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ENVIRONMENT PROTECTION UNDER CPEC-FOCUS ON RELOCATION OF INDUSTRIES FROM CHINA TO PAKISTAN

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DISCUSSION PAPER

ENVIRONMENT PROTECTION UNDER CPEC-FOCUS ON RELOCATION OF INDUSTRIES FROM CHINA TO PAKISTAN

By:

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The Urban Development Division of Centre of Excellence for CPEC (COE-CPEC) is of the view that the increasing quantum of CPEC related investments and relocation of industries from China to Pakistan require proactive planning to protect Pakistan from the adverse environmental effects of these interventions. Therefore, a CPEC-related working group on environment protection needs to be established.

1. Background:

China-Pakistan Economic Corridor (CPEC) provides the industrial sector of Pakistan with an opportunity to modernize and become more efficient and competitive. The various energy projects under CPEC - coupled with improvements in infrastructure and road networks – are helping to address some of the key constraints to growth in the country. More importantly, the development of Special Economic Zones (SEZs) would enable industries to improve supply chain, enhance collaboration, and innovation capabilities of all related sectors. However, this process will take time to materialize, and the nature of its trajectory would depend - at least in the short to medium term - on two main factors: (1) How the industrial transformation currently underway in China creates potential opportunities for Pakistan; & (2) How prepared Pakistan's economy is to take advantage of this opportunity under CPEC.

2. Industrial Transformation in China and Opportunities for Pakistan:

After experiencing rapid economic growth over the last three decades China has been moving towards a new phase of development. The overall policy direction for this transformation stems from the 13th five-year plan (2016-2020) of China, which was adopted by the Chinese government in March 2016. The plan acts as one of the key guiding principles to all Chinese ministries, industries and local governments in formulating their policy goals and development initiatives to complement this new growth paradigm (SBP Annual Report, 2018).

The path for industrial modernization, meanwhile, draws its inspiration from "Made in China 2025" – A master plan adopted in May 2015 to turn China into one of the most competitive manufacturing powerhouses. The objectives are multi-fold, with a focus on emerging and existing industries of China, as well as on their quality improvement and brand development. To summarize:

i. It (Made in China 2025) aims to accelerate the development of new manufacturing and information technologies. Increased focus in the plan is on the provision of services and

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the shift from the traditional industrial structures, and increased research and innovation efforts.

ii. On parallel terms, there is a comprehensive roadmap designed to transform and upgrade existing Chinese industries with a clear objective of moving away from mass production of low-end products towards narrow-based specialized commodities.

iii. By narrowing production and focusing on luxury and specialized commodities, the industries would be trading economies of scale for higher marginal returns. Moreover, increased focusing on value addition would give a boost to the process of brand development that China is striving for in order to break into the high-end market. Lastly, this change of strategy is aimed to aid in addressing the overcapacity problems that some industries (such as steel and coal) are experiencing at the moment.

iv. Furthermore, the plan highlights the importance of a reduction in the level of dependence on foreign industries for raw materials, services and other products. The plan sets targets to overcome such dependencies. For instance, it suggests increasing the share of domestically produced core components and materials to 40 percent in 2020 and to 75 percent beyond that time-period of 2020.

All this would result in a concentrated, specialized and vertically integrated industrial sector that would prioritize application of technology and brand development in order to achieve competitive advantage in high-end and smart manufacturing in China. Mergers and acquisitions would be encouraged where certain inefficient firms still show potential; meanwhile, segments of the sector deemed either technologically out-of-date or incompatible with the new growth model would face liquidations, technology transfer, and relocation opportunities in order to achieve the "better asset utilization".

On the economic front, these advancements in China are being supported by three major changes that have started to affect the Chinese economy: a shift from investment-fueled growth towards consumption-oriented growth; increased focus on technological enhancements; and a struggle to bring forth the "Green Revolution" in China. Table1.1 below illustrates how the 13th 5-year Plan of China focuses on these areas. Also, this table highlights the impacts of this Plan on Pakistan with possible spillovers and transfers to be experienced by the country;

echnologies to complement this transformation	**Pillars of Industrial Transformation in China under the 13th 5-year Plan**		
	1. Consumption-orientation	**2. Technological advancement**	**3. Green Revolution**
	Luxury textile items	Focus on 5G, advanced sensors and artificial intelligence	Environmental monitoring machineries, equipment and software
	High-end food processing and production	Genomics and bio-tech industry	Low-carbon public transportation systems

	Hybrid/electric/driverless automobiles	R&D related to the next generation power generation (biomass, smart grids, etc)	Battery energy density innovations
	Medical advancement	Positioning and global communications infrastructure	Shift from fossil-fuel power generation
	Premium Smartphone manufacturing	Shape-memory alloys, self- healing materials, semi- conductors and biosynthetic Materials	From synthetic to organic fertilizers
	Advanced hospitality services	Disaster prevention technologies	
Possible spillovers and transfers to be experienced by Pakistan	Low-end textile manufacturing	Steel industry inflows	Coal industry inflows
	Mobile and laptop assembly and fixing	Auto business transfers	High-carbon vehicles crossing borders
	Basic food processing	Kitchen/appliances machinery imports	Inflow of synthetic fertilizer manufacturers
	Catering for increased consumer demand in China	Plastics industry (toys, sanitation, PVCs) inflows	Leather & Marble-manufacturers inflow
		Chemical industry technology transfers	

TABLE 2.1: INDUSTRIAL TRANSFORMATION IN CHINA UNDER THE 13TH, 5-YEAR PLAN AND ITS IMPACTS ON PAKISTAN FOR INDUSTRIAL RELOCATION.

With such advancements in China (and a clear focus on environment protection & climate change), many existing practices, equipment, and infrastructure would become obsolete in the near future. Shutting down or disposing off these Chinese industries would not be feasible, while transferring the machineries to the developing economies could act as an attractive alternative for China. With CPEC in its implementation stage, such technology transfers and spillovers from China into Pakistan may be expected. A few such possibilities have been chalked out, which are as under:

- In the energy sector, coal plants and related machinery would be transferred as the majority of CPEC-related energy investments include power generation from coal-based plants. Complementing this fact is the alarming level of air pollution in big industrial regions of China, forcing the nation to look for alternative energy sources.
- Low-end smart manufacturing businesses (like assembling and fixing) may cross the borders as China increases its focus on the high-end avenues of semi-conductor

manufacturing, lens and self-healing modern displays, etc. Post-design development operations such as smart-phones and laptops assembling may fall in China and is prone to relocate to Pakistan.

- For the infrastructure related projects, Chinese steel firms may find an entry into the Pakistani market to better utilize their excess produce by working on the extensive infrastructure investments under the CPEC.
- In the auto sector, an inflow of conventional vehicles and associated spare part businesses may be expected to enter in Pakistan. Crossover sedans, SUVs, and pick-up trucks - together with complementary products and services like spare-part businesses - could find their way into the Pakistani market.

Furthermore, with growing domestic demand in the country, some sectors of the Pakistani economy also provide opportunities of expansion and diversification that domestic players might be able to capitalize upon the Chinese investments in the country. For instance:

- The chemical industry of Pakistan may welcome new players as investments in technology upgradation under CPEC gradually allows for increased efficiency and high R&D spending. Firms may take benefit of these investments by focusing on producing basic petrochemical building blocks such as Naphtha cracker (via gasification of coal for example); marketing and exporting the surplus caustic soda of Pakistan; or using technological advancement to expand the usage of chlorine (a by-product in the production of caustic soda) in the manufacturing of PVC pipes; etc.
- Furthermore, with stringent regulations on the use of vaccines, pesticides and synthetic fertilizers in China and promotion of organic fertilizers in their stead, the scale of such operations is expected to reduce in China. Hence, the relocation of such firms to Pakistan becomes possible as CPEC envisions to establish various joint ventures (JV) in different sectors including fertilizers and pesticide manufacturing between the domestic and Chinese enterprises.
- The plastic industry in Pakistan can also see a boom in terms of investment and technology transfer under CPEC with growing demand for automobiles, rising need for water management infrastructure, and potential low end smart manufacturing entering to Pakistan. Technology aided investments in this sector would help in better construction and manufacturing of pipes, smart phone exteriors, automobile interiors, and packaging materials. In addition, improved and updated variants of crucial machinery like injection molding, extrusion, blow molding and rotational molding units, etc may be imported either by the local firms or by incoming Chinese counterparts in Pakistan.
- With China moving up the global supply chain in food processing, lower-end machineries could be transferred to Pakistan as well, which would aid in catering to the growing demand of hospitality industries under CPEC in Pakistan.

3. Environmental Implications of the Relocation of Industries from China to Pakistan

The possibilities of technology transfers and spillovers from China to Pakistan under CPEC, described as above, have environmental implications as well that need to be addressed promptly with suitable policy measure and strict implementation of the environmental standards in Pakistan. Pakistan's environmental policy is based on participatory approach to

achieving objectives of sustainable development through legally, administratively and technically sound institutions. The conservation challenge in Pakistan, as in other developing countries, is to develop strategies that will meet the resource needs of the local communities while also protecting and preserving the natural resources. The National Conservation Strategy (NCS) of Pakistan was adopted in 1992 after a long and protracted process of consultation with governmental agencies, academia, NGOs, and civil society organizations engaged in the domain of the natural resource conservation, environmental preservation, and sustainable development. The NCS of the Government of Pakistan provided a broad framework for addressing the environmental concerns in the country. It comprised 14 core areas viz. integrating population and environment programmes, supporting institutions for the common resources, preserving cultural heritage, preventing and abating pollution, conservation of bio-diversity, increasing energy efficiency, restoring range land and improving livestock, maintaining the soil in croplands, increasing irrigation efficiency, protecting watersheds, supporting forestry and plantations and protecting water bodies and sustaining fisheries, developing and deploying renewable, and managing urban waste. The NCS was considered as the awareness raising and institution building framework in Pakistan but after the mid-term review (MTR) of NCS in 1999, national emphasis was shifted to the building of implementation capacities with more focused approach by the development of Pakistan's Sustainable Development Strategy for 2002-2012 with a greater emphasis on poverty reduction and economic development in addition to the environmental sustainability in the country.

Pakistan Environmental Protection Act (PEP Act 1997) was enacted on 6th December 1997 to provide a structure for the protection, conservation, rehabilitation and improvement of environment, for the prevention and control of pollution, and promotion of sustainable development (Salik, 2016). The Act particularly focuses on the enforcement of National Environmental Quality Standards (NEQSs), introduction of EIA/IEE review procedures/system, regulatory regime for hazardous substances/wastes, resource generation through establishment of Provincial Sustainable Development Fund and levy of Pollution Charge and providing appellant forum for environmental cases. Soon after the enactment of this law, Ministry of Environment, Local Government and Rural Development set its priorities to operationalize the provisions of PEP Act 1997. The drafting and notifying rules and regulations under Section 31 and 33 of PEP Act 1997 were finalized, which include the following[4]:

i. National Environmental Quality Standards (NEQSs), 2001
ii. Environmental Samples Rules, 2001
iii. Provincial Sustainable Development Fund (Procedure) Rules, 2001
iv. Provincial Sustainable Development Fund (Utilization) Rules, 2001
v. Pollution Charge for Industry (Calculation and Collection) Rules, 2001
vi. Composition of Offences and Payment of Administrative Penalty Rules 2000
vii. Hazardous Substances Rules, 2000
viii. National Environmental Quality Standards (Environmental Laboratories Certification)

[4] Source: Pak-EPA, http://www.environment.gov.pk / 10/2001

Regulations, 2000

ix. Pakistan Environmental Protection Agency (Review of IEE/EIA Regulations, 2000)

S.No	Parameter	Existing Standards	Revised Standards		
			Into Inland Water	Into Sewage Treatment[5]	Into Sea[6]
1.	Temperature or Temperature increase*	40°C	=<3 °C	=< 3 ° C	=<3 °C
2.	pH value	6-10 Ph	6 – 9	6 - 9	6 – 9
3.	5-days Biochemical Oxygen Demand (BOD_1) at 20°C[1]	80 mg/l.	80	250	80**
4.	Chemical Oxygen Demand (COD)[1]	150 mg/l.	150	400	400
5.	Total suspended solids	150 mg/l.	200	400	200
6.	Total dissolved solids	3500 mg/l.	3500	3500	3500
7.	Grease and oil	10 mg/l.	10	10	10
8.	Phenolic compounds (as phenol)	0.1 mg/l.	0.1	0.3	0.3
9.	Chloride (as Cl)	1000 mg/l.	1000	1000	SC
10.	Fluoride (as F)	20 mg/l.	10	10	10
11.	Cyanide (as CN) total	2 mg/l.	1.0	1.0	1.0
12.	An-ionic detergents[2] (as MBAS)	20 mg/l.	20	20	20
13.	Sulphate (SO_4)	600 mg/l.	600	1000	SC
14.	Sulphide (S)	1.0 mg/l.	1.0	1.0	1.0
15.	Ammonia (NH_3)	40 mg/l.	40	40	40
16.	Pesticides, herbicides, fungicides and insecticides[3]	0.15 mg/l.	0.15	0.15	0.15
17.	Cadmium[4]	0.1 mg/l.	0.1	0.1	0.1
18.	Chromium[4] (trivalent and hexavalent).	1.0 mg/l.	1.0	1.0	1.0
19.	Copper[4]	1.0 mg/l.	1.0	1.0	1.0
20.	Lead[4]	0.5 mg/l.	0.5	0.5	0.5
21.	Mercuy[4]	0.01 mg/l.	0.01	0.01	0.01
22.	Selenium[4]	0.5 mg/l.	0.5	0.5	0.5
23.	Nickel[4]	1.0 mg/l.	1.0	1.0	1.0
24.	Silver[4]	1.0 mg/l.	1.0	1.0	1.0
25.	Total toxic metals	2.0 mg/l.	2.0	2.0	2.0
26.	Zinc	5.0 mg/l.	5.0	5.0	5.0
27.	Arsenic	1.0 mg/l.	1.0	1.0	1.0
28.	Barium	1.5 mg/l.	1.5	1.5	1.5
29.	Iron	2.0 mg/l.	8.0	8.0	8.0
30.	Manganese	1.5 mg/l.	1.5	1.5	1.5

31.	Boron	6.0 mg/l.	6.0	6.0	6.0
32.	Chlorine	1.0 mg/l.	1.0	1.0	1.0

TABLE 3.2: NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (MG/L, UNLESS OTHERWISE DEFINED)

Sources; Pak-EPA 2017

S.No.	Parameter	Source of emission	Standards	Revised Standards
1.	Smoke	Smoke opacity not to exceed:-	40% or 2 (Ringlemann Scale).	40% or 2 Ringlemann Scale or equivalent smoke number
2.	Particulate Matter[1]	(a) Boilers and furnaces:		
		(I) Oil fired.	300	300
		(ii) Coal fired.	500	500
		(iii) Cement Kilns.	200	300
		(b) Grinding, crushing, clinker coolers and related processes, metallurgical processes, convertors, blast furnaces and cupolas.	500	500
3.	Hydrogen Chloride[2]	Any.	400	400
4.	Chlorine[2]	Any.	150	150
5.	Hydrogen Fluoride[2]	Any.	150	150
6.	Hydrogen Sulphide[2]	Any.	10	10
7.	Sulphur Oxides	Sulfuric Acid / Sulfuric Acid Plants. Others Plants. [3]	400 400	5000 1700
8.	Carbon Monoxide[4]	Any.	800	800
9.	Lead [2]	Any.	50	50
10.	Mercury [2]	Any.	10	10
11.	Cadmium [2]	Any.	20	20
12.	Arsenic [2]	Any.	20	20
13.	Copper [2]	Any.	50	50
14.	Antimony [2]	Any.	20	20
15.	Zinc [2]	Any.	200	200

16.	Oxides of Nitrogen (NOx) [4]	(i) Nitric Acid manufacturing unit. (ii) Gas fired (iii) Oil fired (iv) Coal fired	400 400 - -	3000 400 600 1200

Sulphur Dioxide

Sulphur Dioxide Background Levels (ug/m3)			**Standards**	
			Criterion I	**Criterion II**
Background Air Quality	**Annual Average**	**Max. 24 hours**	**Max. SO_2 Emission**	**Max. allowable ground level**
($S0^2$ Basis)		Interval	(Tons per day per Plant)	Increment to ambient (ug//m^3) (One year average)
Unpolluted	< 50	< 200	500	50
Moderately Polluted *				
Low	50	200	500	50
High	100	400	100	10
Very Polluted **	> 100	> 400	100	10

TABLE 3.3: NEQS FOR INDUSTRIAL GASEOUS EMISSIONS (MG/NM^3, unless otherwise defined)

Sources; Pak-EPA 2017

NITROGEN OXIDE

Ambient air concentrations of nitrogen oxides, expressed as NO2, should not exceed the follow;

Annual Arithmetic Mean	100 ug/m3 (0.05 ppm)

Emission levels for stationary sources discharges, before mixing with the atmosphere, should be maintained as follows:-

For fuel fired steam generations, as nanogram (10E-9 gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	260

Sources; Pak-EPA 2017

S.No	Parameter	Standards (maximum permissible limit)	Measuring method
1.	Smoke	40% or 2 on the Ringlemann Scale or equivalent smoke number at end of exhaust pipe during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more.
2.	Carbon Monoxide.	Emission Standards: New Vehicles. Used* Vehicles. 4.5 % 6 %	Under idling conditions. Non dispersive infrared detection through gas analyzer.
3.	Noise.	85 db (A).	Sound-meter at 7.5 meters from the source.

TABLE 3.4: NEQS FOR MOTOR VEHICLE EXHAUST AND NOISE;

Sources; Pak-EPA 2017, *10 year or older model.

Introducing Environmental Impact Assessment (EIA) culture in a country like Pakistan was a difficult and challenging task particularly when the environmental institutions were weak and awareness level was low. It is quite encouraging that now the EIA process is in-progress in the country in an organized manner after notification of EIA Regulations 2000 and availability of IEE/EIA reports and review guidelines (developed through a long consultative process). The federal and provincial EPAs have developed their capacities to review and issue environmental clearances (Salik, 2016). The review process is carried out through public participation. The EIA process has further augmented in Pakistan after the directions to all financial institutions in the country on restriction of loans without environmental clearances from the concerned institutions. Pak-EPA has developed number of sector specific guidelines to facilitate project proponents. Some of the key guidelines are given below.

- Major thermal power stations · major roads
- Major chemical and manufacturing plants
- Oil and gas exploration and production
- New township development
- Water supply projects
- Industrial estates
- Municipal waste disposal
- Sewerage schemes

4. WAY FORWARD FOR THE CPEC RELATED WORKING GROUP ON ENVIRONMENT

Below are some key policy recommendations and the way forward for working group to protect environment under the CPEC portfolio:

- Under the Pakistan Environmental Protection Act, 1997 / provincial environmental protection acts, it is mandatory to conduct EIAs of types of development projects. The same legislative requirement should also be followed for CPEC projects with diligence (and in true letter and spirit) both at federal and the provincial levels

- China has commissioned/established various projects that are based on new and advanced technologies in their country. Pakistan may also bring such technologies through future agreements under CPEC. The usage of latest technologies can further significantly reduce emissions from various projects being commissioned under CPEC.
- Strategic Environmental Assessment (SEA) is an analytical and participatory approach that is used to integrate environmental considerations into policies and plans and to evaluate the inter-linkages between economic and social considerations. A good SEA - preparation and implementation - can help identify better opportunities for environmental protection, climate mitigation and adaptation, prevent costly mistakes, build stakeholders' commitment, reduce poverty more effectively, and prevent conflicts. As a tool, SEA is more effective than environmental impact assessment (EIA) while considering larger programmes. Hence, SEA for all special economic zones (SEZs) being set up under CPEC may be planned and carried out as an analytical, participatory and integrated approach to mainstream environmental considerations in CPEC industrial cooperation activities. This will help evaluate the inter-linkages of environment, economic and social considerations.
- Pakistan can take advantage of bringing cost-effective and climate-compatible investments in the country through CPEC new projects. Ministry of Climate Change, along with the federal and provincial environmental protection agencies (EPAs), should prepare plans to seek support from China for Pakistan-focus carbon trading that may finance several new climate-compatible and climate-resilient projects in the country under the overall umbrella of CPEC in the future.

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