SCI-Pak

Sustainable and Cleaner Production in the Manufacturing Industries of Pakistan

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CDM Opportunities in Textile Processing and Tannery Sectors

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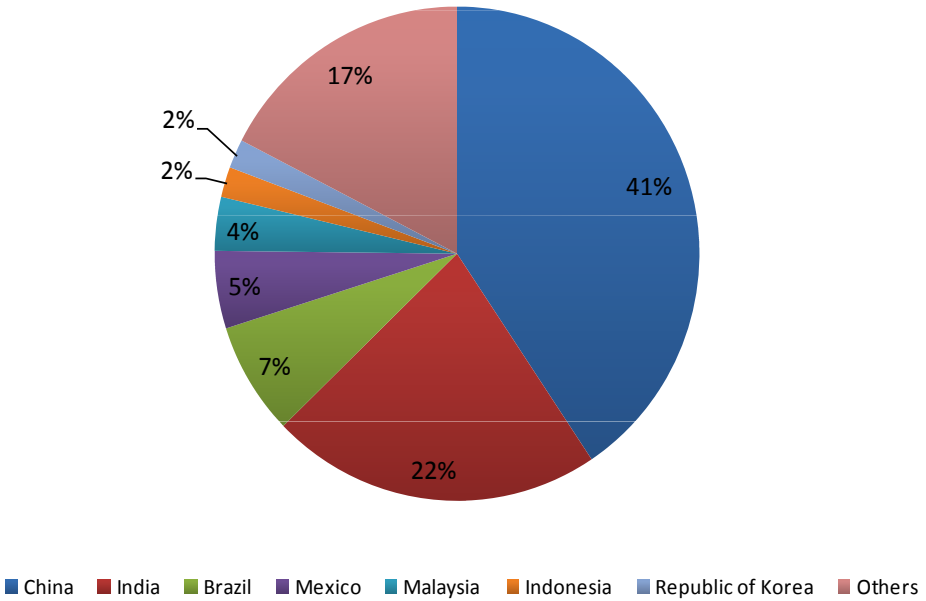
An Overview of CDM Status in Pakistan in Comparison with Other Countries

Status of CDM in Pakistan

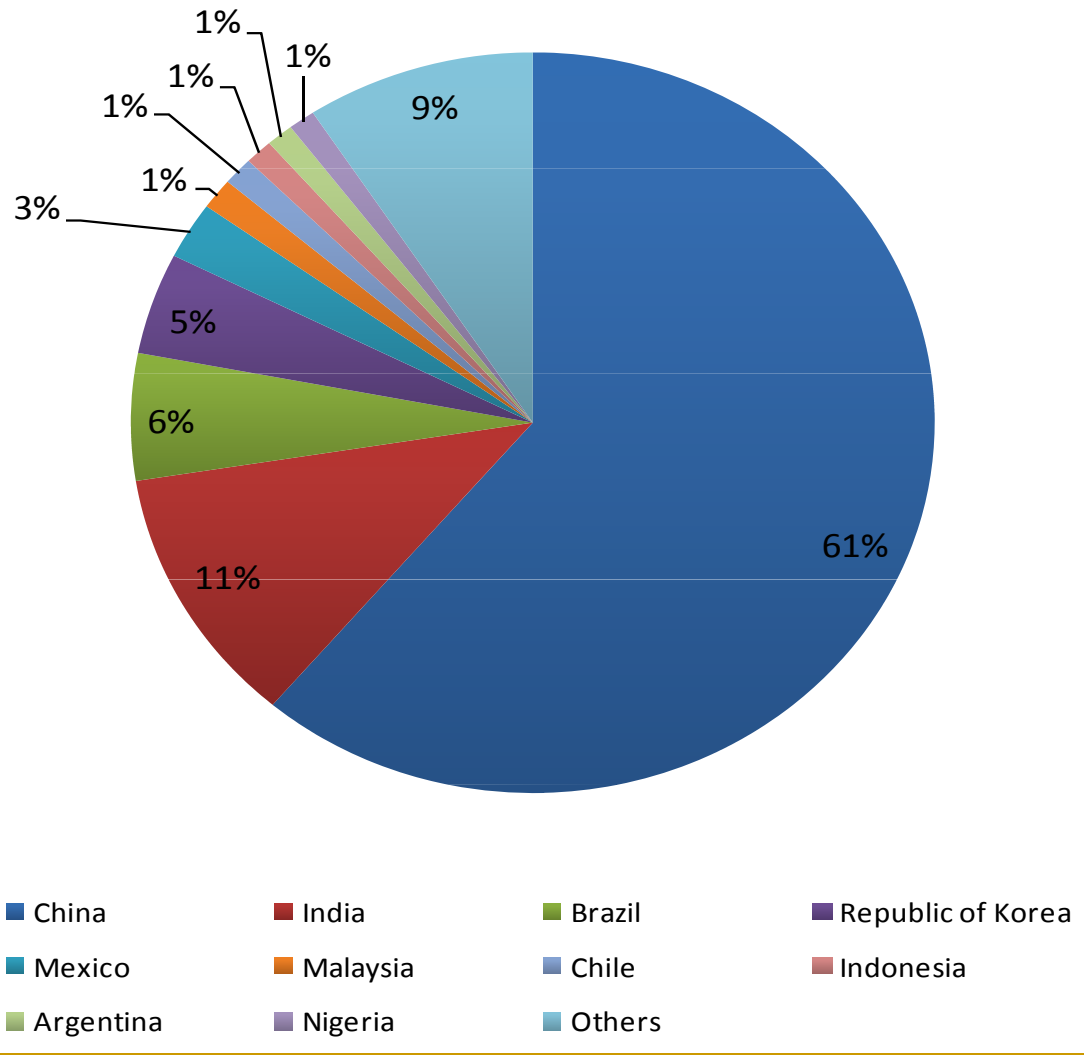
- Pakistan became signatory to Kyoto Protocol quite early (January 11, 2005)
- Growth of CDM in the industrial sector in Pakistan has not been very promising (so far only 9 registered projects)

Status of CDM in Other Countries

- According to the statistics provided on UNFCCC website there are a total number of **2431** registered CDM project activities. Among them
  - China has the largest number of registered projects (988, corresponding to a share of 41 %)
  - India has 2nd largest number of registered projects (538, corresponding to a share of 22 %) and
  - Brazil is third (179, corresponding to a share of 7 %).
  - Pakistan has only 9 registered CDM projects which correspond to a low share of 0.37%



CDM Projects by CERs



CDM Projects in China

CDM Status of the Projects	No. of Projects	CERs (t CO_2/yr)
Registered	969	234,529,529
Registration Request	33	6,377,643
Correction Request	37	5,680,548
Requesting Review	18	4,109,588
Under Review	19	5,174,641
Rejected	71	9,108,329
Validation Terminated	212	28,009,185
Withdrawn	11	1,517,969
Validation Negative	31	5,679,645
At Validation	1,135	158,723,052
Total	**2,536**	**458,910,128**

CDM Projects in India

CDM Status of the Projects	No. of Projects	CERs (t CO_2/yr)
Registered	534	43,268,184
Registration Request	9	278,165
Correction Request	12	845,634
Requesting Review	9	2,832,969
Under Review	3	1,252,648
Rejected	44	4,563,873
Validation Terminated	242	13,969,722
Withdrawn	15	1,430,292
Validation Negative	85	5,097,096
At Validation	872	83,653,961
Total	**1,825**	**157,192,545**

CDM Projects in Pakistan

CDM Status of the Projects	No. of Projects	CERs (t CO_2/yr)
Registered	9	1,688,676
Registration Request	1	28,025
Correction Request	1	35,656
Requesting Review	0	0
Under Review	0	0
Rejected	0	0
Validation Terminated	1	23
Withdrawn	0	0
At Validation	14	2,198,234
Total	**26**	**3,950,614**

CDM Projects in Pakistan

Title of the CDM Project Activity	Status	CERs
Catalytic N2O Abatement Project in the Tail Gas of the Nitric Acid Plant of the Pakarab Fertilizer Ltd (PVT) in	Registered	1050.000
The 84 MW New Bong Escape Hydropower Project, Azad Jammu and Kashmir (AJK), Pakistan	Registered	218.988
Community-Based Renewable Energy Development in the Northern Areas and Chitral (NAC), Pakistan	Registered	87.477
Construction of additional cooling tower cells at AES Lal Pir (Pvt.) Limited. Muzaffar Garh, Pakistan.	Registered	11.179
Almoiz Bagasse Cogeneration Project	Registered	23.319
Pakarab Fertiliser Co-generation Power Project	Registered	119.481
ICI Polyester Co-generation Project	Registered	21.486
Composting of Organic Content of Municipal Solid Waste in Lahore	Registered	108.686
Waste Heat Recovery based 15 MW Power Generation Project at Bestway Cement Limited, Chakwal, Pakistan	Registered	48.060
Gul Ahmed Combined Cycle Gas Turbine Project	Correction request	35.656
Biogas-based Cogeneration Project at Shakarganj Mills Ltd., Jhang, Pakistan	Registration Request	28.025
Fuel Switch and energy efficiency project at PWML, Pakistan	At Validation	16.722
Cattle Waste Management, Landhi Cattle Colony, Karachi, Pakistan	At Validation	1458.148
Grid connected combined cycle power plant project in Qadirpur utilizing permeate gas, previously flared	At Validation	162.943
Waste Heat Recovery and Utilization for Power Generation at Maple Leaf Cement Factory Limited, Iskanderabad,	At Validation	47.807
Waste Heat Recovery and Utilization for Power Generation at Lucky Cement Limited, Karachi Plant	At Validation	50.548
“Waste Heat Recovery and Utilization for Power Generation at Cherat Cement Company Limited, Nowshera,	At Validation	32.278
Waste Heat Recovery and Utilization for Power Generation at Lucky Cement Limited Pezu Plant	At Validation	33.820
Methane avoidance project at Habib Sugar Mills Ltd.	At Validation	58.253
Biomass Fuel Switch Project at Sapphire Finishing Mills Ltd, Pakistan	At Validation	33.502
Reduction of Heavy Fuel Oil usage for Power Generation at Lucky Cement, Pezu, Pakistan	At Validation	34.342
DHCL Gas Turbine based Cogeneration Project	At Validation	31.112
DGKCC Waste Heat Recovery and Utilization for 10.4 MW Power Generation at Dera Ghazi Khan Plant	At Validation	33.845
Compost from Municipal Solid Waste in Peshawar, Pakistan	At Validation	143.899
Methane avoidance project at Colony Sugar Mills Ltd.	At Validation	61.015
Switching of fossil fuel from Heavy Fuel Oil to Natural Gas by replacing Heavy Fuel Oil Engines (5.86 MW*4) with Gas Engine (16.4 MW) at Maple Leaf Cement Factory Limited, Iskanderabad, Pakistan	Validation terminated	22.622

Detailed Assessment of CDM Projects in Textile and Tannery Sectors

CDM Projects in Textile and Tannery Sector

1	**Project Title**	Demand-side energy efficiency programme in the 'Humidification Towers' of Jaya Shree Textiles
	Host Country	India
	Number of CERs	3,393 (10 year fixed)
	Applied Methodology	AMS-II.C.
	Current Status	Registered
	Brief Description	The project activity is an energy efficiency programme comprising of installation of **Variable Frequency Drives (VFDs)** at the motor end of electrical drives so as to increase the energy-efficiency of the motors in the Humidification Towers.
	Additionality Criteria	Barrier Analysis: 1) Prevailing practice barrier 2) Technological barrier

CDM Projects in Textile and Tannery Sector

2	**Project Title**	Energy efficiency and fuel switch project at Welspun India Limited.
	Host Country	India
	Number of CERs	35,131 (10 Year Fixed)
	Applied Methodology	AMS-II.D.
	Current Status	Registered
	Brief Description	This project activity involves installation of an **energy efficient 5.9 MW gas turbine with** heat recovery steam generator **(HRSG)**, **a 6.79 MW gas engine generator with 1260 TR vapour absorption chillers (VAC).** These measures replace use of lower efficient power systems which comprises of FO based Generating sets (2*2MW, 1*4MW and 1 * 6MW) with Exhaust Gas Boiler (EGB) (1*1.5TPH, 1*2.1TPH, 1*1.6TPH) for steam and power generation, FO based boilers (3*6TPH) for steam generation and centrifugal chillers (2*500TR, 1*390 TR) for chilled water generation. The 1260 TR Vapour Absorption Chiller will use the exhaust heat from the gas engine for chilled water generation and in turn replaces use of Centrifugal Chillers thereby reducing the electricity consumption for the equivalent amount of chilled water generation.
	Additionality Criteria	Investment Barrier

CDM Projects in Textile and Tannery Sector

3	**Project Title**	Energy Efficiency Improvement in the Cogeneration System at Unit - Kesoram Rayon, Kesoram Industries Limited
	Host Country	India
	Number of CERs	39,855 (10 Year Fixed)
	Applied Methodology	AMS-II.B.
	Current Status	At Validation
	Brief Description	The project activity involves the replacement of 2 existing boilers with a 40 TPH **high pressure coal fired Fluidized Bed Combustion** (FBC) boiler and the replacement of the existing back-pressure and condensing turbines with a 6MW extraction-cum-condensing type turbine. This has resulted in the conversion of the existing low pressure system (17.5 kgsc) to a high pressure system (62 kgsc). This has resulted in efficiency improvement of the cogeneration system and has enabled the project proponent to reduce the specific coal consumption for steam and power generation and therefore reduced electricity import from the grid. Direct reduction in specific coal consumption for cogeneration system contributes to lower CO_2 emissions.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Institutional barriers 3) Operational barriers 4) Other barriers

CDM Projects in Textile and Tannery Sector

4	**Project Title**	Reduction in Specific Steam Consumption of Vapour Absorption Chillers at Indo Rama Synthetics (India) Limited, Butibori, Distt- Nagpur, Maharashtra
	Host Country	India
	Number of CERs	2,457 (10 Year Fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	The purpose of the project activity is to achieve higher energy efficiency by installation of new energy efficient **Vapour Absorption Chillers** (VACs) in place of old less energy efficient VACs. The new energy efficient VACs would reduce the overall energy demand for air conditioning. In the pre-project scenario, IRSL were operating eight numbers of VACs to cater the chilled water requirement in the fiber complex. The replacement of less energy efficient VACs with more energy efficient VACs will reduce the specific steam consumption of VACs and thereby reduces the overall steam demand. Since the steam is generated by fossil fuel fired boiler, reduction in the overall steam demand will reduce the fossil fuel consumption and subsequently reduce the GHG emission.
	Additionality Criteria	Barrier Analysis: 1)Prevailing practice barrier 2)Technological barrier

CDM Projects in Textile and Tannery Sector

5	**Project Title**	Energy efficiency and fuel switch project at GHCL Ltd.
	Host Country	India
	Number of CERs	14,741 (10 Year Fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	This project activity comprises of commissioning and operation of a new energy efficient 5.67 MW **gas turbine with Waste heat recovery system** for electricity and steam generation at the industrial facility of GHCL Ltd. The project activity will partially replace the use of 1250 KVA DG set and Man B&W DG set (which are having lower thermal efficiency in comparison with Gas Turbine) for electricity generation and partially replace the use of boiler for steam generation.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Other barrier

CDM Projects in Textile and Tannery Sector

6	**Project Title**	13.5 MW Natural Gas based package cogeneration system at Garden Silk Mills Ltd – PFY Division, Gujarat, India
	Host Country	India
	Number of CERs	78,305 (10 Year Fixed)
	Applied Methodology	AM0014
	Current Status	At Validation
	Brief Description	Project activity involves installation of two **natural gas based cogeneration systems** of 6.75 MW rated capacity Rolls Royce engines each. Phase 1, installation of first 6.75 MW, Rolls Royce was completed in October 2005 and phase 2 commissioning of the 2nd 6.75 MW, Rolls Royce was completed in October 2006. The project activity displaces existing HFO based engine by Natural Gas based turbine. The project will generate 13.5 MW power from environmentally friendly fuel - Natural Gas, by displacing the existing HFO based engines and thereby, reducing the Greenhouse Gas (GHG) emissions.
	Additionality Criteria	Barrier Analysis: 1) Technological barrier 2) Investment barrier 3) Barriers related with gas supply 4) Barriers due to prevailing practice

CDM Projects in Textile and Tannery Sector

7	**Project Title**	Natural Gas Based Power generation with waste heat recovery system at Ginni Filaments Limited, Panoli, Ankleshwar, Dist. Bharuch, India
	Host Country	India
	Number of CERs	22,326 (10 year fixed)
	Applied Methodology	AMS-II.D. AMS-III.Q.
	Current Status	At Validation
	Brief Description	The project activity involves **captive power generation along with the waste heat recovery systems**. The project entails implementation of five 1.364 MW capacity gas engines for power generation. Natural gas based engines use environment friendly technology i.e. lean burn technology for generation of power. The technology involves the use of excess air in the combustion process along with the fuel. The excess air reduces the temperature of the combustion process & this reduces the amount of oxides of nitrogen as compared to a conventional natural gas engines. Also availability of excess of oxygen results in efficient combustion & more power output. Waste heat recovery activities involve heat recovery through exhaust of gas engines & also the engine jacket water heat recovery. The exhaust heat recovery activity involves installation of five-heat recovery units on the gas engines to recover the heat from high temperature exhaust gases. Recovered heat is then utilized for thermic fluid heating which was being heated by fossil fuel buring the absence of project activity.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Technological barrier 3) Barrier due to prevailing practice

CDM Projects in Textile and Tannery Sector

8	**Project Title**	Steam optimization by installation of double extraction condensing turbine at Birla Cellulosic
	Host Country	India
	Number of CERs	12,047 (10 Year Fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	The process power and steam requirements are met by 2*15 MW back pressure condensing turbine of which one acts as a standby system. Due to higher power to steam ratio, approximately 7 tonnes per hour (TPH) of low pressure (LP) steam is vented out to the atmosphere. To meet the increased demand due to expansion of the fibre plant from the existing 175 to 350 TPD, a new **double extraction cum condensing turbine** of 11.8 MW capacity is installed. This will also reduce the steam venting by 7 TPH and thereby results in a coal savings of approximately 6500 tons per year. Installation of double extraction condensing turbine in synchronization with existing back pressure turbine reduces the steam consumption from 191.95 TPH to 188.67 TPH. Thus reducing the coal consumption by approximately 20 TPH and hence reduction in GHGs to a considerable extent.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Technological barrier

CDM Projects in Textile and Tannery Sector

9	**Project Title**	Energy Efficient Acid Absorption Crystallizer Project, at Birla Cellulosic, Kharach
	Host Country	India
	Number of CERs	23,707 (10 Year Fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	The proposed project activity aims to reduce steam consumption in the Auxiliary Section at Birla Cellulosic for the crystallisation of glauber salt of sodium sulphate (Na_2SO_4) by the installation of **Acid Absorption Crystallizer** (AAC) technique, which uses less steam as compared to Horizontal Continuous Crystallizer (HCC). Consequently, corresponding consumption of coal shall be reduced leading to reduced Green House Gas (GHG) emissions. The project activity involves the installation of two units of energy efficient Acid Absorption Crystallizers (AAC) in place of Horizontal Continuous Crystallizer (HCC). HCCs are steam booster based and require high pressure steam, whereas AACs eliminate the need of steam boosters, hence reduce HP steam consumption drastically. However, there is a minor increase in LP steam consumption in the evaporation section due to evaporation load of dilute acid. Therefore, the need for high pressure steam is reduced, which reduces the corresponding consumption of coal. The project has been designed to be implemented in two phases. Phase I had been completed in September 2005, which involves the installation of one unit of AAC and phase II is expected to be completed by 2008, which involves installation of the other unit of AAC.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Technological barrier

CDM Projects in Textile and Tannery Sector

10	**Project Title**	Efficient power generation using gas engine technology in textile industry
	Host Country	India
	Number of CERs	34,210 and 18,977 (10 year fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	The project activity entails implementation of energy efficient measures at at Arvind Intex (AI) and Arvind Cotsyn (AC) spinning units by installing **energy efficient gas engines** that utilize natural gas (NG) for efficient power generation thereby substituting fossil fuel use with cleaner gaseous fuel (NG) use. Thus the primary objective of the project activity is to use cleaner fuel in an efficient operating system and reduce GHG emissions.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Technological barrier

CDM Projects in Textile and Tannery Sector

11	**Project Title**	Energy efficiency measures at Maral Overseas Limited, INDIA
	Host Country	India
	Number of CERs	13,080 (10 year fixed)
	Applied Methodology	AMS-II.D.
	Current Status	At Validation
	Brief Description	Maral Overseas Limited (MOL) implemented energy efficiency measures in its several industrial facilities. The measures include: • Use of **energy efficient compressor** having double stage screw • Use of **submersible pumps** to supply water from the river, Narmada, to the plant • Use of the **hydro pneumatic pressure booster** system with set of three small pumps and VFD • Replacement of pumps at duty point with the **energy efficient Grundfos pumps** in Humidification plants of spinning units. • Utilization of waste hot water from various locations like effluent, compressor, finishing machine, etc. • **Introduction of system software, Olympian**, which helps in transfer and translation of the data between different systems that helps in elimination of errors, provides central link between different systems and facilitates quick and efficient information exchange in order to achieve the reduction in extended dying cycle, water, energy, dyestuff, chemical and steam consumption.
	Additionality Criteria	Barrier Analysis: 1) Barrier due to prevailing practice

CDM Projects in Textile and Tannery Sector

12	**Project Title**	Baracol's Tannery Fuel Switch Project
	Host Country	India
	Number of CERs	5,650 (7 year)
	Applied Methodology	AMS-I.C.
	Current Status	At Validation
	Brief Description	The Project consists in the **retrofitting boilers** that used to burn Fuel Oil by retrofitted boilers that burns **renewable biomass** (eucalyptus firewood from renewable energetic forests), for heating water, at the leather treatment facilities of Baracol Courous.
	Additionality Criteria	Barrier Analysis: 1) Investment barrier 2) Technological barrier 3) Barrier due to prevailing practice

CDM Projects in Textile and Tannery Sector

13	**Project Title**	Gul Ahmed Combined Cycle Gas Turbine Project
	Host Country	Pakistan
	Number of CERs	35,656 (7 year)
	Applied Methodology	AMS-II.D
	Current Status	At Validation
	Brief Description	The Project is located in unit 1 of Gul Ahmed Textiles Mills Limited, which provides steam and electricity to units 1, 2 and 3, consisting of textile manufacturing, covering, spinning and wet processing of fabric. Steam is currently supplied by three boilers running on natural gas, and electricity is supplied by a mix of gas-fired and oil-fired engines. This system will be replaced by a combined cycle gas turbine (CCGT) system. A 10 MW **gas turbine** will be installed; its exhaust gases will be fed into a **waste heat recovery boiler** to generate steam for the process, and for a steam turbine that will generate additional electricity (therefore bringing total electrical capacity above 10 MW). Steam for the process will also be extracted from the steam turbine.
	Additionality Criteria	Barrier Analysis: 1) Barrier due to prevailing practice 2) Investment Barrier

Potential CDM Interventions in Textile and Tannery Sectors

Potential Areas for CDM Intervention

- Energy Efficiency Improvements
  - Replacement of existing low pressure boilers with high pressure boilers
  - Replacement of existing back-pressure and condensing turbines with extraction-cum-condensing type turbine
  - Installation of Variable Frequency Drives
  - Installation of Waste Heat Recovery Steam Generator (HRSG)
  - Replacement of High Efficiency Vapor Absorption Chillers with inefficient Vapor Compression Chiller
  - Installation of Vapor Absorption Chillers (VAC) on Waste Heat
  - Use of energy efficient compressor having double stage screw
  - Use of high efficiency pumps to supply water
  - Use of the hydro pneumatic pressure booster system

Energy Efficiency Improvements

- Utilization of waste hot water from various locations like effluent, compressor, finishing machine, etc.
- System Automation like introduction of system software, which helps in transfer and translation of the data between different systems that helps in elimination of errors, provides central link between different systems and facilitates quick and efficient information exchange in order to achieve the reduction in extended dying cycle, water, energy, dyestuff, chemical and steam consumption.
- Improvement in power distribution system by incorporating dry type transformers, bus trunking in place of cable, position of distribution system near to the load, and automatic power factor correction system etc

Cogeneration

- High pressure boilers based cogeneration: Natural gas or biomass based cogeneration in industries with high pressure boilers and power export to grid

Fossil fuel switch, from high carbon intensive to low carbon intensive

- Replacing HFO Based Boilers with natural gas boilers
- Replacing Fossil Fuel Fired Boilers with biomass boilers using rice husk, corn cob, wood chips etc. as fuel

Steam optimization by condensing

- Installation of double extraction cum condensing turbine to optimize the steam wastage

Process Optimization

- Reduction in steam consumption for the crystallization of glauber salt of sodium sulphate (Na_2SO_4) by the installation of Acid Absorption Crystallizer (AAC) technique, which uses less steam as compared to Horizontal Continuous Crystallizer (HCC).

Solid Waste Management

- Landfill Composting of Leather Waste
- Sludge Handling of Combined Effluent Treatment Plant

Causes for Low Participation of Industrial Sector of Pakistan in the CDM and Possible Improvement Measures

Causes for Low Participation of Industrial Sector of Pakistan in the CDM

1. Lack of awareness of industrial sector about CDM
2. Lack of financial incentives from the government
3. Dearth of Institutional Guidance
4. Long Timeframe for CDM project Development
5. High Costs of Validation

Measures Proposed to Boost CDM in Industrial Sector of Pakistan

1. Create Awareness about CDM at the Private, Public and Policy Level
2. Provide Financial Incentives to CDM Project Proponents
3. Develop Institutional Studies and Guidelines
4. Properly Plan Your CDM Project

CDM Guidebook

- Under SCI-Pak Project, a Guidebook has been prepared for Textile Processing and Tannery Sector which can be accessed at:

http://www.sci-pak.org/CDM/tabid/75/Default.aspx