Concept for a CAREC Green Energy Alliance

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List of Abbreviations

ADB	Asian Development Bank
AFD	French Development Agency
ADFD	Abu Dhabi Fund for Development
AIFC	Astana International Financial Center
AIIB	Asian Infrastructure Investment Bank
AMI	Advanced metering infrastructure
AMR	Automatic meter reading
B2B	Business to business
BESS	Battery energy storage systems
BP	British Petroleum
CAREC	Central Asia Regional Economic Cooperation
CATCA	Central Asia Transmission Cooperation Association
CCUS	Carbon capture, utilization and storage
CHP	Combined heat and power
CIF	Climate Investment Funds
CIP	Climate Investment Platform
CIS	Commonwealth of Independent States
CO2	Carbon dioxide
COVID-19	Coronavirus disease 19
CPIH	China Power International Holding
CSP	Concentrated solar power
CTF	Clean Technology Fund
CTGI	China Three Gorges International
DFA	Development finance assessment
DHC	District heating and cooling
EBRD	European Bank for Reconstruction and Development
EDB	Eurasian Development Bank
EDFI	European Development Finance Institutions
EE	Energy efficiency
EFSD	Eurasian Fund for Stabilization and Development
EIB	European Investment Bank
EJ	Exajoules
EMS	Energy Management System
ESCO	Energy service company
ESG	Environmental, Social and Governance
ETS	Emissions trading system
EV	Electric vehicle
FIPEE	Fostering International Partnerships in Energy and Environments
GDP	Gross Domestic Product
GE	General Electric
GEF	Global Environment Facility
GET	Global Energy Transformation Program

GHG	Greenhouse gas
GIF	Global Infrastructure Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSA	Government support agreement
Gtoe	Giga tons of oil equivalent
GW	Gigawatt
HPP	Hydropower plant
HPS	Hydropower system
ICACER	International Conference on Advances on Clean Energy Research
ICCF	Interact Climate Change Facility
IDA	International Development Association
IEA	International Energy Agency
IFC	International Finance Corporation
IKI	International Climate Initiative
IPP	Independent power producer
IRENA	International Renewable Energy Agency
IsDB	Islamic Development Bank
IT	Information technology
ITPO	United Network of Investment and Technology Promotion Offices
JICA	Japan International Cooperation Agency
KDB	Kazakhstan Development Bank
KPIs	Key performance indicators
kWh	Kilowatt hour
LT-LEDS	Long-Term Low-Emission Development Strategy of Georgia
LLP	Limited Liability Partnership
MDB	Multilateral Development Bank
MIGA	Multilateral Investment Guarantee Agency
Mtoe	Million tons of oil equivalent
MVP	Minimal viable product
MW	Megawatt
NDC	Nationally determined contribution
NEA	National Energy Administration
OECD	Organization for Economic Co-operation and Development
PPA	Power purchase agreement
PR	Public Relations
PRC	The People's Republic of China
PPP	Public private partnership
PV	Photovoltaic
RE	Renewable energy
RISE	Regulatory indicators for sustainable energy
SAARES	State Agency on Alternative and Renewable Energy Sources
SDG	Sustainable development goal
SFS	Siemens Financial Services

SME	Small and medium enterprise
SOE	State owned enterprise
SPIC	State Power Investment Corporation
TA	Technical assistance
TES	Total energy supply
TFC	Total Final Energy Consumption
TPES	Total primary energy supply
TWh	Terawatt hour
UHV	Ultra-High Voltage
UK	United Kingdom of Great Britain and Northern Ireland
UN	United Nations
UNIDO	United Nations International Developmental Agency
USAID	The United States Agency for International Development
WBG	World Bank Group

EXECUTIVE SUMMARY

The CAREC region is home to some of the most energy-intensive economies and, despite abundant renewable energy potential, installed solar and wind energy capacity currently amounts to less than 5% of the total capacity on average1. While renewable energy and energy efficiency measures are capital-intensive, they also have shorter pay-back periods. However, current projects and investment capital lack an efficient platform to match. The objective of the assignment is to facilitate the increase of green energy projects in the CAREC region through a new and innovative financing mechanism which de-risks green energy projects and provides a menu of investment options, such as, debt, equity, guarantee, leasing and others leveraging on ADB and other international financial institutions' similar approaches in other regions.

The Consultant on this assignment has been tasked to develop a concept for a new regional financing vehicle bringing together project developers and financiers under a joint platform – the CAREC Green Energy Alliance. The financing vehicle shall be designed with a view to providing CAREC members with end-to-end solutions to co-finance clean energy projects.

The concept paper starts with a brief discussion of the background and the context behind the CAREC Green Energy Alliance. It then analyzes the rationale for its creation by providing a snapshot of the energy efficiency and renewable energy market potential in the countries of the region, the financing sources available, and the barriers to investment.

This concept paper proposes to address these opportunities and challenges of attracting investments by setting up the future CAREC Green Energy Alliance as an online digital platform based on the vision of being **CATALITYC, TRANSFORMATIVE AND SUSTAINABLE**. Digital platform is an efficient and agile solution for the financing vehicle. It will be designed to bring together communities of project developers and investors and enable new level of collaboration between them, by facilitating fast, easy and transparent communication. Such a platform should offer the following essential set of features:

- Project Marketplace
- Project-Investor Matchmaking
- B2B Social Media/Communication features
- Project Preparation Advisory/Tools

Each feature will become a separate component of the platform and will allow to tailor the digital solution according to the stakeholders' requirements. The platform can evolve to support the growth of user and project base. This evolution is to be phased in three stages: development and launch; growth; and maturity. Each stage would require a separate set of decisions relating to staffing, budgets and timelines. However, all stages will need to preserve the integrity of the initial four features, expanding them using the lessons of each previous stage.

The concept paper also outlines the considerations that should be taken into account when establishing a digital platform: key project selection criteria, platform organizational structure, risks to consider, the considerations of an awareness campaign and concludes with an outline of necessary decisions, next steps and documents for preparation. In Annex, it also contains descriptions of the case studies used in the analysis.

[1] IRENA data 2020

1. BACKGROUND AND CONTEXT

The Central Asia Regional Economic Cooperation (CAREC) Program is a partnership of 11 countries[2] and development partners working together to promote development through cooperation, leading to accelerated economic growth and poverty reduction. The program is a proactive facilitator of practical, results-based regional projects, and policy initiatives critical to sustainable economic growth and shared prosperity in the region. It is guided by the overarching vision of "Good Neighbors, Good Partners, and Good Prospects."[3]

The CAREC Energy Strategy 2030 provides a new long-term strategic framework for the energy sector of the CAREC region. It is inspired by the vision of achieving a reliable, sustainable, resilient, and reformed energy market by 2030. Guided by the overarching principle *Common Borders. Common Solutions. Common Energy Future.*, CAREC members are committed to creating a vibrant energy future—a future in which electricity supply is reliable and affordable, energy markets flourish, and cleaner sources have become part of the energy mix.[4]

Pilar 3 of the Strategy, Enhancing Sustainability by Greening the Regional Energy System, calls for a clear focus on energy efficiency and renewable energy as the main contributors in responding effectively to climate change and for the greening of the regional energy system to enhance its long-term sustainability.

Energy efficiency (EE) is to become one of the main focus components of the strategy in the next decade, given that the region holds some of the world's most energy-intensive economies. The program will continue supporting the member countries in identifying EE projects and measures, by raising the EE awareness among consumers of how they can save energy and other measures.

Renewable energy (RE) and the support to its deployment is another focal point for the next 10 years, as increasing the share of solar, wind and small hydro in the regional energy mix is essential to the region's sustainable energy future.

To enable the transition toward a green and clean energy sector, the CAREC Energy Strategy 2030 proposes the establishment of a **CAREC Green Energy Alliance**. It will become a new regional financing vehicle that will allow the CAREC community mobilize finance for clean energy projects from international and domestic and public and private sources. The CAREC Green Energy Alliance shall be established as a forum for CAREC members to identify and attract these sources of funding. The aim of the alliance should be to create a shared regional platform accessible to all members seeking co-financing for investments in EE, RE, and other climate mitigation projects. This report provides a concept for the CAREC Green Energy Alliance Platform, its main features, functionalities and implementation strategies.

The CAREC Energy Strategy 2030 also foresees other new regional platforms which will further enhance the functioning of the CAREC Green Energy Alliance. One example is the planned Central Asia Transmission Cooperation Association (CATCA) which will be responsible for long-term strategic network expansion planning. A more densely meshed network in the CAREC region will support new and variable renewable energy come onstream. Additionally, it is foreseen that CATCA will have a department that is responsible for producing

[2] Current member countries are: Afghanistan, Azerbaijan, the People's Republic of China (Xinjiang Uygur Autonomous Region joined in 1997; Inner Mongolia Autonomous Region in 2008), Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, and Uzbekistan. Pakistan and Turkmenistan joined in 2010; Georgia in 2016

[3] https://www.carecprogram.org/?page_id=31

[4] "CAREC Energy Strategy 2030: Common Borders. Common Solutions. Common Energy Future", November 2019

a regional power masterplan and update the plan regularly (annually or bi-annually). Traditionally, masterplans have been produced every 5 or 10 years but, with increasing variable renewable energy and significant annual decrease in capital costs, a more frequent update of the masterplan has become the modern trend. Overall, the CAREC Green Energy Alliance will thus accelerate new energy efficiency and renewable energy projects in the region, while CATCA will enable that the network is adequately planned for it and provide regional energy security.

2. RATIONALE

2.1. CAREC Green Energy Market Potential

Most economies of Central Asia and the Caucasus have seen unprecedented growth over the past two decades, reaping the benefits of market reforms and taking advantage of relatively high commodity prices. As they are now looking to diversify their economies and integrating into global value chains, their existing infrastructure underperforms in its role to support inclusive economic development and connectivity in the region after decades of underinvestment.

According to the CAREC Energy Strategy 2030, the region's energy investment needs (excluding the People's Republic of China) are estimated at US$ 400 billion, with the current investment levels at only about a quarter of these needs. The top two countries in Central Asia and the Caucasus by infrastructure investments are Kazakhstan (33%) and Azerbaijan (23%). Mongolia and Uzbekistan both attract 11% of total investments, followed by Georgia (7%), Tajikistan and Turkmenistan (6% each), and the Kyrgyzstan (3%).[5] The section below provides some highlights of these investment needs by country.

2.1.1. *Afghanistan*

Establishing a self-sustaining energy system in Afghanistan is a pressing energy policy priority. **EE** is the country's "first fuel", as seizing the saving potential is essential for the sector where the energy acquisition and distribution are both scarce and costly. Some of the most urgent measures will be to minimize losses at each step of the energy supply chain. There is a great EE potential in utilities distribution systems, as well in the residential and commercial buildings, where a large part of energy is consumed.[6]

RE will be vital in the economic, social, and sustainable growth of Afghanistan. Renewable resources such as hydro, solar and biomass are abundant, and utilizing them will greatly improve the existing energy supply gaps.

Afghanistan's total RE potential is estimated to be over 300,000 MW, consisting of solar (222,849 MW), wind (66,700 MW), hydro (23,310 MW) and biomass (4,000 MW).

- Afghanistan's average *solar-energy potential* is about 6.5 kilowatt hours) (kWh) per m2 per day, with approximately 300 days of sunshine per year.
- The *wind resources* also have considerable potential in Afghanistan. Total wind energy capacity is 150,000 MW, whereas exploitable capacity is estimated to be 66,700 MW, and it is concentrated in the southwest near the Iran border.
- According to the World Bank, about 87 % (20,000 MW) of Afghanistan's *hydroelectric capacity* is located in the north-east on the Amu Darya, Panj, and Kokcha rivers[7].
- According to ICACER data, there are also signs of the significant potential of *geothermal and biomass*, but a further study of such sources is required.

2.1.2. *Azerbaijan*

There is a clear case for rapid action on **EE** in Azerbaijan. The country has recently adopted a new law on rational use of energy, bearing in mind Azerbaijan's climate pledge under the

[5] Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD 2019

[6] An Overview of the Opportunities and Challenges in Sustaining the Energy Industry in Afghanistan, ICACER 2020

[7] Afghanistan RE Development Issues and Options, World Bank, 2018

Paris Agreement to reduce GHG emissions by 35% from 1990 to 2030.[8] The long-term sustainability improvements emphasize high EE potential in the industrial and commercial sectors, and the development of infrastructure for electric vehicles (EVs). Continuing improvements in EE could decrease the domestic consumption of oil and gas, thereby providing an opportunity to generate additional revenues through exports and lower domestic subsidies.[9] Some of the most notable investment opportunities in EE currently include:

- *Modern district heating* and cooling (DHC) systems, combined with more efficient electricity generation, heat pumps, waste heat use and thermal storage, which could offer more efficient and cost-effective solutions while reducing CO2 emissions.
- *Renovations* to improve the EE of the existing building stock, especially residential and public buildings, which would also save energy while benefitting citizens' health, a strong case for introducing financing mechanisms for energy-efficient housing.
- The introduction by the government of stringent *standards* across all sectors to cover buildings, vehicles, appliances and equipment, which could result in greater investment in new technologies.[10]

Azerbaijan is yet to tap into its significant **RE** potential. To this end, the country has adopted a dedicated priority pillar promoting the use of clean energy sources with a focus on renewable energy as part of its 2030 Strategy for socio-economic development. The country has excellent wind and solar resources and a sizable potential for biomass, geothermal and hydropower. The share of RE in non-power uses has remained consistently low (0.4% of total final energy consumption) in 2017.[11]

- Azerbaijan has excellent *solar power* potential - the estimated technical potential is around 23 Gigawatt (GW) of capacity. The country has 2,400 to 3,200 sunshine hours annually and high solar intensity, estimated at 1,500 to 2,000 kWh/m2.
- *Hydropower* is the largest source of RE today, and its potential has not been fully exploited, currently estimated at 520 MW for small hydro. The best hydropower resources are in the central river valleys.
- According to the Ministry of Energy, the country has around 3 GW of technical and around 0.8 GW of economic *wind power* potential, capable of generating around 2.4 TWh and save around 1 Mt of conventional fuel and avoid the corresponding carbon dioxide (CO2) emissions. The Caspian Sea is also a promising location for potential wind power development. Estimates provided by the Government of Azerbaijan amount up to 157GW.
- The State Agency on Alternative and Renewable Energy Sources, (SAARES) estimates that *geothermal energy* potential is up to 800 MW. Initial studies indicate that the 11 geothermal zones available in Azerbaijan hold water of 30°C to 100°C that can generate either electrical or heat energy, depending on the type of thermal water.

In terms of investment projects, Azerbaijan's main focus is on large-scale wind projects, which account for almost 100% of tracked investments (total capacity of around 824 MW), as presented in **Table 1** below:

[8] https://www.euneighbours.eu/en/east/stay-informed/news/azerbaijan-adopts-law-energy-efficiency-eu4energy-support

[9] IRENA (2019), Renewables Readiness Assessment: Azerbaijan

[10] https://www.iea.org/reports/azerbaijan-2021

[11] https://www.iea.org/reports/azerbaijan-energy-profile

Table 1. Hotspot RE Projects in Azerbaijan

Name	Technology	Description	Value (US$ m)	Funding source	Type of investment
ACWA Power IPP	Wind	Wind power plant with installed capacity of 240 MW will be located at the territories of Absheron and Khizi districts in the areas of Chayli and Sitalchay villages.	300	Not specified	Greenfield
Masdar Solar	Solar	The 230-MW project is Azerbaijan's first foreign investment-based independent solar project structured as a public-private partnership.	200	Not specified	Greenfield PPP
BP Solar		Azerbaijan and British Petroleum (BP) have signed an agreement to cooperate in the evaluation and implementation of a solar project in the Karabakh region	N/A	Not specified	Greenfield
Offshore Wind Project	Wind	The planned project entails the construction of a 200 MW wind farm in the Caspian Sea financed by China's Export Import Bank. The project is expected to fully contribute to the RE capacity of Azerbaijan.	510	China Export Import Bank	Greenfield
Pirallahi Island Wind Farm	Wind	The project entails the construction of a 200 MW wind power station to provide stable electricity to Pirallahi and Chilov islands	430	Not specified	Greenfield

Source: Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

IPP = independent power producer

Azerbaijan is also designing green energy zones with smart cities and smart villages in the wider region.

2.1.3. *Georgia*

Georgia has plenty of opportunities for **EE**. The National Energy Efficiency Action Plan targets a 13% reduction in total primary energy supply (TPES) and a 9% reduction in total final energy consumption (TFC) by 2025, a 14% reduction in TPES and a 14% reduction in TFC by 2030 compared with the business-as-usual level.[12]

The EE in buildings and the industrial sector has a significant potential. Another important source of savings is efficiency improvements in transmission, transformation and distribution sectors, as stated in Georgia's Energy Strategy 2020-2030.[13]

[12] Georgia 2020 Energy Policy Review, IEA, 2020

[13] The Energy Strategy of Georgia 2020-2030, MoESD, 2019

Georgia's **RE** capacity is mostly in hydro, but the wind, solar, geothermal and biomass sources are also impressive: [14]

- Only 22% of total *hydro* potential in Georgia is utilized, while greenfield potential amounts up to 40 TWh, with 300 rivers capable of providing excellent hydropower opportunities.
- The *wind* power capacity can reach up to 1500 MW.
- *Solar* resource could provide up to 108 MW of annual capacity.

According to OECD's report,[15] over 52% (US$ 18.9 billion) of Georgia's hotspot infrastructure projects are in the energy sector. Georgia's *Long-Term Low-Emission Development Strategy* (LT-LEDS) aims to increase the share of power generation from hydro in domestic electricity consumption to at least 85% and install 150 MW of wind power generation by 2030. Over 92% of Georgia's tracked planned power projects are large-scale hydropower (see Table 2 below).

Table 2. Hotspot RE Projects in Georgia

Name	Technology	Description	Value (US$ m)	Funding source	Project type
Khudoni Hydropower Plant (HPP)	Hydro	Power plant on the Inguri River with a capacity of over 702 MW. The plant is expected to allow two other existing dams, the Enguri and Vardnili, to generate additional energy needed during the rest of the year. The project will account for over 16% of Georgia's hydropower generation. Its construction stopped in 1989 due to the collapse of the Soviet Union and over environmental concerns.	1,200	Not specified	Greenfield
Nenskra HPP	Hydro	The Nenskra HPP plant has a planned capacity of 280 MW and is located in the mountainous Svaneti Region. The project is Georgia's most advanced hydropower installation in the Upper Svaneti region. It is expected to increase the country's power generation capacity during the year and reduce imports of electricity.	1,100	AIIB; ADB; EBRD; EIB; KDB; Private sector	Greenfield
Namakhvani HPP Cascade	Hydro	Construction of two HPPs on the Rioni River, each with a capacity of 333 and 100 MW respectively and a total estimated annual production of 1 514 GWh. The project will contribute to Georgia's objectives to achieve an hourly	730	Clean Energy Group (Norway) Enka Insaat ve Sanayi AS (Turkey)	Greenfield

[14] Ministry of Economy and Sustainable Development of Georgia, 2019

[15] Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

Name	Technology	Description	Value (US$ m)	Funding source	Project type
		day-ahead balancing market for electricity by 2020.			
Tskhinvali Hydropower Project	Hydro	Hydropower project in Tskhinvali city. A feasibility study of the project was carried out in 2015. Further information on the project is not yet available.	723	Not specified	Greenfield
Atskuri Dviri Da Sakuneti Heseb Hydropower Project	Hydro	Construction of three hydro stations in Niala (81.6 MWe), Khertivisi (81.6 MWe) and Aspindza (55.2 MWe) for a total of US$ 604 million. This is a priority project promoted by the Georgian Ministry of Energy.	604	Not specified	Greenfield

Source: Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

AIIB = Asian Infrastructure Investment Bank; ADB = Asian Development Bank; EBRD = European Bank for Reconstruction and Development; EIB = European Investment Bank; KDB = Kazakhstan Development Bank

2.1.4. *Kazakhstan*

In recent years, Kazakhstan has increasingly prioritized development of **EE** to address future energy shortages, improve industrial competitiveness, and mitigate domestic energy price hikes. According to the *Kazakhstan 2030 Strategy*, the country should improve energy infrastructure by focusing on new energy-saving technologies, energy efficient equipment, and metering. According to the recent USAID report, Kazakhstan prioritizes the following sectors with the highest potential for energy savings: industrial (energy saving potential 47%); district heating (energy saving potential 24%); commercial (energy saving potential 14%); and residential (energy saving potential 14%).[16] Residential and commercial district heating energy management systems (EMS), industrial lighting, and industrial motors are among the most cost-effective opportunities. Also, there is significant potential for targeted EE interventions in municipal service sectors – public buildings, transport, waste and water supply, etc.[17]

Concerning **RE**, Kazakhstan aims to reach 15% of renewable generation by 2030 and 50% by 2050. There is impressive resource available to achieve that:

- *Wind* has the greatest potential. According to the national Concept of the Fuel and Energy Complex Development 2030, the country's wind can generate up to 1,820 billion kWh per year, or reach an installed capacity of 354 GW – more than 10 times the current consumption in the country.[18]
- *Hydropower* the second-largest source of RE potential in Kazakhstan. According to the Ministry of Energy of the Republic of Kazakhstan, hydropower is already contributing 10.9% to the country's generating capacity. Ranking third among CIS (Commonwealth of Independent States) in water resource potential, Kazakhstan has an estimated feasible potential of 62 billion kWh per year.

[16] Identifying and Prioritizing Energy Efficiency Opportunities in Kazakhstan, USAID

[17] https://www.esmap.org/new-energy-efficiency-plans-to-unlock-kazakhstan%E2%80%99s-energy

[18] RE: Future Trends, Samruk Kazyna, 2017

- *Solar energy* has an impressive potential. According to the national Concept of Fuel and Energy Complex Development, solar energy can produce 2.5 billion kWh per year, with 2,200- 3,000 hours of solar annually.[19]
- There is potential for *biomass* development in large farms and agricultural enterprises with animal husbandry or crop cultivation. The main waste residues in such farms include manure, crop residues and slaughtering residues.

Since most of the RE projects in Kazakhstan are being developed by private interests, there is no officially tracked project pipeline. However, the rough estimates based on recent auctions by capacity result in approximately **US$ 1 billion** in wind and **US$ 500 million** in solar PV (1.5 GW and 1.2 GW of won capacities respectively).

2.1.5. *Kyrgyzstan*

Both energy supply and demand management offer many opportunities for **EE** improvements in Kyrgyzstan, as its infrastructure is aged, worn and highly inefficient with losses above 20%. Residential and commercial building stock was constructed during the Soviet era with few efficiency standards. Energy savings potential in buildings is estimated at a minimum of 15%, while modernization and rehabilitation in the energy system could yield 25% savings.[20]

Kyrgyzstan has considerable **RE** potential, which already contributes 27% to its energy mix – mostly large HPPs.[21] However, they only constitute 10% of the total hydropower potential. Feasible options for RE development in Kyrgyzstan include small hydro, wind, solar and biogas. No projects so far have exploited these technologies.

- *Small hydro* opportunities located on the abundant mountain rivers, could be used to develop off-grid solutions in the Kyrgyzstan and thus reduce reliance on fuel import and emissions.
- Kyrgyzstan's geographic location and climatic conditions are quite favorable for *solar energy* deployment. Annual solar PV has a 300 kWh/m2 power generation potential, and annual hot water supply from solar sources can reach up to 750 kWh/m2 (heat).

The Government's aspirations for RE investment attraction rest firmly with large-scale hydro projects (see Table 3 below).

Table 3. Hotspot RE Projects in Kyrgyzstan

Name	Technology	Description	Value (US$ m)	Funding source	Project Type
Kambarata 1 Hydropower plant (1900-MW)	Hydro	The project initially started in 1986 but it was halted when the Soviet Union collapsed. It is expected to support the country's power export. It is being financed in large part by a US$ 2 billion Russian aid package, which was announced in 2009.	3,000	Russian Federation	Brownfield
Kambarata 2 Hydropower plant (360-MW)	Hydro	The project is expected to reduce the negative effects of flash floods through implementation of safety	160,7	EFSD	Brownfield

[19] Investor's Guide to RE Projects in Kazakhstan, USAID, 2020

[20] https://www.iea.org/reports/kyrgyzstan-energy-profile/sustainable-development

[21] https://www.iea.org/reports/kyrgyzstan-energy-profile

		measures. It will also support the ongoing commissioning of the second hydro generation unit of Kambarata HPP-2".			
Uch-Kurgan Hydro Plant Modernization	Hydro	This project will modernize the hydropower plant located in the Naryn River cascade. Expected outcomes include enhanced use of clean hydropower as well as to export to neighboring Uzbekistan and Kazakhstan.	145	ADB, EFSD	Brownfield
Toktogul Hydropower Plant Rehabilitation (800 MW)	Hydro	The project includes the replacement of Units 2 and 4, including the replacement and repair of auxiliary systems and plant equipment, of the Toktogul HPP - the largest hydropower plant in the country.	100	EFSD	

Source: Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

EFSD = Eurasian Fund for Stabilization and Development; ADB = Asian Development Bank

2.1.6. *Mongolia*

The rising energy demand and severe air pollution from coal-fired combined heat and power plants (CHPs) puts pressure on the Mongolian government to take **EE** and conservation seriously. Aging energy infrastructure and equipment are the main reasons behind low EE, since large parts of Mongolia's grid require modernization. Transmission lines have to cover long distances and operate with a low power load, which in turn leads to high losses and subsequent grid instability.

According to Mongolia's Green Development Policy, the country aims to reduce building heat losses by 20% and 40% by 2020 and 2030, respectively. Although there have been a number of legal and regulatory improvements to improve EE, residential buildings are yet to become energy efficient. In aggregate terms this sector represents 40% of energy consumption, more than industry and transport sectors combined.[22]

Mongolia also has to increase the share of **RE** to 20% by 2023, and further to 30% by 2030 to tackle negative environmental effects. Mongolia also aims to reduce greenhouse gas emissions by 14% until 2030 from the levels projected in the business-as-usual scenario[23]. Reaching its Nationally Determined Contributions target would not be possible without further deployment of RE.

The country's combined *wind and solar* power potential is estimated to be equivalent to 2,600 GW of capacity (5,457 terawatt-hours of clean electricity generation per year). This is enough to meet the country's energy demand (around 1.2GW as of 2018), and northeast Asia's regional energy demand, provided there is transmission infrastructure.[24]

The country's renewable projects, in comparison with coal projects, are much smaller and contribute less to generation capacity. Tsetsii wind farm is valued at US$ 501 million and has a capacity of only 50 MW, and the Sainshand wind farm costs US$ 120 million and has 55 MW of capacity. The purpose of wind projects is to reduce the carbon intensity of Mongolia's

[22] https://gggi.org/mongolia-accelerates-building-energy-efficiency-deep-dive-program/

[23] https://www.international-climate-initiative.com/en/news/article/mongolia_taking_climate_action_seriously

[24] https://www.adb.org/news/features/unlocking-mongolias-rich-renewable-energy-potential

economy and energy systems and diversify away from coal. To support increased RE integration, Mongolia recently adopted a new RE law that revises feed-in tariffs and establishes an auction scheme. However, on the whole, current investment aspirations still resemble historical development patterns and do not contribute meaningfully to diversification goals. The RE projects listed in Table 4 below are large-scale and may be challenging to finance.[25]

Table 4. EE and RE Projects in Mongolia

Name	Technology	Description	Value (US$ m)	Funding source	Project Type
Various 675 MW Hydropower Facilities	Hydro	According to Mongolia's national determined contributions until 2030, the country plans to install up to 675 MW of combined hydro capacity.	1,350	Unspecified	Greenfield
Various hybrid wind facilities	Wind	According to Mongolia's national determined contributions until 2030, the country plans to install up to 354 MW of combined wind capacity with storage capabilities.	584	Unspecified	Greenfield
Various solar PV facilities	Solar PV	According to Mongolia's national determined contributions until 2030, the country plans to install up to 145 MW of combined solar farms.	573	Unspecified	Greenfield
EE improvements on several CHPs	EE	Various modernization investments to improve EE at coal-fired plants.	900	Unspecified	Brownfield

Source: Government of Mongolia, 2015

2.1.7. *Pakistan*

As Pakistan has a tremendous potential for economic expansion, it will be important that energy resources are used efficiently to promote sustainable growth. There is a need for **EE** interventions in the electricity and agriculture sectors as collectively they account for over 90% of GHG emissions.[26]

Various sector studies, conducted initially by ENERCON and corroborated by similar studies carried out by other agencies, show energy saving potential in major sectors of the economy up to of 20% - 25% of total sectorial consumption. This can be translated to realizable savings of around US$ $10 billion to the national economy till 2030.

Pakistan targets to increase its **RE** to 20% of electricity mix by 2025, 30% by 2030. Solar and wind power have tremendous potential in Pakistan and should be urgently expanded to at least 30% of Pakistan's total electricity generation capacity by 2030, equivalent to around 24,000 MW. According to the World Bank's November 2020 report,[27] expanding RE can make

[25] Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

[26] Energy Efficiency Roadmap for Pakistan, World Bank

[27] Expanding Renewable Energy in Pakistan's Electricity Mix, World Bank, 2020

electricity cheaper, achieve greater energy security, reduce carbon emissions, and help Pakistan save up to $5 billion over the next 20 years.

- *Hydropower* is among the cheapest and most promising sources of power generation in Pakistan. Large hydropower meets a third of Pakistan's electricity needs and could provide more. Development of small-scale run-of-river hydropower, especially in Punjab, could add another 150 MW.
- According to the World Bank, utilizing just 0.071% of the country's area for *solar PV* generation could meet Pakistan's current electricity demand. The solar industry is still nascent, but the sector is taking off. Energy shortages and frequent load shedding have created a market for stand-alone solar systems with battery back-up. Integration of wind and solar is highly beneficial for the Pakistan energy mix and for the end-user's basket price in the short- and long-term (see footnote 30 above).
- Pakistan has several well-known *wind corridors* with average wind speeds of 7.87 m/s in 10% of its windiest areas. However, despite a number of successful projects, the installed capacity of solar and wind energy in Pakistan, at just over 1,500 MW, is just 4% of total capacity (refer to footnote 30 above).

2.1.8. *People's Republic of China*

As the world's second largest economy, the People's Republic of China (PRC) is the largest energy user, a major energy importer and is responsible for one fifth of global energy consumption.[28] PRC is putting a lot of effort into the implementation of green initiatives throughout various sectors of the economy, which has resulted in a 28.7% decrease in energy intensity between 2011 and 2020 – one of the fastest reductions in the world.[29]

According to the Efficient World Scenario report issued by International Energy Agency (IEA), the country has an enormous **EE** potential, and the measures to realize it could save China 16 Exajoules (EJ) by 2040.[30] A bulk of these savings would come from the energy intensive industrial (41%) and transport (30%) sectors. The benefits from EE could also be reaped in residential sector, with introduction of new standards to further cover appliances and equipment, such air purifiers, data centers and dust collectors.

As a global leader in **RE** generation, PRC has an enormous RE potential. It is already the world's largest producer of wind and solar energy, and the largest domestic and international investor in RE. In order to achieve emission reduction goals, the National Development and Reform Commission and the National Energy Administration of China have jointly published The 14th Five-year Plan for Renewable Energy Development which outlines the following goals: China's total annual renewable-generated electricity will reach around 3.3 trillion kilowatts by 2025; within the 14th five-year period, China's added renewable-generated electricity will account for more than 50% of all additional electricity generated while the amount of wind and solar generated electricity in total is set to double.

- China is the global leader in *hydropower* development, and its projects are among the world's largest by scale and capacity. According to the World Watch Institute, China's estimated hydro capacity could reach 500 GW.[31] According to data from China's National Energy Administration, China's installed hydropower capacity reached 400 gigawatts by the end of June, 2020. According to NEA, China's installed

[28] China: Renewable Energy Prospects, IRENA, 2014

[29] http://www.news.cn/english/2021-11/02/c_1310286250.htm

[30] https://www.iea.org/articles/e4-country-profile-energy-efficiency-in-china

[31] Review on China's renewable energy and future projections, International Journal of Smart Grid and Clean Energy,2018

wind power capacity had reached 342 gigawatts by the end of June, 2020. That figure is expected to rise to 400 GW by 2030, according to a study by the Chinese Renewable Energy Industries Association, the Global Wind Energy Council and Greenpeace.[32]

- According to data from China's National Energy Administration, by the end of June, 2020, China's installed *solar power capacity* had reached 336 gigawatts PRC is expected to add more than 70 GW wind and solar each year during the next decade and build up a renewables fleet of over 1,200 GW by 2030, in line with the new nationally defined contributions (NDCs),[33] as announced by Chairman Xi Jinping at the Climate Ambition Summit in 2020.

Given the country's resource potential, the PRC's priority technologies include solar PV, wind, and nuclear power for the generation category; and Ultra-High Voltage (UHV) grid expansion, "green" hydrogen, battery energy storage systems (BESS), carbon capture, utilization and storage (CCUS) for the transportation, storage and consumption categories.

2.1.9. *Tajikistan*

Given the current status of Tajikistan's energy system and specifics of energy consumption pattern, much remains to be done to ensure significant **EE** improvements in power, industry, heating and utilities, housing sector, agriculture and transport.

The country possesses a significant **RE** resource potential. Solar, wind, biomass and geothermal energy can provide almost 10% of its energy needs. However, Tajikistan faces an energy deficit of 3.0 to 3.5 GWh, resulting in seasonal winter blackouts, while using less than 4% of its technical and economical hydropower potential and less than 1% of the potential of other types of RE. About 10% of the population lives in remote mountainous off-grid areas and in valleys with small rivers and streams, where off-grid RE solutions could make economic sense.

- *Hydropower* is the backbone of Tajikistan's electricity sector while the country possesses enormous hydro power potential – 4% of the world's and 53% of Central Asia's resources, with approximately 220 terawatt-hours technically recoverable.[34] Yet these resources remain to be developed.
- Tajikistan's climate is favorable for *solar power*, which can potentially satisfy up to 10%–20% of the country's energy demand. While the estimated solar potential is about 25 billion kWh/year, it is yet to be deployed, although Tajikistan does utilize some solar resources for water heating purposes.

According to the OECD,[35] out of the US$ 33.3 billion of Tajikistan's infrastructure investments tracked, energy projects account for over 58% (US$ 21.6 billion). They are in turn divided into electricity generation projects (over 49% or US$ 16.3 billion) and electric power transmission and distribution (7% or US$ 2.3 billion).

Table 5. Hotspot RE Projects in Tajikistan

Name	Technology	Description	Value (US$ m)	Funding source	Project Type
Hostav HPS	Hydro	The project, scheduled for completion in 2026, is a key part of the strategy to eliminate	2,309	Not specified	Greenfield

[32] https://www.enr.com/articles/51110-china-sets-2020-milestone-in-wind-power-capacity-growth

[33] https://ihsmarkit.com/research-analysis/chinas-updated-2030-climate-targets-beyond-carbon-peak.html

[34] Country Partnership Strategy: Tajikistan, 2016–2020, Energy sector assessment summary, ADB

[35] Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

Name	Technology	Description	Value (US$ m)	Funding source	Project Type
		the winter energy deficit. It is expected that the project will create employment for 26 000 people annually.			
Shurob HPP	Hydro	The project is 100 km east of the capital Dushanbe and is expected to produce 3.2 billion kWh per year.	1,500	Not specified	Greenfield
Shtiyon HPP	Hydro	This is a priority project to tackle Tajikistan's winter deficit. It has been selected because of its potential to ensure energy stability, socio-economic gains, and reduction of water spillages.	1,500	Not specified	Greenfield
Anderob Power Plant	Hydro	The project aims to overcome the current electricity shortages and meet the growing demand.	1,300	Not specified	Greenfield

Source: Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, OECD, 2019

2.1.10. *Turkmenistan*

Turkmenistan's electricity transmission and distribution, as built in the Soviet Union, are inefficient, resulting in losses of 12.5% of the power they transport, according to World Bank data.[36] Although there are no quantitative goals, Turkmenistan's *National Climate Change Strategy* lays out **EE** as one of the priorities by 2030.

Turkmenistan possesses an impressive potential for wind and solar power, but the abundance of gas and oil reserves is a factor discouraging development of **RE**. Nevertheless, the President Gurbanguly Berdymukhamedov defined RE, primarily *solar and wind*, as a priority area in the development of the country's energy sector. The natural and climatic conditions of Turkmenistan are favorable for wider use of RE. The duration of sun shining in Turkmenistan is 2,768-3,081 hours per annum, almost all year round. At the same time, the wind speed in the Caspian zone is enough for an all-year stable energy supply from wind power stations.[37]

2.1.11. *Uzbekistan*

Uzbekistan is one of the most energy-intensive economies in the world. The Government of Uzbekistan aims to reduce the country's energy intensity by about 50% by 2030, and as such, has initiated modernization investment programs that target **EE** key energy-consuming sectors.

Uzbekistan aims to grow the share of **RE**, including hydropower, in its total electricity generation to 25% by 2030, with an additional 5 GW of solar, 1.9 GW of hydropower and 3 GW of wind, according to the *Strategy on the Transition of the Republic of Uzbekistan to the Green Economy for the Period 2019-2030*. It also plans to double its EE indicator, reduce the carbon intensity of GDP, and provide the entire population and all economic sectors with access to modern, inexpensive and reliable energy.

[36] https://datacatalog.worldbank.org/dataset/world-development-indicators

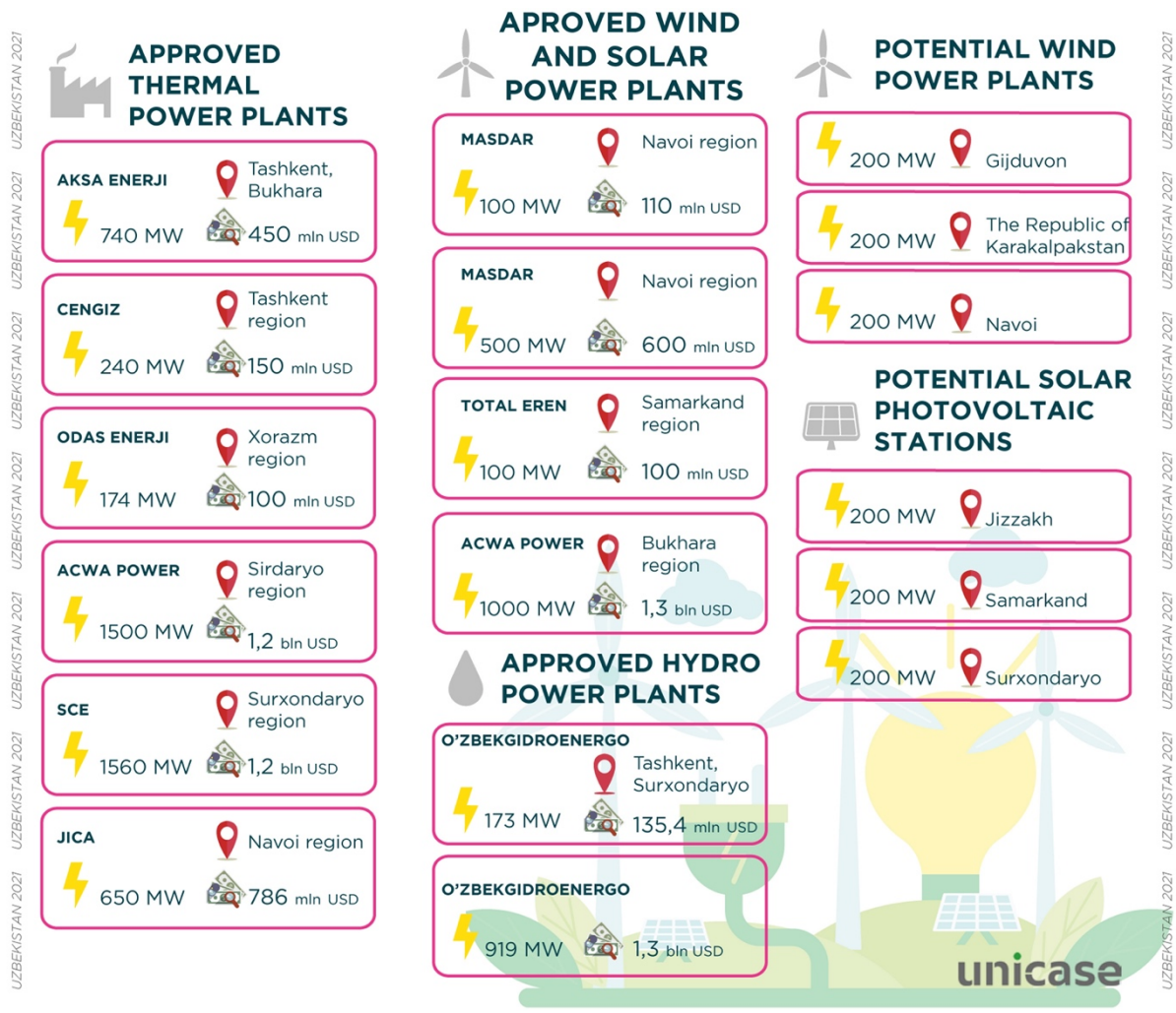
[37] Turkmenistan country profile, EBRD

Uzbekistan's considerable RE potential could spur significant development of a green, environmentally friendly economy. The country's estimated total RE potential is 117 984 Mtoe, while its technical potential is 179.3 Mtoe.[38]

- The bulk of this potential lies in *solar energy* (total potential of 51 Gtoe and technical potential of 177 Mtoe). In fact, solar energy's technical potential is almost four times the country's primary energy consumption. Its favorable climate and geographical location would allow Uzbekistan to use solar energy for a wide range of industrial purposes.
- *Wind energy* potential totals 2.2 Mtoe, with 19% technical development possible, but this does not take wind potential in local regions (e.g. Bekabad, Ustyurt) into account. The development of wind power in Uzbekistan is very promising for agriculture in remote areas.
- *Geothermal resources* are available in almost all regions, as long-term research has revealed eight large hydrothermal resource pools. Although total geothermal energy potential (67 Gtoe) exceeds that of solar, the underdevelopment of simple and cost-effective technologies to exploit this type of energy The greatest geothermal water potential is in the Fergana Valley (Namangan region: 42 600 tce) and the Bukhara region (81 200 tce).
- As for the *biomass*, Uzbekistan has the potential to use cotton stems, residues from other crop production sectors, industrial and domestic waste, and livestock and reed waste as energy resources for producing heat and electricity through direct combustion or gasification.

[38] https://www.iea.org/reports/uzbekistan-energy-profile/sustainable-development

Figure 1. Hotspot Power Projects in Uzbekistan



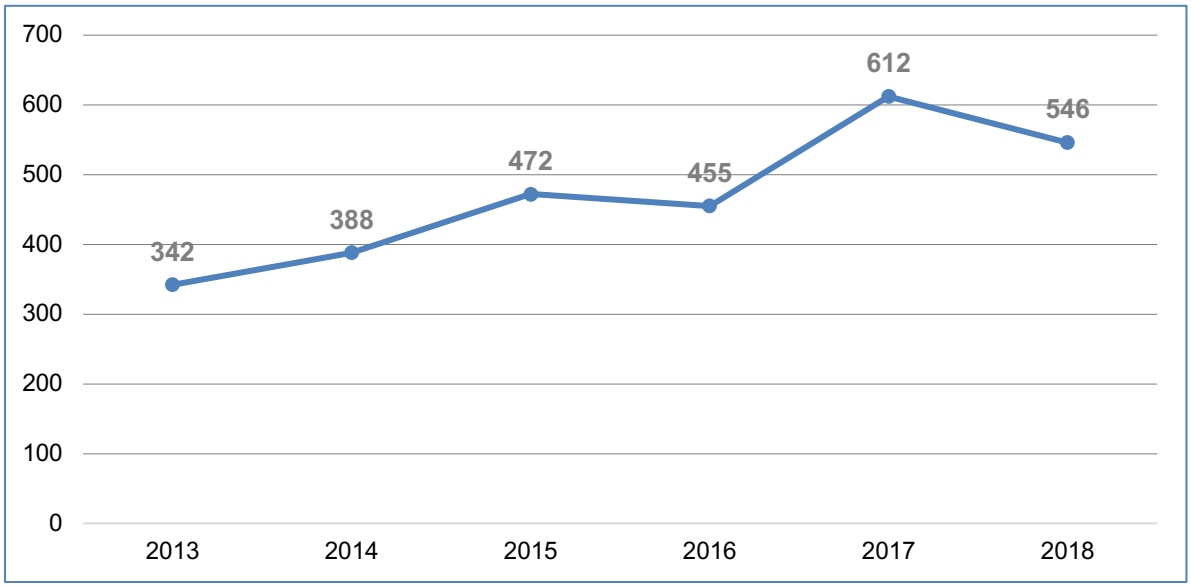
Source: Unicase Law LLP, 2021

2.2. Financing Sources

The global landscape for green financing, including sustainable energy, has been demonstrating a steady growth over past decade having reached a staggering US$ 546 billion in 2018 [Figure 2]. Of that amount, around 58% has been spent on RE, with EE being only 0.5% globally.

However, according to multiple reports, most of this money has been spent in the high-income countries. Of the US$ 322 billion of global investment spent on RE for instance, the emerging markets only received 15%.[39]

Figure 2. Global Climate Finance Flows 2013/2018 (in US$ billion)



Source: 2019 Global Climate Finance Landscape, Climate Policy Initiative, 2019

Theoretically, the CAREC region could claim a fair share of these funds for its clean energy projects. Practically however, tapping into these vast resources will require pipelines of well-prepared projects, use of credit enhancement instruments and raising awareness on the region's potential – preferably done via single access platform.

While globally the investments in the energy infrastructure are mostly private in nature, in the middle- and low-income countries they come primarily from the public sector – state budgets, state-owned enterprises (SOEs) and loans from multilateral development banks (MDBs). CAREC region is not an exception – for instance, the recently published Development Finance Assessment (DFA) for Kazakhstan demonstrates that public finance, both domestic and international, has been 48% of all the development finance available for this county in 2018. In the clean energy sector, most of it has been spent on Kazakhstan's RE projects and raised in the form of SOE equity and MDB loans.[40]

Since CAREC's clean energy financing landscape is currently dominated by the state and MDBs, crowding in private investments will require the efficient use of these resources. For this reason, it is suggested that the CAREC Green Energy Alliance should initially concentrate on these investor types, as briefly analyzed in this section.

[39] *Global Landscape of Renewable Energy Finance, 2020, IRENA and CPI, 2020*

[40] https://www.adb.org/sites/default/files/publication/664451/kazakhstan-development-finance-assessment.pdf

2.2.1. *Development Banks*

Due to the COVID-19 pandemic, most of the CAREC governments have experienced sharp declines in public revenues and had to rely heavily on borrowing from the MDBs, who have played a critical role in the financing of RE and EE in all countries of the CAREC region. The support of the international donors and their efforts to promote green energy through involvement in legislation, provision of technical assistance and project funding in cooperation with the governments, has set the ground for private investors, who are becoming more interested in the region. Some of the notable, but not all, development banks and their activities are highlighted in the table below:

Table 6. Selected Development Partners Active in CAREC Countries

Bank	Active in	Products
Asian Development Bank (ADB)	ADB is active in all CAREC countries.	ADB provides sovereign loans to government as well as private debt and equity to international sponsors and investors. It also extensively provides technical assistance to project preparation, regulatory support, institutional strengthening and reform agenda. ADB has a noteworthy track record of investments in RE and EE across the CAREC region.
European Development Bank (EBRD)	The bank does not have operations in Afghanistan, China and Pakistan.	The bank provides sovereign and private debt to public and private projects and sponsors, and participates in equity of private companies. It also extends technical assistance for market reform, project preparation, institutional development, and much more.
The World Bank Group (WBG)	WBG is active in all CAREC countries.	World Bank Group is represented by the World Bank, International Finance Corporation (IFC), International Development Agency (IDA) and Multilateral Investment Guarantee Agency (MIGA). IFC, the Group's private financing arm, invested and mobilized hundreds of millions of financing in solar, hydro and wind and projects across all of CAREC members. Equally important is IFC's activity in project preparation via its world-renown Scaling Solar facility.
Islamic Development Bank (IsDB)	The bank does not have operations in Georgia, Mongolia and China.	IsDB actively invests in large-scale RE projects throughout the CAREC region by providing equity and Sharia-compliant debt to projects and companies.
Asian Infrastructure Investment Bank (AIIB)	AIIB is active in all CAREC countries except Turkmenistan.	AIIB focuses on projects in: RE, EE, rehabilitation and upgrading of existing plants, and transmission and distribution networks. The bank works in cooperation with other multilateral development banks, bilateral agencies and the private sector operating in Asia.[41]
Eurasian Development Bank (EDB)	Within the CAREC region, EDB is active in Kazakhstan, Kyrgyzstan and Tajikistan.	The bank's operations focus on energy, transport and infrastructure sectors. It aims to participate in projects that promote RE, energy conservation, EE, sustainable urban and industrial development, reduction of the greenhouse effect, and waste management. Last year the EDB has acquired a stake in AIFC Green Finance Centre to expand its green finance operations. This acquisition opens up new possibilities to take an active part in advancing green energy market in

[41] Energy sector strategy: sustainable energy for Asia, AIIB, 2017

Bank	Active in	Products
		Central Asia, ensuring the introduction of new green finance products.[42]
Eurasian Fund for Stabilization and Development (EFSD)	Within the CAREC region, EFSD is active in Kyrgyzstan, Kazakhstan and Tajikistan.	For EFSD, energy is one of the core sectors where it has a substantial portfolio, including co-financing with other development partners.

2.2.2. *Other Donors Active in CAREC Countries*

Global Environmental Facility (GEF) include the Least Developing Countries Funds, the Special Climate Change Fund, and the GEF Trust Fund. GEF invests directly as well as through accredited institutions, such as ADB, the World Bank, the EBRD as well as other regional partners. As an entity of the United Nations Framework Convention on Climate Change, GEF receives guidance from, and is accountable to, the Conference of Parties. Its total resources committed are over US$ 8 billion with a new replenishment being implemented. It focuses on building capacities, project development, and the use of seed capital, including blended finance models to pioneer and scale up financing of new technologies in RE, EE, urban transport, and other related fields.

Climate Investment Funds (CIFs) have committed $4.1 billion from 2010 to 2015. Across the multilateral development banks (MDBs), including the World Bank Group, the $8.3 billion CIFs are on track to support at least an additional $58 billion from the MDBs and public and private sources, with $35 billion already committed for projects under implementation. These projects will deliver emission reductions of approximately 1.5 billion tCO2e over the projects' lifetime and support more than 30 million people through climate resilience projects. However, the CIFs are already mostly committed and if they are to continue to play this catalytic role and support the World Bank Group and other MDBs to deliver on their climate mandate, they would need to be recapitalized in the near future.

The Clean Technology Fund (CTF), one of two multi-donor trust funds under the Climate Investment Funds (CIF) framework, promotes scaled-up financing for demonstration, deployment and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emissions savings implementation in RE, EE, and clean transport in emerging market middle-income and developing economies. The CTF is at the forefront of financing promising RE technologies, such as concentrated solar power (CSP). Channeled through the African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, and World Bank Group, the CTF finances 19 country programs and one regional program with over 90 individual projects.

The Global Infrastructure Facility (GIF) is a global, open platform that facilitates the preparation and structuring of complex infrastructure public private partnerships (PPPs) to enable mobilization of private sector and institutional investor capital. The GIF platform coordinates and integrates the efforts of Multilateral Development Banks (MDBs), private sector investors and financiers, and governments interested in infrastructure investment in Emerging Markets and Developing Economies (EMDEs). This approach enables collaboration and collective action on complex projects that no single institution could achieve alone. GIF's engagement begins with upstream support on market structure and project identification and appraisal, continues through transaction preparation, and integrates financial structuring and credit enhancement.

Bilateral Climate Funds such as the German International Climate Fund (IKI) and the UK Climate Fund, Japan International cooperation Agency (JICA) and others, exchange experiences to support a green, cost-efficient, and climate-friendly transformation of the

[42] https://eabr.org/en/press/news/the-edb-becomes-a-shareholder-of-aifc-green-finance-centre-ltd-a-subsidiary-of-the-aifc/

energy sector through government-to-government collaborations with relevant authorities responsible for the energy sector and other relevant public and private actors and are a source of capital for green investments. For example, the French Development Agency (AFD), the European Investment Bank (EIB), and 11 European Development Finance Institutions (EDFI) have founded the Interact Climate Change Facility (ICCF) the organization provide funding capacity for the co-financing facility. The ICCF has contributed to about €500 million worth of projects related to improving energy infrastructure in developing and emerging countries from 2011 to date. On April 21st, 2021, DFIs from the Netherlands, Austria, and Sweden committed to replenish the facility with €50 million.[43]

2.2.3. *Private Investors*

RE investments in CAREC countries are pursued by non-energy-producing companies who are motivated by the cost saving potential resulting from increasingly price-competitive renewable technologies, long term price stability and security of supply, in addition to social and environmental concerns. Corporate actors have a significant role to play in decarbonizing the energy sector as they account for about two-thirds of the world's energy consumption.[44] Some of the oil majors too, have invested heavily in the green energy, as they look to transition towards cleaner energy sources.[45] This change in attitude is driven by growing concerns about climate change following the Paris Agreement targets. Additional pressure for the conventional energy majors comes from the climate-conscious investors, and their negative outlook towards CO2 emissions.

- *Chevron* is an investor in a large-scale wind project in Kazakhstan. It has launched its Future Energy Fund in 2018 to invest in breakthrough technologies that will reduce carbon emissions and provide cleaner energy. The US oil giant has invested in solar, wind and geothermal projects over the past 20 years but, following low returns, the focus has remained on its oil and gas business.
- *Total* is an investor in two PV projects in Kazakhstan and another one in Uzbekistan. Globally, it has ambitious plan to become a green energy major, aiming to reach carbon neutrality by 2050, by investing in more solar and wind power projects.[46] The company aims to reach 35 GW of gross RE generation capacity by 2025 from around 9 GW now. Total's investment budget for electricity and renewables would surpass $2 billion in 2021[47].
- *Eni* is present in three CAREC countries: Azerbaijan, Kazakhstan and Turkmenistan. In Kazakhstan, it has invested in solar and wind projects, and is currently considering projects in Uzbekistan. Globally, clean energy plays a key role in the firm's corporate strategy reflecting on the commitment to further invest in RE including solar, wind and wave motion. Eni also has an ambitious goal to reach 15 GW of installed renewable capacity by 2030 and 60 GW by 2050.[48]
- *Masdar*, the Abu Dhabi-based clean energy major and a subsidiary of Mubadala Investment Company is expanding its green energy deals to Uzbekistan (see **Box 1** below). In addition to Masdar's existing Uzbekistan projects, including 100 MW Nur Navoi Solar Project and a 500 MW wind farm in Zarafshan, the company has signed new

[43] https://www.developmentaid.org/#!/news-stream/post/93169/green-energy-projects

[44] IRENA and CPI (2020), Global Landscape of RE Finance, 2020

[45] The RE strategies of oil majors – From oil to energy?, Matthias J. Pickl, Energy Strategy Reviews, Vol 26, 2019

[46] https://www.bbc.com/news/business-57282008

[47] https://www.reuters.com/article/us-total-renewables-idUSKBN29D11D

[48] https://www.eni.com/en-IT/operations/energy-green-customers.html

agreements to build two photovoltaic (PV) power projects that will hold a combined capacity of 440 MW.[49]

- *State Power Investment Corporation (SPIC)* is a key state-owned enterprise directly under the central government of PRC. It is one of the five major power generation groups in China and the largest solar power generation enterprise in the world.[50] As the only integrated energy group in China that holds assets of nuclear, thermal, hydropower and new energies simultaneously, SPIC establishes itself with such industries as power, coal, aluminum, logistics, finance, environmental protection and high-tech industries.[51]
- *China Power International Holding (CPIH)*, a subsidiary of SPIC, started construction of the first phase of the 100 MW wind power plant in Zhanatas, Kazakhstan in June 2019. This is the largest wind power project in Kazakhstan and in Central Asia. The project is jointly developed and constructed by CPIH and local partner Visor with the shareholding ratio of 80:20, financed by AIIB. All units have been connected to the grid in August 2021.

Notable examples of non-energy producing corporations, involved in clean energy investments include in the CAREC region:

- *China Three Gorges International Corporation (CTGI)* is a global investment vehicle of China Three Gorges Corporation for clean energy sector, including hydro, wind and solar. CTGI invested in Karot Hydropower Station in Pakistan, which is expected to go into production in H1 2022. The project is located on the Jhelum River in Punjab Province, Pakistan, with a total installed capacity of 720 MW and a total investment of US$ 1.74 billion. The power station has an average annual electricity generation of about 3.21 billion kWh for several years, which can meet the electricity need of about 5 million people.[52]
- *Siemens and Siemens Financial Services (SFS)*, with Siemens providing technology and SFS developing tailormade financing structures for clean technologies financing. Siemens has financed more than 18 GW of wind and solar power plants globally.[53]
- *General Electric (GE).* GE's Energy Financial Services provides financial solutions to meet the capital-intensive investment needs by supporting customers and projects utilizing GE equipment and services with a wide range of investing and structuring solutions, including development, construction and operations.[54]

[49] https://www.arabianbusiness.com/energy/466095-masdar-expands-clean-energy-portfolio-in-uzbekistan

[50] http://eng.spic.com.cn/2021/whoweare/aboutspic/

[51] https://www.hydropower.org/our-members/state-power-investment-corporation-spic

[52] https://www.ctgi.com.cn/ctgi/about_us/we_are_ctgi/index.html

[53] https://new.siemens.com/global/en/products/financing/siemens-financial-insight-center/energy-transition-unlocking-the-potential-of-green-financing.html

[54] https://www.gecapital.com/energy-financial-services/financial-solutions

Box 1. Nur Navoi Solar Project

In November 2019, **Masdar** signed a Power Purchase Agreement (PPA) and Government Support Agreement (GSA) with the Government of the Republic of Uzbekistan to design, finance, build and operate the country's first public-private partnership (PPP) solar power plant that will generate 100MW of RE.

The World Bank, the EBRD, IFC and ADB are providing loans for the development of the solar PV plant in the city of Navoi.

The World Bank Group, Abu Dhabi Future Energy Company PJSC (Masdar), ADB and the Government of Uzbekistan signed agreements to finance the project under efforts to support the country's clean energy transition whilst combating climate change and ensuring the security of supply.

The IFC and the ADB will provide $60 million in finance for the project for the first large-scale, privately developed and operated RE facility in Uzbekistan.

Picture 1. Illustrative Solar PV Photo

2.3. Barriers to Financing

For clean technologies to make a significant impact on emissions reduction, investments of significant scale and scope are needed. Such investments may, to a varying extent, exceed some governments' abilities to raise and redirect financial resources. The biggest challenge for the CAREC countries is therefore to mobilize sufficient amount of private investment in green energy and EE.

Investments in RE and EE are indeed essential in the CAREC countries as a response to the challenges of ageing power infrastructure, seasonal and structural electricity shortages, high transmission losses and the deteriorating level of services.[55] They are also important for addressing climate change and for the reduction of hazardous environmental impacts from fossil-fuel based generation. Lastly, EE and RE could support the economic and social transformation by increasing resources available for export, addressing energy poverty, and increasing investment attractiveness.

An array of regulatory, policy, technical and financial constraints limit improvements in EE and increased uptake of RE. Timely identification and effective resolution of these barriers could

[55] RE in Central Asian Economies: Role in Reducing Regional Energy Insecurity, Shadrina. E., ADBI, 2019

help increase investment and financing flows and in meeting the ambitious climate-related targets set by the CAREC countries.[56]

The pace and scale of EE and RE deployment in the CAREC region will greatly depend on the speed with which these investment constraints are addressed. The CAREC Green Energy Alliance could potentially become an instrument in addressing some of them, especially related to financial constraints and the lack of awareness (shown as **Areas of Intervention**).

The sections below outline the most common barriers separately for EE and RE based on the Problem Tree Analysis. Where appropriate, the analysis also lists the countries that are most affected by specific barrier.

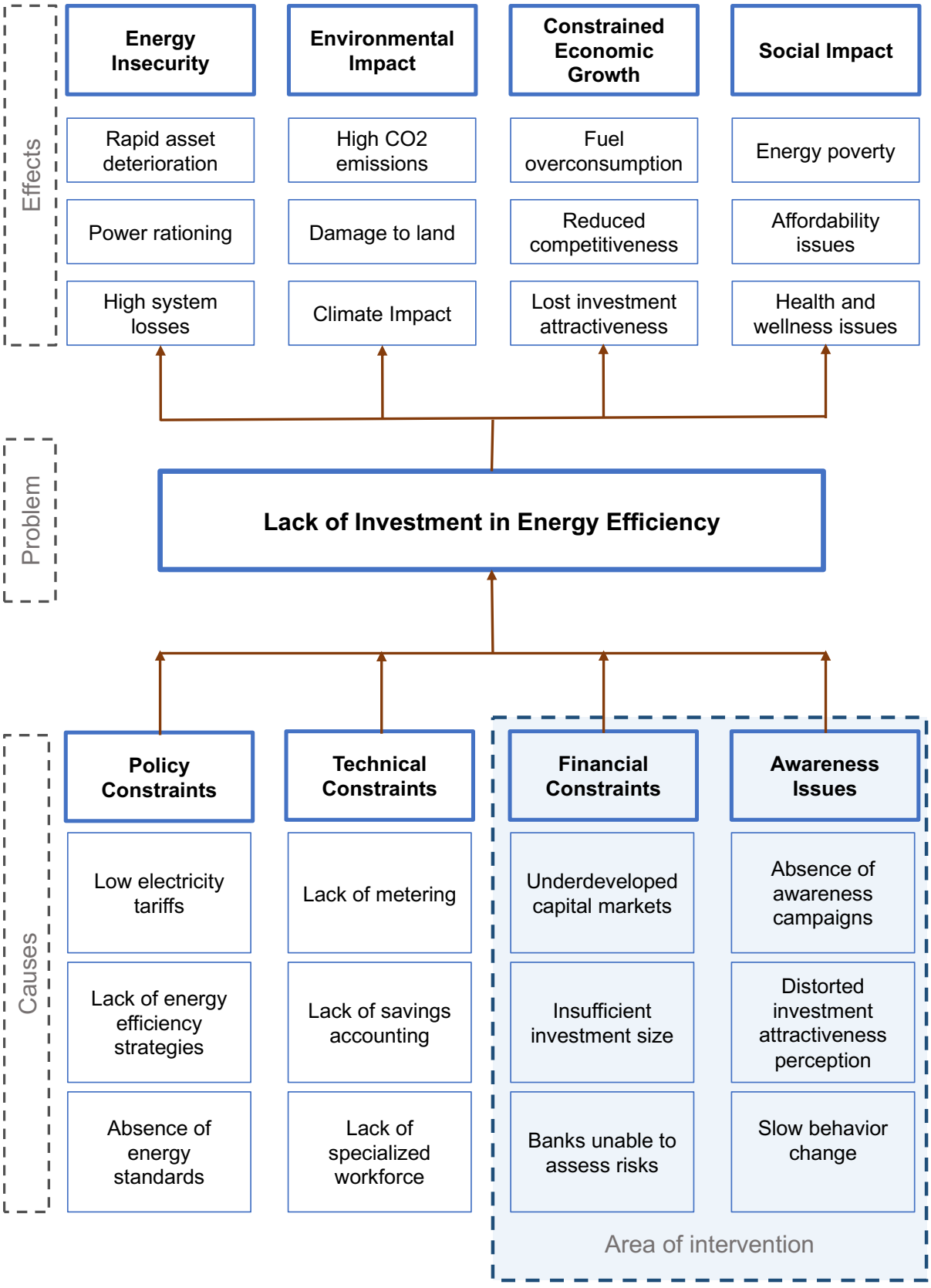
2.3.1. *EE Investment Barriers*

EE is said to be one of the core focuses of the CAREC Energy Strategy 2030, as more efficient energy systems have greater reliability margins, stable power supply and lower system losses. EE is also a critical contributor to the fight against climate change by reducing carbon intensity and avoiding unnecessary damage to land, air and water. It can also contribute to the economic competitiveness by improving productivity and attracting investment. Lastly, EE strengthens social stability, as it alleviates energy poverty, increases disposable income and improves wellness and healthcare.

Despite some of CAREC member countries being among the world's most energy-intensive economies, investment in EE is yet to gain momentum. There are several barriers at the root of this phenomenon, which are broadly categorized as institutional, technical, financial and awareness-based, as represented in the Problem Tree on the next page.

[56] Enabling Renewable Energy and Energy Efficiency Technologies, IEA and OECD, 2015

Figure 3. EE Problem Tree



Source: Consultant's analysis

Policy Constraints in EE relate to the legal and regulatory restrictions that preclude the emergence of practices and players. The easing of these constraints depends on the state policies, reform agendas and the institutional capacities of the regulators. Some of the most common such constraints are:

Constraint Description	Affected Countries
Low electricity tariffs – institutionalized caps on tariff growth are widespread among the CAREC member countries. Low power prices render investments in EE commercially unattractive and disincentivize energy saving practices. Pricing energy in a fair and transparent manner, with an inclusion of true carbon costs, could make EE more profitable.	The countries most affected by this constraint tend to be hydrocarbon exporters (e.g. Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan). However, non-fuel exporting countries also suffer from suppressed tariffs, too (e.g. Kyrgyzstan and Mongolia). However, investments in RE in Azerbaijan, for instance, do attract the interest of private parties (see Table 1 on page 11).
Lack of EE strategies – many energy strategies concentrate on the generation-transmission-distribution aspects of the energy sector, disregarding anything that is "behind the meter". Lack of planning for EE may lead to endemic over-forecasting of generation and transmission infrastructure, which in turn may affect end-user prices.	This problem is being actively addressed by many countries of the CAREC region, as they have started including EE in their energy policies. However, some countries are yet to do so fully, e.g. Turkmenistan, Kyrgyzstan and Mongolia.
Absence of EE standards – many CAREC member countries are yet to adopt a set of rules and procedures that would guide businesses and citizens on the minimum accepted energy performance of buildings, appliances and equipment, so that people could make smart choices about EE.	This is a widespread problem, as only China and Uzbekistan have energy labeling systems, for instance. All other CAREC countries are affected by this constraint.

Technical constraints: these constraints relate to the legacy power system design and may require substantial investments to alleviate. They may also require policy decisions and state support to become commercially attractive for the private sector investments. Some of the most common such constraints in the CAREC region are:

Constraint Description	Affected Countries
Lack of metering – the most critical EE gains usually come from the reduction of losses. These gains are impossible to identify, evaluate and verify without the installation of metering devices at all stages of the energy value chain. The widespread absence of advanced metering infrastructure (AMI) and automatic meter reading (AMR) also undermine the demand-response related measures, which require "behind-the-meter" data, in order to analyze consumption patterns, evaluate the impact of various EE measures and suggest the most commercially attractive of them.	This is a widespread constraint with only a few countries as exceptions. High penetration of metering devices is present in China, Azerbaijan, and Kazakhstan (with the exception of heat). All other CAREC countries could benefit from national metering program roll-outs at all levels of the energy value chain.
Lack of savings accounting – a fair and clear accounting for the savings and the ability to share them in the future is a prerequisite for the emergence of energy service companies, or ESCOs, which are specialized in energy audits, EE investments and services.	This is a widespread constraint relevant for all CAREC member countries. For instance, the consultant's own analysis of the World Bank's RISE indictors demonstrates that all of the 11 CAREC countries lack the budget instruments to retain energy savings for public utilities and publicly owned consumers.
Lack of specialized workforce – just like many other energy-related professions, EE requires a specific set of skills to	The countries with the lowest World Bank RISE rankings on the availability of specialized training and

Constraint Description	Affected Countries
conduct energy audit, evaluate the financial and economic benefits of the interventions, operate and maintain the equipment and administer EE-specific legal and financial arrangements.	certification programs for EE specialists are Uzbekistan, Kyrgyzstan and Tajikistan. These countries also happen to have the lowest electricity tariffs in the CAREC region.

Financial constraints: public finance, domestic banks, and international financial institutions cannot provide all the funds required to close the EE investment needs. With the narrowing of fiscal space after the COVID-19 pandemic response, national budgets are tight. Policy makers therefore look to private capital as the critical source of funding for EE. This trend is most commonly restricted by the following set of barriers:

Constraint Description	Affected Countries
Underdeveloped capital markets – capital markets in the region are predominantly narrow and shallow and therefore cannot attract a broad enough investor base. As many EE technologies are capital-intensive, access to equity restricts the ability of the investors to raise capital and limits their exit options.	All CAREC countries but China suffer from this constraint. With the development of Astana International Financial Center in Kazakhstan (AIFC), this constraint may become less acute, provided that it can effectively serve all CAREC countries.
Insufficient investment size – economies of scale are important in driving down the costs of financing. EE investments by their nature are small and dispersed. Scaling them up and aggregating them in larger investment instruments will be therefore important to successfully attract investors.	All CAREC countries but China suffer from this constraint. Project aggregation may develop further in some countries where in addition to the efficient state support to EE, there are effective SME financing instruments in place.
Banks unable to assess risks – the availability of debt financing is critical to ensuring attractive returns on EE projects. However, not all local banks are capable of assessing related risks and evaluating the cashflows from savings. Providing training and assistance in loan pricing for EE projects is therefore essential.	Interest rates remain high in most post-Soviet countries of the CAREC region. According to RISE rankings, banks don't provide loans for EE projects in Afghanistan, Azerbaijan, China, Pakistan, and Turkmenistan. In modest volumes, bank debt is available for EE in Kazakhstan (for commercial services), and in Mongolia (for industrial enterprises). In the Kyrgyzstan and in Uzbekistan banks finance EE to residential, commercial and industrial customers, in limited volumes.

Awareness issues: lack of public awareness of the economic, environmental, social and intergenerational benefits of EE are arguably the most important set of constraints for the successful rollout of EE campaigns. Raising awareness will not only eliminate the misconceptions about EE as expensive and unaffordable, but will also make the investments more attractive and widespread. Some of the constraints relating to the awareness are identified as follows:

Constraint Description	Affected Countries
Absence of regional and national awareness campaigns – these campaigns are usually designed and sponsored by the Government with the involvement of the civil society, volunteers and private sector companies, and rolled out on a national scale.	In most CAREC member countries EE awareness campaigns are not present or are underfunded. The countries without national EE awareness campaigns are: Afghanistan, Kazakhstan, Uzbekistan, and Turkmenistan. China, Georgia and Pakistan have state-funded awareness campaigns.

Constraint Description	Affected Countries
Distorted investment attractiveness perception – not only residential customers but also industrial energy consumers sometimes perceive investments in EE as costly and risky. This misunderstanding creates the reluctance in pursuing the benefits and undermines the spread of modern technologies.	This constraint is particularly relevant to markets with electricity tariffs regulated to remain low, e.g. Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan. However, as the tariffs start to grow, private sector utilities and energy consumers will be bound to seek energy efficient technological solutions.
Slow behavior change – behavior change is regarded as one of the most potent drivers of EE, and yet it is the trickiest to achieve. Special techniques can stimulate behavior change to drive habits in consumption patterns among households, and promote investment in efficient equipment among businesses. However, to make an impact, these changes in habits should become long-term.	All CAREC member countries could benefit from adopting the programs aimed at behavior change in the residential, services and industrial sectors, especially as new techniques are being developed and tested in the OEDC countries.

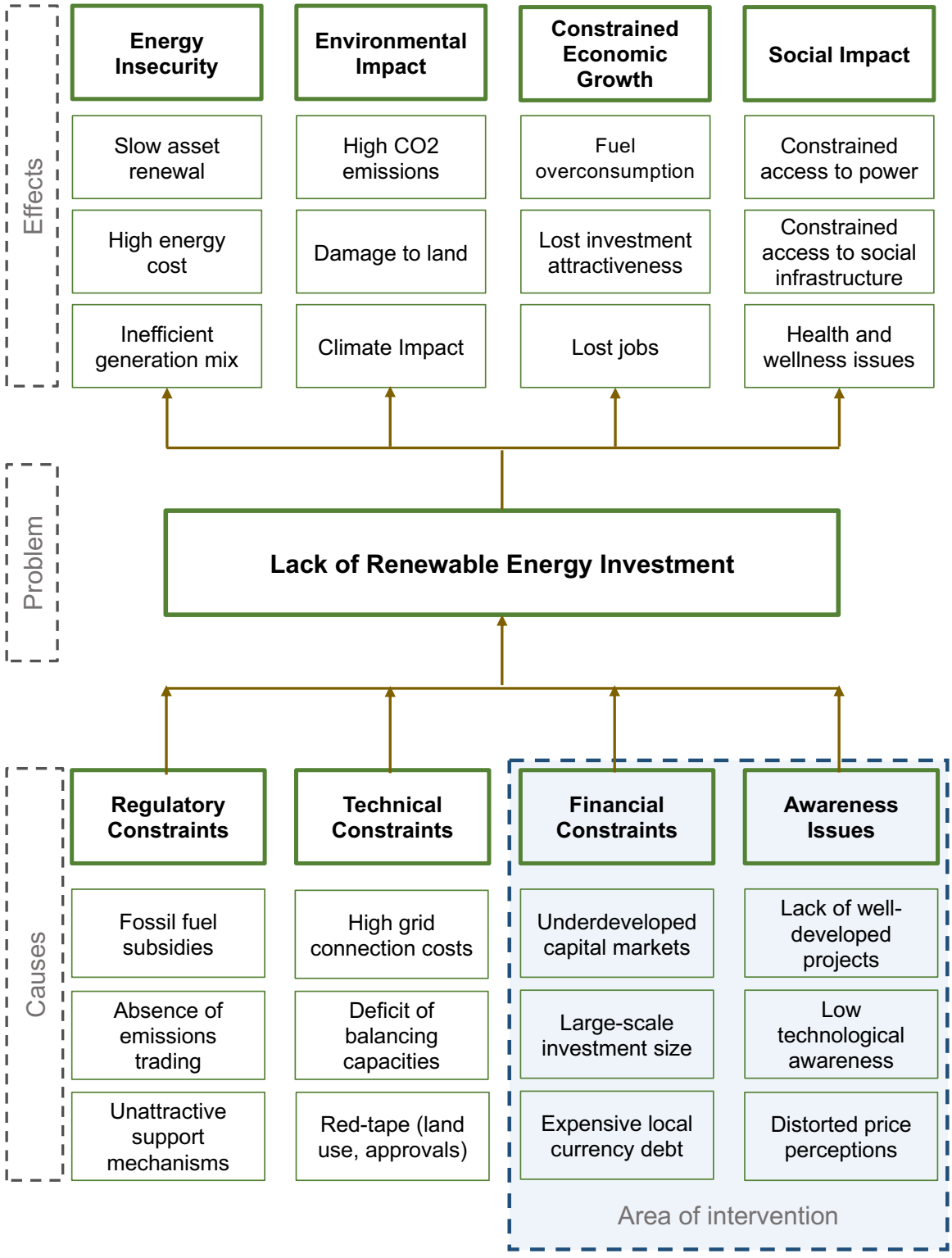
2.3.2. *RE Investment Barriers*

As shown in the previous section on green energy market potential, each CAREC member country requires billions in RE investments. Without them, the climate goals are unlikely to be attained, as RE is currently the only mature carbon-free alternative to fossil-fuel based power. In addition to its environmental benefits, RE has positive economic impacts, as it attracts investments, creates new jobs, and reduces the cost of electric power. Its social impacts are also undeniable – clean energy brings access to power for remote areas, makes social infrastructure accessible and affordable, and improves health and wellness of citizens by replacing polluting power plants. Counterintuitive to many beliefs, RE does contribute to the energy system security by diversifying generation mix, reducing fuel dependence and making energy cheaper.

Scaling up investment in clean energy will require mobilization of private investment from both domestic and international sources.[57] With the narrowing of fiscal space after the COVID-19 pandemic response, the national budgets are tight. The CAREC Green Energy Alliance should therefore become the financing vehicle that addresses specific constraints to RE investments in the region. The problem tree outlined in Figure 4 on the next page, presents these constraints and the area of intervention of the Alliance.

[57] Overcoming barriers to international investment in clean energy, OECD, 2016

Figure 4. RE Investment Problem Tree



Source: Consultant's analysis

Regulatory Constraints: these constraints relate to the laws, regulations and policies of the power markets that affect the ability of sponsors to plan, design, implement and operate RE projects. Most common of those constraints relate to the commercial regulations and policy-related agendas, as listed below:

Constraint Description	Affected Countries
Fossil Fuel subsidies –subsidization of energy costs, both hidden and apparent, is highly present in the CAREC region. Governments usually justify their interventions by the desire to alleviate the cost of energy to socially vulnerable consumers, or aiding local manufacturing, or increasing the competitiveness of imports. However, while largely failing to benefit the socially vulnerable, they also harm the investments in RE by distorting the prices.[58]	The countries most affected by fossil fuel subsidies are Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, Pakistan and Mongolia.[59] Kyrgyzstan, Tajikistan and Afghanistan, while not subsidizing fuel, suppress tariff growth, thus subsidizing consumption.
Absence of emissions trading – the ambitious decarbonization goals set by the CAREC countries can only be attained if the true cost of fossil fuel-based generation is reflected in tariffs. Emissions trading systems (ETS) are the market based mechanisms that allow for such pricing, making RE competitive and commercially attractive.	Of the 11 CAREC countries only China has a carbon pricing system in place. All other countries are yet to develop and/or launch their ETS.
Unattractive support mechanisms – lack of bankability in the support mechanisms is a widespread impediment to RE investments in the region. In many instances they require guarantees over the off-takers' obligations, or mitigation of curtailment and transmission risks.	The World Bank's RISE scores for RE support mechanisms are above 50 only for China. All other CAREC members' rankings remain low, as they either do not have RE support mechanisms in place (e.g. Turkmenistan) or have unattractive terms in them (e.g. short durations of PPAs, unregulated curtailment risks, lack of protection against currency risks, etc).

Technical constraints: given the intermittent nature of RE, the technical constraints to its deployment relate to the power system legacy design issues. Some of the most common such constraints in the CAREC region are:

Constraint Description	Affected Countries
High grid connection costs – in many CAREC countries the transmission system operators expect the investors in RE to cover the costs of grid connection. Given modest tariff levels, this renders many projects commercially unattractive. Supporting grid connection could promote investments in RE. This is a widespread constraint	While all CAREC countries have some rules for network development cost allocation, none of them have them adapted to the needs of RE projects or are they deep enough to provide investors with assurances that the grid would be available by the time of project commissioning. This constraint is present in all CAREC countries according to RISE rankings.
Deficit of balancing capacities – most energy systems in CAREC are based on fossil-fuel fired base-load plants, making additions of intermittent RE a challenge to national and regional system operators. The inability of RE stations to sell output to the balancing pool, or exchange balancing between the areas, exacerbates this constraint.	The lack of flexible generation is a common problem for the region. Even the countries mostly powered by hydro and gas (e.g. Georgia and Uzbekistan) suffer from the inability to provide flexible output. To a varying extent, all CAREC countries are affected by this constraint.
Red-tape – RE projects require vast land areas and sometimes may result in resettlements. Providing support in this area may	The length and complexity of the permitting process are especially cumbersome in Afghanistan, Pakistan, Tajikistan and Kyrgyzstan – these countries have the

[58] RE Status Report, UNECE, 2017

[59] https://www.iea.org/topics/energy-subsidies

Constraint Description	Affected Countries
result in more financially robust projects. This constraint is relevant only in some CAREC member countries	longest periods (6 months and more) to obtain regular construction permits, and hence the lowest rankings in that area according to the World Bank's Doing Business.[60]

Financial constraints: public finance, domestic banks, and international financial institutions cannot provide all the required finance. With the narrowing of fiscal space after the COVID-19 pandemic response, the national budgets are tight. Policy makers therefore look to private capital as the critical source of funding for RE. This set of constraints is most commonly represented by the following set of barriers:

Constraint Description	Affected Countries
Underdeveloped capital markets – just like EE, RE projects require access to a broad investor base, being a capital-intensive industry. Capital markets in the CAREC region are predominantly narrow and shallow and therefore cannot attract a broad range of investors. Meanwhile, the volume of green bonds alone has reached US$ 1 trillion globally in 2020, and tapping into this source is critical to the development of RE in the region.[61]	All CAREC countries but China suffer from this constraint. However, AIFC is gaining momentum in this area, having hosted a debut green bond in 2020.[62] If this trend continues, this constraint may become less acute, provided that AIFC serves as many CAREC countries as it can.
Large-scale investment requirements– the financial attractiveness of RE is highly sensitive to economies of scale. Most investors therefore prefer pursuing projects requiring hundreds of millions in investment, making them ever sensitive to macroeconomic and political risks and deterring the providers of debt and equity.	This constraint is particularly relevant for the countries pursuing large-scale hydro projects(e.g. Afghanistan, Tajikistan, Georgia, Mongolia and Kyrgyzstan) and large-scale solar endeavors (e.g. Uzbekistan and Azerbaijan).
Expensive local currency debt – One of the critical factors, determining the success of RE projects is availability of affordable local currency bank loans, especially where PPAs do not allow for foreign exchange tariff indexation. Access to debt financing remains low throughout the region. This barrier is essentially limiting the capacity to implement projects aimed at development of RE sources.	Access to finance is ranked low for most of the countries in the region. The World Economic Forum's 2019 Global Competitiveness Report ranks domestic debt as a % of GDP among 141 countries (Afghanistan, Turkmenistan and Uzbekistan are not yet ranked). In that rating, Pakistan, Tajikistan, Kyrgyzstan and Azerbaijan are ranked among the lowest and are yet to expand their financial sectors, so that they are able to provide affordable financing to RE.[63]

Awareness issues: despite being a mature market, RE still suffers from many misconceptions, relating to pricing, environmental impact, sustainability, etc. Raising awareness will not only eliminate these misconceptions, but will also make the investments more attractive and widespread. Some of the constraints relating to the awareness are identified as follows:

[60] https://www.doingbusiness.org/en/rankings

[61] https://www.thirdway.org/memo/how-capital-markets-are-driving-clean-energy

[62] https://aifc.kz/green-finance/

[63] http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Constraint Description	Affected Countries
Lack of well-developed projects – most RE projects can only be developed at the back of publicly available resource data (e.g. river hydrology, wind measurement data, solar irradiation data, etc). This basic data is required not only to make investment decisions, but also to obtain quotes from equipment producers and prepare applications for bank financing.	The World Bank's RISE indicators rank availability of resource and siting data as available (to a varying extent) only in Azerbaijan, Pakistan and Kazakhstan. Georgia has a hydro resource map. All other CAREC countries are constrained in the availability of RE resource data.
Low technological awareness – despite being a mature market, there is still low awareness of the available technologies and their capabilities. This constraint is especially important in promoting off-grid and distributed generation solutions. Spreading knowledge about modern renewable technologies and solutions is therefore important to making sure that more people benefit from them.	This constraint is especially acute in the CAREC countries with remote areas (e.g. Afghanistan, Tajikistan, Kyrgyzstan, Mongolia), while it is the very RE technologies that can alleviate the remote areas' energy access and transport mobility problems should the awareness of these technologies spread.
Distorted price perceptions – there is a widespread fallacy that RE is very expensive and cannot compete with fossil fuel-based generation. While wind and solar have repeatedly demonstrated their affordability, this misconception still persists among some policy makers in the region.	The perception that coal-fired generation is cheaper than RE is still widely present in Kazakhstan, according multiple local newspaper articles. In Mongolia, the perceptions of RE being expensive leads to the priority of dispatch from the CHPs.[64] In Uzbekistan, where electricity prices in general are still low, local media also express cautious concerns about the perceived expensive costs of RE.

[64] https://www.climateinvestmentfunds.org/sites/cif_enc/files/srep_ip_mongolia_final_14_dec_2015-latest.pdf

3. THE CAREC GREEN ENERGY ALLIANCE

3.1. Vision

Based on the vast potential for EE and RE in the CAREC region and the financing barriers, the CAREC Green Energy Alliance aims to become a platform that attracts investment in clean energy projects, encourages, co-investment and deploys climate finance in an effective and sustainable manner, while encouraging decarbonization, innovation, increased resilience and support the development of enabling environments, including both market and policy development. With this in mind, the CAREC Green energy facility will be designed with the following key principles:

Figure 5. CAREC Green Energy Alliance Vision

CATALYTIC

- The platform attracts (private) finance to de-risk projects and improve their bankability.
- It creates robust green energy pipelines, attractive to private investors, by working with governments, financial institutions and businesses to originate new opportunities.

SUSTAINABLE

- It aims at achieving economic transformation toward low-carbon, sustainable and inclusive energy market and environment.
- It aims at creating sustainable development outcomes, including climate change mitigation and adaption, by scaling up the implementation of clean energy projects.

TRANSFORMATIVE

- The platform develops projects that have optimal social, economic and environmental benefit.
- It demonstrates transformative, advanced technology and innovative and disruptive financing models that can contribute to achieving sustainable development, while achieving climate commitments.
- It encourages a transformative effect on markets in terms of scale, improved private sector participation, confidence in clean energy investments.

3.2. Clean Energy Investment Platforms – Examples and Benchmarking

The CAREC Energy Strategy 2030 identified the following desired features to characterize the Green Energy Alliance:

- The CAREC program should establish a Green Energy Alliance in form of a green-energy marketplace to bring together project developers and potential financiers and provide the member countries with end-to-end solutions for co-financing investments in clean energy projects.
- The CAREC Green Energy Alliance can be a forum where all CAREC members can identify and attract sources of funding for a pipeline of well-developed and investment ready green and climate-responsive energy projects.

Based on these requirements, CAREC Green Energy Alliance should be established as a digital clean energy Platform allowing to explore the following **benefits of the online investment space**:

- Green Energy Alliance will cover all the CAREC countries and fix a gap in regional financing.
- The platform will have a comprehensive set of features, that combined, provide the best possible service offering both for the project developers and financiers.
- The Alliance will also feature a network of CAREC donors that offers project preparation to address project bankability gap and reduce risks for the investors.
- Increase project pipeline by providing an easily accessible space for project developers by mobilizing a broad spectrum of investors and development partners in one place with increased speed, scale and ease of a digital platform solution.
- Create a reliable source of project opportunities with clearly defined financial and environmental metrics for the potential investors.
- Enable dissemination of information and knowledge on bankable clean energy projects in finance community.

To develop a digital platform that is attractive to the project owners and investors, the Lead Consultant has identified, reviewed and analyzed the existing online solutions. For the purpose of the comparative analysis five platforms were selected:

- *GET.invest* is a European program that runs on the Get.pro platform, and is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The platform aims at catalyzing investment in RE in developing countries by supporting developers and companies in sub-Saharan Africa, the Caribbean and Pacific towards investment readiness and by linking them with investors, thus building a pipeline of investment-ready projects and companies.[65]
- *FIPEE*[66] Investment and Matchmaking Platform on Energy and Environment is run by the UNIDO Network of Investment and Technology Promotion offices and is funded by the Italian Ministry for Ecological Transition. The platform 's main goal is to promote investment and trade in sustainable energy and environment technology innovations and projects in Small and Medium-sized Enterprises (SMEs) among seven partner countries and Italy. This will be achieved by promotion of businesses and projects on the platform's Project Marketspace, and by facilitating access to financing through series of matchmaking events.
- *IRENA Climate Investment Platform* connects projects with available climate capital by working closely with project developers to improve their proposals through project

[65] https://www.get-invest.eu/about/who-we-are/

[66] FIPEE stands for "Fostering International Partnerships in Energy and Environments"

preparation tools (IRENA Project Navigator),[67] while facilitating matchmaking between projects and suitable investors under the facility.[68]

- *The Cities Investment Facility* strives to attract investment in inclusive sustainable urbanization projects at pre-feasibility stage, and SDG profiling and financing. The Facility features three multi-stakeholder instruments – the Cities Investment Portal, the Cities Investment Advisory Platform, and the Cities Investment Vehicles. This analysis will look at the two interconnected platforms and analyze them as one digital solution:
    - The Cities Investment Portal is an online platform that connects UN-Habitat certified city development projects featured on the portal's Project Market, with investors seeking to finance projects that are economically, socially, and environmentally sustainable.
    - The Cities Investment Advisory Platform focuses on upstream project identification and portfolio mapping, as well as SDG alignment and non-financing impact verification for projects.
- *SOOOF* is a commercial social media platform that helps organizations connect, collaborate, and exchange through sooof Channels. This is commercial platform, where like-minded project owners, businesses and investors can communicate and cooperate due to the platform's social media features. Sooof[69] was selected for analysis due to its concept – 'connect, collaborate, exchange, that promotes commercial collaboration between project and product developers' and innovative B2B social media concept.

Many platforms and their additional features are located on different websites, which makes navigation less convenient. In particular, this is the case with IRENA Climate Investment Platform and IRENA Project Navigator project preparation toolset. Cities Investment Facility is also located on two separate platforms – the Cities Investment Platform and Cities Investment Advisory Platform. This is considered to be an IT architecture inefficiency issue and should be avoided by the CAREC Green Energy Alliance.

As platform solutions for clean energy investment are becoming more popular due to their ease of use and outreach potential, there were numerous platforms available for analysis. The selected platforms were chosen due to their implementation mode characteristics, their purpose and features, and their alignment with the requirements identified in the Rationale part of this paper and CAREC Energy Strategy.

[67] https://navigator.irena.org/index.html

[68] https://www.climateinvestmentplatform.com/

[69] https://sooofinc.com/

Table 7. Investment Platforms Features Benchmarking Analysis

Platform Features	GET. Invest	IRENA Climate Investment Platform	Cities Investment Facility	FIPEE	SOOOF	Green Energy Alliance
Project Marketplace	✗	✓	✓	✓	✓	✓
Project-Investor Matchmaking	✓	✓	✓	✓	✓	✓
B2B Social Media/Communication features	✗	✗	✓	✗	✓	✓
Project Preparation Advisory/Tools	✓	✓	✓	✗	✗	✓

The digital platforms featured in this benchmarking exercise, compete for the similar audiences, but leverage their competitive advantages and distinctive aspects to reach their particular audience and deliver unique service offerings. The analysis of the online platforms allowed to determine the features and services that are essential for the platform to attract users, promote cooperation and communication and become an efficient financing vehicle.

The Green Energy Alliance platform shall offer a comprehensive set of features:

- Project Marketplace.
- Project-Investor Matchmaking.
- B2B Social Media/Communication features.
- Project Preparation Advisory/Tools.

Project Marketplace allows all registered users to browse the projects and saves potential investors and collaborators a considerable amount of time finding, by screening and benchmarking quality projects, while providing a space for developers to show their projects and get them funded faster. Cities Investment Platform, FIPEE and Sooof have additional interactive features that enable project owners to add photos and videos to the project description which should also be considered for the CAREC Green Energy Alliance.

Project-Investor Matchmaking is an essential component, featured on all the platforms in the analysis. B2B matchmaking takes place online or through a series of events organized by the platforms and provides the possibility to engage directly and discuss business opportunities with participants. Adopting this feature means that the Alliance will be able to better connect project developers and investors. Early and frequent matchmaking activities help to increase trust and knowledge flows between entrepreneurs and investors. Thereby, increasing the likelihood of a successful match and a financial deal being closed.

B2B social media/communication feature is considered to be an innovative addition to the investment platforms. Only two of the five platforms analyzed by the consultant have added this component to the platforms' services - the Cities Investment Facility and commercial platform SOOOF. This component allows registered users to cooperate with each other, exchange ideas through dedicated channels, as does Sooof, or through interactive dashboards, where users can message each other, and follow the projects as is the case with Cities investment Platform. SOOOF considers sooofCommunity to be one of its most prominent service offerings, that adds value by promoting commercial and investment collaboration through social technologies on the platform.

CAREC Green Alliance platform will benefit from having this tool, as it will allow its users to collaborate, build their own network and an investment community. Proprietary communities like this can provide an enhanced value to all other platform users allowing more collaborative

ways of working, acquiring connections and resources and finding support and obtaining project feedback from other participants in a trusted and secure environment.

Project preparation is a common feature for the investment platforms. This component was included in the list of Green Energy Alliance to increase an access to the bankable projects for the investors and provide advice on essential aspects of business case and financing models to support developers towards structuring their propositions in a way that corresponds with the needs and expectations of financiers and contribute to reduced investment risk and increased investment flows.

- **Project preparation advisory** usually means that there is a team of experts that verifies the received information. This is the case with the GET.Invest platform, which has a separate team of experts that help to prepare the projects towards the bankability. Cities Investment Advisory Platform performs SDG and non-financing impact verification for the projects.
- **Project Preparation toolset** is another option – Climate Investment Platform and GET.invest provide a set of guidelines, tools and checklists that project developers can use to upload a standardized set of information that is anticipated by the investors.

These features form a comprehensive service offering, by combining the essential pieces necessary to create a successful digital platform. The Platform's easy structure, where each component is represented by a separate block, facilitates a simple, time and cost-saving implementation and uncomplicated maintenance and upgrades. Such structure also means that step-by-step rollout is possible, and features could be added gradually as the platform develops Thus, the platform can adapt and adjust according to the users needs in order to make the collaboration as efficient as possible.

3.3. CAREC Green Energy Alliance Description and Main Components

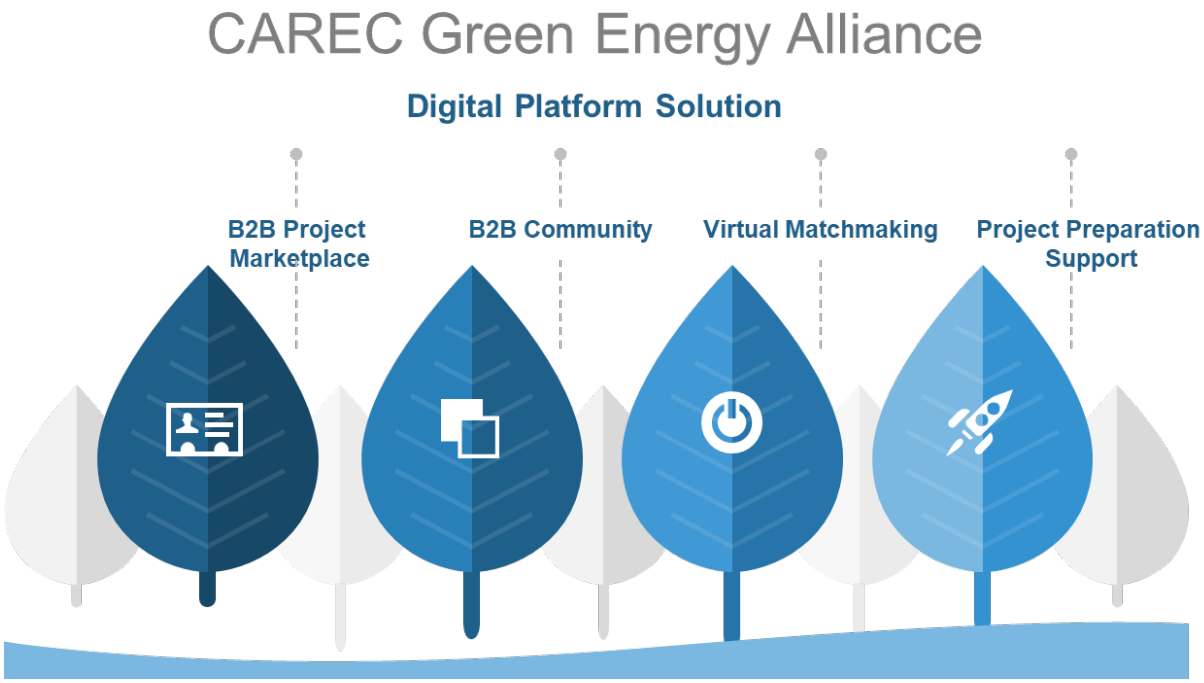
Conceptually, the CAREC Green Energy Alliance shall be an online B2B platform that will connect CAREC countries, project developers, businesses, investors and lenders in a pursuit for clean energy opportunities that are environmentally, socially and economically sustainable.

The platform will allow participants connect and work together more easily and efficiently by:

- Providing easy access to a pipeline of investment-ready projects as well as proposals in the discovery stage in the CAREC region through easy to navigate Project Marketplace.
- Find investors or new partners with interactive Virtual Matchmaking.
- Cooperate and exchange knowledge and ideas within B2B community. And
  - Prepare high quality investment-ready projects with Project Preparation Support.

3.3.1. *Platform Features*

Figure 6. Suggested Platform Solution



B2B Project Marketplace

Green Energy Alliance digital platform allows to:

- Browse active opportunities in the Marketplace (or narrow the search by industry or category).
- Showcase projects, products and services.
- Develop and personalize profiles and dashboards:
  - Project developers and companies can upload project or company materials, as well as photos and videos;
  - Investors can list their requirements, track progress on selected projects and view recommended projects.
- Project Marketplace shall allow to filter the projects by:
  - Sector;
  - Country;
  - Technology;
  - SDG;
  - Investment type (e.g. debt, equity, grant);
  - Financing / procurement structure (e.g. entirely publicly financed, private financing, PPP, other).
- Project Developers' profiles can be rated and ranked according to a certain set of criteria, such as number of commercially and financially closed projects, financial and sustainability indicators acquired via continuous tracking and post-evaluation of projects that have obtained financing through the platform, etc. Higher rating will allow the investors to evaluate the proposals and assess future projects' reliability.

B2B Community

- The digital space will be developed around a social networking model to connect platform participants so they could collaborate on projects more efficiently:
    - Platform users can select profiles or projects to follow;
    - Use personal and group messaging and chats;
    - Participate in dedicated channels;
    - Link their platform profiles with social media via LinkedIn or Facebook.

Virtual Matchmaking

- Matchmaking sessions will be the part of the services offered by the platform and will help to mobilize investments in clean energy projects and businesses.
- Platform will allow business matchmaking sessions to identify and connect:
    - project developers and investors;
    - participants with common business interests, complementary services, expertise or technology.
- Matchmaking meetings will take place as one-to-one talks. Participants can check out the platform participants' profiles and schedule short online meetings with a single click at any time.
- Automated matchmaking: users can select business criteria (by clean technology, by purpose – investment or cooperation required, etc.) and the platform runs an algorithm to match the user with the right projects. If there is a match, the parties decide if they like to learn more and connect with each other.

Project Preparation Support

- The platform will form a network of partners that will perform project preparation for the projects they consider viable for financing.
- The platform will provide project developers with project preparation resources so they could:
    - Assess existing project needs and gaps;
    - Upload project documentation that is standardized, contains all the necessary information for further processing;
    - Present projects that are financially viable, transparent and comply with investors' requirements and standards;
    - Increase their chances to receive necessary financial support.
- Proposed project preparation resources include:
    - Project development process guidance;
    - Technical concept guidelines for clean energy technologies;
    - Templates, checklists, evaluation forms;
    - Financial Models;
    - Case studies.

The CAREC Green Energy Alliance will also be relying on the flagship regional reference – the CAREC Energy Outlook 2030 – which is the region's flagship source for identifying future regional energy market trends, business opportunities, investment needs and business climate considerations as well policy landscapes. This will allow accelerating appropriate projects at the appropriate time. The CAREC Energy Strategy 2030 also foresees the establishment of a CAREC Business Advisory Council in future years to help guide investors on their path. An annual flagship Energy Investment Forum is also part of the CAREC program allowing the business community to exchange lessons learned and discuss further cooperations.

Figure 7. Sample Project Lifecycle

Project developers and companies can initiate networking by registering on the platform and creating and filling out their user profile. The profile is a user's virtual business card that contains all the essential information. Developers will also need to upload project and media materials to the profile's interactive dashboard to complete it.

Developers will need to create marketplace items with project description, so their project could be featured on the platform's Project Marketplace. All registered users will be able to view each other's profiles and browse the Marketplace. Project Marketplace is a part of Matchmaking facilitation mechanism as it allows project developers to showcase their projects to the investors or potential partners. The Marketplace allows to search for investment opportunities, project cooperation, products and services or expertise.

Virtual Matchmaking will be the part of the services offered by the platform and will help to mobilize investments in clean energy projects and businesses and promote cooperation on the projects. The users can either initiate Matchmaking at any time by requesting the one-to-one meeting. Or participate in the matchmaking sessions organized by the platform.

The platform will also be a community for clean energy enthusiasts where participants can communicate on the dedicated channels to discuss projects and ideas. The platform will also encourage to direct interaction, including inquiries, requests for proposals and messaging. Investors and potential partners can follow the project news and updates.

3.3.2. *Platform Application Criteria*

Location: Applicants and projects must be located in the CAREC Region.

Focus on RE and EE: A major part of the proposed project or business must be a RE system or EE equivalent.

The following investment priorities may be set for the target sectors:

RE

- Renewables – generation.
- Distribution / management.
- Energy storage.
- Products and technologies that support smart grid.
- Data centers using RE.

EE

- Green commercial buildings.
- Green residential mortgages.
- EE technology and products.
- Industrial retrofits.

Investment Size and Generation Capacity: these are important application criteria, so careful consideration will be given to the investment ranges, applicable minimum and maximum generation capacity criteria, at the later stages of platform design.

Revenue generation: Submitted proposals must prove to be revenue-generating and meet minimum economic and financial viability criteria (to be determined at platform design stage).

Demonstrate clear linkages to SDG goals and indicators: Project proposals need to have positive environmental impact and show how they contribute to the attainment of the SDG 7 Affordable and clean energy and SDG 13 Climate Action The following indicators might be considered:

- *Mitigation core indicator*: tons of CO2 emissions to be avoided or reduced per annum;
- *Adaptation core indicator*: expected total number of direct and indirect beneficiaries and number of beneficiaries relative to total population (e.g., total lives to be saved from disruption due to climate-related disasters);
- *Other indicators*: accessibility, affordability, job creation, energy security, environmental, health, education, gender.

Show compliance with good Environmental, Social and Governance (ESG) criteria, as well as local regulatory/strategic requirements. For instance, the projects should demonstrate:.

- **Coordination with the local energy and power development plan.** Project Applications might need to demonstrate the extent to which their projects have been developed in accordance with the local strategies and plans. Also, electricity generation projects might need to mention grid connection status (e.g., permission obtained, permission unavailable or permission pending, etc).
- **Energy planning and management policy information**. Each project information pack should include a brief summary of relevant information on planning, policy, and institutional information on RE and EE status quo in its country of origin, including electricity market goals and planning, electricity price policies, grid access, foreign capital investment, taxation, financial data, foreign exchange, etc., so that the investor can better understand and evaluate policies and the business environment in which the project is in. The above information is collected and organized by the Alliance itself or by a professional third-party consulting agency, and can be obtained and updated from official channels on the Internet.

The illustration on low-risk and high-risk project according to the criteria is provided below.

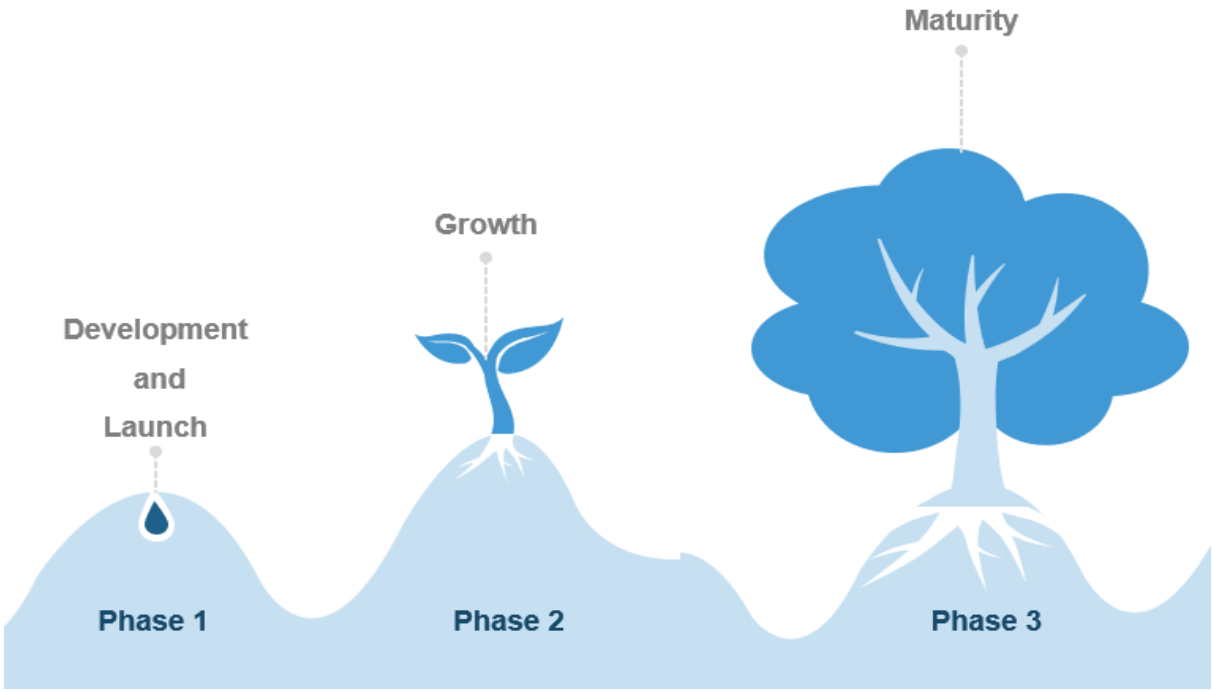
Table 8. Low-Risk and High-Risk Projects

Lower Risk Projects	Higher Risk Projects
Projects which have good resource characteristics	Projects which have poor resource characteristic, e.g. poor wind or hydrology
Projects which have contracted revenue stream with a creditworthy off-taker	Projects which are exposed to market risk (e.g. merchant projects)
Sponsors who have substantial relevant experience	Sponsors who have little or no relevant experience
Sponsors who have ample financial resources	Sponsors who have limited or stretched financial capacity
Low dependence on subsidy. Competitively procured subsidy, i.e. through tenders	High dependence on subsidy. Low affordability.
A well established and proven regulatory environment	A regulatory environment which is dysfunctional or unreliable
A low break-even price	A high break-even price
Projects with lower completion and operation complexity (solar, wind)	Projects with higher completion and operation complexity (hydro, biogas, biomass)

3.4. Platform Development Stages and Issues to Consider

The platform launch and further development is projected to happen in **three phases**:

Figure 8. Platform Evolution Phases



The phased approach allows for the gradual evolvement of the platform, its services and accommodate for the growing user and project base. This method also allows for the efficient use of resources and funds.

Platform development and maintenance will require an agile approach that supports product evolvement and adjustment. Using an agile methodology will significantly increase development productivity and result in an end product that can provide real value to the platform users. As a part of this process, the project will be split into development phases, with working software delivered at the end of each sprint. This approach will accommodate for the platform scaling and user base growth over time.

The first phase: platform development and launch

This phase has the following main steps: platform kick off and launch.

- Kick-off:
  - Project team is assembled and platform deployment phases, project schedule and milestones, as well as platform development goals and KPIs are decided.
  - On the technical side, platform technical specification including configuration, graphic and web design are developed to make the platform convenient and user-friendly.
  - Platform prototype – a scaled down version of the platform is created to run the tests and improve the functionalities and interface, if required.
  - The first version of the platform is created, tested and parameters are further configured to the users' needs.
- Launch:
  - Beta-launch for the small number of users to resolve the bugs and unplanned use-cases.
  - The platform is launched.
  - The platform features are implemented, but their functionality is either slightly reduced, or not automated to the full extent.

The second phase: platform growth

- At this stage the focus is on the users, their activities and user experience, as well as platform services and their performance.
- The platform features are implemented, but their functionality is either slightly reduced, or not automated to the full extent.
- Through various evaluation methods the added value for the users is to be steadily increased in order to attract potential users to the platform.

The third phase: platform maturity

- At this stage, the digital platform has larger number of users and projects
- The platform features are implemented on the full scale and are automated to the large extent due to the high number of users and projects.
- Even more growth is possible, especially through further development of core functions.
- At this stage, platform users and sponsors may even consider integration of investment fund functionality into the platform that will finance attractive projects, provided there is an interest from the key stakeholders.

3.5. Considerations for the Platform Features

A minimal viable product (MVP) approach is suggested, since the platform has a broad scope and many features. The MVP approach is based on the premise that at the launch of the product, sufficient customer value can be provided by delivering basic features that early adopters will use. This approach might be useful in the first two phases of the platform growth, to ensure that resources are spent efficiently.

The modular structure of the platform allows to avoid the unnecessary complexity and allow for the features to develop and evolve together with the platform. This approach allows to cut out all the complex sub-features, like full automation, of the platform's components and start with the basic functions and build on them.

In the context of this platform, full functionality is attributed to the automation of the component.

The first phase: platform development and rollout

- *Project Marketplace*: full functionality.
- *Project-Investor Matchmaking*: partial functionality. At this stage, B2B matchmaking is mostly performed manually – via online matchmaking sessions and meetings as well as project presentations for the investors or potential partners.
- *B2B social media/communication*: partial communication. At this phase the platform will allow users to send each other messages and will have a basic forum for ideas exchange and communication.
- *Project Preparation Advisory/Tools*: basic functionality. As the platform is in the developing phase, the number of projects will allow the platform's network to do the project preparation, if they find the project appealing.

The second phase: platform growth

- *Project Marketplace*: full functionality
- *Project-Investor Matchmaking*: partial functionality. At this stage, B2B matchmaking is mostly performed manually – via online matchmaking sessions and meetings as well as project presentations for the investors or potential partners
- *B2B social media/communication*: partial functionality. At this phase the platform will allow users to send each other messages and will have a basic forum for ideas exchange and communication.
- *Project Preparation Advisory/Tools*: full functionality. As the platform is growing, so does the number of projects. At this developmental phase, the Project Preparation Tools are introduced to the platform, and project developers are allowed to prepare the necessary project documents themselves. Introduction of Project Preparation Tools will reduce the workload for the platform's partner network. But at this stage the platform's network is still able to do the project preparation, if they find the project appealing.

The third stage: platform maturity

- *Project Marketplace*: full functionality.
- *Project-Investor Matchmaking*: full functionality.
    - At this stage, B2B matchmaking is performed manually – via online matchmaking sessions and meetings as well as project presentations for the investors or potential partners.
    - Automated matchmaking becomes available to allow quick screening of the Project Marketplace: users can select business criteria (by clean technology, by purpose – investment or cooperation required, etc.) and the platform runs an algorithm to match the user with the right projects. If there is a match, the parties decide if they like to learn more and connect with each other.
- *B2B social media/communication*: full functionality. Social networking model will be fully integrated into the platform to connect platform participants so they could collaborate on projects more efficiently:
    - Platform users will be able to select profiles or projects to follow.
    - Group messaging and chats will be added.
    - Dedicated thematic channels will be added to the platform.
    - Integration with social media like Facebook and LinkedIn could be added.
- *Project Preparation Advisory/Tools*: full functionality.

Table 9. Platform Features Functionality with Regard to the Evolution Phases

Platform Features	Functionality for Phase 1	Functionality for Phase 2	Functionality for Phase 3
Project Marketplace			
Project-Investor Matchmaking			
B2B Social Media/Communication features			
Project Preparation Advisory/Tools			
	Enhanced functionality of the platform's feature		
	Basic functionality of the platform's feature		

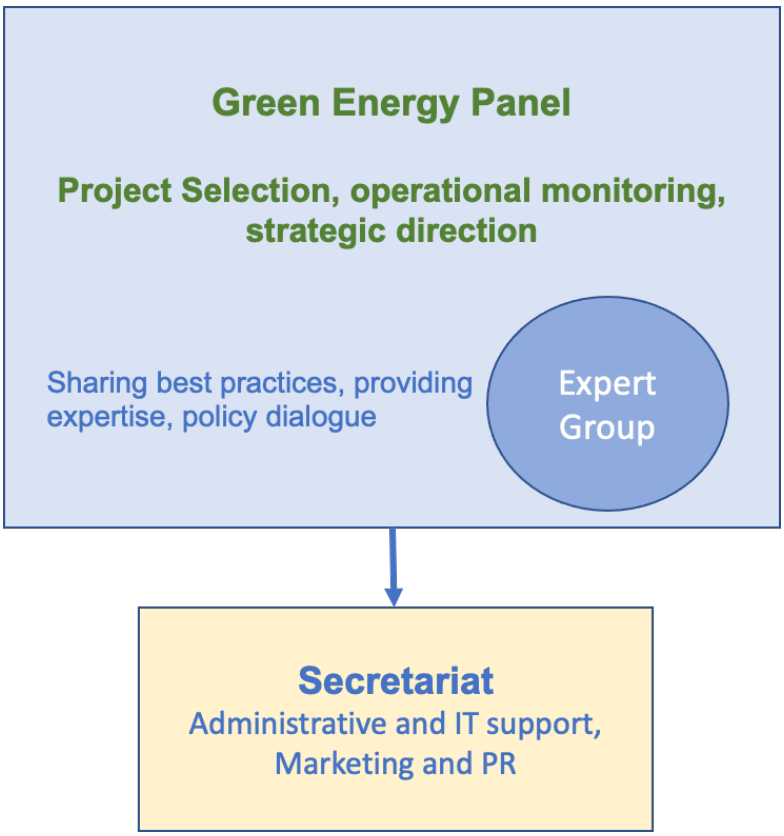
3.6. Organizational Structure and Corporate Governance

Organizational structure and corporate governance are the key aspects of the platform solution design, as the choice of the model will determine how the platform will be managed organizationally, and how it will operate. Below, we provide three high-level governance model and, including important considerations that affect the choice of the latter.

Organizational structure and corporate governance are also critical to attracting the appropriate shareholders, investors and partners, as well as the management team that the platform requires to be successful. They can help ensure that the platform operates in a manner that allows for adequate performance and provides confidence to all stakeholders of sustainable success.

The governance structure needs to achieve a fine balance between providing operational flexibility and supervisory direction and control while ensuring that the platform always operates on commercial principles. The proposed structure is provided below:

Figure 9. Proposed High-Level Organizational Structure



The platform organizational structure will be very lean and flexible. It will consist of the Green Energy Panel (including a Green Energy Expert Group) and Secretariat.

- The Green Energy Panel will consist of the CAREC development partners (including highly credible international and domestic experts from the areas of energy, banking, finance, environment sustainability, social aspects, etc.). Green Energy Panel will perform the following primary functions:
    - Decisions regarding the applications from the project developers, including project selection;
    - Provision of strategic direction to the platform;
    - Setting general goals of the platform;
    - Overview of the platform development, monitoring and reporting.

  Green Energy Panel is expected to meet once a month to perform the aforementioned duties.
- The Green Energy Expert Group will consist of experts from the think tanks and academia from CAREC member countries. The experts will:
    - Facilitate regulatory and policy dialogue;
    - Share best EE and RE practices;
    - Provide necessary expertise.
- The Secretariat is proposed to be managed by the ADB as it is hosting the CAREC Energy Secretariat, however, any other CAREC Development Partner may host the Secretariat as well. The Secretariat shall be responsible for:

- Platform establishing and hosting;
- Provision of IT support;
- Platform management on the day-to-day basis;
- Platform performance monitoring against the set targets;
- Preparation of reports, presentations, list of projects and other documents for the Committee;
- Secretariat sub-unit will be also responsible for marketing and PR.

Secretariat is expected to manage the platform on a daily basis.

This structure will be sustainable for phases 1 and 2 of the platform development. For the platform maturity phase, the secretariat could be expanded, if necessary, with compact and flexible modular sub-units, each responsible for the platform's component:

- Project Marketplace management module.
- Project developers and Investor relationship management module.
- B2B social media/communication module.
- Project Preparation module.

Platform staff can cover several modules in order not to overload the structure.

3.7. Platform Risk Assessment and Management

Risk is inherent to the software development process. Therefore, it is critically necessary to identify, understand, and mitigate the risks that threaten the success of the endeavor. For projects that have time and cost constraints, experience shows that successful software development treats risk mitigation as the central management concern.

Risks to consider at platform design stage:

Incorrect functional requirements. At the platform design stage, the main risk is incorrect or incomplete identification of requirements, services and functions. Attempts to change or add elemental requirement at the later stages could lead to major complications, delays, uncovered costs in project implementation as well as low user satisfaction in later stages.

In order to mitigate this risk, the platform development should be based on the clear technical concept, including detailed understanding of services and functions, as well as tools for decision making for the final product. To ensure that the product development satisfies key stakeholders' performance expectations, regular acceptance driven tests should be performed throughout the project.

Ineffective IT architecture design. The risk occurs when the system does not properly align with the purpose and business goals of the platform. The risk might come from the rigid design, or from incorrect understanding of the future users' needs/functional requirements (see previous risk). It could lead to increased development times, cost and complexity. To overcome this risk, it is vital to have the right team of IT experts/consultants, who have extensive experience and right capabilities in IT architecture design.

Incorrect budget estimation and improper project scheduling risks. Individual software projects are unique and this creates problems for developers and managers in estimating correct budgets and scheduling development time. The main causes of cost risks in software development include: incorrectly calculated budget; no extra funds reserved; unplanned project expansion. In order to avoid this risk, it is necessary to maintain constant control of the budget and development process. For any changes or introduction of the additional features, their cost should be calculated at the discussion stage.

General digital ecosystem risks for consideration at the later stages of platform development and implementation:[70]

- Technology related risks have an impact on systems, people and processes. Key risk areas include systems scalability, compatibility, and accuracy of the functionality of the implemented technology.
- Operations risks arise due to inadequate controls in the operating procedures.
- Third Party risk occurs due to inappropriate controls at third party technology providers, developers and third-party operating environment. Key controls would be established around data sharing, technology integration, operations dependency, vendors resiliency etc.
- Regulatory risks realize in case of failure to comply to regulatory requirements, including applicable technology laws, sectoral laws, and regulations. These risks will include the electronic communications and transactions that should comply to general and industry-specific regulation.
- Cyber Resilience refers to protection of digital environment from unauthorized access usage and ensuring confidentiality and integrity of the technology systems. Key controls may include platform hardening, network architecture, application security, vulnerability management, and security monitoring.
- Data Leakage and Privacy. Ensuring protection of data across the digital ecosystem at various stages of the data life-cycle: data in use, data in transit and data at rest. Key focus control areas would be around data classification, data retention, data processing, data encryption.
- Authentication of community members and their activities is the primary responsibility of the platform owner and partners, far more than in an offline business where physical verification is fundamental.

[70] Managing risk in digital transformation, Delloitte, 2018

4. RAISING AWARENESS

4.1. Focus of the Communication and Visibility Enhancement

The following platform features should be actively used in platform marketing:

- *CAREC region coverage*. Green Energy Alliance platform will accept projects from all the CAREC countries. Other platforms cover some of the CAREC countries, but nevertheless there is a gap in regional coverage, that will be fixed by the platform.
- *Focus on clean technologies (RE and EE)*. It should be highlighted that the platform will deal with RE and EE projects, while most of the platforms are concentrated on RE.
- *Service offering*. The platform will have a comprehensive set of features, that combined, provide the best possible service offering both for the project developers and financiers.
- *Network*. The Alliance will also feature a prominent network, consisting from the CAREC donor community, that will offer project selection and technical assistance (TA) to address project bankability gap and reduce the risks for the investors.
- *Increase project pipeline and reduce financing gap* by providing an easily accessible space for project developers and mobilizing a broad spectrum of investors and development partners in one place with increased speed, scale and ease of a digital platform solution.
- *Create a reliable source* of project opportunities with clearly defined financial and environmental metrics for the potential investors.
- *Enable dissemination of information and knowledge* on bankable clean energy projects in finance community.

4.2. Raising the Visibility for CAREC Green Energy Alliance

Effective communication and visibility enhancement program are essential for marketing the CAREC Green Energy Alliance as a leading financial mechanism in the CAREC region, aiming at the promotion of clean energy, innovative green energy projects and solutions and fostering environmentally sustainable development in the region.

Visibility enhancement should also be considered as one of the tools to demonstrate results of the Alliance to its key stakeholders and general public in an open and transparent manner. Moreover, communication channels and methods should be complementary and consistent with financing vehicle organizational style and purpose. Communication program should be designed in such a way, that will allow to make a beneficial contribution to the CAREC Green Energy Alliance strategic objectives, improve institutional relationship with member countries, donors, partners and investors and help raise the profile of green energy projects, ultimately supporting the financing vehicle mission and vision. Using communication in a strategic way will help Green Energy Alliance to develop trust with their key stakeholders, harness commitment from partners, and ultimately contribute towards the long-term success of the organization.

A detailed communication and visibility enhancement program should be provided at feasibility study and business planning stage, possibly to include the following steps:

1. Select the key stakeholders and target groups and develop specific objectives for each selected target group, related to the Green Energy Alliance activities and particular project's objectives and the phases of the project cycle.
2. Define the overall communication objectives of the program in order to ensure that selected target groups are aware of the Green Energy Alliance work, opportunities, projects implementation and presence in the region. Also, awareness should be raised

of how ADB, CAREC and Green Energy Alliance work together to support the development of clean energy market in the region.

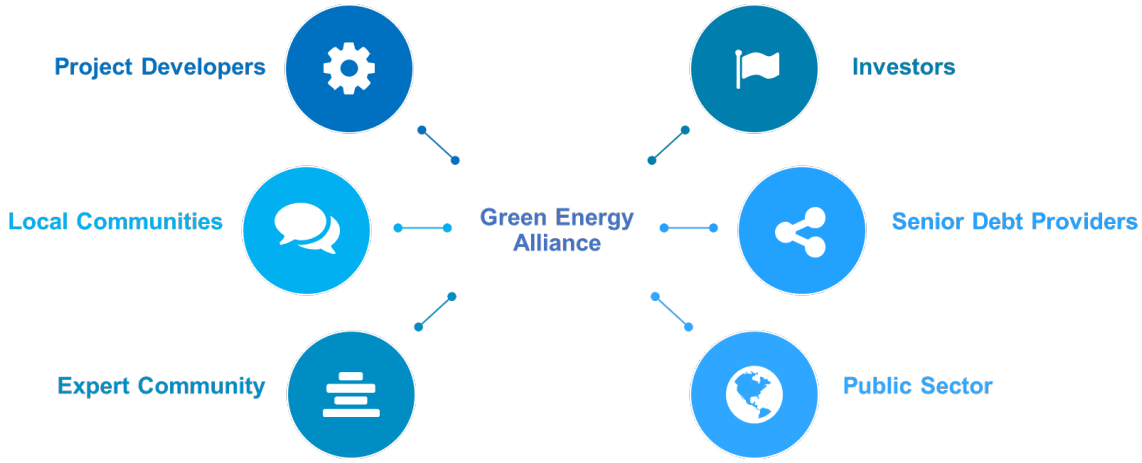
3. Identify the main communication activities that will take place during the period covered by the communication and visibility program, including the nature of the activities, responsibilities for delivering the activities.
4. Choose the communication tools, detailing the advantages of particular tools (media, advertising, events, etc.) suitable for the local context of the member countries. Each communication toll shall have measurable indicators of objectives achievement as well as suitable feedback forms, where applicable. Visibility and awareness enhancing activities may include, but are not limited to, social media presence, conferences, meetings, press releases, press conferences, press visits, visits by government officials, publications, web sites, display panels, banners, promotional items, photographs, audiovisual productions, public events and visits, as well as information campaigns.
5. Assess the requirement in human resources for the implementation of the awareness raising activities, including personnel required to implement the communication activities as well as the members of the management team responsible for communication activities.
6. Allocate the budget required to implement the communication activities.

4.3. Target Green Energy Stakeholders

The growth of green finance markets represents an emerging opportunity for both the private sector investment, project developers and MDBs. The Green Energy Alliance has the main objective of developing an innovative pathway for green energy projects, by establishing long-term strategic collaboration between CAREC member countries and potential investors and donors, while simultaneously enhancing the development of clean energy market across the region. Therefore, the key audience of the platform might include the following groups:

1. Project developers.
2. Investors:
    a. MDBs;
    b. Development funds;
    c. Private equity departments of financial institutions;
    d. Private equity funds and private investors (e.g. Meridiam, Mubadala, GE, Total, Shell etc.).
3. Senior debt providers:
    a. MDBs;
    b. Privately owned Commercial Banks;
    c. Government owned Commercial Banks.
4. Public sector:
    a. Relevant ministries (such as ministry of economy, ministry of finance, ministry of energy, ministry of transport etc.);
    b. Institutions dedicated to green energy development (including government agencies).
5. Local communities.
6. Local and international Expert communities / key experts.

Figure 10. Proposed Green Energy Alliance Platform Stakeholders Flow Chart



5. NEXT STEPS

The following broad next steps will need to be taken to establish the Green Energy Alliance

1. Approve the platform concept
2. Establish and approve a business plan
3. Obtain budget as agreed in the business plan
4. Establish the basic organizational structure
5. Procure platform developer
6. Proceed with phase 1, 2 and 3 as outlined in table 9

ANNEX 1: CASE STUDIES

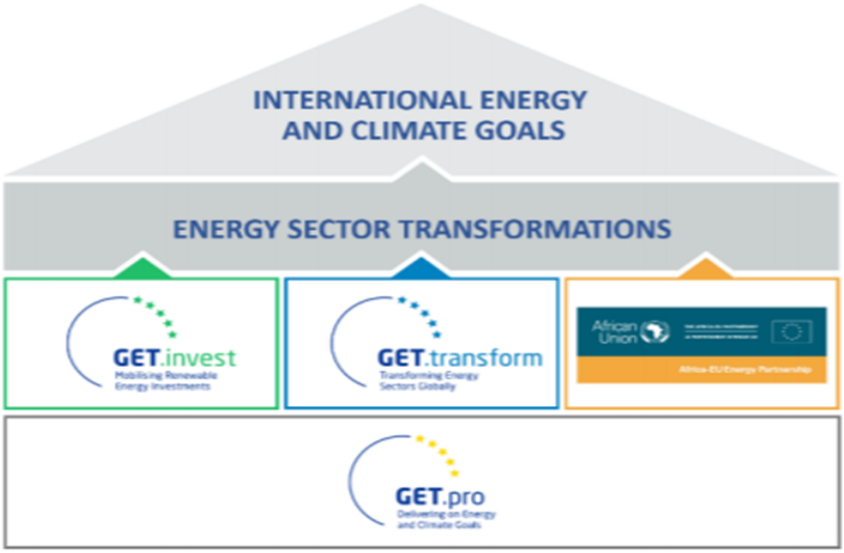
1. Global Energy Transformation (GET.Invest, GET.pro and GET.Transform)

GET is a program based on a multi-donor platform GET.pro that unites European countries in order to scale-up joint action on the climate and energy challenges. The program was founded by the GIZ and is co-funded by the European Union, Germany, Sweden, the Netherlands and Austria. GET operates at a global scale with a particular focus on Africa that is considered a high-impact region.[71]

The GET.pro instruments simultaneously - mobilize private investments in decentralized energy:

- *GET.invest* operates at the private sector level. This part of the program mobilizes private investments in decentral RE by supporting market access and by building a pipeline of bankable investment projects.
    - *Matchmaking sessions* to connect investors, technology providers, project developers, as well as other innovators in the sector.
    - *Finance Catalyst* helps projects achieve readiness for and access to financing. Services include honest-broker advisory support and assistance in preparing key project documentation.
    - *Capacity development and other complementary work* – including trainings, advisory/support to regulatory support.
- *GET.transform* operates at the public sector level and offers comprehensive advisory services to developing and emerging countries to advance their energy sector transformations.
- *GET.pro* provides the management platform for all donors and instruments.by offering:
    - Central coordination and administration functions.
    - Financial management.
    - Robust monitoring and evaluation system.

Figure 10. GET.pro Platform Instruments



[71] https://www.global-energy-transformation.eu/

Centralizing these functions on one platform equipped with specialized personnel, substantially increases efficiency and accountability while allowing the instruments to concentrate on implementation with the advantage of avoiding duplication of administrative resources within each instrument. Funding partners can invest into instruments that help boost their own priorities. The joint management of the platform enables synergies between the different political initiatives and provides a sustained contribution towards a global energy transformation.

Results:

- 600 applications for support received by the GET.invest Finance Catalyst.
- 160 projects and companies selected for support.
- 90+ active clients in the current GET.invest portfolio.
- 33 companies and projects successfully assisted in accessing financing.

Projected estimated impacts (related to the 33 companies and projects linked with financiers):

- 244 MW installed capacity.
- €440 M investment volume.
- 460,000t CO2eq. emission reduction p.a.
- 6.3 M additional end-users with access to clean energy.

2. FIPEE Investment and Matchmaking Platform on Energy and Environment

FIPEE is an online interactive platform that aims to promote investment and trade in sustainable energy and environment technology innovations and projects in Small and Medium-sized Enterprises (SMEs) among six partner countries (Botswana, Cuba, Ethiopia, Kazakhstan, Kenya and Peru) and Italy. The platform is funded by the Italian Ministry for the Environment, Land and Sea and implemented by UNIDO ITPO Italy. Cleantech SMEs will be provided with the opportunity to contribute to the transition to a low-carbon economy and benefit from economic opportunities in the sector.[72]

The Platform Features:

The Marketplace that allows the companies to showcase innovative technologies through the upload of photos, videos and further company material. Project marketplace also enables FIPEE users to offer product or service, look for partnerships and project cooperation, investment opportunities, and specific expertise. Marketplace allows all registered users to browse through the projects and offers.

Matchmaking sessions. The users can participate in B2B sessions directly on this platform. B2B sessions are a great opportunity to engage directly and discuss opportunities for business with other participants

Capacity building. The platform hosts multiple informative conference sessions, talk shows, Q&As sessions.

[72] https://www.unido.it/FIPEE/project.php

3. Cities Investment Facility

CIF is a UN-Habitat's Sustainable Urban Development pioneering investment platform that catalyzes investments from both public and private sectors to mobilize significant capital for SDG compliant municipal and UN-Habitat originated urban development projects in emerging and frontier markets.

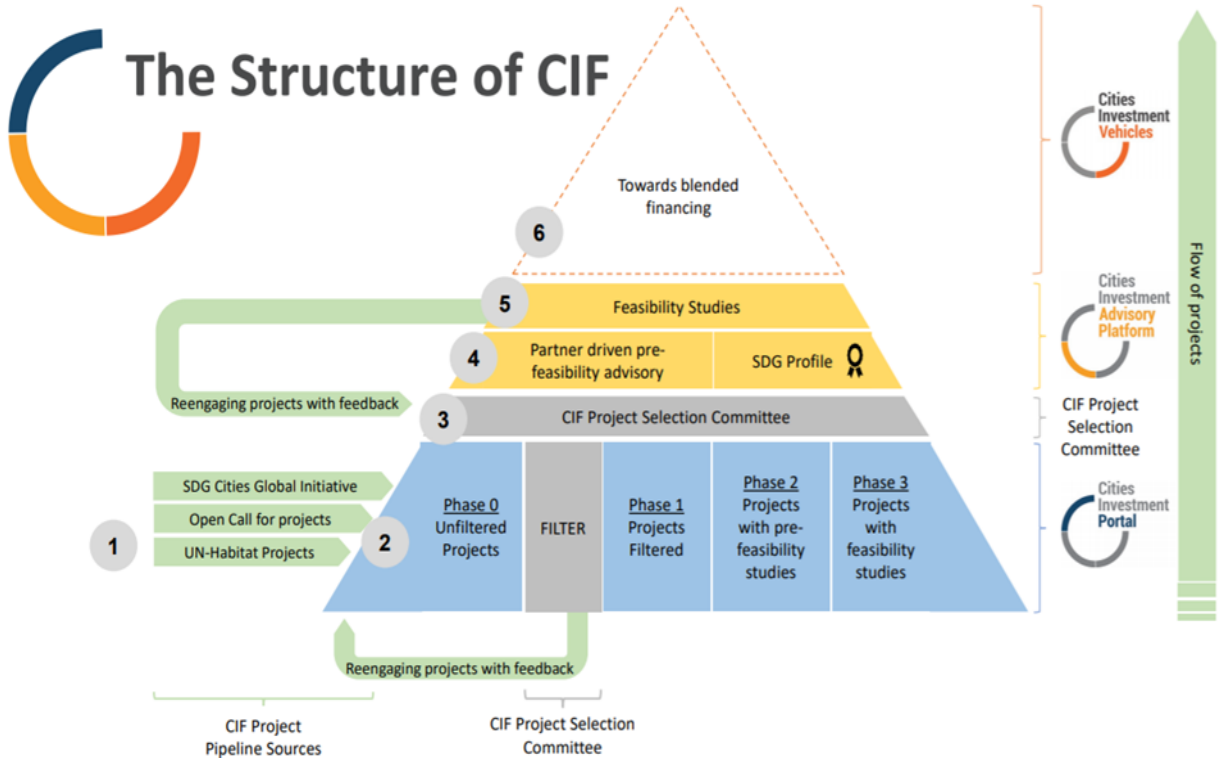
CIF's Pipeline Facility aims to:

- Create a pipeline of bankable projects.
- Conduct project-level SDG impact assessment.
- Performs upstream project preparation.
- Facilitate project–investor matchmaking.

The platform works in the following way:

1) Project developers propose their projects to the Cities Investment Facility through the Cities Investment Portal in conjunction with their local UN-Habitat office or focal point. The local UN-Habitat country office acts as a relationship manager for these projects
2) The projects are assessed against the criteria and ones that match, are further selected to proceed into the Cities Investment Facility.
3) Project's information is shared with SDG assessment and planning teams, as well as the teams that advise on the projects' bankability.
4) Projects are connected with the early-stage investors.

Figure 11. Cities Investment Facility Digital Transformation Platform Instruments



The Cities Investment Portal.[73]

The Cities Investment Portal is an online platform that connects UN-Habitat certified city development projects with the investors seeking to finance projects that are economically, socially, and environmentally sustainable. The portal opens up opportunities for investors and city projects to connect, communicate, and create sustainable cities of the future.

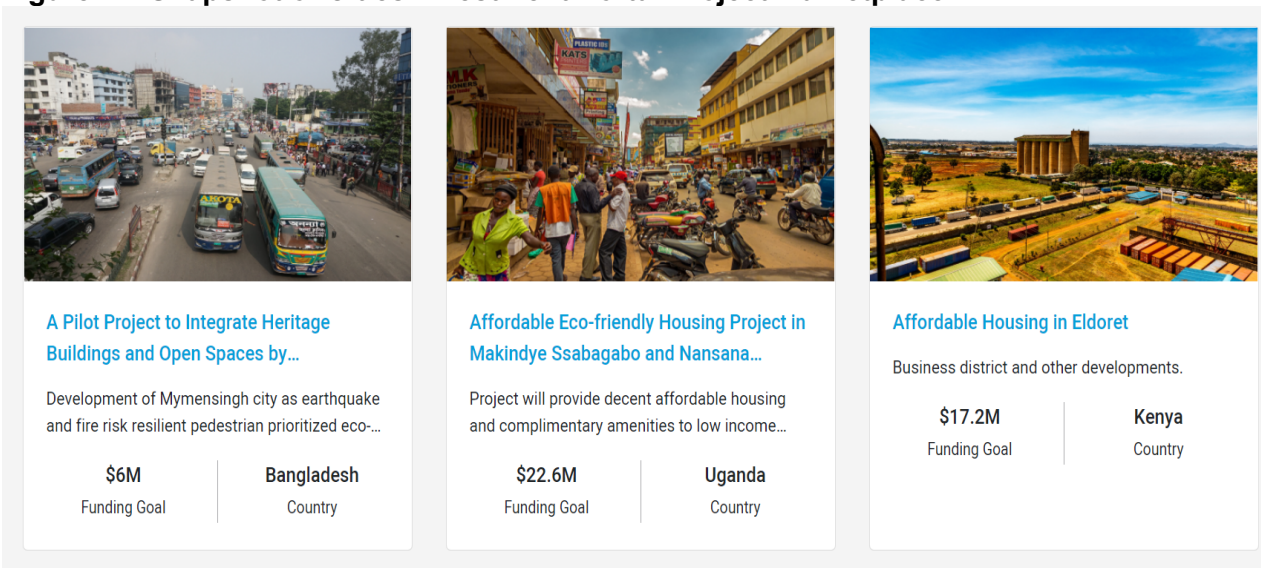
[73] http://citiesinvestmentfacility.org/

The Cities Investment Portal seeks to facilitate the matchmaking between projects and investors in two ways:

1) By offering users access to an interactive database of bankable city and country-level projects, along with potential investors with clear areas of interest, types of investment, and credentials that align with sustainability and inclusion principles.
2) Cities can initiate networking and outreach on planned projects by uploading their package of information, which will be accessible to a global audience of investors that will be linked with the city-based project promoters. The portal will thus bring together a community of interested parties at the ideation stage.

To ensure the quality and feasibility of information, the portal's management team will include experts that will review incoming materials.

Figure 12. Snapshot of Cities Investment Portal Project Marketplace



4. SOOOF. An open B2B Marketplace

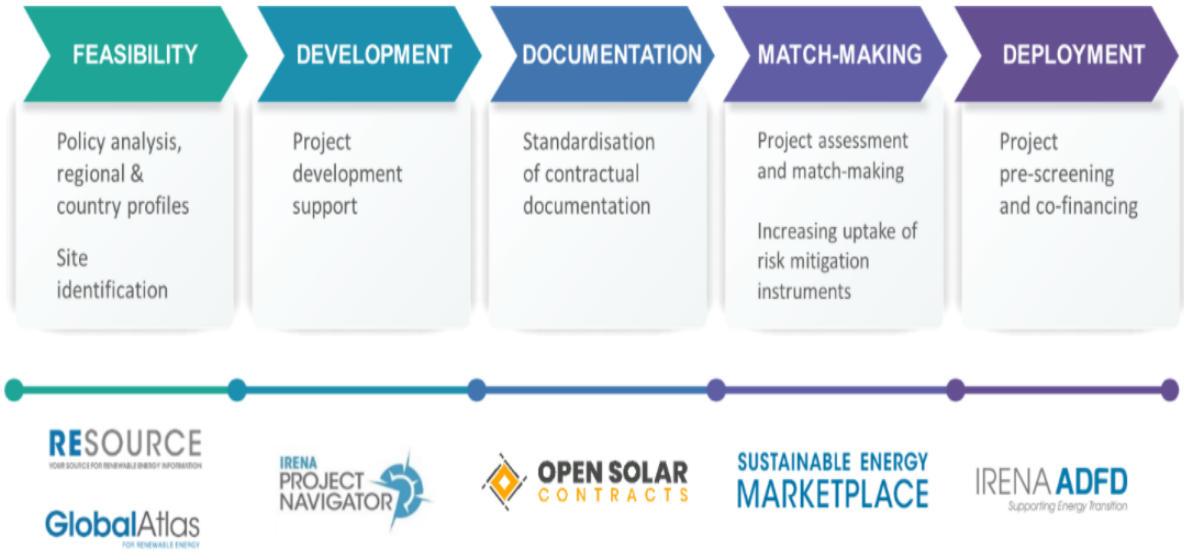
SOOOF is an Open B2B Marketplace that uses a social networking model to connect project developers, businesses and investors. The platform positions itself as anonymous, secure, and free to join.

- *B2B Marketplace*. SOOOF's Marketplace allows to showcase products, services and projects via deals, personalized storefronts, and SOOOF's enhanced advertising channels.
- *Social Media*. SOOOF is an open platform that allows users to interact directly with customers and partners in real-time, including inquiries, quote requests, or request for proposals. Through "Join", "Watch", and "Share' features, customers and partners can follow updates at the product, service, project or storefront level, or participate in the exchange of business intelligence.
- *A B2B Community & Global Projects*. The platform helps investors to access projects around the world, including in the discovery and funding stages, giving potential financier an early competitive advantage to customize the bid.
- *Crowd-Order & Crowd-Sourcing*. The platform allows to buy, sell and fund deals and projects together. SOOOF's B2B social media platform gives the ability to anonymously join other companies in a Crowd-Order deal for specific products, services, or projects. This translates to increase sales volume for the business and preferential pricing. Selling as a group offers companies the chance to take part in larger, more complex opportunities.
- *sooofChannel* is a set of customized channels tailored to the users' needs. A sooofChannel is a community of like-minded buyers, sellers, investors, and project owners collaborating on business. User can list products/services, projects, or procurement needs on one or more sooofChannels and promote their project or company on their own individual digital storefront. The sooofChannel allows focused communication to one's target investors, customers, suppliers and partners.
- *B2B Matching*. The platform B2B Matching allows to collaborate on projects from around the world. Users can suggest business criteria and the platform runs an algorithm to match the user with the right projects. If there is a match, the parties decide if they like to learn more and connect with each other. SOOOF can help promote and facilitate one's project needs through the platform's team's strategic partnerships. Notable projects financed through B2B matchmaking include the South East Asia Clean Technology Economic Zones, retrofitting street lights to solar for a country in the Middle East, infrastructure projects in Eastern Europe, building RE in Africa, North America waste-to-energy plants, or the development of Green Community in the Caribbean.

5. International RE Agency (IRENA) Climate Investment Platform (CIP)

In its pursuit for accelerated development and deployment of RE projects, IRENA has built a project facilitation ecosystem that supports both project developers and investors by matching projects and financing. This ecosystem consists of the set of tools, that specifically target project-level barriers. These interconnected online platforms aim to develop a pipeline of investment-ready projects by providing active full cycle support.

Figure 13. IRENA Project Facilitation Mechanism



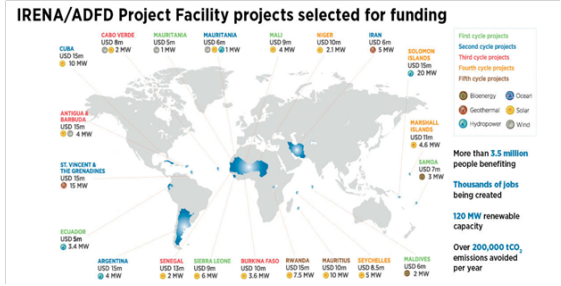
IRENA platform-based solution includes the following tools:

- The IRENA Global Atlas: An online geographic information platform providing resource assessment and mapping data covering solar, wind, bioenergy, geothermal and marine energy.
- IRENA Project Navigator: An online platform providing easily accessible, and practical information, tools and guidance to assist in the development of bankable RE projects.
- Open Solar Contracts: Offers simple and universally-applicable legal agreements that make contracting much faster and less costly to streamline project development and financial processes.
- Sustainable Energy Marketplace/Climate Investment Platform: A virtual marketplace connecting RE project owners, financiers/investors, services providers and technology suppliers.
- IRENA ADFD joint facility: A joint financing facility dedicated to finance RE projects recommended by IRENA in developing countries.

The Summary on each of the instruments is provided in the table below:

Table 10. Summary of Instruments

Tools	Services
	The Global Atlas for RE is an online platform intended to help users - policymakers and investors - to find RE resources maps for locations across the world. The Global Atlas stems from an initiative coordinated by IRENA and aimed at closing the gap between countries that have access to the necessary data and expertise to evaluate the potential for RE deployment in their countries and those that lack these elements. The initiative has brought together more than 50 highly skilled international research institutions to share over 2000 RE maps on this single and consistent platform covering solar, wind, bioenergy, geothermal and marine energy.
	IRENA Project Navigator is an online platform providing easily accessible, and practical information, tools and guidance to assist in the development of bankable RE projects. Project Navigator also enables developers to keep track of their progress, identify gaps, and export their work with dedicated templates for further processing. • Project Development Process guidance helps to address risks and make informed decisions to develop a bankable RE project • Technical Concept Guidelines provides an access to knowledge and best practices covering the lifecycle of a RE projects for onshore wind power, utility-scale solar PVs, small hydropower, woody biomass, mini grids, biothermal and solar home systems. • Tools (financial models, checklists and evaluation forms), Templates and Case Studies section provides materials to support the development of a RE projects.

	• The platform also provides information on investors, including information on multiple fund types, their requirements and contact details among others.
OPEN SOLAR CONTRACTS	International RE Agency (IRENA) and Terrawatt Initiative have teamed up to support the rapid and widespread scale-up of solar energy in line with goals of the Paris Climate Agreement and Sustainable Development Goals. Open Solar Contracts streamlines project development and finance processes by offering simple and universally-applicable legal agreements that make contracting much faster and less costly. • Robust, clear and customizable documents. • Two-year, multi-stakeholder approach, including top-tier law firms. • Simplified and bankable solution to unlock solar potential.
CLIMATE INVESTMENT PLATFORM 	The IRENA Sustainable Energy Marketplace – Climate Investment Platform, is an online platform that aims at scaling up the existing global investment and support the channeling of public and private finance to meet the demand in the market. The virtual marketplace is a relevant channel for financiers to screen a wide variety of RE projects and helps project developers to identify potential stakeholders.
IRENA ADFD PROJECT FACILITY 	A joint financing facility dedicated to finance RE projects recommended by IRENA in developing countries. The International RE Agency (IRENA) and the Abu Dhabi Fund for Development (ADFD) have collaborated in the provision of a joint Project Facility to support replicable, scalable and potentially transformative RE projects in developing countries. ADFD committed US$ 350 million in concessional loans, over seven annual funding cycles that have concluded

	in 2020, to RE projects recommended by IRENA. The IRENA/ADFD Project Facility has resulted in the selection of 32 RE projects, with over US$ 100 million being allocated in the seventh cycle to eight RE projects.

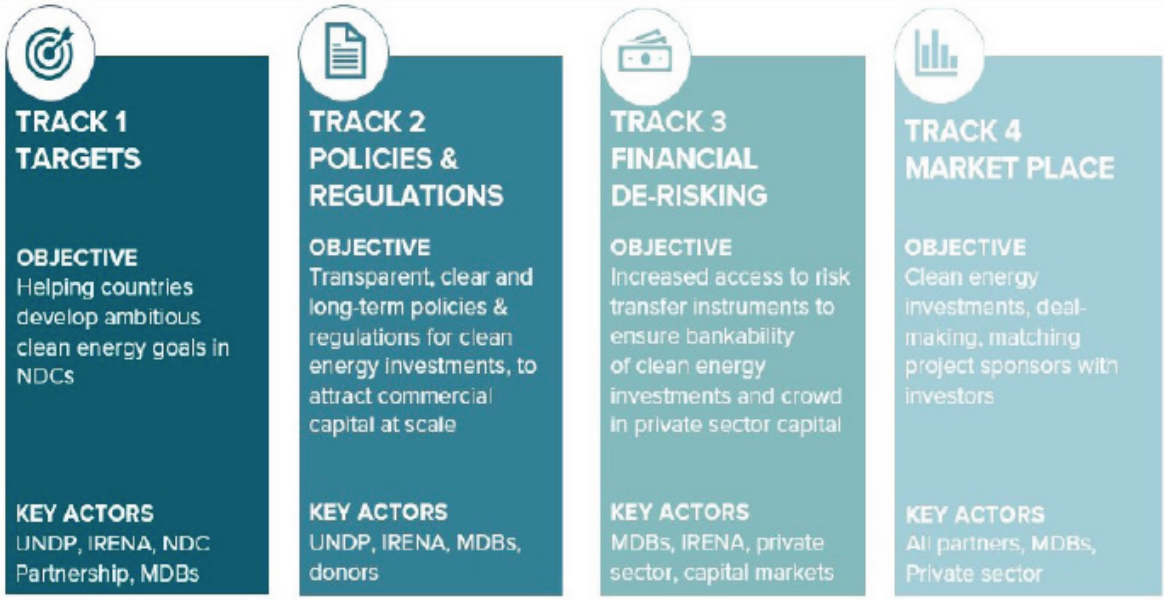
Climate Investment Platform (CIP)

For the purpose of this Assignment, we will provide more detailed description on the CIP, an online platform that serves as a sustainable energy marketplace. The Climate Investment Platform was launched by IRENA, together with SEforAll, the UNDP and in cooperation with the Green Climate Fund. The platform utilizes the joint capabilities, resources and extensive network of the aforementioned organizations to address the existing financing barriers and unlock clean energy investment needs in developing countries, in turn accelerating the much-needed global energy transition. The barriers that CIP aims to tackle by developing tailored solutions with respect to the country specifics, include: limited capacity of local developers to produce investor ready projects, weak investor appetite for early-stage development risk and the absence of enabling policies and regulatory frameworks. The aim of the Platform is to connect projects with available climate capital by working closely with project developers to support project proposals, while facilitating matchmaking between projects and suitable investors under the facility.

The platform has the following objectives:

- To accelerate investments for low-carbon, climate-resilient development. The provision of streamlined support to developing countries and the private sector aims to transform national markets and accelerate investments for an effective energy transition, and to enable the delivery of ambitious NDCs.
- As a market transformation vehicle, the Platform will help raise climate ambition with definition of clear targets and support the realization of the frameworks required to meet those targets.
- As an investment catalyzer, the platform will scale-up energy transition investments through increased access to risk transfer instruments and deal-making by matching relevant market players. The platform will seek to directly mobilize US$ 1 trillion in clean energy investment by 2025.The platform will commit to engage in support for an initial 20 countries in its first year.[74]

The CIP partners support countries with target setting, the establishment of an enabling legal and regulatory environment, and development of risk mitigation measures to encourage capital flows:



[74] https://climateinitiativesplatform.org/index.php/Climate_Investment_Platform

Track 1: Helping countries to raise and specify their energy targets in NDCs.

Track 2: Providing support for well-designed and implemented national clean energy policies and regulations to scale-up private investment.

Track 3: Facilitating access to project preparation funding and de-risking instruments to ensure bankability.

Track 4: To declutter access to climate investment through facilitated deal-making, syndication, and matching of projects and funding.

Together, these four tracks aim to promote a comprehensive framework to deliver system-wide transformation that addresses both mitigation and adaptation.

IRENA's has a central role as a facilitator of this process. The Agency's understanding of the products, risk appetite, geographic scope and eligibility criteria of the partners, IRENA works to steer projects towards partners whose criteria align with the features of the project – saving both time, and money. Supporting the development of bankable projects also transfers important skills to developers in countries across the global that will have a lasting effect on their ability to build more investor ready project proposals. Similarly, the large and growing pool of partners convened under the platform has access to a consolidated and streamlined pipeline of financing opportunities in developing countries – many of whom are supported by IRENA at policy as well as risk mitigation level. To date, IRENA's CIP efforts have resulted in more than 180 project financing applications and more than 50 active partner pledges of support.

Financing and Partnerships

The CIP works with governments at all levels, financial institutions, project developers and the private sector to increase financing for the energy transition and clean energy access in order to help developing countries reach ambitious climate goals. Multilateral, bilateral and local financial institutions and development organizations together with private companies and investors that are prepared to provide financial resources, technical assistance and other support to the realization of projects, are invited to become partners of the CIP.

CIP Investment Forum

Regional Investment Forums are an important part of CIP investment attraction activities. Series of regional Investment Forums are designed to connect registered project developers and governments, with the financial partners to identify areas of cooperation. The Investment Forums will be organized around 14 regional clusters allowing activities to be adjusted to the specific needs of countries. The clusters are built around five sub-regions in Africa, four in Asia and two in Latin America together with specific clusters for the Caribbean, Pacific islands and Southeast Europe.

Figure 14. The CIP Services Snapshot