KUNDLI MIX INDUSTRY

CLUSTER REPORT

IMPRINT

Global Green Growth Institute (GGGI)
M-6, 3rd Floor, Hauz Khas
New Delhi-110016, India

Energy Efficiency Services Limited (EESL)
6th Floor, Core - 3, Scope Complex,
Lodhi Rd, New Delhi,
Delhi 110003, India

We acknowledge the cooperation extended by Local Industrial Associations & Government Setups at Kundli

CONTRIBUTING AUTHORS

Global Green Growth Institute (GGGI)
Mr. S.P. Garnaik, Regional Lead -GBI (Asia)
Ms. Neha Sharma, Energy Efficiency Officer

Energy Efficiency Services Limited (EESL)
Mr. Anil Kumar Choudhary, Head (Operations)
Mr. Girja Shankar, Head (CDP)
Mr. Amit Semwal, Technical Expert

Federation of Indian Chambers of Commerce and Industry (FICCI)
Mr. MA Patil, Assistant Secretary General
Mr. MN Girish, Director
Mr. Surender Kumar Verma, Additional Director
Mr. Pushpendra Nayak, Additional Director

Study by:
Federation of Indian Chambers of Commerce and Industry (FICCI)
Federation House, 1, Tansen Marg, New Delhi 110001, INDIA

TABLE OF CONTENTS

DISCLAIMER

This Cluster Profile Report for Kundli Mixed Cluster, Kundli, Sonipat district, Haryana has been prepared by Federation of Indian Chambers of Commerce & Industry (FICCI) and submitted to Global Green Growth Institute (GGGI)

The inferences and analyses made by FICCI in this report are based on information collated through primary research, secondary research, discussions with the industry personnel and key stakeholders and our knowledge. FICCI has taken due care to validate the authenticity and correctness of the information from various sources, however, no representations or warranty, expressed or implied, is given by FICCI or any of its respective partners, officers, employees or agents as to the accuracy or completeness of the information, data or opinions provided to FICCI by third parties or secondary sources.

Nothing contained herein, to the contrary and in no event shall FICCI be liable for any loss of profit or revenues and any direct, incidental or consequential damages incurred by the Client or any other user of this report.

In case the report is to be made available or disclosed to any third party, this disclaimer along with all the limiting factors must be issued to the concerned party. The fact that FICCI assumes no liability whatsoever, if for the reason any party is led to incur any loss for acting upon this report, must be brought to the notice of the concerned party.

ACKNOWLEDGEMENTS

Global Green Growth Institute (GGGI) works to strengthen India's energy security of India by aiding the design and implementation of policies that support renewable energy, energy efficiency and sustainable transport solutions. FICCI would like to express its sincere gratitude to Green Global Growth Institute (GGGI) for supporting the project on "Scaling Up of Investments through ESCO Mechanism in MSME Clusters by Deploying Standard Energy Efficient Technologies (SEET)" and preparation of profiling report for Kundli Industrial Cluster in India. We are thankful to Mr. S.P. Garnaik, Regional Lead -GBI (Asia)-GGGI, Ms. Neha Sharma, Energy Efficiency Officer- GGGI for their proactive support and guidance to the team during the entire process.

The team at FICCI is indebted to Kundli Industry Association (KIA); Kundli Cold Storage Association and Kundli Statinless Steel Houseware Association for providing support and information related to Auto Part, Engineering Services, Printing & Packaging, Cold Storages, Kitchen & Houseware Utensil Manufacturing Mix Cluster Industries in the Kundli, Sonipat cluster. FICCI extends its sincere thanks to Shri Subash Gupta, President, Kundli Industries Association (KIA), Mr Atul Goel, President, Kundli Cold Storage Association, Mr. Pawan Kansal, President, Kundli Stainless Steel Houseware Association, Mr Sanjeev Chawla, Director, MSME-Development Institute, Karnal, for preparation of this cluster profile report. FICCI extends special thanks to Mr Ravi Prakash, Asst. Director, MSME-Development Institute, Karnal, for close maintaining coordination with the team, organizing visits to industries, and providing data and inputs during field visits.

We would like to convey our sincere thanks to Energy Efficiency Services Limited (EESL) officials for their involvement and valuable inputs during the preparation of this report. We are thankful to Mr. Anil Kumar Choudhary, Head (Operations), EESL; Mr Girja Shankar, Head (CDP), EESL; Mr. Amit Semwal, Technical Expert, EESL for their valuable inputs.

Also, we must extend our sincere thanks to MSME entrepreneurs and other key stakeholders who gave us their valuable time and insights with respect to various dimensions of the industry and its support requirements. Without their help, capturing the industry insights would not have been possible.

ABBREVIATIONS

Short Form	Full Form
BDS	Business Development Services
BLDC	Brushless Direct Current
CFM	Cubic Feet per Minute
DG	Diesel Generator
DIC	District Industries Centre
DMC	District MSME Centre
EESL	Energy Efficiency Services Limited
ESCO	Energy Service Company
GGGI	Green Global Growth Institute
HCCI	Haryana Chamber of Commerce and Industries
HCMA	Haryana Carpet Manufacturers Association
HSD	High Speed Diesel
HSIIDC	Haryana State Infrastructure & Industrial Development Corporation
HUM	Haryana Udyam Memorandum
IMT	Industrial Model Township
KIA	Kundli Industrial Association
KVA	Kilovolt Ampere
KVAH	Kilovolt Ampere hours
KWH	Kilowatt-hour
MSME	Micro, Small, and Medium Enterprises
MSME-DI	MSME–Development Institute
NH	National Highway
PLC	Programmable Logic Controller
PNG	Pipeline Natural Gas
PNG	Piped Natural Gas
SEET	Standard Energy Efficient Technologies
SS	Stainless Steel
TFH	Thermic Fluid Heater
TOE	Tons of Oil Equivalent
UIA	United Industries Association
VFD	Variable Frequency Drive

KUNDLI MIXED INDUSTRIAL CLUSTER

INTRODUCTION

Kundli is a town and municipal council in Sonipat, Haryana on Delhi-Haryana border in Sonipat tehsil of Sonipat district in the Indian state of Haryana. It lies on Western Peripheral Expressway, Eastern Peripheral Expressway and Delhi-Amritsar NH-1 (presently NH-44). Kundli also lies on the planned Delhi-Sonipat Rapid Regional Rail Transport System (RRTS) and Delhi Metro extension.

Industrial Model Township, Kundli (IMT Kundli) or Kundli Industrial Area, established by the HSIIDC in NCR, is a large Industrial areas of Haryana on the northern border of Delhi adjacent to Narela and it lies south of Sonipat. The Kundli industrial area spread over 560 acres is also part of the Amritsar-Delhi-Kolkata Industrial Corridor.

CLUSTER OVERVIEW

The Kundli Industrial Area consists of mixed category of industries which includes manufacturers in various business segments like housewares, textile/garment, cold stores, printing & packaging, auto component, food processing, foot wear, engineering goods, etc.

a) Kitchenware Industries

Kundli Industrial Area houses about 108 kitchenware manufacturing units. These units are principally known for their ability to make superior kitchen aid products and cater to wide range of kitchen appliances used in day to day life. The cluster manufactures a variety of kitchenware products such as dinnerware, serveware, knife, cutlery, cookware, non-stick cookware, etc. to name a few from more than 250 allied products. Leading Kitchenware manufacturers in the cluster include M/s Jagdamba Cutlery Limited, Allene Overseas Pvt. Ltd., Devisons Infiniti Housewares Pvt.Ltd, Global Housware Pvt Ltd.

Kitchenware Production

b) Cold Storage

The cold storage industries were set up in Kundli, district Sonipat primarily due to the strategic location of the place, which is near to farms (located in Haryana and Punjab) as well as consumer market. Another major factor for existence of cluster is the capital investment subsidy (35% of project costs) scheme of national horticulture board for construction/expansion modernization of cold storage and storage for horticulture products. The purpose of cold storage is to strengthen post-harvest storage and marketing infrastructure.

There are bout 80 number of cold storages in Kundli cluster. Post-harvesting products, such as fruits (apple), pulses (legume, chhole, and rajma), spices, vegetables (potato), etc., are directly sent to cold storage through farmers or through intermediate dealers. Kundli cold storages are the main storing facilities for products being sold out in Delhi/NCT market. Some of the intermediate dealers/merchants also procure products from Gujarat, Madhya Pradesh, Punjab, and Himachal Pradesh during farming season, which are stored in cold storages and sold during off season or when there is demand for a particular product. The capacity of the cold storage facilities in Kundli varies from 665–8,600 MT.

Leading cold storage facilities in the cluster include Bajrang Cold Storage, Kumar Ice & Cold Storage, Ambe Agro & Cold Storage (P) Ltd, R J Cold Storage (P) Ltd, etc

c) Garment Manufacturing (Textile)

India is among a few countries that has a large domestic demand as well as competitive in exports. Presence of strong raw material base in terms of cotton and polyester fibres and large fabric manufacturing capacities in the country have given a thrust to the garment sector.

The Indian garment manufacturing industry is 60- 70% unorganized which is characterized by MSME units operating in specific clusters across the country. The organized part of the industry is dominated by export oriented garment manufacturing units.

India’s domestic garment market was estimated to be US$ 68 billion in 2019 which has grown at an annual growth rate of 9% in last 5-years. The market is dominated by ethnic garments (sarees, salwar-kameez-duppatta, etc.) but the western wear categories are growing at a much faster rate

Kundli industrial area houses about 91 no. of textile/garment industries manufacturing readymade garments, lables, hand bags, fancy yarns & chenille Yarrns, terry towels, accessories etc. Garment manufacturing requires fabric as the main input and several types of accessories for functional and aesthetic purposes. Fabric variety to be used depends on the type of garment, its price, season for usage, etc. In terms of fibres, cotton, polyester, viscose, linen, and their various blends are quite popular. Accessories that are used in garment production include sewing threads, buttons, zips, laces, hooks, labels, etc.

d) Printing & Packaging Industries

The packaging segment in Kundli is an amalgamation of both organized and unorganized players ranging from very small players with limited presence to big players with large market share. There are about 143 printing & packaging industries in Kundli Industrial Area making cardboard box of different type & sizes, paper & paper products.

Demand for this segment is growing rapidly across all the players. Also there is an increasing focus on innovative and cost effective packaging materials. Thus, the industry players are keeping in track with the changing trends in packaging and making efforts to capture the market with higher technology orientation. Further with a viewpoint of health and environment friendliness, the growth is packaging industry has been leading to greater specialization and sophistication amongst the market players.

Packaging in general is classified into two significant types i.e. Rigid Packaging and Flexible Packaging. As compared to rigid packaging, flexible packaging is one of the most dynamic and fastest growing markets in India. Flexible packaging anticipates a strong growth in the future. There has been increasing shift from traditional rigid packaging to flexible packaging due to numerous advantages offered by flexible packaging such as convenience in handling and disposal, savings in transportation costs etc.

Flexible Packaging

CLUSTER ASSOCIATIONS & SUPPORT INSTITUTIONS

Kundli Industry cluster consist of many support institutions and agencies such as industry associations, government agencies, academic/R&D institutes, financial institutions, BDS providers etc. situated within and outside the cluster, which play a key role in developing the cluster. The key stakeholders of Kundli Cluster are:

Major Industrial Associations

Kundli Industry Association (KIA): President, Mr. Subash Gupta

Kundli Cold Storage Association: President, Mr. Atul Goel

Kundli Statinless Steel Houseware Association: President, Mr. Pawan Kansal

United Industries Association (UIA), President: Mr. Manish Nangia

Haryana Chamber of Commerce & Industries: Chairman Mr. RL Sharma

Government Support Institutions

a) District MSME Centre (DMC)

DMC is another major government stakeholder for the cluster. The office of DMC comes under the Directorate of MSME and is headed by the General Manager who is assisted functional managers and technical field officers. DMC promotes and routes subsidies to micro and small enterprises in the region. The Sonipat DMC is actively supporting the units in the cluster to register them under central and state government portals like Udyam Registration, Haryana Udyam Memorandum (HUM) etc. The DMC would play a role in facilitation or implementation of any kind of policy, scheme or project in the mix industry Kundli cluster.

b) MSME-Development Institute, Karnal (MSME-DI Karnal)

MSME- DI, Karnal is a field office of the Development Commissioner (MSME), Ministry of MSME, New Delhi, which is an apex body for formulating, coordinating and monitoring the policies and programmes for promotion and development of MSMEs in the country. The MSME -DI provides a wide range of support services to the MSMEs including implementation of various schemes of central government.

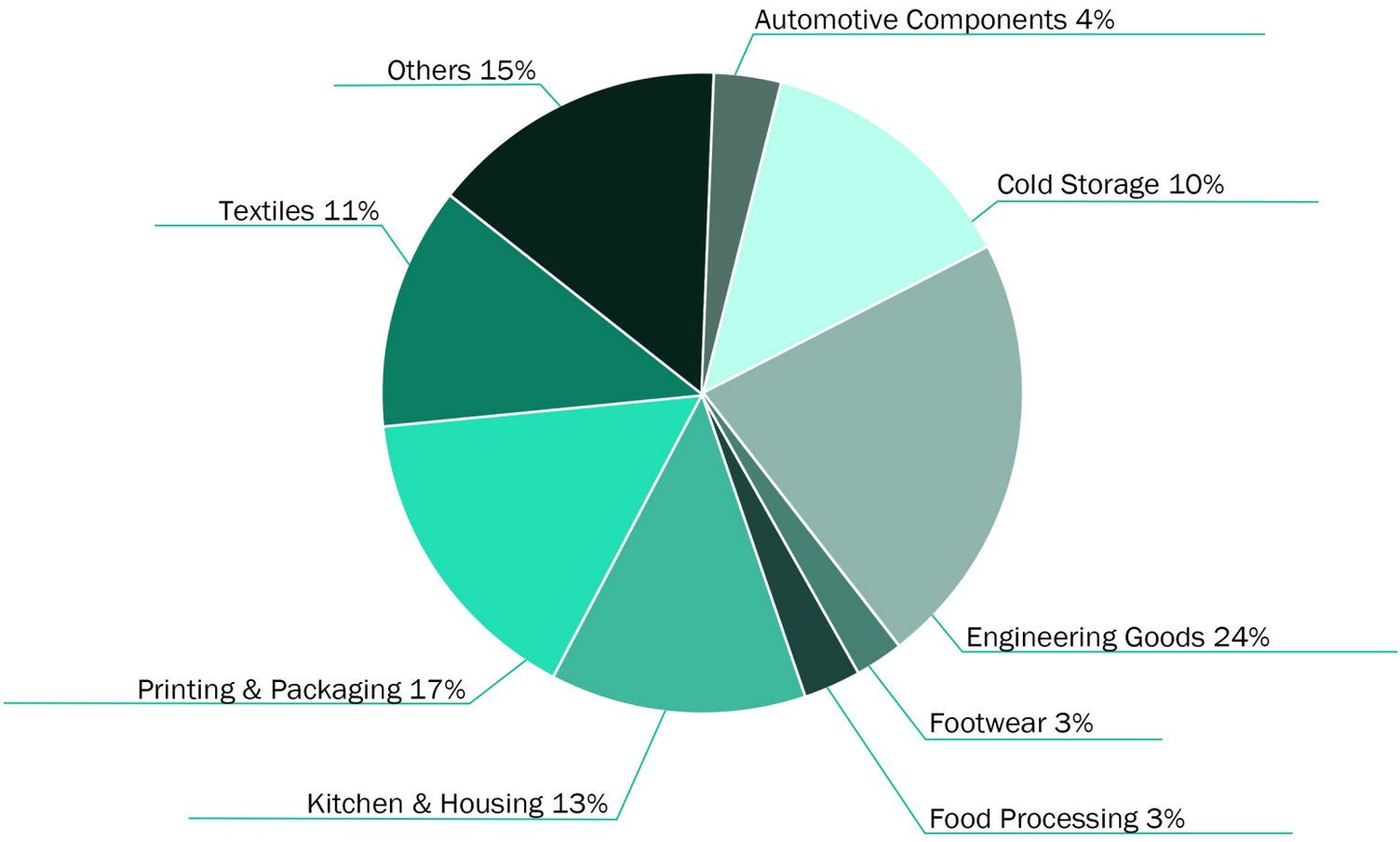
c) Haryana State Infrastructure & Industrial Development Corporation (HSIIDC)

HSIIDC is a major agency in the state to promote the setting up and promotion of small, medium and large-scale industrial units. The corporation also acts as a state-level financial institution and provides long term loans for industrial projects. The important activities of the corporation are, development of industrial areas/ estates, support for entrepreneurs for securing registrations/ licences/ clearances from the statutory/other authorities, provisioning of term-loans etc. HSIIDC currently has 5 Industrial Estates and 1 EPIP in Kundli district

INDUSTRY CATEGORY

In Kundli Industrial Area about 3000 organized & unorganized industries including about 820 units operating in HSIIDC Industrial Estate, Kundli, representing various sectors like housewares, textile/garment, cold stores, printing & packaging, auto component, food processing, foot wear, engineering goods, etc.

The major energy consuming sector industries are Kitchenware, cold storage, textile, auto components, printing & packaging units having total count of over 50% in the cluster. However, few industries from other sectors also consume significant amount of energy compare to same sector industries.



The breakup of textile units operating in the cluster based on product manufactured is given in the following table.

Industry Sector	No. of Units
Automotive Components	32
Cold Storage	80
Engineering Goods	201
Footwear	23
Food Processing	23
Kitchen, Houseware	108
Printing & Packaging	143
Textiles	91
Others	126
Total	827

KITCHENWARE MANUFACTURING PROCESS

The major raw materials used in the kitchenware manufacturing units include stainless steel SS 202 sheet metal, SS 202 rod& pipes, CRC sheet metal, aluminium circles and plastic raw materials like acrylonitrile butadiene styrene (ABS), HDPE food grade (PC) polycarbonate plastic and polypropylene plastic (PP).

SS Utensil manufacturing involves metal shaping process often involving complex geometries with straight sides and as well as curvatures of different radii. The process steps may include:

a) Raw material shearing/cutting

The process starts with Blank preparation by Punching from coil or flat sheet on shearing machine / press machine.

b) Presswork embossing/bending

As per required profile shape and size of components cuts are bended, embossing operation is done under mechanical presses or hand presses. Deep drawing to shape and size metal sheet as per required design. Special steps are necessary for knives, spoons, forks, etc.

The Cutlery items may be formed in power or hydraulic press where the blanks are graded or rolled to the correct thickness required for cutlery items. Between operations, the blanks may be annealed to soften the metal for further operations. The items after processing are trimmed in press or trimming/ edge beading/ curling machines as per need.

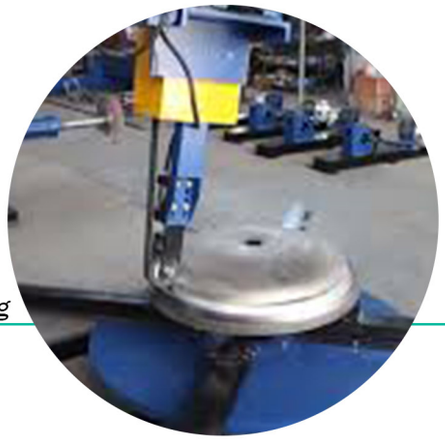
Stainless steel hollow wares are produced by roll forming of different sheets to cylindrical shells and edges are then welded together, by TIG welding. After welding the weld beads are rolled hammered, buffed and polished until the seam is no longer visible.

Other operations like Bulging, Beading and Curling, Necking and Rib Forming may be carried out to create specific shapes and an inward or outward protrusion on surface.

c) Grinding & Buffing/polishing

In case of knives sharpening & grinding of edges are done on conventional grinding machine after which buffing / polishing is done with emery rolls. In most of kitchenware items, buffing/ polishing is done to provide lustrous look to the SS, CRC, aluminium components.

For high end design of wares and cutlery items, an additional step of electroplating process is carried out to give silver and gold-plated finish.



Buffing and Polishing

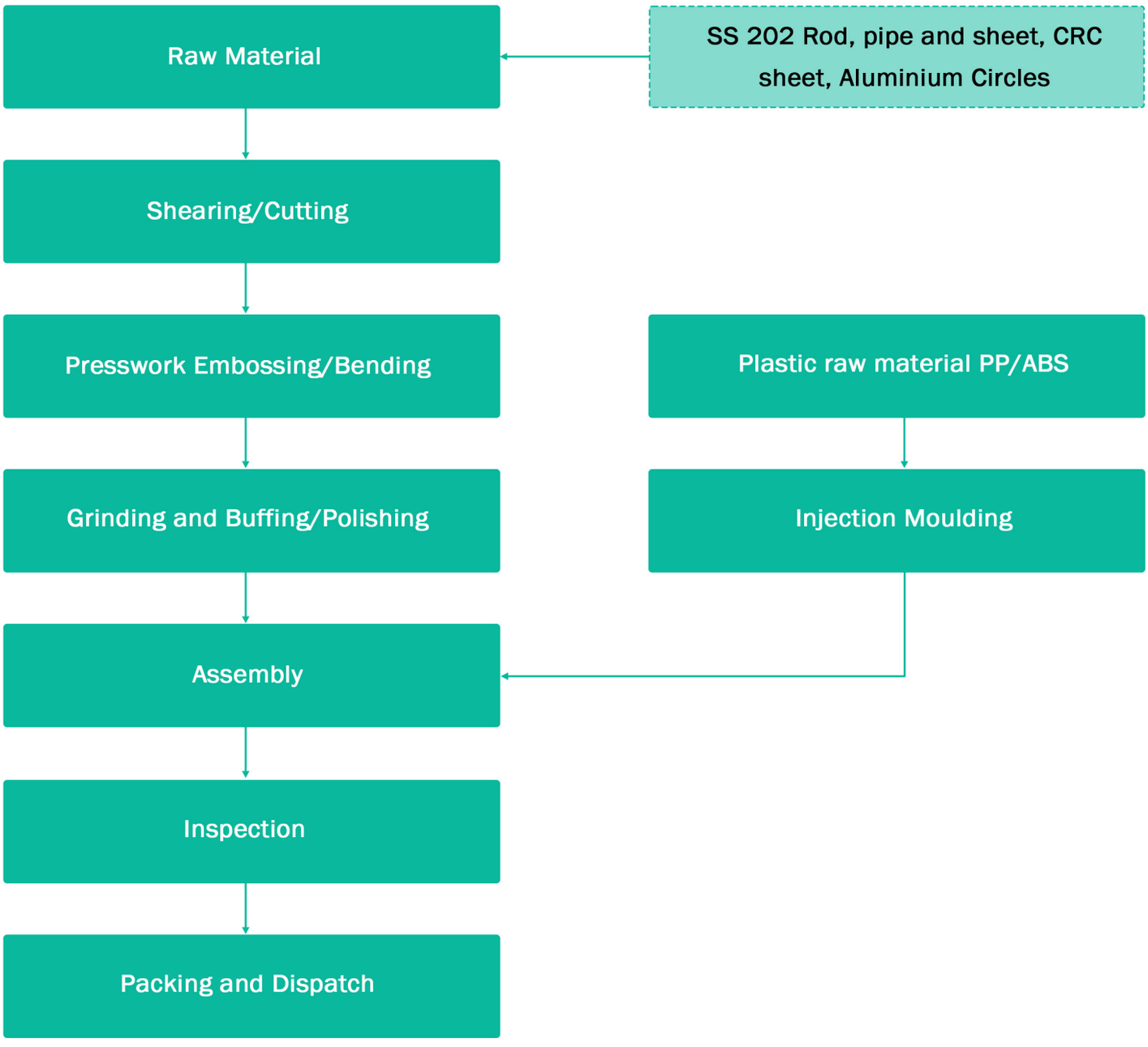
d) Plastic raw material

Plastic raw materials like ABS/ PP / PC are used for preparing plastic body/ handle in most of kitchenware components. As plastics are light weight and durable, they are extensively used in kitchenware items.

e) Injection moulding

Depending upon the end product, forming is done using appropriate dies and shaping mechanism such as injection moulding is done. Hence various injection moulded components are used in most of the kitchenware products like chilly cutter, juicer, slicer, knifes, cutlery, etc

f) The finished products are inspected for chafes, scratches, rough spots, discoloration, or any other flaws that might have occurred in processing and polished to rectify the defects before packing and dispatch.


Raw Material
SS 202 Rod, pipe and sheet, CRC sheet, Aluminium Circles
Shearing/Cutting
Presswork Embossing/Bending
Plastic raw material PP/ABS
Grinding and Buffing/Polishing
Injection Moulding
Assembly
Inspection
Packing and Dispatch

COLD STORAGE PROCESS

The process adopted by a cold storage facility is defined from the construction stage. Primarily, cold storage, which required pre-cooling process before storing the material in constant atmosphere, is designed to cater to fruits and vegetables. These facilities are meant for storing fresh fruits, vegetables, and other horticulture products that require pre-cooling/rapid cooling to 'seven-eighth cooling' in a short duration of 4–24 hours depending on requirements in order to preserve freshness, quality, and life

a) Pre-cooling (limited to fruits and vegetables)

Pre-cooling process plays an important role to prolong the shelf life of fruits and vegetables by removing heat and reducing metabolic activities. Pre-cooling is the first step in temperature management of fruits and vegetables after harvesting. It is an essential process in any cold chain management of horticultural produce. For fresh horticulture commodities, a delay by one hour at the field temperature of 35 oC between harvest and pre-cooling may reduce quality almost equal to 20 hours in storage. Delay in pre-cooling results in loss of moisture and weight from produce. These losses combined with active micro-biological organisms can result in deterioration of quality. There are multiple methods for rapid removal of heat from produce and are largely dependent on perishability and refrigeration equipment of the produce and its adaptability to a specific method and availability of facilities. The basic processes for pre-cooling of fruits and vegetables include the following:

- Hydro-cooling
- Forced air cooling
- Evaporative room cooling
- Package ice cooling

Fruits and vegetables require pre-cooling at origin of produce (field or farm), if transportation time to reach cold storage is relatively longer. Fresh produce, such as grapes, berries, cherries, leeches, melons, sapotas, okra, tomatoes, capsicum, chilli peppers, cucumbers, green beans, peas, and spinach should be cooled as soon as possible.

b) Storage

A multipurpose cold storage is a building structure in the form of palletized storage, suitable for long-term storage of fruit, vegetables, and other commodities under the critical ambient conditions, such as temperature, humidity, CO2, and air circulation rate.

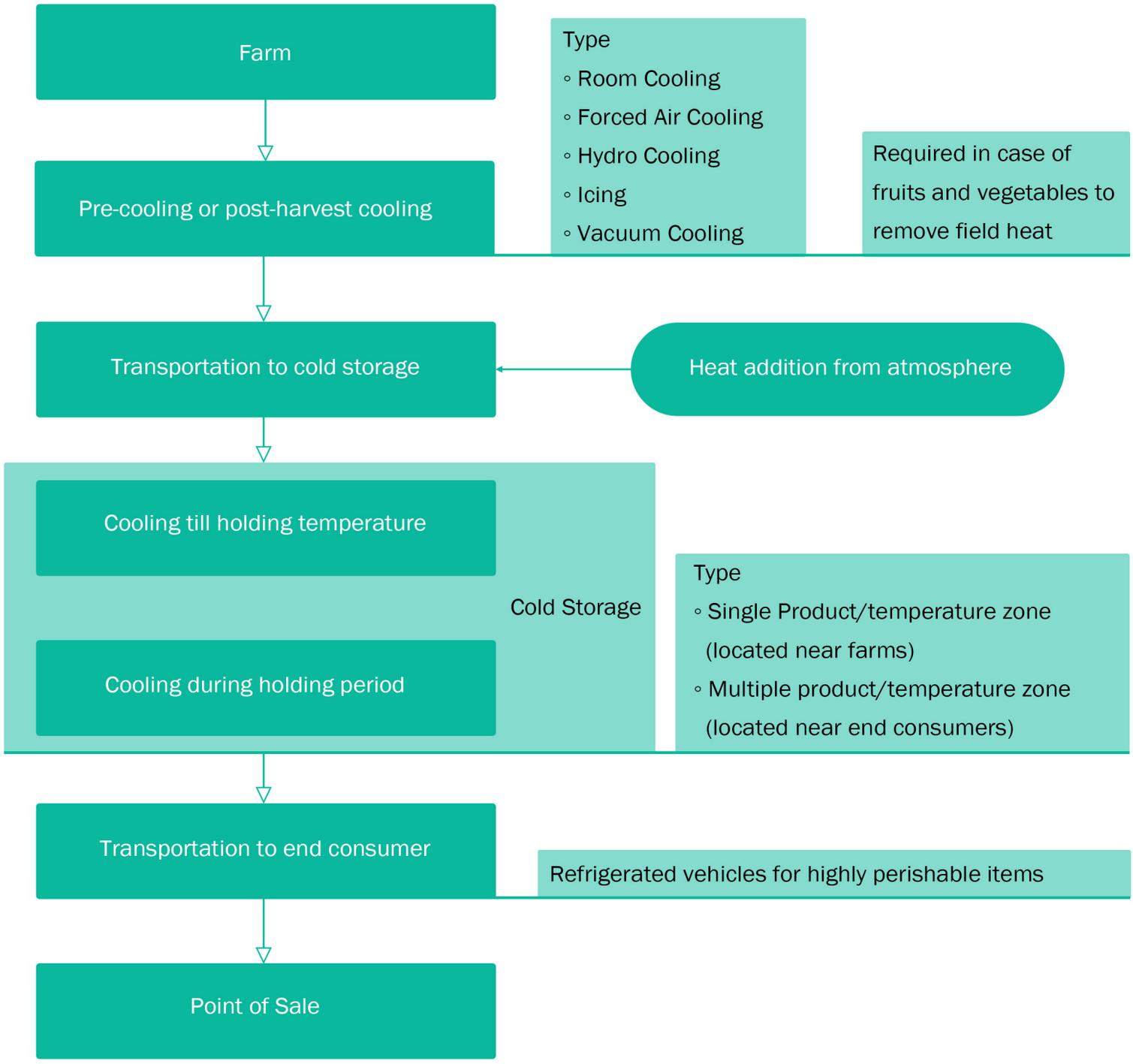
The typical range of the parameters for multi-commodities cold store chamber is given as follows.

Temperature: The variation in temperature should not be more than ±1 oC of recommended temperature for a particular product. Apple, orange, pears, cherries, mushrooms, etc., should be kept in the range of 0–2 oC.

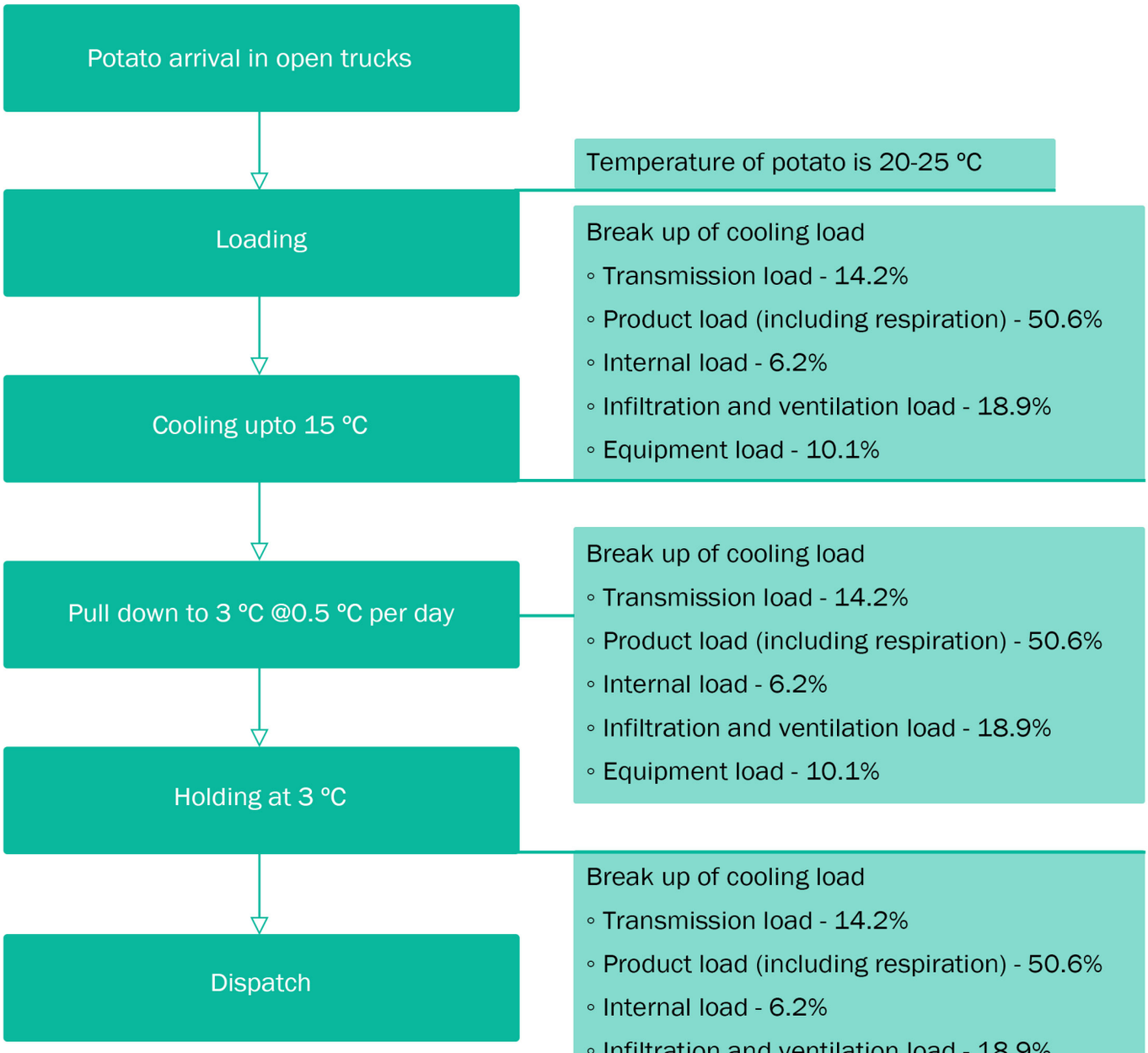
Humidity: Relative humidity (RH) should be in the range of 95%–98% for the fruits and vegetables. In some of the range of vegetables, such as onion and garlic, it should be in the range of 65%–75%. The RH for apple, orange, pears, cherries, mushrooms, etc., should be in the range of 90%–95%.

CO2 level: CO2 level of cold store chamber should not be more than 4,000 ppm during the loading and 2,000 ppm during the holding. To maintain the CO2 level less than 4,000 ppm, 2–6 air changes per day is recommended.

Air circulation: The recommended design for multi- commodities cold storage facility is 170 m3/hr/MT of product holding. The air flow rate can be maintained in the range of 34–68 m3/hr after the produce reaches the chamber or desired temperature. The variable air flow rate can be maintained by installation of 'variable frequency drive' (VFD) with feedback from chamber temperature.



General Process in cold storage facility



Product-specific process (potato)

GARMENT MANUFACTURING

There are two types of garments described according to the type of fabric used:

Woven Apparel: Shirts, Trousers, Dresses, Denims, Kurtas, Skirts

Knitted Apparel: T-Shirts, Jerseys, Dresses, Sweaters, Cardigans, Skirts

Garment manufactures in Kundli Industrial area are mainly in the business of woven apparel production, producing Shirts, Trousers, labels etc. Garment manufacturing process steps includes

a) Spreading & Cutting

Spreading is the process of laying fabric layers on a table, one on top of another so as to form a “lay”. The fabric from the stores is issued to the cutting room daily in advance which is stored in the cantilever rack provided next to the cutting tables. The fabric rolls are loaded on to the roll holders.

The fabric is spread manually by spreaders or by a semi-automatic or automatic spreading machine. After spreading, layers are cut with the help of straight knife cutting machines and end cutters. In order to cut across on such a wide table, a mobile cutting machine guiding rail is used. This rail is a “mobile” guide that is used along with a straight knife cutting machine having a foldable handle bar.

b) Sewing

The production system to be implemented in the factory would be an Assembly Line System whereby a group of operators would work on a product depending on the product type. Operation sequences for sewing room operations would define the sequence of the operations for the reference styles in the projected product mix, along with machine type and work-aids required.

Stitching quality and production are of immense importance; hence imported machines are suggested which are capable of producing high quality end product at good speeds. All the sewing machines would be procured from reputed sewing machine suppliers. The line will have quality checks after every set of operations. All pieces will also be checked fully at the end of the line before they are moved on to the finishing department

Sewing and Cutting

c) Finishing

In the finishing stage the sewn products are checked for any faults or defects. These if reparable are mended or else the piece is rejected. The pieces are then ironed and packed, after a few more check points. In case the pieces have any soiling/staining a stain removal station helps in cleaning the same.

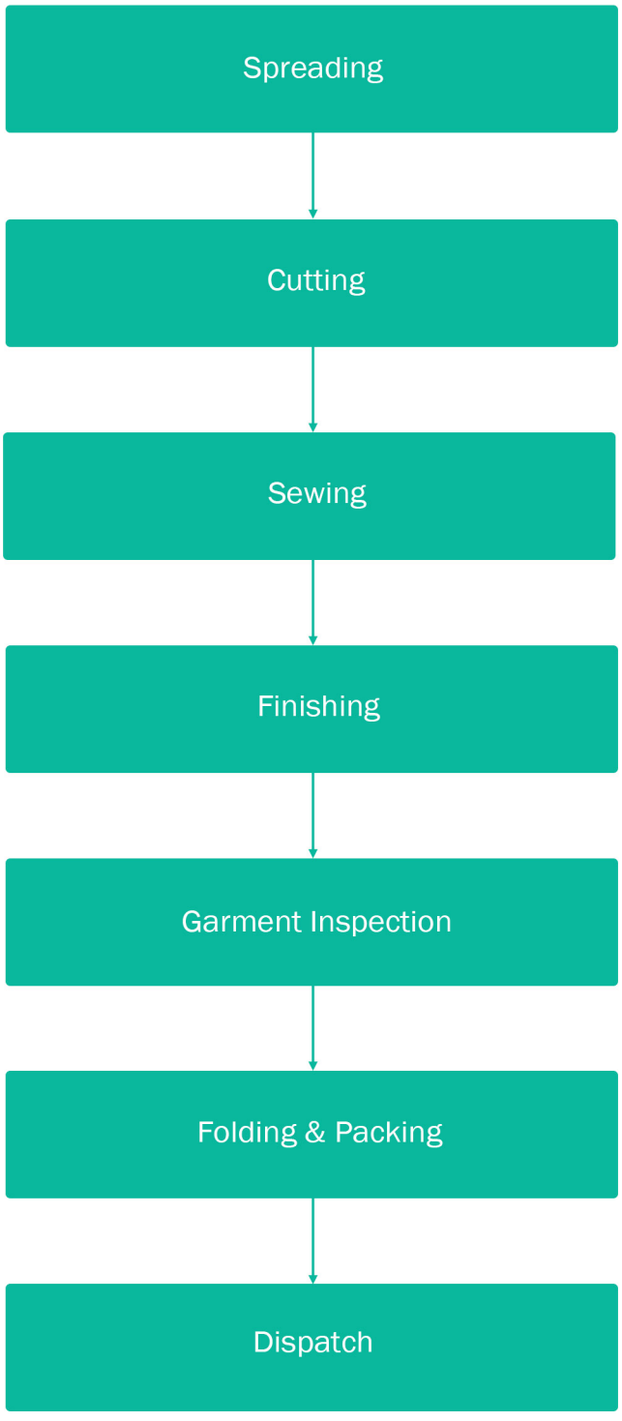
d) Inspection

The garment pieces produced are checked thoroughly for various types of defects such asBroken Needle, Fly, Hole, Thick Yarn, Thin Yarn and Barre Packing& Dispatch After inspection, the defective products are sent for correction while the other products are wrapped in polythene bags and sent for packing in suitable form as per the buyers' specifications. After packing, the final products are dispatched.

e) Garment Testing

Garment testing assess the quality of garment and workmanship, using a no. of quality control checks and tests, including:

- Colour shading
- Symmetry check
- Size fitting test
- Adhesive check
- Fabric weight test
- Ventilation test
- Care labelling
- Needle damage check
- Burn test
- Barcode scanning test
- Mold contamination prevention
- Metal contamination prevention
- Waterproof test
- Down feather leakage test
- Seam slippage test
- Colour fastness check (Rub test)
- Fasteners fatigue and zip quality test


Spreading
Cutting
Sewing
Finishing
Garment Inspection
Folding & Packing
Dispatch

PACKAGING - CORRUGATED CARDBOARD

Corrugated cardboard is a stiff, strong, and light-weight material made up of three layers of brown kraft paper because it produces a strong paper that resists tearing, splitting, and bursting. Most items at supermarket, discount store, or shopping mall were safely delivered in boxes made of corrugated cardboard, and many are displayed in the same boxes, which were manufactured so they could be opened and used for this purpose. Other items may arrive in their own corrugated or uncorrugated paperboard boxes. Because corrugated cardboard is such a versatile packaging material, millions of tons are used each year to protect and display products.

Corrugation

From the paper mill, rolls of kraft paper are transported to a corrugating, or converting, plant. At the plant, layers of kraft paper are crimped and glued to form corrugated cardboard, which is then cut, printed, folded, and glued to make boxes. At the beginning of this process, kraft rolls from the paper mill are loaded into a huge machine called a corrugator. A typical corrugator is as long as a football field—300 feet (91.44 meters). Some rolls of kraft paper are used as the corrugating medium, and others are used as liners, the layers of kraft paper glued on each side of the medium.

Rolls of the paper made from the dried pulp are fed through a corrugated roller, which flutes or ruffles the paper. Depending on the quality of the box being made will depend on the level of fluting required. As increasing the fluting leads to higher use of material and therefore increased strength, this is used for high-quality boxes. For cheaper boxes, less fluting can be used which can help to create space-saving, a reduced amount of material used and can lower the carbon emissions.

The corrugation machine uses hot steam to create the flutes. At the same time glue is rolled down each side of the flute, so that is sticks to the liners. Once corrugated cardboard is formed, it is then trimmed to provide straight edges.

Corrugator Machine

Cutting

After the corrugator has heated, glued, and pressed the kraft paper to form corrugated cardboard, the continuous sheet of cardboard is cut into wide box blanks that then go to other machines for printing, cutting, and gluing. Finally, batches of finished boxes are banded together for shipping to the food processor, toy maker, automobile parts distributor, or any of the thousands of businesses that depend on corrugated cardboard packaging.

MAJOR ENERGY CONSUMING EQUIPMENTS, UTILITIES IN KUNDLI INDUSTRIAL CLUSTER

Kundli Industrial Cluster being consist of various sector industries has different types of equipment's & utilities installed across the cluster. The use of outdated technologies is a major challenge in the cluster. Presently, most of the kitchenware & auto component units use manually operated shearing press, mechanical presses and hydraulic presses along with injection moulding machine for plastic moulding. Some units are using electrical resistance type baking oven for teflon coating and paint drying. Whereas cold storage units is operating chillers with standard & rewound motors.

Some of the major energy consuming equipments & utilities used in Kundli cluster are explained below.

a) Shearing, Mechanical & Hydraulic presses

SS-202 raw materials like sheetmetal, pipes and round bar are sheared in press machine. These presses use motors of 5-10 hp capacity. The SS sheets are sheared as per dimensions in shearing presses. Some of the shearing presses are also hydraulic type its shearing blades are working with hydraulic cylinder strokes

Mechanical presses are used for profile cutting, bending and embossing as per dies used. Profiles like knife, spoon cutlery items are manufactured using mechanical presses. The mechanical presses are conventional machines used in large numbers in the cluster with pressing capacity of 1-6 tonne. These presses are provided with induction motor of 3-20 hp.

Hydraulic presses are basically used in all units involved in the production of cooker and non-stick cookware for deep drawing of aluminium circles into bottom parts and top lids. These presses work on hydraulic oil pressure supplied by hydraulic pump driven by electrical induction motor of 7.5 hp to 30 hp .These presses are of capacities of 100-600 tonne.

Hydraulic Press/Mechanical Press

b) Teflon Coating Oven

Electrical resistance type heaters are used in baking oven for drying teflon coating and paints of non -stick cookwares. Most of the ovens are continuous conveyor type ovens in which cookware with teflon coating and paints are heated at about 400-450 oC for about 30 minutes cycle time. These ovens are provided with recirculating fan of 1-2.5 hp for hot air circulation internally. Most of the ovens have on-off control.

c) Spot welding

Most of the components in kitchenware are welded using spot welding machines which lead to proper joining of kitchen basket and various stove components. Presently these spot welding machines are transformer controlled with capacities ranging from 5-10 kVA. Spot welding machines are also used to weld SS202 blades on SS 202 slicer body

d) Grinding and buffing

Kitchenware products like knifes are ground manually for sharpening. These grinding machines have grinding wheels which are driven by electrical induction motor of 0.5 hp to 5 hp. Buffing is an operation in which SS body parts are held across rotating emery roll driven by electrical induction motor of 0.5hp to 5 hp. After buffing all SS 202 or aluminium kitchenware have lustrous and shining look

e) Air Compressor

Compressed air is used for pneumatic operation in process machinery, such as like actuation of cylinders in clamping/ declamping operations, operating pneumatic values, cleaning, and packing etc. Old units are still using reciprocating, however few units has adopted new technology screw type air compressors. The connected load of an air compressor size ranges from 5 hp to 60 hp. The pressure requirement for the majority of applications is below 5.5 kg per cm2 (bar). Capacity of most of the compressors is more than the requirement, which is leading to unload power losses. Air quality control (e.g., auto drain valve) system and improvement system (e.g., dryer) are also not used by most of the units

f) Chillers (Refrigeration System) in Cold Storage

Most of the refrigeration units installed in the cluster use ammonia as refrigerant, reciprocating type, multi- cylinder, with accessories, such as oil separators, capacity control, and unloaded start. Though ammonia- based system is better for cold storage applications, it is toxic and precautions should be taken while handling it.

The general assembly of ammonia-based refrigeration system consist of a reciprocating compressor, ammonia pump, atmospheric/evaporative condensers, and fan coil units, which are installed in cold chamber area. In almost all units, all systems were operated at maximum load conditions and controlling of system is done manually. Electric motors associated with compressor (including new installations) are of standard efficiency class and rewound.

Mild steel piping is used to handle refrigerant (interconnecting compressor, condenser, and cooling units). A large number of un-insulated areas/locations were observed in the facilities.

g) Motors

All the units in the cluster use electrical motors as prime mover. The ratings of these motors vary from 0.5 hp to 75 hp depending on the capacity of the machine and operations to be performed. Most of these motors operate on low loads except during punching, cutting operation in kitchenware, auto component manufacturing industries. The power factor of these motors are also generally lower than 0.87. Due to presence of significant variable and jerk loading pattern in the machines, failure rates of motors are high. Further, no-load losses of these motors are high, which increase the overall energy consumption. There is a lack of awareness among MSMEs about efficiency standards of motors. Most of the units use low-efficiency standard motors. There is a significant potential to save energy by replacing the low-efficiency motors with energy efficient IE3 motors. Depending on the operating period of the machines, payback period for EE motors can vary between 1 year to 3 years.

Energy Efficient Motors

ENERGY SCENARIO IN THE CLUSTER

Electricity is the major energy form used by Kundli Industrial Area, however few garment manufacturing industries use PNG/Diesel fired baby boilers to generate low pressure steam required for cloth ironing. Facilities also use diesel generator (DG) sets for backup power during power cuts, which use HSD.

Kundli Industrial Area houses mainly micro & small category of industries having energy consumption as shown below.

Industry category	Electrical Energy KWh/year	Total Energy (toe/year)	Total CO^2 emissions (t CO^2/year)
Kitchenware Industry	308000	26.488	295.68
Cold Storage	234000	20.124	224.64
Garment Manufacturing Industry	360000	30.96	345.6
Printing & Packaging Industry	24000	2.064	23.04
Auto Component Manufacturing	360000	30.96	345.6

Prices of major energy sources is provided in the table below

Source	Price
Electricity HT Industry (above 50 kW)	Demand Charges: 165 per kVA Energy Charges: @11 kV— 6.55 per kVAh @33 kV—6.55 per kVAh @66/132 kV—6.45 per kVAh
Electricity LT Industry (above 50 kW)	Demand Charges: 185 per kW Energy Charges: @up to 10 kW—6.35 per kVAh @10–20 kW—6.65 per kVAh @20–50 kW—6.40 per kVAh
PNG	Rs. 50 to 55/ SCM
HSD	Rs. 90 per litre (price subjected to market fluctuations)

STANDARD ENERGY EFFICIENT TECHNOLOGIES (SEET) ADOPTION POTENTIAL

There is great potential exist in Kundli Industrial cluster for adoption Standard Energy Efficient Technologies (SEET) through innovative financing mechanism which will Improve Industrial Productivity, Reduce Electricity & Fuel Bills, Control Emission of Pollutants, Access to Technologies at Discounted Price, reducing Operating & Maintenance Cost. The SEET already demonstrated by EESL in other MSME clusters, which are applicable for Kundli Mixed Cluster Industries are as below:

a) Replacement of IE1 or sub IE1 level motors with IE3 motors

Existing practice:

In India, about 40% of the total electricity consumption is contributed by the industrial sector. Electric motor-systems use 28% of total national electricity which is reasonably high. India has banned IE1 motors since October 2017.

Historically, the motors sold (and used by end-users) in India have lower energy efficiencies (IE-1 or less) than the efficient products technologically available and manufactured. Based on estimation, 90- 95% of the current installed stock of motors is at IE1 & sub-IE1 levels. The issue of multiple rewinding in the service life of motor(s) further reduces the efficiency drastically. This results in more energy consumption, hence affects the competitiveness of any business entity.

Proposed Technology:

Replacing the existing IE1 or sub-IE1 level motors with IE3 motors can save energy as well as operating cost, which is more than its purchase cost. IE3 motors offers

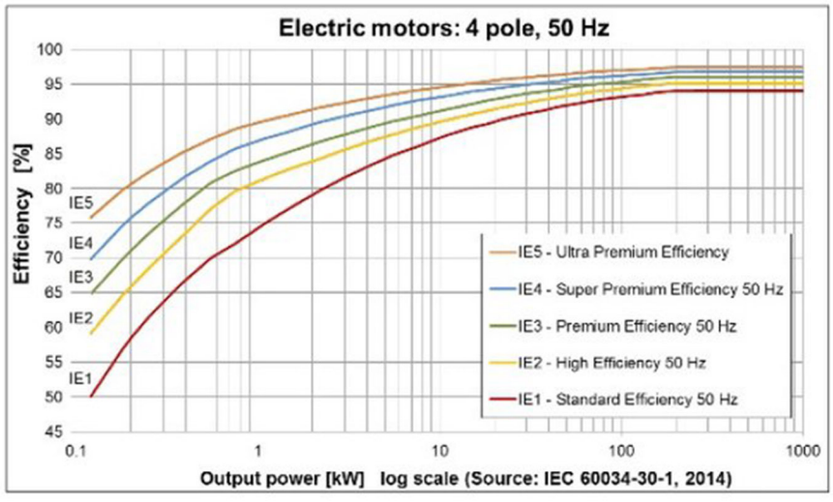
- Higher Efficiency and hence Lower Power Consumption
- Constructed with superior material
- Longer Insulation and Bearing Lives
- Lower Waste Heat Output
- Less Vibration

Success Story: Demonstration in Textile unit:

Year of demonstration	2018
Location of MSME	Banswara, Rajasthan
Type of Cluster	Textile
Name of the MSME Unit	Banswara Syntex Limited
Annual Energy Saved	2,44,094 kWh
Annual Money Saved	Rs. 14,64,563
Total Project Cost (125 nos. IE3 Motors)	Rs. 35,88,000
Simple Pay-back Period	2.4 Years
Life of New Technology	15 Years
Warranty of the New Technology	3 years

Benefits Incurred from the Project

- IE3 motor provide 2-3% higher efficiency compare to IE2 motor, which even higher compare to IE1 motor
- Suitable for continuous process industries , where high energy saving is essential.
- Short Payback Period, Enhanced motor life, Less maintenance
- Rating-wise energy saving percentage for replacing Standard motors with IE3 motors
  - 3.7KW - 9.89%
  - 5.5KW - 7.35%



b) Replacement of Reciprocating Compressor by Screw Compressor with VFD & Permanent Magnet Motor

Existing practice:

In Kundli industries, there is a continuous demand of compressed air in order to cater various pneumatic operations throughout the manufacturing process. In the exiting manufacturing process the compressed air system is distributed in nature and most of the compressed air demand is catered by multiple reciprocating air compressor installed at various location of the plant. In most of the cases separate reciprocating air compressors are installed for individual processes. Generally, these single stage reciprocating compressors work with higher noise and have a relatively high cost of compression. The operational efficiency varies from 22 to 35 kW/100 cfm, based on the age of the equipment

Proposed Technology:

Based on the detailed analysis of the existing compressed air system, it is proposed to replace the low performing reciprocating compressor with VFD enabled permanent motor based screw air compressor.

The package of Screw Compressor with VFD & Permanent Magnet Motor offers flexibility to operate air compressor to meet varying air requirement without compromising on performance and Energy Efficiency. Each component of this technology has added advantages over conventional reciprocating or Screw compressor with standard motor.

- Permanent Magnet Motors offer increased efficiency compared to standard motors. The rotor is made up of a permanent magnet.
- Motor is directly connected to the screw arrangement of the compressor which nullifies the transmission loss of a belt- driven system (3% to 5%). Such a direct drive system enhances the overall efficiency of the system.
- Permanent Magnet Motor is maintenance free
- VFD provides soft starting, enabling controlled acceleration and deceleration
- VFD keeps desired line pressure constant, adjusting automatically according to system air consumption by varying motor speed
- Through VFD, compressor operating range reduces from 1-2 kg/cm2 to 0.2- 0.4 kg/cm2.
- VFD with highly efficient rotary screw compressor can cater to fluctuating compressed air requirement efficiently

Success Story: Demonstration in MSME Clusters

Location of MSME Cluster	Bhestan, Gujarat
Type of Cluster	Textile
Name of the MSME Unit	Narayan processor
Baseline Specific Energy Consumption	0.27 kWh/cfm
Resulted Specific Energy Consumption	0.17 kWh/cfm
Annual Energy Saved	1,87,651 kWh
Annual Money Saved	Rs. 14,20,000
Total Project Cost	Rs. 16,00,000
Simple Pay-back Period	13 Months
Life of New Technology	15 Years

Benefits Incurred from the Project

- Reduction in specific power consumption by 40%
- Replacement of multiple compressors with one compressor
- Reduction in maintenance cost and break-down time by 50%
- Noise free operation

Reciprocating Compressor

VFD

c) Replacement of Regular Fans with BLDC Fans

The fan is a device that delivers the amount of cool air at low pressure. There are many different types of fans and various applications. The fans used in the modern age are the electric fans mostly comprised of a motor connected to blades. The motor blades that move at a fast speed to create a fast flow of air causing the air to cool. In warm places, it is common to see fans to get rid of the discomfort of heat and sweat

Existing practice:

Industries are using ceiling fans with an ordinary induction motor which consumes about 75-80 W power. Such fans are used in the industry for several decades.

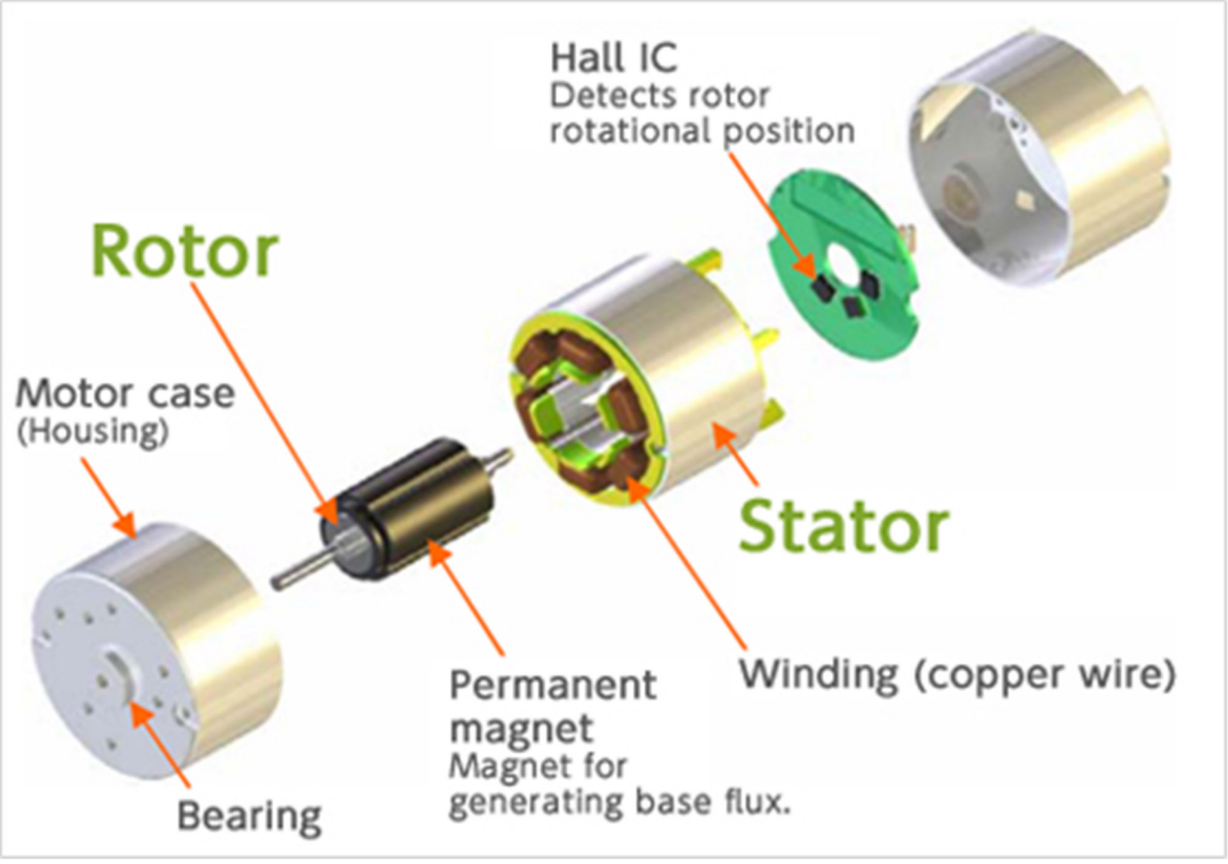
Proposed Technology:

It is proposed to replace regular fans with BLDC fans. The term BLDC stands for Brushless Direct Current Motors. It essentially comprises a synchronous motor clubbed with a DC electric source. The windings in the BLDC motor are supported by the housing. This feature allows the motor to cool by conduction. So, no external airflow is required for internal cooling, thus protecting the motor from dirt and foreign substances. Some of the prime benefits of BLDC motor fans can be listed as

- BLDC contains Permanent Magnets while Electromagnet is used in Induction Motors, with Direct Current input
- Super Energy efficient ceiling (BLDC) fan providing 50% savings over regular ceiling fan, consumes about 25-30W power
- Remote integrated ceiling fan with service value > 6.0 (m3/min/watt)
- Fan with wide operating voltage (90 – 300V)
- Capacitive regulator operated BLDC fan
- Lower noise, lower static pressure due lower RPM, and higher airflow(15% more) compared to any other fans
- Runs upto 3X longer on inverter

Success Story: Demonstration in Ceramic unit

Year of demonstration	2019
Location of MSME	Thangadh
Type of Cluster	Ceramic
Name of the MSME Unit	Sunrise Pottery Works
Annual Energy Saved (108 ceramic units and 17600 fans)	48.2 Lakh kWh
Annual Money Saved	Rs. 335 Lakh
Total Project Cost (17600 nos.)	Rs. 382 Lakh
Simple Pay-back Period	2.4 Years
Life of New Technology	15 Years
Warranty of the New Technology	3 years



STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS

A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the MSME manufacturing units in Kundli cluster has been carried out keeping in mind the energy/environment compliance, marketing, business environment and, skills, inputs, innovation of the units. The SWOT analysis is provided in below table

Area	Strengths	Weaknesses	Opportunities	Threats
Energy/ Environment	● Adoption of alternative fuels like PNG, electricity reducing GHG emission reduction ● Increased focus on environment due to requirement from buyers, government regulation	● Lack of knowledge of energy efficiency resulting in higher energy consumption ● High energy cost structure because of lack of efficient processes	● Regular checks on maintaining quality and safety standards ● Potential to reduce energy costs by energy auditing	● Increase in power tariff ● Increased focus on environment standards ● Certifications would have to be met.
Market	● Cluster located within the Kundli (Sonipat) Industrial area, which is well connected with all major national and international industrial hubs. ● Cluster located in the proximity of NCR which is a major supply hub. ● Strong natural business ecosystem in the region with presence of a large number of buying houses. ● Steady local and international demand for cluster products.	● Presence of other large players to whom bulk orders are made. MSME units have a well-established clientele. This makes market penetration, a challenge. ● Loss of orders occasionally due to inordinate delay in processing of orders.	● Rising income levels and increasing urbanisation driving the growth of domestic market ● Potential to price products competitively with acquisition of technology, in order to compete effectively with countries such as China ● Potential for assistance under upcoming State Policy	● Intense competition from global markets. ● Competition from other major players

Area	Strengths	Weaknesses	Opportunities	Threats
Skill/ Manpower	● Skills acquired on-the-job ● Presence of technical institutes	● High labour costs ● Lack of interaction between SMEs and technical institutes for providing technical training ● No mechanism to mobilize regional youth for training in the sector	● Customized training programs on required skills (operations, soft skills etc.) Engage technical institutes for skill development programs ● Increased cost of labour in China provides opportunity for Indian industry	● Youth interested to work in other lucrative sectors
Inputs	● Availability of raw materials from local dealers ● Buyers sometimes specify dealers from whom they want materials	● No web portal displaying prices and sources of raw materials	● Potential to develop a portal displaying information (price, suppliers) of raw materials	● Cost of power in India is, on average, higher than key competing countries like China, Bangladesh, Vietnam
Innovation	● Ability to manufacture products as per the manufacturers specifications ● Some units create their own designs and sell these	● Lack of a standardised ERP solution for industry ● Low investment in development of designs ● Lack of process automation ● Lack of adoption of lean manufacturing clusters such as Six Sigma, Kaizen	● Development of a standard IT based ERP solution ● Structured processes for information sharing among SMEs in the cluster	● Could lose business to other more price competitive manufacturers from countries such as China if units do not innovate

Area	Strengths	Weaknesses	Opportunities	Threats
Business Environment	● Kundli is well known as a leading industrial hub of India ● Steady growth in domestic demand ● Cluster well known for garment, kitchenware product across North India ● Conducive policy and regulatory initiatives ● Active State Govt. and schemes for development of the sector ● Proactive industries associations in Kundli	● Lack of knowledge of regulatory frameworks and government schemes among micro level home furnishing units ● High cost of industrial land in the cluster ● Lack of common infrastructure/CFC facilities ●No long-term vision of industrialists	● Establish CFC with latest technologies for digital ● Printing Create better awareness of government schemes and regulations	● Change in policies and regulatory environment ● Increase in land rates Environmental policies result in shutting down of units which is impacting whole cluster

REFERENCES

Diagnostic Report for MSME Sector in Haryana
http://msme.dev.webappline.com/wp-content/uploads/2021/03/Sector-Diagnostic-Report.pdf

FICCI report on Plastic Packaging – The Sustainable Choice
https://ficci.in/spdocument/20690/plastic-packaging-report.pdf

http://www.phdmsme.in/uploaded_files/project_report/1536154809_809.pdf

The Energy and Resources Institute Cluster Profile Rajkot Kitchenware manufacturing industries:
http://www.sameeeksha.org/pdf/clusterprofile/rajkot-kitchenware.pdf

Project Report on Garment Manufacturing
http://dcmsme.gov.in/39_Garment%20Sector%20%20by%20AK%20Verma.pdf

The Energy and Resources Institute Kundli Cold Storage Cluster Profile Report:
http://sameeeksha.org/pdf/clusterprofile/Kundli_Cold_Storage.pdf

https://www.tribuneindia.com/news/archive/haryanatribune/kundli-a-preferred-industrial-destination-708941

http://www.madehow.com/Volume-1/Corrugated-Cardboard.html#ixzz80LhiMf00

About FICCI

Established in 1927, FICCI is the largest and oldest apex business organisation in India. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies

The Resource Conservation & Management (RCM) division was formed as part of FICCI's initiatives to promote and provide integrated services to the industries in enhancing their competitiveness and productivity, particularly through process optimization and improvements, energy efficiency, water use efficiency, sustainable use of resources (raw materials, energy, water, etc), renewable energy and the effective management of wastes generated.

FICCI's specialist team has conducted national & international assignments on detailed energy audits/ walk through energy audits in various sector of MSMEs, feasibility study on the potential use of Solar PV system, benchmark studies, KPI identification, etc

About GGGI

The Global Growth Institute (GGGI) is an international organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies.

GGGI's mission is to support the transition of its member and partner countries toward a model of green growth by developing and implementing strategies that simultaneously achieve poverty reduction, social inclusion, environmental sustainability and economic growth. By pursuing this mission, GGGI aims to achieve its vision of a resilient world of strong, inclusive and sustainable green growth
GGGI aims to achieve its vision of a resilient world of strong, inclusive and sustainable green growth

About EESL

Energy Efficiency Services Limited (EESL) is a super Energy service Company(S-ESCO), which enables consumers industries and governments to effectively manage their energy needs through energy efficient technologies. EESL is implementing the world's largest energy efficiency portfolio across sectors like lighting, buildings, industry electric mobility, smart metering agriculture, etc. at an enormous scale. EESL's energy efficiency solutions have saved India over 47 billon kWh energy annually while reducing 36.5 million tons of carbon emission Founded in 2009, EESL is promoted by Ministry of power Government of India as a joint venture of PSUs

For further information, Please contact:

Mr. Surender Kumar Verma
Additional Director
surender.verma@ficci.com
+91 9818186253

Mr.Pushpendra Nayak
Additional Director
pushpendra.nayak@ficci.com
+91 9313636244

Federation of Indian Chambers of Commerce and Industry (FICCI)
Federation House 1, Tansen Marg, New Delhi 110001, India

Ms. Neha Sharma
Energy Specialist
neha.sharma@gggi.org

Global Green Institute (GGGI)
M-6, Third floor, Aurobindo Marg, Hauz Khas, New Delhi 110016, India

Mr. Amit Semwal
Technical Expert
asemwal@eesl.co.in

Energy Efficiency Services Limited (EESL)
EESL, 5th & 6th floor, Core 3, Scope Complex, Lodhi Road, New Delhi 110003, India