Capital Goods: Innovative Interventions Required

Intervention 1 : Improve raw-material competitiveness of the industry			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Policy support from government in the following areas so as to resolve raw-material issues faced by Indian Capital Goods industry: • Duty Exemption on CRGO/ CRNGO Steel: till the time the country sets up indigenous manufacturing and achieves self-sufficiency in production of CRGO/CRNGO. • Zero customs duty applied to project imports should be suspended to alleviate the impact of cost disadvantage to indigenous Capital Goods manufacturers. • Rationalize inverted tariff structure to ensure level-playing field so that it promotes technology, manufacturing and value addition within the country. Rationalization can be achieved through application of uniform tariff rate across imported inputs and finished capital Goods. • Relaxation of mandatory BIS certification on imported raw-materials like CRGO/CRNGO and thick boiler quality steel plates etc.	Department of Heavy Industries (DHI), Ministry of Finance	Knowledge Creation and Commercialization
2	Create a centralized fund for SMEs which could be utilized for acquisition of international companies/assets operating in various raw-material categories like CRGO/CRNGO steel, amorphous steel, high alloy materials etc. For the same designate an implementing agency to invite, shortlist and grant the funding to the SMEs. The scheme will supplement the objectives of the Cluster Innovation Centres to bridge the demand-supply gaps in multiple aspects of a business and drive need-based innovation in the industry clusters in a localized manner, by prioritizing the needs of the industry and enable agencies like the Government and others in directing their efforts for increased efficacy.	Department of Heavy Industries (DHI), Ministry of Finance	Knowledge Creation and Commercialization
3	Focused scheme for encouraging domestic manufacturing of critical raw-materials and inputs. Some of the steps that may be adopted are: • Designate an agency to identify prospective international partners who are pioneers in manufacturing of inputs like: CRGO/CRNGO steel, high alloy materials, amorphous steel etc. • Provide tax holidays for wholly-owned subsidiaries, JVs & overseas companies setting up production base in India. • Leverage access to domestic raw material sources to global majors willing to share CRGO technology to the Indian companies interested in setting up the manufacturing capacity. This can be done by	Department of Heavy Industries (DHI), Ministry of Finance	Knowledge Creation and Commercialization

	– Reducing excise duty on these inputs in case of domestic production or by reducing customs duty in case of imports. – Financial incentives to companies supplying inputs/raw-materials to these manufacturing units of CRGO, high alloy materials etc.		
Issues Targeted			
• Inability to attract huge FDIs • Dependence on imports for critical raw materials such as CRGO steel, amorphous steel • Unavailability of high alloy materials for pressure parts in India, resulting in dependence on imports. • High custom duty on raw-materials that add to the cost of product by 7-10%			

References:

1. **CRGO steel developments in Japan, US & East Europe**

Cold Rolled Grain Oriented Steel (CRGO) was pioneered by ARMCO, USA and Allegheny Ludlum Corporation (ALC) during the period 1940-50. Since then, CRGO steel containing about 3% Silicon replaced the HR silicon Steel containing 4 to 4.5% Silicon which was used as Transformer core-material till 1940s. Subsequently, both ARMCO and ALC transferred CRGO Process technology to several other manufacturers, who produced conventional CRGO steel under license from either of the two companies mentioned above.

In Japan, CRGO steel was first developed by Kawasaki Steel in 1961. Their process involved MnS as grain growth inhibitor, while Americans employed MnS as grain growth inhibitor. Kawasaki process, which was independently developed, employed a considerably different production process to produce CRGO. Meanwhile, Nippon Steel was also manufacturing conventional CRGO steel through an ARMCO License. Though conventional CRGO steel has low core Loss; its induction (at 1000A/M or 10 Oe is around 1.80T), is not adequate to reduce the exciting current to make the transformer core more compact. Moreover, if the core loss is further reduced, the amount of energy, which is lost, as heat is reduced and further saving in power consumption is possible. This was the guiding principle in development of high permeability CRGO STEEL. Nippon Steel development the world's first high permeability CRGO steel in 1968 called Hi-B and in 1973 Kawasaki developed its own high permeability grade called 'RGH'.

Only Japanese companies mentioned above independently developed Hi-permeability CRGO and issued licenses to make this product to other manufacturers. For example, ARMCO manufactures TCH (Tran-Core H) under license from Nippon Steel – a Classic case in reverse technology transfer. Due to substantially high costs involved in such technology transfers, companies such as ALC in USA developed thin gauge CRGO to further reduce Core Losses.

East European Countries- Czech Republic and Slovakia developed a new concept in production of regular Grain Oriented Silicon Steel by using Nitrides as grain growth inhibitor rather than sulphides which is the normal grain growth inhibitor in the pioneering CRGO technology developed by ARMCO and ALC of USA. The concept of using Nitride as grain growth inhibitor resulted in a major advantage to steel makers, since Nitrides require > 14000C as compared to Sulphides which require > 14000C slab reheating temperature so that MnS goes into solution prior to slab rolling. This new type of approach was

developed in 1986 by researchers at Iron & Steel Institute in Dobra, Czech Republic in co-operation with East Slovakian steel works at VSZ Kosice.

Intervention 2 : Foster technology adoption & promote domestic machinery manufacturing			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Capital goods sector may be covered under Technology Up-gradation fund. Further following schemes may be implemented to foster technology adoption in the industry: • Import duty on new machinery should be made lower than second hand machinery, hence discourage the procurement of second hand imports • Regulatory mechanism to stipulate 30% minimum value addition for large value imports along with transfer of technology to an Indian company via JV/JWA. • Higher depreciation on machinery manufactured with 75% local value addition in India. • Capital subsidy may be provided for import of new machinery for selected identified equipment for which no domestic production facility exists. • Further, enter into tie-ups with financial institutions like SIDBI to extend credit to the applicants to undertake the machinery procurement project. (Relatively soft loans should be advocated to encourage small firms to go for technology up-gradation)	Department of Heavy Industries (DHI), Ministry of Finance	Knowledge Creation and Commercialization
2	Program to accelerate manufacturing of critical machinery currently not available in India. Various steps required are: • Compile a list of critical machinery which is not indigenously available. (e.g. high productivity, multi-spindle, high precision , heavy duty machine tools and metal forming machines) • Encourage foreign investors to collaborate with Indian counterparts to create machinery manufacturing facilities in India for the identified machinery. (Same model was adopted in China) Several measures that can be adopted for the same are : – Reduce or exempt investors from India's corporate income tax rate for 5-10 years. This may be done for investors who are willing to produce machinery currently not available in India. – Provide incentives for foreign players who are ready for technology transfer to Indian players. – Provide infrastructure support to ensure shorter time to market • Reduced excise duty on the identified machinery to encourage Indian enterprises to purchase the same, and indigenous machinery manufacturers to expand their capacities.	Department of Heavy Industries (DHI), Ministry of Finance	Knowledge Creation and Commercialization
Issues Targeted			

- India allows second hand imports of capital goods at concessional rates for various sectors, which has deterred the growth of domestic capital goods industry.
- Huge technology gap exists in high productivity, multi-spindle, high precision , heavy duty machine tools and metal forming machines

Intervention 3 : Improve testing and certification infrastructure			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Set up a National Implementing Organization which shall be entrusted with the responsibility of planning, implementing and monitoring the program for improving testing & certification infrastructure for the capital goods industry. The implementing agency may focus on the following activities: • Attract private investments in the testing and certification activity by creation of additional testing/ certification agencies under the PPP route either independently or for specific laboratories under the CPRI. • At the same time set up government aided testing & certification labs in some of the key clusters like Delhi/NCR, Rajkot, Coimbatore, Pune, Bangalore, etc. These labs may have technology collaboration with testing labs from countries like Holland & Korea so as to encourage same technology adoption in Indian labs. The objective of these labs will be to mentor the other small & medium private testing labs throughout the country. • Incentivize Indian electrical equipment & process plant equipment manufacturers who go for indigenous testing from government certified testing labs. • Provide necessary budgetary support to augment CPRI's test facilities and also upgrade testing laboratories in India to address capacity & availability issues obviating the need for sending the equipment abroad for type testing. • Create separate wing in CPRI to conduct prototype and material development for special castings and forgings used in power generating equipment as they require infrastructure supplementation at national level to speed up the development process. • Promote joint research activities of Indian companies with IGCAR, MIDHANI etc. to develop and commercialize production of prototypes.	Ministry of Science & Technology, Department of Heavy Industries	Knowledge Diffusion and Absorption
Issues Targeted			
• Costs of testing of different equipment and components in order to conform to the relevant standards of Indian Standards (IS) or International Electro technical Commission (IEC) is very high in India • Inadequate testing & certification labs in India. • Existing labs and centres for performing tests and R&D are not well equipped and lack modernization; often the machines are old and not working • Lack of strong quality control mechanisms in many Indian companies, especially to test their sub-vendors 'product quality leads to the final product being of poor quality.			

Intervention 4 : Foster domestic demand & market access			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Formulate a "local procurement" policy on the lines of Chinese industry wherein the government gives preference to domestically-produced electrical equipment and process plant products. Products with Indian-owned intellectual property and brands should be given mandatory preference for government procurement contracts. Further, various measures that may be taken to improve domestic market are: • All large Government purchasers may adopt the route of "Development Contracts" by which they award contracts to suitable Indian companies to develop their requirement of new machines/technologies/products through a risk-sharing partnership between the purchaser and supplier. This is a standard practice in foreign countries, where major developments are realized through contracts. • Preferential treatment in Government procurement process to indigenous innovative products/process for initial purchases and orders to encourage equipment innovation. Procurement norms/policies may be revisited so as to accommodate the newness/innovativeness of the product and not only consider the lowest price for awarding a contract. • Create a special vehicle for State Electricity Boards (SEB) that would enable replacement of old and ageing power plants of lower ratings with higher rating (500 MW & above) utilizing the existing land and infrastructure, rather than adopting Renovation and Modernization (R&M) route. • Central Electricity Authority (CEA)/ Ministry of Power (Mop) may decide on specific power plant ratings as standard ratings to be adopted for the Indian grid. In the current scenario, different ratings are being specified by different developer/ utilities. This makes standardization of the plant design, equipment design, inventory management including stocking of long lead components and raw material difficult. Critical time is taken for engineering, which affects the timely completion of the Projects. Many manufacturers face the difficulty in meeting the qualification requirements due to new ratings being specified	Ministry of Power, Department of Heavy Industries	Knowledge Creation and Commercialization
2	Countries which have huge market opportunities for Indian Capital Goods sector need to be examined for having Free Trade Agreements (FTAs) or Comprehensive Economic Cooperation Agreements to provide better access to Indian players in these countries. Some of the prospective countries which can be considered : EU, North America (US, Canada, Mexico) , Indonesia, Korea etc.	Ministry of External Affairs	
Issues Targeted			
• Issues in procurement policies of utilities. Emphasis is only given to L1 bids and very little encouragement is given for product innovation • Lack of export incentives lowers the competitiveness of the industry, which already suffers from high export transaction costs.			

Intervention 5 : Foster R&D in the industry & develop schemes to percolate the same across industry			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Set up a high level empowered body for R & D promotion comprising of key stake holders from institutes, private & public sector which would be responsible for execution and monitoring of efforts for technology development. Some of the tasks that may be performed by the body are: • Set up a technology fund to help Electrical Equipment manufacturers in developing product technologies and modernizing manufacturing infrastructure. • Form technical collaborations to champion various process technologies like precision measuring, material engineering & process control etc. These should then be percolated across the industry through organized knowledge transfer programmes. • Identify and invite international players to bring product innovation in India. Further, provide incentives for large foreign MNCs (Mainly from EU) to bring product technology into India. • Promote R&D in the Electrical Equipment industry by promoting pre-competitive research and providing incentives to industry players for R&D spending. • Establish product development centres covering all product development lifecycle stages in the following selected institutions: – Central Power Research Institute (CPRI) – Central Manufacturing Technology Institute (CMTI) – Selected IITs and NITs – Designated PSUs • Formulate a list in consultation with the sector industry associations for technology available for improving the energy efficiency and recycling. Further, 100% depreciation should be permitted for promoting investments in equipment & technology for energy efficient and recycling equipment. • Set up some private & public players to champion the R&D and technology innovation in electrical equipment & process plant equipment sector in identified areas. Further, these champions may be incentivized for diffusion of the technology to all the industry stakeholders.	Ministry of Science & Technology, Department of Heavy Industries	Knowledge Diffusion and Absorption
Issues Targeted			
• Limited government support for R&D. The existing labs and centres for performing tests and R&D are not well equipped and lack modernization; often the machines are old and not working. • Very few Indian firms use technology to make their business processes like procurement, distribution, marketing and servicing more efficient. • Lack of supporting process technologies such as precision measuring, material engineering and process control.			

References:

1. **R&D Initiatives of Korea Electro Technology Research Institute(KERI)**

Since its establishment in 1976, Korea Electro technology Research Institute (KERI) has been carrying out R&Ds on electro technology, testing and certification business on power apparatus as a government-sponsored institute as well as internationally accredited testing and certification body. For the last 30 years, KERI has also achieved a variety of technological achievements for power systems, power industries, electric materials and electronics for medical instruments including IT convergence technologies as well. Moreover, KERI has risen to a top-notched testing and certification organization for covering diverse electric apparatuses manufactured at home and abroad.

KERI is now playing the leadership role for the enhancement of electric industry and its business through R&Ds and testing & certification with excellent researchers, engineer's technicians including a 30-year long accumulated expertise and brand new dedicated facilities.

In the first half of 2011, KERI acquired a regular membership from the **Short-circuit Testing Liaison (STL)**, which is called as the G10 in the world's electric equipment industry. Korea became the 10th country to win the STL regular membership in the world. Britain was next, followed by Italy, Netherlands, France, Germany, Scandinavia, the U.S., Japan and India. China is still a preliminary member. Meanwhile, Russia, Romania, South Africa, Poland, Hungary and Czechoslovakia are participating members. After winning STL membership, Korea has secured a firm foothold for the domestic heavy electric equipment industry to enhance its export competitiveness. The nation is also expected to increase its foreign currency revenue through attraction of overseas test certification services.

KERI plans to expand the 4000MVA test facilities at a cost of KRW 160 billion for globalization of facilities, technology and services. Through globalization of the KERI brand, it is expected to catch up with Italy in 2015 and the Netherlands in 2020 in terms of globally-recognized test and certifications.

In the light of convergence trend in the science and technology field, including electro technology, Korea Electro Technology Research Institute (KERI) has off late targeted its efforts towards new types of technologies and services. In keeping with the expanded supply of smart grids, provision of stable power supply will become more important. In accordance with this, KERI will make a strong push for HVDC technology development to enhance efficiency and confidence in the power system. Further, KERI has also placed emphasis on R&D projects in the power propulsion sectors, including electric cars and ships.

KERI already started the technology development project related to electric cars in 1988 and now has secured the three core technologies - secondary cell, rapid charging/ discharging system, and control system technology. At the same time, it is also developing power storage technology considering the characteristic of electric energy, which accompanies demand and supply simultaneously.

KERI has decided to concentrate its R&D efforts on the development of the following six technologies - next-generation power grids, electricity propulsion technology, HVDC technology, electric equipment test certification technology, convergence medical instrument technology and Nano-based electric technology.

Intervention 6 : Measures to improve labour skills & productivity			
S.No.	**Tasks**	**Key Stakeholder**	**Innovation**
1	Set up secondary training centres on a PPP model in the existing as well as developing capital goods clusters to cover skill up-gradation training for the existing workforce in both organized and unorganized segments. These centres should incorporate trainers from industry having considerable experience in various shop-floor operations. Various programmes on making critical business processes (like procurement, distribution, marketing and servicing) more efficient may be carried out by these centres.	Ministry of MSME, NSDC, Department of Heavy Industries	Knowledge Diffusion and Absorption
2	Infrastructure updation in existing ITIs & Polytechnics • Introduce courses for inducing more number of semi-skilled workers in the industry. For this, specialized courses in the areas of welding, fitting etc. should be arranged. • Set up non-engineering courses for metallurgy. • One time capital grant may be given for upgrading the infrastructure of such institutes. Recurring expenditure should be met by the concerned institution.	Ministry of MSME, NSDC, Department of Heavy Industries	Knowledge Diffusion and Absorption
Issues Targeted			
• Huge gaps exist in the availability of skilled manpower in the power equipment manufacturing industry. Also the available workers lack the required skills in welding and fitting. • Very few Indian firms use technology to make their business processes like procurement, distribution, marketing and servicing more efficient. Also the use of techno-managerial processes like JIT, TQM, TPM etc. are limited to large firms only.			

Intervention 7 : Provide database & technology support to domestic firms			
S.No.	**Framework for Innovation**	**Key Stakeholder**	**Innovation**
1	Provide database & technology support to domestic firms in the following areas: • Quality standards followed globally for various components & products. • Technology- and innovation-related international journals from major publishers. • Country wise/OEM wise SOPs for testing the products. • Details of testing infrastructure available in India and globally. The details need to include testing labs availability and tests conducted by them, machinery employed for testing, fees for conducting the tests etc. • Database of industry experts (either retired or from the industry) who can be contacted by domestic firms for any kind of technical support required. For the same, profiles of the experts need to be invited and kept in a repository. On receipt of any request from the industry, communication can be sent to the relevant experts and the interested one's can then be suggested to the requestor.	Ministry of Science & Technology	Knowledge Diffusion and Absorption
Issues Targeted			

- Lack of awareness of global standards for among domestic firms
- Limited government support for R&D. The existing labs and centres for performing tests and R&D are not well equipped and lack modernization; often the machines are old and not working.