

China-Pakistan Economic Corridor; Prospects and Challenges for Balochistan, Pakistan.

Muhammad Ahmed Farooqui¹ and Syed Mobasher Aftab²

¹Office of Academics and Research, COMSATS University Islamabad, Lahore Campus, Defence Road, Off Raiwind Road, Lahore, Pakistan

²Balochistan University of Information Technology, Engineering and Management Sciences, Quetta, Pakistan

Email: farooqui@ciitlahore.edu.pk

ABSTRACT

Balochistan is rich in natural resource but due to the extremely harsh geographical environment and under-developed civil infrastructure (including roads, energy and water supplies), these natural resources could not have been tapped adequately in the past. With the launch of China-Pakistan Economic Corridor (C-PEC), there are ample opportunities for the exploitation of these resources that are expected to pave the way for unprecedented economic activities in Balochistan. From the perspective of natural resources these activities include, but not limited to, development and management of water resource, mining of coal and minerals, exploration of unexplored hydrocarbons, exploitation of dimension stones and construction material, and the establishment of related and subsidiary industries. All these activities require human resource development, better health, and educational facilities especially institution for technical and skill development of masses and most importantly the sustainable development of water resources and reservoirs for drinking, municipal and industrial purposes. In this paper key natural resources of Balochistan are identified in the context of their sustainable use under the C-PEC induced development projects. These include water, minerals, hydrocarbons, shale-gas, and coal. Suggestions are presented for a way forward to take maximum advantage of these resources for revenue generation and for the ultimate benefit to the local communities in Balochistan. A large number of mega projects including development of deep-sea Gwadar port, power generation plants, highway construction, and the establishment of special economic zones have been part of the C-PEC and are already being undertaken. However, it appears that small and medium-sized local industries and production units have not been given due attention. It is proposed here that the local people through local bodies may be identified and matched with relevant Chinese counterparts to develop joint ventures. Most of the areas of production and development identified in this paper are those whose products are already being exported to China through Karachi port. Hence the demand for these products in China is already established and need not any further survey. The products proposed in this paper are considered viable as all kinds of transport for C-PEC shall be passing through a large part of Balochistan where these resources occur naturally.

Keywords. China-Pakistan Economic Corridor, natural resources, local communities, Balochistan.



1. Introduction

In the seventy years history of Pakistan, the initiation and launching of the China-Pakistan Economic Corridor (C-PEC) is a significant economic activity that has been truly termed as "game changer" [1]. Since the fall of Dhaka that led to the creation of Bangladesh in 1971, Pakistan has been continuously struggling to regain its position on the economic front. One after the other several internal and external conflicts and issues that surrounded Pakistan unwillingly, including, Soviet invasion in Afghanistan, Iran-Iraq war, Kuwait war, Iraq war, continuous turbulence in Afghanistan for the last four decades, intermittent escalation of tension with India on Kashmir issue, nuclear tests by India and Pakistan, political instability in Pakistan due to military rule, and continuous, mostly uncontrolled, population growth, have been the major causes that did not allow the planners to frame and implement any long-term sustainable economic policy that would have helped Pakistan regain its economic status [2, 3, 4, 5, 6, 7].

The One Belt One Road (OBOR) Initiative and the launching of C-PEC in 2013, when the official MoU was signed between China and Pakistan, has emerged as a strong ray of hope for Pakistan to regain its lost economic strength. The C-PEC aimed to connect western regions of China and Pakistan through integrated investments in energy, trade, and communication. The C-PEC is going to enhance trade activities through Pakistan between China and the Middle East, Africa and Central Asia. The corridor will be a strategic game-changer in the region and would certainly bring long-term opportunities for Pakistan to become a richer and stronger economy. This paper provides an overview of the present and future opportunities for economic growth of Pakistan, especially Balochistan for which comprehensive long-term planning is urgently and essentially required. The paper also identifies the focus areas for effective economic development and the available natural resources in Balochistan for a profitable business. Such businesses are recommended to be initiated as joint ventures of local people of Balochistan and Chinese companies so that the real benefit of development percolated down to the deprived communities.

2. Focus Areas of Technology for Pakistan

According to the latest biennial report of the US National Science Foundation and the National Science Board, China has gained the status of second-largest R&D spender in the world, accounting for 21% of the of approximately \$2 trillion, which is next to the United States (26%) [8]. The rate of increase in R&D spending is the point of particular interest. R&D budget in China grew at the rate of 18 percent a year between 2000 and 2015, that is more than four times faster than the United States' rate of four percent. It is almost definite that by the end of 2018, China will be the largest spender on R&D in the world. This should be of interest to not only Pakistani policymakers, but also to the policymakers of the neighboring countries of China. Pakistan is required to train as many people, especially youth, from its rapidly growing population as it can, using both indigenous and foreign institutions. In the context of the latest growing anti-immigration and anti-Muslims sentiments in the United States, China may be an attractive alternative for Pakistani youth.

Increased funding for R&D by the Chinese government has resulted in the increase in the trained technical workforce that ultimately led to a dramatic increase in technical output [8]. The number of science and engineering graduates increased in China increased from 359,000 in 2000 to 1.65 million in 2014, almost a five-fold increase as shown in Table-1 [8]. The number of technology-based research papers being published by Chinese scholars is increasing at an unprecedented rate [9]. Chinese researchers and technologists are heavily involved in technology development and have made impressive contributions in artificial intelligence, telecommunications, robotics, electric cars and renewable energy [10]. These are the areas in which Pakistan also needs to develop expertise and human resource with the help of China.

It is a general perception in Pakistan that most of the C-PEC projects are in two sectors: energy and highways. But in reality, C-PEC projects are mostly about technology. New technologies are bound to be embedded in the C-PEC projects. With fast-paced technology developments, it is evident that in near future only technologically sound nations will be able to survive honorably. The future economic growth of a nation will depend on the confluent use and applications of big data, artificial intelligence, and connectivity; hence Pakistan is required to take initiatives in these focus areas. Therefore, it is imperative for Pakistan to initiate academic and research programs with the help of Chinese institutions to train as many Pakistani youths as possible in the five focus areas of; 1) artificial intelligence, 2) robotics, 3) renewable energy, 4) agriculture and 5) biotechnology [10].

Table 1. A comparison of the R&D spending and Technical Workforce in China and USA [8].

	USA	China
R&D Expenditure in 2017	\$520 Billion	\$420 Billion
R&D Global share in 2017	26%	21%
R&D Rate of Increase	4% per year	18% per year
R&D Expected expenditure in 2019	\$562 Billion	\$588 Billion
Technical Workforce 2000	4,83,000	3,95,000
Technical Workforce 2014	7,42,000	1.65 Million
Technical Workforce 2017 (Estimated)	≈800,000	≈2.1 Million

3. Major Areas of Current Activities in Pakistan

At present a major portion of the funds under C-PEC are allocated to the projects in the following seven areas;

1. Construction of highways and railway tracks
2. Development of Gwadar port
3. Energy generation projects
4. Establishment of industrial zones along the C-PEC route (Fig.1)
5. Laying down of pipelines for oil and gas transmission
6. Cyber networking and telecommunication
7. Water supply projects for industrial and municipal use (mostly in Balochistan)

All projects require technology development and human resource development. Therefore, it is imperative for Pakistan to create and strengthen proper infrastructure and facilities at R&D organizations and universities in Pakistan so that the future demand of technologies technologists, scientists and engineers are met. The list of C-PEC projects and their current statuses are tabulated in tables 2 to 6, [11]. The energy and power generation sector comprised of 18 projects, the overall progress varies from 15 to 75% while a few are completed, table 2. The transportation and communication infrastructure including eight projects, the overall progress varies between 15-70%, table 3. Six projects are related to industrial

cooperation and ten projects to Gwadar Port with nominal progress on all of them, table 4 and 5. There are ten Special Economic Zones have been planned to establish in different parts of the country, the feasibility studies and technical evaluation is under progress on all the projects, table 6, [11].

Considering the present rate of development work under C-PEC, it has been estimated that the GDP of Pakistan is expected to experience an annual increase of about 2.5 percent by the year 2030 whereas ca.700,000 jobs are expected to be created in next 10 years. Most of the jobs shall be in the Energy, Communication (Highways and Railways) and Port Development sectors [12, 13].

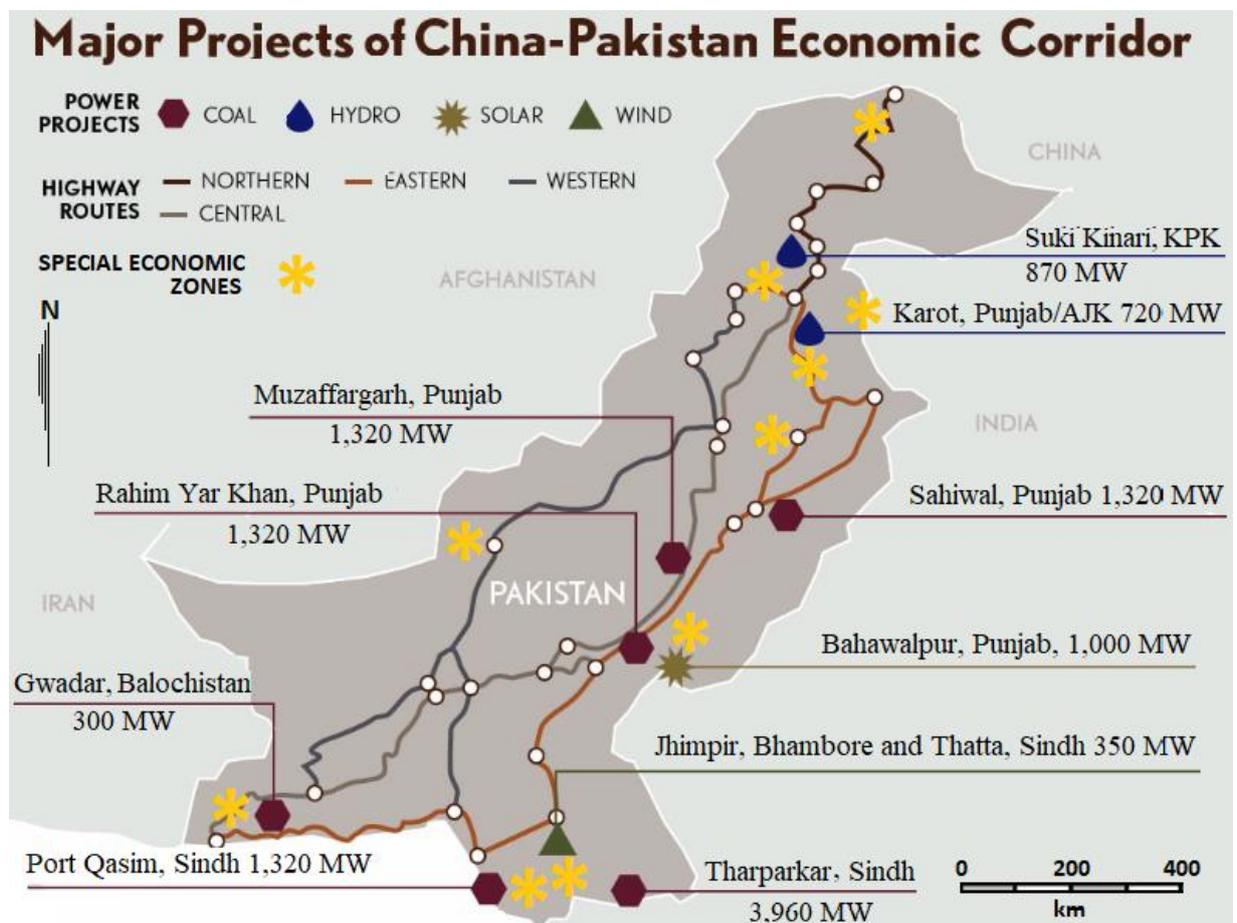


Figure 1. Map showing major projects of China-Pakistan Economic Corridor [13, 14, 15, 16].

4. C-PEC and the Local Communities in Balochistan

The rural communities in Balochistan take pride in their traditions, culture and the natural environment. They are well aware of the natural resources, agriculture, forests, rangelands, watersheds, biodiversity and mineral deposits of the province, however, the harsh living conditions like aridity, depleting groundwater resources, periodic droughts, overgrazed and degraded rangelands, low productive livestock, and rugged terrain are the major hurdles in their advancement. The government departments, both provincial and

federal, have been largely unable to mitigate desertification, deforestation, de-vegetation of rangelands and recharging of the groundwater resources.

The province needs an integrated developmental approach in which all stakeholders including government departments, politicians, civil society leaders, community elders and local NGOs are to be brought on one page to take maximum advantage of C-PEC for community development. The western route of the C-PEC has excellent potential for the developmental projects. For a sustainable development-harmonized with local communities, the developmental activities should involve local communities through a consultative process. It's imperative to bring the rural communities into the mainstream by transforming and empowering them in decision making. The empowerment of communities in developmental activities may initiate from project identification to implementation and from operation and maintenance to project's ownership, [17].

The rural communities are dependent on their surrounding environment and natural resources. The small-scale farming, orchards, livestock grazing, limited mining and fishing in coastal areas may improve the community's economic conditions. In some cases, these said economic activities and occupations have already been molded by the natural climate and availability of surface and groundwater resources [18]. The sustainable management, conservation, and protection of water resources is an important factor for the physical, social and economic endurance of rural communities [18].

The impact of climate-induced changes in Balochistan are obvious but are not scientifically understood. The relevant government departments, R&D organizations, and universities may get benefit from the Chinese experience through C-PEC to address and resolve these issues. One of the major challenges is the protection and conservation of groundwater resources [19].

5. Focus Areas for Balochistan

Despite being resource-rich, contributing more than 40 percent to the country's energy requirement in the form of electricity, natural gas, and coal, Balochistan is still the most underdeveloped province of Pakistan. There are multiple reasons and justifications for the slow development of Balochistan and each one has counter-arguments [2, 5, 20]. But the bottom line fact remains unchanged that people of Balochistan are lagging behind in the race towards better socioeconomic conditions and lifestyle.

After a long wait of more than seventy years, the C-PEC is the first ray of hope for the people of Balochistan to prosper. In order to take advantage of this unique opportunity, it is necessary to move forward without indulging into the unending discussions on the background and history of the political, geographical, tribal and social conflicts that kept Balochistan away from the mainstream of development path in the past. With this context, five major focus areas of natural resources are proposed here for initiating new projects table-7.

The focus areas projects are comprised of minerals, coal deposits, and construction materials, which are widely exposed along the new trade corridor. The proved oil and gas reserves are present in many parts of the province, even oil and gas seeps at the surface are known from a long time. The renewable energy resources including solar, wind and geothermal potential are extensively present. New projects are required to initiate the development of these natural resources.

The management of the water resources is the sweltering issue of the province. The climate change has deteriorated the surface and groundwater balance. The different categories of droughts have become a permanent feature in one or the other part of the province. The groundwater table is depleting at an alarming rate in most of the river basins. The development of new water resources and management techniques are needed to apply for a sustainable supply of water.

Table 2. Energy and Power Generation Projects [11]

No	Project Name	Status	Progress
1	Two 660MW Coal-Fired Power Plants at Port Qasim	Under construction	100%
2	Two 660MW Coal-Fired Power Plants at Sahiwal	Two units inaugurated	100%
3	Four 330MW Engro Thar Coal-fired Power Plant	Under construction	60%
4	50MW (Dawood) Wind Farm, Gharo	Ready for operation	100%
5	900MW Solar Power Park Bahawalpur	Energization achieved	100%
6	100MW Jhimpir Wind Energy Farm Jhimpir	Under construction	100%
7	50MW Sachal Wind Energy Farm, Sachal	Under construction	100%
8	720MW Karot Hydro-Power Project,	Financial close achieved	70%
9	873MW Suki Kinari Hydropower Project	Under construction	65%
10	Two 60MW Coal-Fired Power Plant Rahimyar Khan	Feasibility stage	15%
11	Two 660MW Coal-Fired Power Plant Hub (Habco)	Under construction	50%
12	300 MW Power Plant Gwadar	Feasibility stage	60%
13	Faisalabad-Matiari-Lahore Transmission Line	Negotiation in process	15%
14	Two 660MW Power Plants Gadani Lasbela,	Feasibility stage	15%
15	1100MW Hydro-Power Station Kohala	Negotiation in process	15%
16	300MW Power Plant at Salt Range Mine	Feasibility stage	15%
17	Two 660MW Coal-Fired Power Plants, Thar Coal Mine	Feasibility stage	15%
18	Two 660MW Coal-Fired Power Plants Muzaffargarh	Feasibility stage	15%

Table 3. Transportation and Communication Infrastructure - Roads and Highways [11].

No	Project Name	Status (April 2018)	Progress
1	120 km KKH Phase-II, Havelian- Thakot:	Under construction	70%
2	392 km Karachi-Lahore Motorway (S-M-S)	Under construction	70%
3	Establishment of Havelian Dry port	Feasibility completed	100%
4	Upgradation of Multan-Lahore Section, 339 km; Hyderabad-Multan Section, 749 km; and Kemari-Hyderabad Section, 182 km.	Agreement under discussion	40%
5	Construction of New Havelian Dry Port	Feasibility completed.	25%
6	110 km Khuzdar-Basima Highway (N-30)	Feasibility completed.	25%
7	280 km KKH Phase III (Raikot-Thakot Section)	Feasibility completed. Procedural formalities to be completed soon	25%
8	533 km D.I.Khan-Quetta Highway (N-50)	Feasibility stage	15%

Table 4. Industrial Cooperation Projects [11].

No	Project Name	Status	Progress
1	700 km Gwadar-Nawabshah LNG Terminal and Pipeline	Ready to be inaugurated	40%
2	Haier & Ruba Economic Zone Phase-II	Feasibility stage	15%
3	Laying of Optical Fiber Cable Rawalpindi to Khunjrab	Under construction, Expected Completion by Dec 2018	70%
4	DTMB Demonstration Project	MOU Signed	5%
5	Lahore Orange Line Metro Train	Under construction	70%
6	Promotion and commercialization of TD-LTE in Pakistan	Feasibility stage	15%

Table 5. Gwadar Port and Peripheral Projects [11].

No	Project Name	Status	Progress
1	19 km Gwadar Eastbay Expressway	Framework Agreement Signed	60%
2	New International Airport Gwadar	Framework Agreement Signed	40%
3	Free Economic Zone Gwadar	1st phase completed	60%
4	Smart Port City Master Plan Gwadar	Contract negotiations underway	20%
5	Expansion of Multi-purpose Terminal	Feasibility stage	15%
6	Fresh Water Supply, Wastewater Treatment Plants for Gwadar City	Feasibility stage	15%
8	China-Pakistan Faqeer Primary School Gwadar	Completed.	100%
9	Pak-China Friendship Hospital Gwadar	Feasibility study underway	10%
10	Pak-China Friendship Technical and Vocational College Gwadar	Feasibility study underway	10%

Table 6. Special Economic Zones [11].

No	Name	Type of Industry	Progress
1	Rashkai Economic Zone, M-1, Nowshera, KPK	Fruit/Food/Packaging/Textile Stitching/Knitting	Feasibility study is technically evaluated by China
2	Special Economic Zone Dhabeji Sindh	To be determined during feasibility stage	Feasibility study is technically evaluated by China
3	Bostan Industrial Zone Balochistan	Fruit Processing, Agriculture machinery, Pharmaceutical, Motor Bikes Assembly, Chromite /Ceramic, Ice and Cold storage, Electric Appliance	Feasibility study is technically evaluated by China
4	Allama Iqbal Industrial City (M3), Faisalabad, Punjab	Textile, Steel, Pharmaceuticals, Engineering, Chemicals / Plastics, Food Processing, Agriculture Implements	Feasibility study is technically evaluated by China
5	ICT Model Industrial Zone, Islamabad	Steel, Food Processing, Pharmaceutical & Chemicals, Printing and Packaging, Light Engineering etc.	Feasibility study is technically evaluated by China
7	Industrial Park at Port Qasim, Sindh	Steel, Auto & allied industries, Pharmaceutical, Chemical, Printing and Packaging, Garments.	Feasibility study is technically evaluated by China
8	Special Economic Zone at Mirpur, AJK	Mix industry	Feasibility study is technically evaluated by China
9	Mohmand Marble City FATA-KPK	Marble / Granite, Mineral Processing Industry	Feasibility study is technically evaluated by China
10	Moqpondass Special Economic Zone, Gilgit-Baltistan	Marble / Granite, precious stones, Fruit Processing, Steel Industry, Mineral Processing and Leather Industry	Feasibility study is technically evaluated by China

6. Human Resource Development

Education and training of indigenous human resource are integral parts of all developmental activities. Human resource in all academic disciplines including engineering, medical, computer, social, business, and natural sciences will be required for C-PEC projects in Balochistan. Higher Education Institutions (HEIs) in Balochistan are to be provided special funds to develop state of the art laboratories either independently or in collaboration with Chinese Universities.

In Pakistan, the skilled labors constitute about 6% of the entire labor-force [21]. The technical and vocational trade institutions are far less to meet the present and future demands in a broader context of C-PEC. In Balochistan, the situation of primary, secondary and the technical and vocational training colleges and the institution is very grim. The number of technical institutions, students enrollment capacity and the number of pass-outs figures are very low as compared to other provinces of Pakistan. Establishment of technical and vocational institutions are required on an emergency basis to fulfill the present and future demands in diverse technical and professional trades. Chinese language institutions are also required to be established for the skilled workforce to learn the Chinese language for a better work-place understanding with their Chinese counterparts.

7. Opportunities for Joint Ventures in Balochistan

A large number of high-cost projects like Industrial Zones, Power Generation Plants, Road & Highways Construction, Special Economic Zones etc. have been part of the C-PEC and are already in progress. However, small production units and business enterprises require more attention owing to its potential to contribute effectively. It can be anticipated that with the opening of commercial transport on C-PEC, a large number of heavy-duty trucks and trawlers will be carrying goods from China to Gwadar port. After getting unloaded these trucks and trawlers will have no or little goods available to take back to China. The traveling of unloaded large vehicles shall be a huge waste of time, fuel, and transport machinery. In order to save these losses, local industrial and production units may be developed by providing facilitation to local people and their relevant Chinese counterparts. It is proposed here that the local people may be identified and matched with relevant Chinese counterparts to develop joint ventures. Most of the areas of production and development identified in this paper are those whose products are already being exported to China through Karachi Port. Hence the demand for these products in China is already established and need not any further survey in China.

Very little facilitation has been provided to match the local business community with their prospective Chinese counterparts to initiate joint ventures in Balochistan. One such meeting was organized (22nd August 2016) by Ministry of Industries and Production (Islamabad) in which business community belonging to Quetta Chamber of Commerce and Industry (QCCI) were invited. The ultimate result of this meeting is yet to come out, however, it is opinionated here that the business community of QCCI has very little to contribute at least at the current stage. This is because Quetta is part of the Western Route of the C-PEC, whereas, according to latest news appearing in press and media, most of the development work on C-PEC is currently concentrated on the Eastern Route of C-PEC.

Geographically, the Balochistan part of the Eastern Route starts from Shahdad Kot in Sindh, crosses Kirther Mountains towards the west and passes through towns of Karkh, Khuzdar, Basima, Nag, Panjgoor, Turbat and ends at Gwadar. An alternate route is from Khuzdar to Wadh, Bela, Winder, and then connects to Coastal Highway leading to Ormara, Pasni and ultimately Gwadar, figure 1. In either case, the town of Khuzdar is common on both routes. Therefore, the products proposed in this paper are considered viable as all kinds of transport for C-PEC shall be passing through Khuzdar. Additionally, the identified products are being produced either along the C-PEC route in Balochistan or in its immediate vicinity.

Table 7. Major natural resources for development projects in Balochistan

No	Natural Resource	Types of deposits	Location in Balochistan
1	Minerals and Coal deposits	<ul style="list-style-type: none"> • Iron Copper and Gold • Barite, Lead, and Zinc • Chromium and Iron • Iron, copper, chromium gold, Rare Elements • Coal deposits 	<p>Chaghi Mountains. Khuzdar and Bela districts. Muslim Bagh and Zhob districts, and Raskoh. Raskoh Mountains.</p> <p>Quetta, Bolan, Kohlu, Barkhan (Chamalang).</p>
2	Construction Material	<ul style="list-style-type: none"> • Aggregates • Limestone and sandstone • Dimension stones: Granite, Limestone, Onyx Marble and sandstone 	<p>All districts of Balochistan. Sulaiman and Kirther Mountains. Sulaiman and, Kirther Mountains, Chaghi Mountains and Raskoh Mountains.</p>
3	Oil and Gas Reserves	<ul style="list-style-type: none"> • Petroleum • Gas • Shale Gas 	<p>Kharan Basin and Offshore Makran. Offshore Makran. Coastal Makran Ranges and Offshore Makran.</p>
4	Energy Resources	<ul style="list-style-type: none"> • Solar Energy • Geothermal Energy • Bioenergy • Ocean Energy • Hydrogen Energy 	<p>All Balochistan. Murri-Bugt Hills, Chaghi Hills, Bolan district and Makran Coast (mud volcanoes). All Balochistan. Coastal Makran. All Balochistan.</p>
5	Water Resources	<ul style="list-style-type: none"> • Surface Water (perennial) • Rain Water (non-perennial) • Groundwater • Seawater 	<p>Nag, Hoshab, Panjgoor (Rakhshan River), Bolan, Harnai, Zarghoon, and Zhob. All Balochistan; Natural dam sites are available where rainwater can be stored both for groundwater recharge and water supply. Fractured hard rocks, conglomerates and alluvium available all along the C-PEC route in Balochistan; Specific aquifers are a) rocks of Binga and Diz units of Khojak Formation in Central Balochistan (Panjgur and Turbat districts) and b) rocks of Talar and Hinglaj units of Makran Group in Makran Coastal Range between Ormara and Jiwani. Along Makran Coast; desalination of sea water</p>

7.1 Dimension Stones

Huge deposits of dimension stones of international quality are available in Balochistan. These stones include limestone, granite, marble, sandstone, and onyx to name a few. From geological prospective Kirther and the Sulaiman Mountains in Balochistan are the natural geological environments where multiple types of high-quality natural stones are available. Such rocks are rarely available in the northern parts of Pakistan and even in Western China (the Tibet Plateau) because of the intense geological activities (tectonically compressed) due to which most of the rocks are highly crushed or broken into

pieces. Large-sized un-fractured dimension stones of same color, texture, and strength which are commercially required, are generally not available in the areas where rocks have gone under high compression. There are some local areas from where these dimension stones are already being mined/quarried for export to China through Karachi Seaport. Some of the locations in Balochistan, mostly along the C-PEC route, from where these stones are being produced, are as under:

1. Saruna, District Khuzdar
2. Karkh, District Khuzdar
3. Nal, District Khuzdar
4. Basima, District Qalat.
5. Duraji, District Lasbela
6. Loi, District Lasbela
7. Gajri, District Lasbela
8. Shah-e-Noorani, District Lasbela
9. Yak Mach, District Chaghi
10. Dalbandin, District Chaghi
11. Nokundi, District Chaghi
12. Different localities in District Loralai, Ziarat, Quetta and Zhob

In these localities, the mining facilities and infrastructure are very primitive with old machinery. Their production can easily be increased by introducing more mechanized mining. Chinese mining companies can play a very productive role by developing joint ventures with local miners to boost the production.

7.2 Minerals and Mining

Balochistan is a host of large deposits of metallic and nonmetallic minerals. These include ores of Gold, Copper, Iron, Chromium, Barium, Magnesium, Aluminum, Tungsten, Lead, Zinc, Antimony and many more. The minerals named Chromite, Pyrite, Barite, Magnesite, Galena, and Sphalerite, are already being mined in various localities of Khuzdar, Bela, Chaghi and Muslim Bagh areas of Balochistan. With the exceptions of few, all these ores are being exported to China through Karachi port for further refining and processing. The transport of these ores may be diverted to C-PEC and the production may be enhanced with the help of Chinese mining companies. Some of the major mineral deposits and their locations are listed below for ready reference;

1. Copper-molybdenum deposits of Dasht-e-kain, Chaghi.
2. Copper deposits of other areas of Chaghi District.
3. Iron Ore reserves of Dalbandin and Nokundi District Chaghi.
4. Sulphur reserves of Koh-i-Sultan Nokundi.
5. Chromite deposits of Wad, District Khuzdar.
6. Chromite deposits of Kharan.
7. Laterite deposits of Ziarat District.
8. Antimony deposits of Arambi Village District Qila Abdullah.
9. Chromite deposits of Muslim Bagh District Qilla Saifullah.
10. Magnesite deposits of Muslim Bagh.
11. Chromite deposits of Zhob District.
12. Lead-Zinc Deposits of Lasbela District.
13. Quartzite deposit of Gajri village Lasbela

7.3 Fisheries/Fish Farming

Makran Coast and its seawater are regarded as one of the cleanest natural environment having no impact of industrial pollution. Hence it is the habitat of freshest and cleanest marine life. Fish Farming has huge potential all along Makran Coast especially in the towns of Gwadar, Pasni, and Ormara. Local people along the coast are already engaged in traditional fishing activities with minimal resources and training. Fish/Sea Food processing and preservation facilities may be established with the help of local people and their Chinese counterparts. These fish and other raw seafood may then be exported to China via C-PEC.

7.4 Agriculture

Climatically, Balochistan comes under desert to semi-desert environment. Water is scarce hence largescale agriculture products may not be expected. However, different types of high quality "dates", the product of desert environment, are enormously available in a vast area between Khuzdar and Gwadar. These dates can be easily processed and preserved for export to China or Central Asian countries (through C-PEC) where dates are not naturally grown.

7.5 Livestock

Balochistan has huge potential for the growth of livestock, especially sheep, lamb, and goat. Local people are already involved in traditional livestock business but do not have means for mechanized livestock farming. Small and medium-sized processing plants may be installed along C-PEC or near Khuzdar for the slaughtered cattle and their processing for preservation for ultimate export to China through C-PEC route.

7.6 Cement Manufacturing Plant

All the raw material for a cement manufacturing plant are extensively available all the way from Mughal Kot (Zhob) in the north to Surab (near Khuzdar) in the south. The four basic ingredients of cement (Calcium, Silicon, Aluminum, and Iron) are extracted from limestone and shales which are abundantly available in the rocks exposed along the road between Quetta and Zhob. The most viable location for the Cement Plant is the Bostan Industrial Zone (near Quetta) that falls almost halfway on western route of C-PEC between Zhob and Gwadar providing equal access to both northern and southern localities in Balochistan.

7.7 Ferro-Chrome Beneficiation

Chromium is an essential ingredient for the production of steel. Muslim Bagh has the second largest chromite (ore of chromium) deposit of the World from where mining is being done for the last 100 years. Currently, the raw chromite ore from Muslim Bagh is being transported all the way to Karachi for its onward export to China at a very low cost. This raw Chromite ore is processed at China to convert it into Ferro-Chrome which is then imported back in Pakistan, at a very high cost, for use in the iron/steel industry (mostly in Pakistan Steel Mills). A Ferro-Chrome plant will not only reduce the transport cost, it will substantially save foreign exchange also. All industrial units in C-PEC Projects will certainly need the iron and steel in one form or other that can be met from the products of Ferro-chrome plant. The most viable location for this industry is near Muslim Bagh.

8. Conclusions

China Pakistan Economic Corridor (C-PEC) has opened up vast opportunities for the socio-economic development of Pakistan. Pakistan needs to focus on key areas of artificial intelligence, robotics, renewable energy, agriculture, and biotechnology to develop its human resource. Trained technical human resource in these areas will be essential for a sustainable development with Chinese investment. Similarly, Balochistan being a resource-rich but highly deprived and underdeveloped province, also needs to focus on seven key areas to take maximum benefits from C-PEC induced trade and transport projects. These are

minerals and coal exploration, construction materials, Oil and Gas exploration, Energy generation including renewable energy, Water, including surface water, groundwater, and seawater, and Human Resource Development. Additionally, Balochistan has the potential offer joint industrial ventures with Chinese counterparts in the production and marketing of dimension stones, mining of mineral deposits, fish farming, agriculture products that are not available in China, farming of Livestock, cement manufacturing, and Ferro-Chrome manufacturing industry.

9. Acknowledgment

The travel grant provided to the authors by the Higher Education Commission through the Balochistan University of Information Technology and Management Sciences, Quetta (Pakistan) is acknowledged and appreciated. The grant was meant to attend and present this paper as Invited Speaker at the 1st International Conference on Advances in Engineering & Technology held at Quetta on 2-3 April 2018.

References

- [1] Naqvi, Baqar Abbas. 2017. CPEC – A Game Changer; *Spearhead Research* 5 July 2017; <https://spearheadresearch.org/index.php/researchopinions/cpec-a-game-changer> (accessed 15 March 2018).
- [2] Saleem, Ali Haider 2017. CPEC and Balochistan: *Prospects of Socio-political Stability Strategic Studies* p118-132. Avai. at http://issi.org.pk/wp-content/uploads/2018/01/7-SS_Ali_Haider_Saleem_No-4_2017.pdf.
- [3] Workman, Daniel, 2017. “China’s Top Trading Partners”, January 28, 2017. www.worldstopexports.com.
- [4] Mullen, Rani D. and Poplin, Cody, 2015. “The New Great Game: A Battle for Access and Influence in the Indo-Pacific,” *Foreign Affairs*, September 29, 2015. www.foreignaffairs.com
- [5] Ahmed, Mansoor. 2017. New Great Game and the CPEC in Balochistan: Opportunities and Challenges: *Pakistan Journal of History and Culture*, Vol. XXXVIII, No. 1, p 83-108
- [6] Ramay, Shakeel Ahmad. 2017. China Pakistan Economic Corridor; A Chinese Dream Being Materialized Through Pakistan, *Strategic Development Policy Institute*, Islamabad, 8p. www.sdpi.org
- [7] Tong, Liang 2014. CPEC Industrial Zones & China-Pak. Capacity Cooperation, *Strategic Studies*, p.174-184
- [8] National Science Board. 2018. Science and Engineering Indicators 2018. NSB-2018-1. *Alexandria, VA: National Science Foundation*. Available at <https://www.nsf.gov/statistics/indicators/>. (19 May 2018)
- [9] Han, Xueying., Appelbaum, R.P., 2018. China’s science, technology, engineering, and mathematics (STEM) research environment: A snapshot. *PLOS ONE* | <https://doi.org/10.1371/journal.pone.0195347> April 2018
- [10] Burki, Shahid Javed. 2018. Technological development due to CPEC; Opinion Editorial *Tribune* 29-01-2018
- [11] Pakistan-China Institute, 2018. <http://www.C-PECinfo.com/pci-C-PEC> (Accessed 22 March 2018)
- [12] China Pakistan Economic Corridor (CPEC), *Board of Investment, Government of Pakistan*, www.boi.gov.pk.
- [13] CPEC, Directorate General of Public Relations, *Government of Balochistan*.
- [14] China Pakistan Economic Corridor, 2018. *CPEC*, www.cpec.gov.pk. Government of Pakistan, Islamabad.
- [15] Daniel S, Markey and James West, 2016. *Behind China’s Gambit in Pakistan*. Council of Foreign Relations, The New Geopolitics of China, India and Pakistan. www.ForeignAffairs.com.
- [16] Bengali, Kaiser 2015, China-Pakistan Economic Corridor; The Route Controversy, *Chief Minister’s Policy Reform Unit Government of Balochistan* 24p. www.cmpru.gob.pk (Accessed 29 May 2017)
- [17] Techno Consult International, et. al., 2010. Ground Water Management Action Plan for Pishin Lora Basin & Implementation of Pilot Program in Quetta Sub-basin. Balochistan, Pakistan. *Balochistan Small Scale Irrigation Project, Government of Balochistan*.
- [18] Planning and Development Department, Government of Balochistan, Quetta. IUCN-The World Conservation Union, 2000. *The Balochistan Conservation Strategy*. Quetta, Pakistan.
- [19] Pakistan Poverty Alleviation Fund, Government of Pakistan, 2013. Balochistan Strategy, a roadmap to inclusive socio-economic development of the province. Islamabad, Pakistan.
- [20] Abid, M. and Ashfaq, A. 2015. CPEC: Challenge and Opportunities for Pakistan; *Pak. Vision* V16 No.2.
- [21] NAVTTC, 2018. *National Vocational & Technical Training Commission (NAVTTC)*, Pakistan. In: Government of Pakistan. Islamabad, Pakistan