Pakistan Renewable Energy Coalition

The Chairman
National Electric Power Regulatory Authority
NEPRA Tower, Ataturk Avenue (East)
G-5/1, Islamabad

Dated: 14th June 2021

Subject: Comments on the IGCEP 2030 by Pakistan Renewable Energy Coalition

Dear Sir/Madam:

Attached herewith, are comments from the Pakistan Renewable Energy Coalition, in response to the IGCEP 2021 issued by NTDC for review and approval by NEPRA and the NEPRA Public Hearing Notice, inviting comments in writing and participation from all stakeholders.
The RE Coalition is a group of allied organizations and individuals working to assist in accelerating the growth of renewable energy in Pakistan's energy mix and foster implementation of goals set within the Alternate and Renewable Energy Policy 2019, Paris Climate Agreement and Nationally Determined Contributions (NDCs) of Pakistan.
We hope that these comments and suggestions are taken up by NEPRA in the public hearing to be held on 15.5.2021 and are incorporated in any further revisions or iterations of the IGCEP 2030.

The following organizations as a part of the RE coalition endorse the comments that follow this letter.

1	Rural Development Policy Institute	
2	World Wide Fund for Nature-Pakistan	
3	Sustainable Development Policy Institute	
4	Indus Consortium	
5	World Wind Energy Association	
6	Health Education and Life Protection (HELP) Foundation	

7	Initiative for Participatory Development through Peace (IPDP)	
8	Social Youth Concil of Patriots (Sycop)	
9	Participatory Welfare Services (PWS)	
10	Tanzeem Tahafuz-e-Maholiat, Enviornmental Proteciton Organisation (EPO)	
11	Al- Rehmat Welfare Sociecty (ARWS)	
12	Social Welfare and Community Development Society (SWCDS)	
13	Cholistan Development Council (CDC)	
14	Good Thinker Organization (GTO)	
15	Saiban Kissan Society (SKS)	
16	Village Shadabad Organization (VSO)	
17	National Disability & Development Forum (NDF)	
18	Laar Humanitarian Development Program (LHDP)	
19	Advocacy, Research, Training and Services (ARTS) Foundation	
20	Sustainable Development Foundation (SDF)	
21	National Advocacy for Rights of Innocent (NARI) Foundation	
22	Village Development Organization (VDO)	

23	Marvi Rural Development Organization (MRDO)	
24	Sindh Community Foundation (SCF)	
25	Sukaar Foundation	

Best Regards,
Pakistan Renewable Energy Coalition

Comments on the IGCEP 2030
Submitted by the Renewable Energy Coalition
Dated: 14th June 2021

The latest version of the IGCEP has some improvements over the last one when it comes to demand forecasting. A base case demand of 34,377 MW has been projected for this version while the previous version had a demand forecast of 43,820 MW. An hourly demand forecast has also been developed for the first time to allow for the incorporation of VRE, which is also a good practice and would help factor in the real time availability of variable renewable energy.
That being said, the model deployed has various constraints and limitations which prevent it from optimizing renewable energy to its maximum potential.

1. **Changed definition for "Committed" Projects results in reduction of capacity available for competition from different generation technologies**

The new IGCEP has a changed definition of committed projects. In IGCEP 2047 the following statement has been used to describe a committed project:

"A project is considered as committed one provided the project fulfills at least one of the following pre-requisites:
• Already under construction;
• Has achieved financial close;
• Has strategic importance i.e. China-Pakistan Economic Corridor (CPEC) project;
• A G2G project"

However, in the newer version, the definition of committed projects has changed resulting in the over-prioritization of hydropower and locking in of unsustainable power generation sources such as RLNG and imported coal.
IGCEP 2030 describes a committed project as:

"A project will be input as 'committed' and its capital cost or CAPEX will be not entered in the model, provided the project fulfills at least one of the following pre-requisites:

- *Has obtained LOS as of December 2020 for private sector projects. For Federal Government Public Sector projects, the PC-I has been approved and funding secured (As of March 2021). However, M/s Jamshoro Unit-2 & M/s Chashma-5 nuclear power project shall be modelled as candidate projects to be evaluated under least cost principle.*

- *G2G project: Power Generation projects which are listed under Federal Government's international (bilateral or multilateral) commitments, if project / financing agreements signed.*
- *Where timelines of completion of a project under G2G are not firmed up yet. The tool shall determine the timeline by which such a project must come online based on its tariff optimization with respect to other available options.*
- *RE plants (Wind, Solar, Bagasse) enlisted in Category I & II of CCoE's decision dated 4th April 2019.*
- *RE on-grid power projects in balance target block share as stipulated in the ARE Policy 2019 i.e. 20% by year 2025 and 30% by year 2030 (including net-metering), candidate block will be considered on respective wind/solar/hybrid technologies from the year 2023-24 onwards on least cost principle."*

Due to the above mentioned criterion, the following projects have been taken as committed while they were previously categorized as a candidate project:

Name of Project	Status in IGCEP 2030	Status in IGCEP 2047	Fuel Type	Implementing Agency	Capacity (MW)	Current Status	Expected Schedule of Commissioning according to IGCEP 2030	Expected Schedule of Commissioning according to IGCEP 2047
Diamer Bhasha	Committed	Candidate	Hydro	WAPDA	4,500	PC-I Approved. & Financing Secured.	Feb-29	2045
Balakot	Committed	Candidate	Hydro	PEDO	300	PC-I Approved. & Financing Secured.	Mar-27	2047
Kathai-II	Committed	Candidate	Hydro	PPIB	8	LOS (Issued)	Dec-24	2044
Chapari Charkhel	Committed	Candidate	Hydro	PEDO	10.56	PC-I Approved. & Financing Secured.	Jun-24	2046
Jagran-II	Committed	Didn't exist in IGCEP 2047	Hydro	AJK	48	PC-I Approved. & Financing	May-22	

						Secured.		
Ranolia	Committed	Plant already existed but was not connected to the system	Hydro	PEDO	17	PC-I Approved. & Financing Secured.	Jul-21	

This has resulted in hydro taking up the bulk of the capacity that the model had been given to prioritize least cost generation on. The model also seems to ignore construction and schedule delays which are often associated large hydro-power projects. As can be seen in the table above, power plants which were projected to come online by 2044-2047 are now coming online by 2029. A timeline that is too optimistic. If given to compete on realistic grounds, the capacity taken up by these power plants could've easily been taken over by VRE at significantly lower costs.

In addition, the cumulative capacity of the committed projects is so huge that the model is left with very little room to play with the variety of generation options available to it. Of the 25,263 MW of capacity that is to be added to the system by 2030, almost 88% of the capacity is already fixed. This negates the true purpose of the modelling exercise which is to make different power generation technologies compete with each other on a least-cost basis.

2. **ARE Policy ignored:**

The ARE Policy also set's targets of a 20% penetration of renewable energy sources in the national energy mix by 2025 and a 30% penetration by 2030. This CCI approved policy, clearly highlights Pakistan's ambition and resolves to increase its RE share (not including Hydro) to the goals set above. The PM of Pakistan in various international forums has highlighted the same, where Wind and Solar are expected to be scaled up to 30% of the energy mix by 2030. The Chairman of NEPRA, as early as last week reiterated the same goals while speaking on an online webinar on Pakistan's energy transition[1]. Wind and Solar featured heavily in the previous iteration of IGCEP as well, with almost 20 GW additions by 2030, which attracted massive international investor interest and brought Pakistan to the table of future potential markets and contesting ground for Renewable Energy Initiatives.

Unfortunately, with the current planning document, all of this goodwill and international acclaim is threatened to be disregarded with volumes of RE massively reduced and the share of VRE, as defined in the ARE Policy document being limited to around 10 to 12%. By limiting volumes of Wind and Solar, potential investments and support are threatened, while the credibility of the government and its associated policies are brought into disregard.
The IGCEP 2030 clearly state on page 4 of the document that,
"…..the IGCEP is meant to be considered as an indicative generation expansion plan, since it will be updated on yearly basis to account for any change in generation technologies trends, ***governmental policies,*** *progress/priorities of different project execution agencies and project sponsors in developing the generation facilities, etc."*

Unfortunately, by ignoring the ARE Policy, this iteration is clearly disregarding its mandate by failing to incorporate governmental policies as highlighted in the above paragraph in its energy planning activity.

The World Bank has conducted two recent studies on Variable Renewable Energy (Locational Study and Integration and Planning study), which had "all key federal agencies involved in power system planning, led by the National Transmission & Despatch Company (NTDC) as the primary technical counterpart, with the findings reported to the Ministry of Energy (Power Division)". These reports that were greatly supported by all relevant national stakeholders were considered as key studies to act as the basis of future investments in Renewable Energy with integrated planning of transmission and dispatch.

The report presents the following key observations under a least cost scenario development for Pakistan:

■Achieving a least cost electricity mix in Pakistan would require a rapid expansion of VRE, reaching
at least 20% of installed capacity by 2025, and at least 30% by 2030.

■ An analysis carried out using the PLEXOS1 modeling tool and based on the latest official power
system data reveals that at least 6,700 MW of wind and 17,500 MW of solar photovoltaics (PV) should be added by 2030 to achieve the government targets in a least cost way.

■ The optimum electricity mix would require even greater additions: a total of 27,400 MW of VRE by
2030. If this were achieved, the VRE share would represent 30–33% of a total installed capacity of
85,000 to 88,000 MW by 2030.

This clearly highlights that by using the same planning software as the one utilized by NTDC for the IGCEP, and under a least cost scenario modeling, Wind and Solar could have significant shares in the energy mix. Unfortunately, the IGCEP 2030, by building out committed projects that would go idle or run at inefficient capacities, is ignoring the least cost methodology and a secure energy future for Pakistan.

Another aspect that needs to be highlighted is that by massively reducing the volume of wind and Solar in the energy mix by 2030, any chance or opportunity for the development of a domestic market for Solar Panels and/or Wind turbines as proposed by the IGCEP 2030 in Section 7 and the summary, goes out of the window. India is already a great example of increasing RE volumes leading to local market development of panels resulting in an industry creation for the same. Under the current IGCEP Planning however, Pakistan stands to lose out on this opportunity.

3. **Distributed Generation not included in IGCEP**

Sources of Distributed Generation such as Rooftop solar in Pakistan has promising potential in terms of solar radiation, architectural landscape, suitable demographic and socio-economic conditions in terms of a large population in need of power grid back-up on a daily basis. With major technological breakthroughs, today it has also broken through the cost barrier—currently emerging as the most economically efficient resource of power procurement in the country. It is very important to understand here that for Pakistan, net-metering offers a major opportunity to

devolve capacity payment to end-users and reduce the financial liability of RE expansion —a much overlooked discourse and important dimension in the wake of the country's ballooning capacity payment.

A quick glance at its growth trendline shows that recently it is picking growth speedily— overall crossing 160 MW in March 2020 and registering more than 40 MW of growth in the past three months alone. IGCEP (vide section 7.3) also acknowledges that "a major share of future power generation will come from small, distributed and dispersed technologies'. The plan needs to account for DG both in their load forecast analysis, and generation capacity expansion.

4. **Renewable energy ignored as the cheapest source of energy**

This iteration of the IGCEP states on page 1 that "The goal of this plan is to improve decision-making under different long-term uncertainties while assuring a robust generation expansion plan with least cost and minimum risk."

The IGCEP does not appear to achieve this goal. By significantly reducing emphasis on wind and solar the opportunity to provide a least-cost plan is lost. The IGCEP makes clear on page 22 that "Renewable energy, including wind and solar, are quickly becoming cheapest forms of new electricity generation across the globe" and that the "Trend of cost reduction for the renewable technology is set to continue in the future and will inevitably reduce the cost burdens, reliance on increasingly expensive fuels and hence lowering the overall generation cost."

Given Pakistan's circular debt situation and the pressure to address the crisis with significant power tariff increases, it would make sense to make more commitment to wind and solar - the cheapest sources of new power generation in Pakistan. Instead, this new version of the IGCEP plans for around 17,000MW less solar and wind capacity in 2030, than the 2020 version. This plan has Pakistan going in the opposite direction to the rest of the world where solar and wind installations are accelerating.

5. **Distance of plants from load centers requiring Transmission upgrades**

Pakistan has been heavily investing in Transmission networks in its southern regions where the Matiari-Lahore transmission project (878km-long, 660kV high voltage direct current (HVDC) transmission line) as part of the CPEC is one of the biggest investments lately on the transmission front. In this iteration of the IGCEP however, a shift of energy plants from load centers in South

towards the KPK is observed, with a particular focus on hydel projects. By choosing to supply more than half of the nation's electricity demand through hydel power located in the northern region of the country, long transmission lines and networks will need to be constructed to transport this power to domestic and industrial load centers in Punjab and Sindh. Since this version of the IGCEP also lacks a TSEP component, it remains pertinent to understand the high costs involved in the undertaking of such a large scale activity for transmission and the associated challenges including line losses, capacity payments, upfront capital and land requirements.

6. Reserve Requirements

> Furthermore, the GoP through ARE Policy 2019 aims to include at least 20% and 30% renewable energy generation by capacity by the year 2025 and 2030, respectively. However, these two energy resources due to their intermittency cannot be considered as a firm capacity, at all points in time or all around the clock; therefore, appropriate amount of backup generation is also required to provide for reserve requirements of the system. Based on the available wind mast data, plant factor of 42.5% have been assumed for candidate wind power projects and for the candidate solar power projects a plant factor of 23% has been assumed.

According to the IGCEP (*vide section 3.6.5*), *a*lthough ARE Policy 2019 aims to include at least 30% of renewable energy generation capacity mix by the year 2030, yet because these two energy resources require appropriate amount of backup generation to provide for reserve requirements of the system, their targets have been revised down. This argument of '*additional reserve requirements*'—is not only marred by misconceptions and misinformation but also contradicts the findings of recent World Bank study (2020) which otherwise claimed that achieving least cost electricity mix in Pakistan would require a rapid expansion of VRE'.

VRE has become currently the fastest-growing sources of electricity globally best captured by innovative and cost-efficient integration strategies. Several factors could contribute to its least cost deployment. This includes system friendly VRE deployment, improved system and market operation, flexible operational resources, tariff design, balanced induction over a well-distributed time span etc. So, costs depend on how well different components of the system fit together. For instance, an assessment of the revised IEA Flexibility Assessment Tool (FAST2) showed that "annual VRE shares of 25% to 40% can be achieved from a technical perspective, assuming current levels of system flexibility."

The greater cost for VRE uptake is incurred by those countries who have stagnant power demand as they simultaneously have to manage the costs associated with scaling down the old system. But for a country like Pakistan characterized by a "dynamic" power system with growing electricity demand and enormous solar and wind resources, it can facilitate system

transformation without any economic stress on incumbents. VRE offers several other advantages to the power sector too. For instance, the country has unique natural flexibility for solar PV. The sunny periods in the country coincide with high electricity demand load profiles, and so solar PV generation could be both conveniently integrated and displace fuel-based thermal plants production—contributing to enormous variable cost savings. Based on a thorough assessment of flexibility options carried out in the World Commissioned study *VRE Integration and planning Study* (2020), it visualizes how VRE generation could cover essential parts of the peak load supply both during summers and winters. Further, where the argument on reserve costs have been sufficiently assumed by the same study (also carried out for a much higher volume of VRE scenario at the time), it affirms that "transitioning to a system based on hydropower and VRE could substantially lower costs, improve energy security, and reduce GHG emissions—decreasing overall costs by more than $5 billion". For this to happen, it also proposes adoption of a high accuracy central forecasting system; changes to operational procedures and revisions in contractually agreed ramp rates of existing and committed plants; optimal planning of VRE expansion; and competitive electricity market which allow for enhanced flexibility in the system.

It is the interaction of VRE and other system components that determine the additional costs for its deployment. If solar and wind uptake are planned optimally from the very start, a flexible system can be built, and the cost of transforming the system could be reduced substantially**.**

In a nutshell, Pakistan has sufficient flexible generation to adequately balance higher shares of VRE without building additional reserves. The new paradigm for power sectors therefore is to prudently plan VRE expansion, and system-wide transformation to harness *Flexibility*. All that is needed is a coordinated transformation of the system as a whole. Also based on the unique pro VRE characteristics that Pakistan enjoys, the net economic benefits for the country could be substantially higher than other regions. Finally, new alternatives solutions are emerging such as green hydrogen and cost-effective storages, which overtime will enable 100% RE transition. We need to steer the power sector in the right direction from now, so as to reap maximum benefits of these ongoing developments.

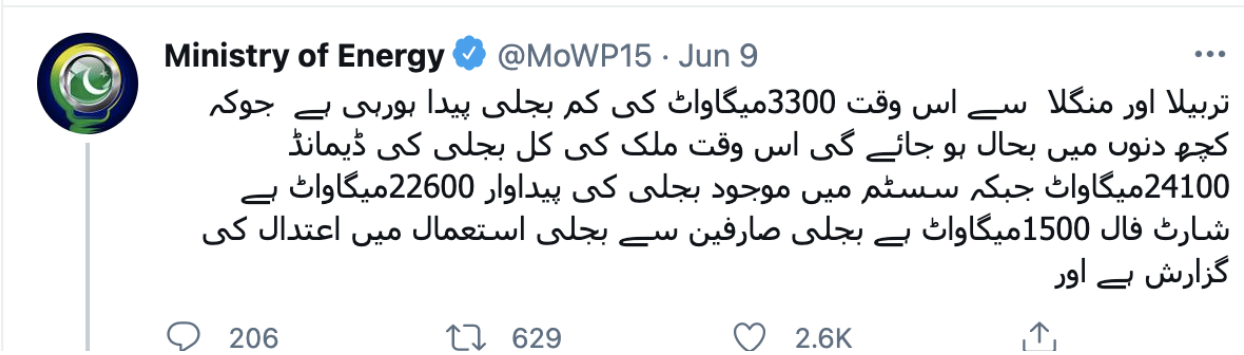
7. Ambitious hydro build-out and no back-up plan

The revised version of IGCEP has increased ambition on hydro power where the plan envisages addition of around 23 GW of installed capacity by 2030. However, no 'risk accounting' or 'alternative-case scenario' has been built to accommodate for any gaps/delays in case of unfulfillment of these optimistic assumptions. Against these challenges, IGCEP needs to be very

realistic about implementation periods or doing at least additional scenarios to account for the stated risks.

This being stated, increased ambition for hydro presents great opportunity for VRE, countering the argument on intermittency challenges of solar and wind. Hydro power is one of the most flexible operational reserves which has the ability to buffer intermittent renewable generation and increase the system-wide flexibility. An ideal scenario in the context therefore would be to revise back the VRE targets upward since the integration of *VRE-Hydropower* will both enable an economically robust dispatch, while also accommodating for any unanticipated delays/ lags in hydropower uptake via "insured" VRE induction. VRE could accommodate for risks/delays associated with the ambitious hydro build-out plan

Another issue that needs to be taken on board with a hydro buildout is the seasonality of hydel power. Even as early as last week, insufficient supply from Tarbela and Mangla Dams due to lower water availability has resulted in country wide load shedding and power outages. With Pakistan's demand peaking in summer months, coupled with the country's increasing vulnerability to changing weather and climate patterns, caution needs to be exercised by the planners when putting all eggs in one basket.



8. **Stranded Assets (Coal/ RLNG)**

The new IGCEP envisages an addition of 2970 MW of local coal, 960 MW of imported coal and 1120 MW of RLNG by 2030 as committed power plants. The imported coal fired generation that already exists in the system has a minimum dispatch factor of 50% incorporated into their power purchase agreements on a 'take or pay' basis, while the three large RLNG power plants at Haveli Bahadur Shah, Bhikki and Balloki have a 66% minimum off-take until 2022.

Despite these pre-conditions these RLNG power plants can be seen to have very low utilization rates, which decrease to zero percent in just a few years according to the generation model.

#	Plant Name	Fuel Type	2021	22	23	24	25	26	27	28	29	2030
			(%)									
1	Engro	Gas	79.68	57.24	50.66	50.51	50.66	50.63	50.64	50.51	50.64	50.64
2	Foundation	Gas	77.47	70.90	50.54	50.39	50.54	50.51	50.52	50.40	50.53	50.52
3	Guddu-I U(11-13)	Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Guddu-II U(5-10)	Gas	26.63	20.69	4.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Guddu-V (747)	Gas	68.87	65.09	33.96	23.79	16.75	8.46	9.05	12.44	12.20	0.83
7	Liberty	Gas	46.12	44.01	38.11	38.00	38.16	38.12	37.65	0.00	0.00	0.00
8	Uch	Gas	68.29	64.59	41.02	35.22	33.03	33.03	33.03	32.94	33.06	33.06
9	Uch-II	Gas	81.44	59.62	49.48	49.43	49.52	49.54	49.46	49.31	49.51	49.65
10	KAPCO 1	RFO	15.76	14.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	KAPCO 2	RFO	7.71	9.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	KAPCO 3	RFO	1.64	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Balloki	RLNG	65.68	38.73	4.98	1.10	0.00	0.00	0.00	0.00	0.00	0.00
14	Bhikki	RLNG	65.67	25.91	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	FKPCL	RLNG	3.69	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	GTPS Block 4 U(5-9)	RLNG	3.97	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Halmore	RLNG	20.61	12.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Haveli	RLNG	65.66	49.35	12.73	6.35	0.29	0.15	0.25	0.39	0.17	0.00

The same applies to other Natural gas/ RLNG and RFO plants which can be seen contributing minimally to the generation mix proposed by the IGCEP 2030 model.

This points to the glaring fact that RLNG and RFO plants are at a great risk of becoming stranded assets, due to increasing economic inviability over the years.
From the capacity factors presented in the table, it is visible that RLNG and Imported Coal plants with guaranteed offtakes are not utilized beyond their guarantees and in fact in some cases perform even below the minimum off-take threshold, despite the 'take-or-pay' arrangement.

With such small utilization rates predicted in the future, the government should be wary of bringing on large scaled investments in RLNG, such as the Trimmu RLNG power plant.

The ARE Policy also allows for displacement of fossil fuel based generation by Renewable energy under a set criterion:

"AREPs' induction in the system will also be driven by the objective of displacement of more expensive electricity of thermal plants where such displacement enables lowering the average system generation cost, as determined by the IGCEP outputs".

The AREPs shall be added:
where there is a demonstrable lowering of the average basket cost of generation for the system where they rank higher in merit order dispatch over the to-be-displaced thermal plants

With wind and solar tariffs hitting as low as 3 cents/KWH, this is a reality and hence should be factored as such in power generation planning too. It is advised that the model be run with this particular condition set as inputs. The existing outputs of the model with stranded and under-utilized fossil fuel based power plants and only RE candidate additions, points towards feasibility of displacement, as indicated in the ARE Policy of the government of Pakistan.

9. Assumptions on cost of Local Coal

The costing methodology employed by the model, does not take into account upfront capital costs for committed projects, so no conclusions can be drawn about why a certain generation technology is being prioritized over the other. Nonetheless, some discrepancies were still observed in the costing data being used for local coal in the report.
From fuel adjustment tariff documents, it can be seen that the fuel cost of Thar coal being used at Engro Thar Coal Power Plant is close to USD 70/ton. This is also reflected in the IGCEP report itself where in Table 5-4 the fixed O&M costs of Engro Thar Coal are seen to be higher than imported coal, owing to a fixed fuel cost component.

Table 5-4: Performance Characteristics of Generic Thermal Power Plants

	Performance Characteristics	Imported Coal Fired Steam	Coal Fired Steam Thar	Combined Cycle on RLNG	Combustion Turbine on RLNG	Nuclear
		660 MW	660 MW	1,263 MW	400 MW	1,100 MW
A	Net Capacity (MW)	625	607	1,243	396	1,018
B	Minimum Load (%)	50	54	40	50	81
	Technical Parameters					
C	Heat Rate at Maximum Load	9.23	9.23	5.88	9.464	9.73
D	Scheduled Outage (d/year)	36	36	36	30	40
E	Forced Outage (Hours)	594 (6.78%)	596 (6.8%)	350 (4%)	438 (5%)	87.6 (1%)
F	Economic Life (years)	30	30	30	30	60
	O & M Cost					
G	Fixed ($/kW/year)	24.56	24.76 + 314.8*	12.94	12.94	43
	Variable ($/MWh)	3.07	5.61	2.98	2.98	0

*314.8 is the Fixed Fuel Cost Component (FCC) of Engro Thar Coal as of December 2020
The economic parameters of thermal candidate plants are highlighted in the Table 5-5.

However, this factor is not taken into account when accounting for the cost of candidate power plants based on local coal. This could partially be responsible for high utilization rates for local coal in the generation mix (All local coal power plants have high utilization rates (>65%) till 2030) and mean that the true costs of generation from local coal are not being accounted for leading to false prioritization in the merit order

#	Plant Name	Fuel	Fixed O&M	Variable O&M	Fuel Cost	Heat Rate	FLD Cost
			($/KW/Year)	($/MWh)	($/GJ)	(GJ/MWh)	($/MWh)
44	Rousch	RLNG	21.6	2.78	7.27	8.84	67.03
45	Saba	RFO	21.6	1.7	8.71	9.69	86.14
46	Sahiwal Coal	Imp.Coal	24.56	1.15	4.63	8.92	42.41
47	Saif	RLNG	19.91	3.77	8.05	7.25	62.14
48	Saphire	RLNG	19.18	3.73	8.05	7.24	62.06
49	Uch	Gas	33.86	2.37	3.72	10.86	42.76
50	Uch-II	Gas	25.38	2.14	5.37	8.21	46.23
Committed Power Plants							
51	Gwadar	Imp.Coal	33.27	1.13	2.99	9.66	30.07
52	Jamshoro Coal U-I	Imp.Coal	4.15	2.44	4.35	8.71	40.28
53	K-3	Uranium	35	0	0.55	9.73	5.35
54	Lucky	Local Coal	25.13	3.03	2.59	9.23	26.93
55	Siddiqsons	Local Coal	24.76	5.61	1.67	9.23	20.98
56	Thal Nova	Local Coal	26.88	5.92	1.67	9.73	22.12
57	Thar TEL	Local Coal	26.88	5.92	1.67	9.73	22.12
58	Thar-I (Shanghai Electric)	Local Coal	25.1	5.92	1.67	9.23	21.29
59	Trimmu	RLNG	12.94	2.98	7.27	5.89	45.77
Candidate Power Plants							
60	C-5	Uranium	43	0	0.49	9.73	4.77
61	Hybrid Muzaffargarh	RLNG	16.42	2.08	5.55	6.00	35.35
62	Jamshoro Coal Unit 2	Imp.Coal	4.15	2.44	4.35	8.71	40.28
63	K-4	Uranium	43	0	0.49	9.73	4.77
64	K-5	Uranium	43	0	0.49	9.73	4.77
65	KAPCO Coal	Imp.Coal	28.36	1.29	2.79	9.23	27.08
66	M-1	Uranium	43	0	0.49	9.73	4.77
67	M-2	Uranium	43	0	0.49	9.73	4.77
68	New_CCGT	RLNG	12.94	2.98	7.27	5.89	45.77
69	New_Imp.Coal	Imp.Coal	24.56	3.07	2.92	9.23	30.04
70	New_Local_Coal	Local Coal	24.76	5.61	1.67	9.23	20.98
71	New_Nuclear	Uranium	43	0	0.49	9.73	4.77

10. PPAs of New RLNG and Imp. Coal Plants:

Another challenge with these stranded and underutilized assets will be the motivation of investors for future energy investments in Pakistan. New and upcoming plants for RLNG and Imported Coal, if brought online without guaranteed takeoffs and/or capacity payments will not be utilized by the energy market as predicted by the model. Conversely, if some form of guarantees are provided to these plants, it would result in locking in further capacity, resulting in ballooning capacity payments, expensive basket price of electricity and a further dent to the already minimal renewable energy capacity in the energy mix. The suggested course of action remains opting out of these unfeasible projects and plans, and investing in alternatives with greater output and cheaper energy over the coming years.

11. Natural Gas supply moratorium to Captive Power Plants:

In a move to counter the decreasing national reserves of natural gas in Pakistan, the Cabinet Committee on Energy (CCOE) has placed a moratorium on supply of gas to industrial units for self-generation of electricity.

To counter the massive seasonal gas sector shortages, this move is expected to add around 3 to 4 GW of load to the power grid in the coming years, which is intended to reduce the average cost of power as well as the rising circular debt, in tandem with conserving the natural gas supplies.

A total of 1,121 Captive generation power plants with gas/RLNG consumption requirements of around 415 mmcfd were found and the moratorium was put in place with applicability from the first of February for the general industry and from the first of March for the export oriented industry. While implementation of this moratorium is still in progress, it's inevitable that loads will be shifted to the national grid, in order to conserve gas for the domestic sector.

By shifting these industries with Captive Power Plants to the national grid, electricity demand is expected to rise by 3 to 4 GW, as per government estimates. With the government pursuant of a policy of conserving gas supplies by moving away from gas based captive power plants, the IGCEP 2030 fails to incorporate the implications of the same in its planning.

Conclusion

In light of these comments, we request that clarity be provided about the costing methodology put in place for selection of candidate power plants and the rationale behind converting the above mentioned candidate hydro power plants to committed power projects this year.

The blatant disregard of the targets set forth by the ARE 2019 policy needs to be set right too. While the ARE policy sets a clear target of an integration of 30% renewables into Pakistan's generation mix by 2030, the IGCEP proposes only 10% in its outcome. We want the document to be thoroughly revised keeping in mind these targets so that renewable energy can have its fair share of representation in the generation mix as mandated by policy. We also encourage the government and the ministry of energy to rethink its decision about bringing on more imported/local coal fired and RLNG based power generation given the extremely low utilization rates predicted by the IGCEP 2030 models. Continuing with business as usual as planned could very well lead to a large amount of stranded assets and the burden of capacity payments as plants sit idle, given their economic infeasibility. Careful consideration must also be given to the geographical location of the projects being proposed. Concentrating too many projects in a single region could lead to not only transmission constraints but could also cause political rifts between the provinces.