation range consumes about 850-870 Btu/lb. On a rope range, the bleaching sub-steps consume the following specific energy: Peroxide saturation – 200 Btu/lb; Peroxide steam – 300 Btu/lb; Peroxide J-box – 120 Btu/lb; Peroxide wash – 230 Btu/lb.

The Mercerization of cotton fabrics is accomplished by applying a caustic solution (more concentrated than that used for scouring) in a multiple dip operation to cause swelling of the cotton fiber. Mercerizing consumes an average of 1,575 Btu/lb. Open-rope fabric on a mercerizer range is processed through a water mangle, mercerizing and drying consumes between 5,350 and 6,670 Btu/lb.

The Dyeing. Fabric dyeing may be accomplished by either a continuous or batch process. The majority of woven fabric is continuously dyed with pad/squeeze type of equipment.

Continuous woven fabric dyeing is basically accomplished on a continuous dye range which applies one of the following three methods:

Thermosol oven pad/steam or Thermosol and Pad/steam. Energy consumption for polyester thermosol dyed is about 2,400 Btu/lb; for cotton, pad/steam dyed 6,760 Btu/lb; for polyester/cotton dyed by thermosol and pad/steaming ranges from 6,390 to 8,550 Btu/lb, averaging 7,345 Btu/lb. Dye range energy consumption can vary from 1,000 to 9,000 Btu/lb, averaging about 5,900 Btu/lb. About two-thirds of this energy is lost through the exhaust stacks and about one-third is lost via the effluent water. Other continuous dyeing methods and their associated average energy consumption areas follow: pad/batch 3,570 Btu/lb; pad/dry 5,270 Btu/lb; pad/dry/bake 5,895 Btu/lb; pad/dry/chem pad/steam 6,050 Btullb; and pad/dry/ thermofix/chem pad/steam 6,980 Btu/lb.

The energy required in the batch dyeing of woven fabrics by atmospheric becks varies from 5,820Btu/lb to as high as 24,100 Btu/lb.

In jet-dyeing of woven fabrics, a horizontal, tubular-type jet consumes 4,500-5,100 Btu/lb without heat recovery, or 2,100-2,700 Btu/lb with cooling-water heat recovery. Autoclave-type jets consume 3,300 Btu/lb without heat recovery, or 1,500 Btu/lb with heat recovery.

Energy consumption of jigs averages 1,765 Btu/lb, varying from a low of585 to 2,950 Btu/lb. Hosiery dyeing machines such as paddle dyeing machines and rotating drum machines consume an average of 23,500 Btu/lb

The Printing is normally accomplished by a semi-continuous flat screen process, continuous rotary screen process, or a roller printing process. A typical rotary screen print range consumes an average of 9,570 Btu/lb varying from 505 to 15,150 Btu/lb.

The Finishing operations normally involve the padding of a specific chemical onto the fabric, drying, and curing to fix the finish. Finishes such as antistatics, fire retardants, softeners, water repellents and durable press resins may be applied. The average energy consumption of a chemical finishing range is 5,685 Btu/lb, with a variation from 4,050 to 8,000 Btu/lb. If fabrics need to be drier before finishing, an additional 2,470 Btu/lb are necessary.

A typical sanforizing range consumes 1,310 Btu/lb, since this process only involves fabric shrinkage with a rubber belt unit and permanent-press resin curing to stabilize the shrinkage.

The average energy consumption of the chemical finishing ranges is 2,360 Btu/lb, with a variation from 415 to 6,760 Btu/lb. Two-thirds of this energy is lost through the exhaust stacks, and radiation losses vary from 2% to 30%. Properly maintained insulation and housings can correct energy losses.

The Knit Fabric Dyeing and Finishing Component

Knit fabric preparation primarily consists of scouring and bleaching. The average specific energy consumed in knit preparation is about 2,660 Btu/lb.

Recent figures for atmospheric beck dyeing of knits vary from a low of 1,620 to 3,850 Btu/lb. Pressure jet dyeing of knits can vary from 1,600 to 6,260 Btu/lb. A typical energy consumption value for knit dyeing would be about 5,890 Btu/lb.

The printing of knit goods is less common than for woven goods, but may be accomplished with any of the same processes.

The finishing of knit can merely be washing and subsequent drying of the fabric with typical energy consumption value chemical finishing of about 2,360 Btu/lb.

The Floor Covering Component. The principal steps in carpet and rug manufacturing are as follows:

• Heat-setting or thermosetting; after the spinning process, the yarns are twisted. After twisting, the yarns are heat set in an autoclave at high temperatures and pressures. The average energy consumption in twisting is 4,500 Btu/lb at a production rate of 0.833 pounds/hour/position.

• The Tufting is the process of attaching carpet yarn to a primary backing material and it can consume a vast range of energy from 185 to 2,000 Btu/lb.

• The Dyeing. Tufted carpet produced from undyed yarn is dyed or printed using several methods; the average energy consumption value for Kuster dyed tufted carpet is about 6,150 Btu/lb and atmospheric beck dyeing consumes about 6,000 to 7,500 Btu/lb.

• The Drying. Once the color has been established, the carpet is dried. Batch dyed carpet is sewn together to form a continuous run of material through the drying range. The dried carpet is then ready to print and/or receive the secondary backing.

• The Printing. The prevalence of carpet printing has increased in recent years; the method that is being phased out is flatbed screen printing and it consumes between 18,000 and 60,000 Btu per square yard of carpet which is approximately 7,200 to 24,000 Btu/lb. After printing, the carpet is cured and then washed in the same manner as for continuous dyeing.

• The Finishing operations in floorcovering consist of the spraying of chemicals and a number of mechanical processes which improve the appearance of the product. Chemical finishing consumes between 1,200 and 3,900 Btu per square yard of carpet.

TEXTILE MANUFACTURING TECHNOLOGIES

The textile industry has the unique characteristic of modernizing in a very gradual and systematic way. Its ability to make changes on a single piece of process equipment without any drastic risks to the production line or to the financial health of the company has provided the industry with the advantages of flexibility.

Leading companies have increased their energy awareness, and are emphasizing computer monitoring of all process steps in terms of quality, production rate and energy consumption.

Inspecting and real-time power managing selected equipment using state-of-the-art automated systems that are able to keep control the increasingly demanding electricity costs, impacting sustainability. Such proven and reliable high-payback technologies enhance the quality of economic productivity and guarantee its suitability for the global market competitiveness.

A focused and selective checklist to select new technologies must be done by highly skilled professionals to avoid selecting expensive and unreliable solutions that instead of contributing to business sustainability aggravate energy-dependent equipment impacting processes and producing the inappropriate outcome.

A proven and cost-effective innovative technology like the Intelligent Demand Response Systems provided by EUPMS.COM are a safe and guaranteed pathway to energy conservation and rational usage of power when resources need to be skillfully applied. Textile-producing companies regard such steps as a competitive edge where new technologies must be diligently applied and adopted in order to minimize manufacturing costs, improve quality and overall productivity to provide more flexibility in their product offerings.

The industry has already begun to meet these challenges by implementing many low-cost, fast ROI conservation measures, and developing some technology improvements that offer the side benefit of increased energy efficiency. The industry's strategy is to introduce energy-saving techniques through process optimization/modification.

Energy conservation and rational use of energy in the textile industry has been achieved by:

• Maximizing output per unit duration of various electrically driven machines;

• Incorporating effective automatic controls;

• Reducing and combining processing steps;

• Using less water intensive processes or those which require low evaporative drying, since water; consumption and energy requirements are virtually inseparable;

• Installing the proper size and maintaining electric motors (with VFD’s) and equipment;

• Improving thermal insulation;

• Increasing energy awareness and process energy monitoring;

• Tightening controls on batch dyeing equipment;

• Conducting energy conservation seminars and gatherings;

• Improving lighting level controls;

• Recovering hot water;

• Employing microprocessor-based moisture controls on dryers and curing ovens and using differential pressure controls in steam stacks;

• Reclaiming heat with heat exchangers;

• Using efficient HVAC units combined with real-time electric load management;

• Using vacuum extractors;

• Using efficient dye/finish application equipment;

• Operating with more continuous processing;

• Controlling wet pick-up (WPU);

• Shortening of processing sequences;

• Shutting off non-essential equipment, reducing down-time and change-overs;

• Recovering boiler condensate;

• Maintaining steam-traps;

• Recovering boiler blow-down heat;

• Attempting to level energy demand curve with Intelligent Demand Response Techlology

• Employing counter flow wash-boxes;

• Limiting wash-box flows;

• Limiting air flows;

• Preventing fabric over-drying by using humidity sensors;

• Running the mill against overall composite plant energy standards;

• Using low liquor batch dyeing machines;

• Having cost-effective maintenance and lubrication cycles done by trained technicians;

• Having a dual drain system: one for cold effluents and one for hot effluents thus recovering heat.

Energy Conservation procedures oriented to:

Dry Processes. Although the amount of energy consumed in dry processing is considerable, a relatively small amount of the energy conservation work done in textile industry has been directed toward dry processes. Most of the energy savings in dry processing can be realized by improving the design and sizing of electric motors as well as reducing the air conditioning requirements. The general technical thrust has been to simplify operations by reducing the number of process steps.

Yarn Formation. The direct-feed carding system is more efficient than the conventional methods and eliminates the need to transport the fibers between each stage.

Spinning. An average of 30 percent of the yarn used in weaving is produced by the open-end method. Air-jet spinning, which is rapidly becoming the state-of-the-art in certain yarn counts, and friction spinning have generated great interest among yarn producers because of the high speeds and quality output of these systems. Open-end spinning frames can produce yarn routinely at 250-300 ft/min, and new air-jet spinning equipment delivers output as high as 600 ft/min.

Texturizing with air-jet crimpers is a replacement for mechanical false-twist texturizing. The state-of-the-art machines can texture yarn a t over 3000 ft/min and improving.

Weaving. Shuttleless looms operate at three times the rate of conventional shuttle looms, and in addition to improving productivity, these looms are quieter and take up less floor space per unit of production than conventional looms.

The current trends in weaving technology are:

• Rapier technology offering advantages of versatility, high productivity, short set-up times, easy turning and low strain on warp and filling yarns;

• Air-Jet technology providing high efficiency for standard fabrics, high production with low space requirements, and a favorable price/productivity relationship.

Knitting is not an energy-intensive process. One development that will become firmly entrenched is a knitting system without needles, or at least without latch needles. Needle costs can be very high. A 28-cut machine uses about 6,000 needles with an average life of six months. In order to cut production costs, knitting mills must adopt this system.

Warp knitting machines will continue to dominate in the drapery and apparel material markets which demand sophisticated patterns.

Synthetic Lubricants. A relatively small amount of energy conservation work done in the textile industry has been directed toward dry processes. Besides replacing old motors with high efficiency motors and utilizing variable speed controllers (VFD), some mills are now using synthetic lubricants instead of petroleum lubricants with an increase efficiency up to 27% over equipment using traditional petroleum-based lubricants.

Wet Processes. The wet processing of textiles is the most energy-consumptive part of textile processing. Energy conservation efforts entail reducing water consumption per pound of fabric, reducing the number of washings and dryings between processes as well as shortening their duration, lowering process temperatures, and using other low-cost mediums which have a lower heat of vaporization than water, such as solvents. Air is ideal since it is already gaseous and there is no heat required for vaporization.

Some of the more energy efficient wet processes are:

• Warping/slashing. One system that saves energy and serves as a cost-reducer is the combined warping and slashing single operation. Efforts to reduce energy consumption in slashing involve lowering the cooking and drying temperatures.

• High-pressure squeezing. New systems are able to remove more moisture from the warp yarns before they pass over the dryer cans, thus reducing the drying energy requirements. The electrical energy requirements are higher for the high-pressure system because a larger motor is required to produce the higher roll pressures. The increased electrical energy is small in comparison to the savings gained in drying. Other advantages of the high-pressure systems are faster slashing speeds and better size penetration. The primary disadvantage is that size migration to the surface is decreased causing a "flattening effect" to the yarn.

• Fabric preparation accounts for about 17 percent of the total energy consumed by the textile industry. A logical approach to energy conservation is to shorten the sequence events by combining the operations of desizing-scouring-bleaching (DSB) into one stage. Such as a combined DSB process would establish conservation through elimination while drastically reducing operating costs. Overall energy conservation potential for KPP fabric preparation is approximately 1,875 Btu/lb per comparison with conventional fabric preparation.

• Solvent processing offers the prospect of substantial energy savings over conventional aqueous processing, principally because about 8.5 times more energy is required per pound to heat and vaporize water than to heat and vaporize typical organic solvents.

The future energy conservation in the textile Industry

Textile manufacturing of the future is envisioned by experts as demanding more continuous and higher speed operations with higher and more consistent quality, and will promote quick response to demand. The potential impact of advanced textile manufacturing technologies on energy consumption and production efficiency is large and processing speeds will continue to increase.

The closely coupled operations of the future textile manufacturing process will require much closer control and more rigorous limits. To achieve this, continuous real-time monitoring is essential together with the development of reliable/low-maintenance sensors, measuring procedures, computer controls, robotization and automatization are critical to the successful implementation of advanced textile manufacturing technologies.

Such monitoring and automated control systems will demand electricity, causing the electric energy use by the industry to increase as the thermal energy use will be fast decreasing. Compressed air consumption will also increase as the result of more air-driven machines used in the spinning, weaving and texturizing components. Friction spinning systems will dominate air-jet spinning systems since friction spinning offers higher speeds of production.

The key to energy savings through automation, computer monitoring and controls is to establish proficiently prepared process energy standards so that wasteful deviations as well as improvements can be identified and quantified. There is no room for less trained labor or consequences can be high and market competition will be merciless to less skilled mills.

What are the impacts of rising energy prices?

The sharp rise in the price of energy is undermining the financial balance of companies, in particular the textile industry that consume gas or electricity. A fragile balance that is forcing industry to look for solutions in their energy consumption requirements.

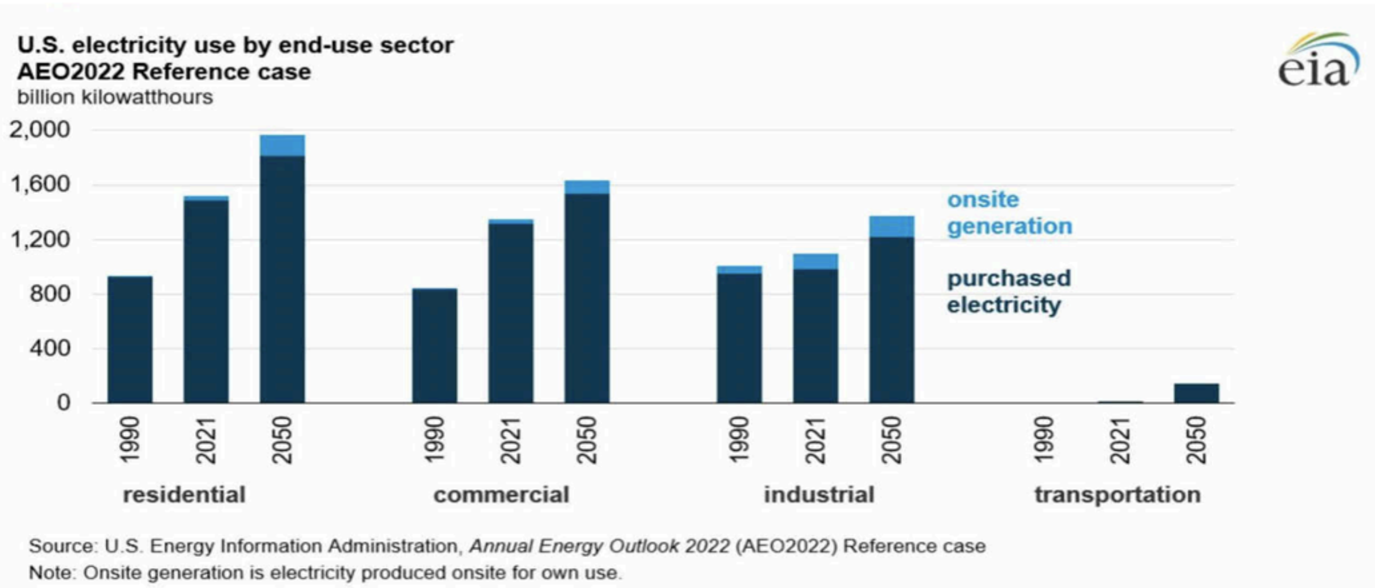
The impact on business activity is not homogeneous:

As a first step, companies that have evaluated energy purchasing strategies in advance will be able to protect themselves from the impact in the immediate future. Most part of electricity users have not anticipated such eventual strategy.

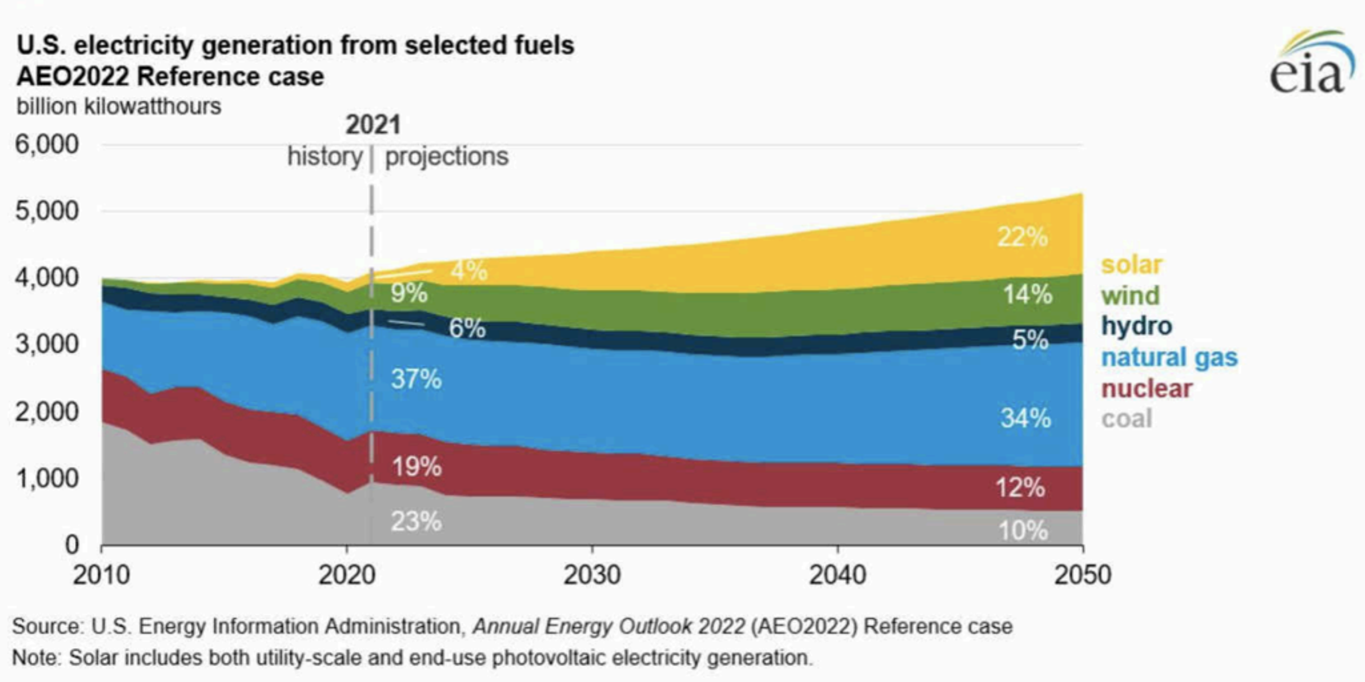
In a second step, even companies that have assessed energy purchasing in advance will be affected. Utilities contracts will expire or will or will be not appropriate for the power usage profile and they must be renegotiated upwards. They will be able to smooth out the rise together with energy efficiency strategies, power optimization and cost-effectiveness rare now irreplaceable since the rise in energy prices is here to stay, demanding proficient rational use of resources.

This cost-increase is not cyclical: it is structural. It is, of course, galvanized by one-off factors such as China's energy consumption, which is higher than expected, or the problems of the Nord Stream 2 pipeline for Europe's gas needs. But the reality is that energy demand is increasing everywhere and solutions like nuclear power are long and complicated to implement. As a result, the basic problem is that per capita consumption is increasing non-stop.

We are consuming more and more energy, including gas and coal, and projections for 2030-2050 point to a very complicated situation.



The so-called green solutions aren’t going in the short term serve the growing demand of power, although current strategies are anticipating results suitable for the consumer.



The best solution would therefore be to reduce consumption, especially for the industrial sector, which consumes a lot of energy and in many cases does not have a strategy in place to rationalize their power usage. In other situations, expensive solutions were selected but many without careful criteria of the relation cost/benefit therefore generating additional concerns instead of leaving the focus into the production and manufacturing.

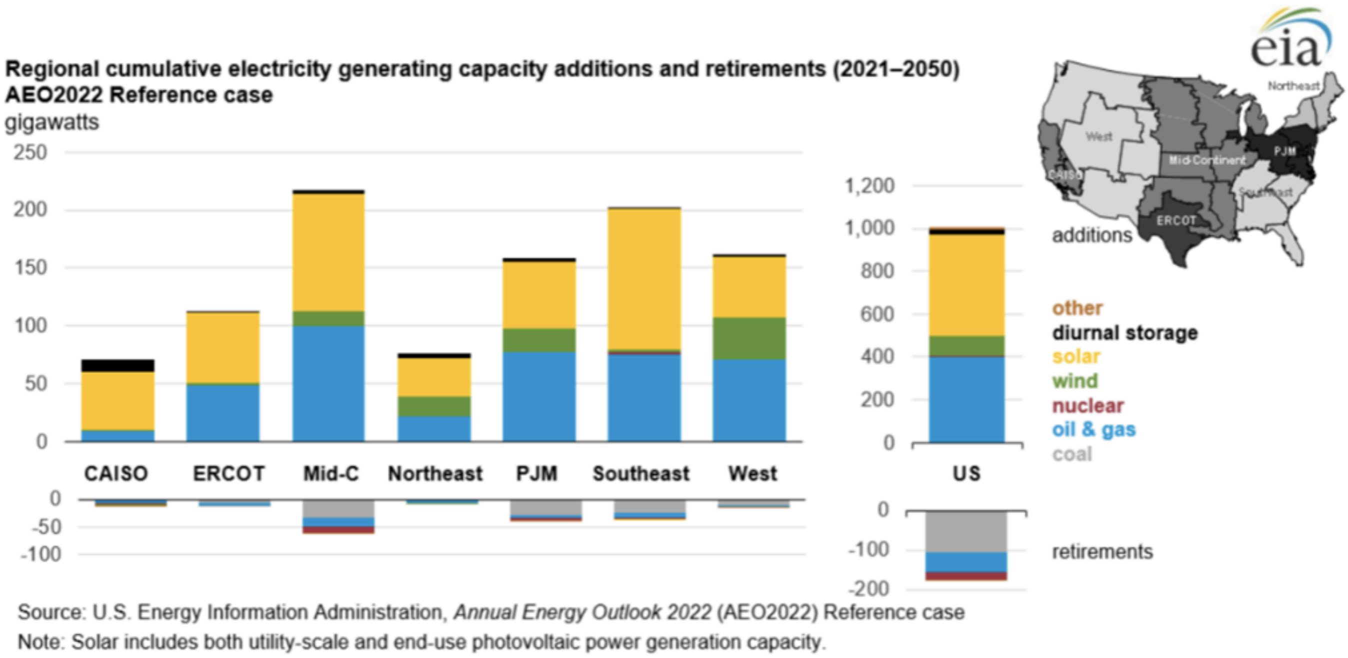
Undoubtedly, the industrial sector is the most vulnerable since its raw material is energy. In addition, it is an activity that is little worked in search of tailored optimizations, so when its budget is multiplied by two, the impact is direct and significant.

A second sector that we must be considered is that of transportation. Even though they are more dependent on oil than on electricity or gas, they face an increase in fuel prices as all sectors are on the rise impacting the textile industry so reliant on transportation.

It's essential to structure the purchasing process to smooth the increase. It is necessary to protect oneself for future years and anticipate purchases and energy needs, which implies a clear internal strategy to follow the energy market and avoid buying at the worst time.

The industry must act smart, because prices will not fall in the coming years according to projections. It is therefore necessary to move towards energy efficiency and better consumption patterns to reduce the energy bill. Proven technologies with a fast pay-back and guaranteed results are not an option but an urgent necessity.

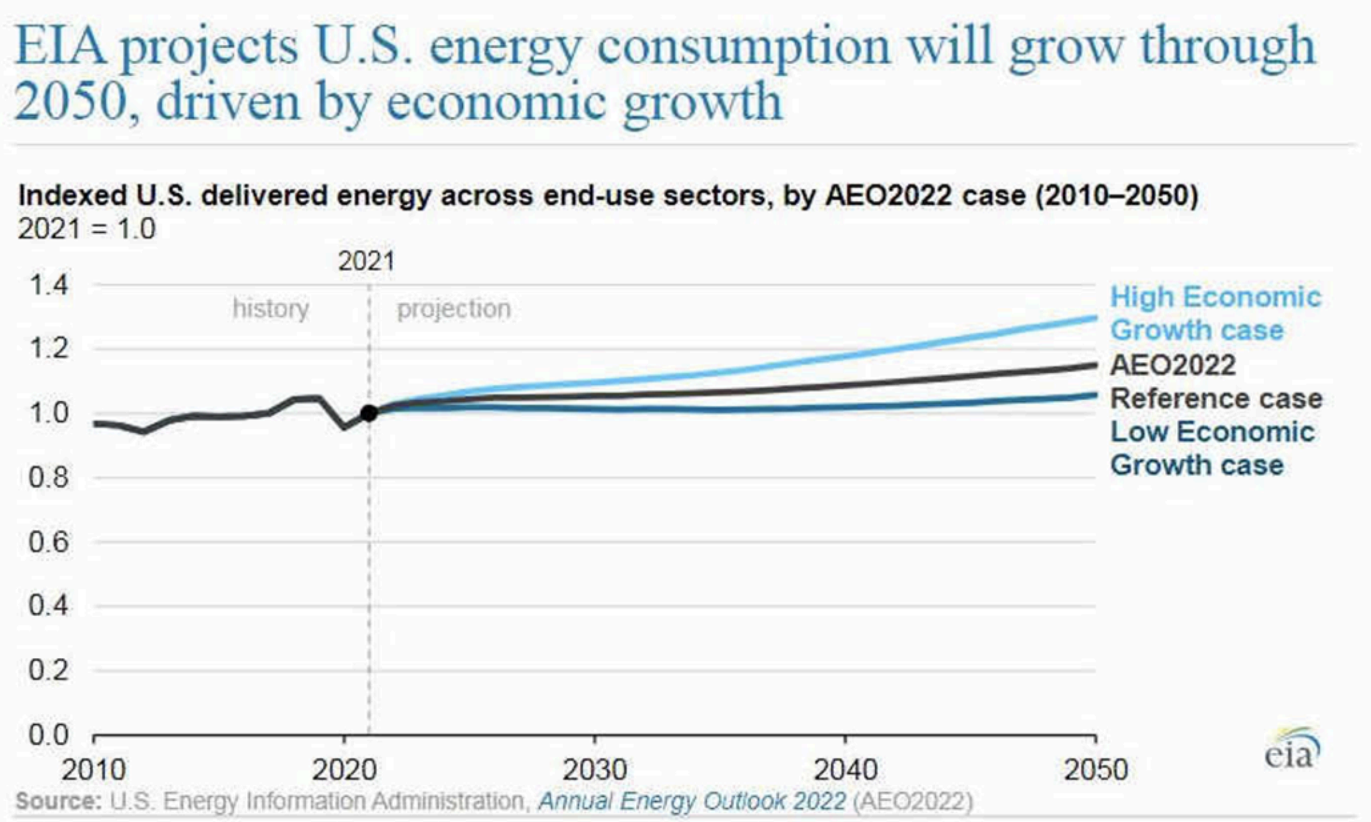
The decarbonization of industry and all support plans for the reduction of emissions must be used in a thoughtful, coherent and strategic way to become real levers for the rationalization of the price in the medium and long term. Some companies can compensate for this increase with the adapted contracts that exist in their sector by working during off-peak hours, weekends and evenings, the cost of production can be reduced. However, this is not a suitable long-term strategy and may have serious impact in production goals.



The solution must come from a medium- and long-term vision for the entire sector, or even the US. Consistent and adequate alternatives must be considered, explore energy efficiency solutions in the market that are compatible with the industry requirements and balance professionally each benefit and thoroughly document each and every result. The textile industry reached a moment where there's no room for less qualified professionals balancing mills energy requirements.

Price inflation is an international phenomenon that impacts solutions for manufacturers. The same advice applies everywhere: anticipate purchases, transform your industry and look for all the mechanisms available to optimize your energy consumption. However, this is complicated for manufacturers who rely heavily on their production tools; because energy consumption will always be high therefore adequate technical skill are in demand to manage resources.

The use of digital automation and controls can help to make more in-depth diagnoses to look for the best available strategies. EUPMS.com digital solutions help the textile industry for over 18 years in reducing their energy consumption between 15% up to 30% with a proven technology.



The price of energy is predestined to rise, and companies must face it competently. It will be necessary to implement many of the strategies described above, anticipate future purchases, reduce current energy profile by optimizing processes and power use and think about the indispensable transformation of the industry, facing productivity in better energy patterns.

Companies need to be careful about the electricity supply contracts they sign. Some contract clauses may present risks of high price variation or revision, work with a professional that can guide the best option while plant's electric profile is known and analyzed both in consumption (kWh) and in Peak Demand (kW). It is necessary to buy energy intelligently, in a specific strategy and vision, while being adapted to internal constraints and resources.

Citizens are becoming more aware about environmental projects and alternative energies, now it is necessary to integrate these concerns into the actions of companies.

References:

D. Balmforth, ITT, "Energy Consumption Patterns in the Textile Industry"

American Textile Manufacturers Institute, "Energy Reports"

Georgia Institute of Technology, "Energy Conservation in the Textile Industry"

Joseph S. Baldwin and Howard E. Lowitt," The US Textile Industry", Columbia, Maryland

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