

ALTERNATIVE LAW COLLECTIVE

Main Office: Suit No. 1, 3rd Floor, Ghazi Plaza, 2 Mozang Road, Lahore.

Regional Office: [Islamabad] 19-B, Saeed Plaza, Blue Area, Islamabad.

E-Mail: syed.ghazefur@gmail.com

Contact Number: 092 - 308-6124105

14th of June, 2021

Registrar NEPRA

NEPRA Tower, Attaturk Avenue (East),
Sector G-5/1, Islamabad.

Subject: Comments on the Indicative Generation Capacity Expansion Plan (IGCEP) 2021-2030.

Dear Sir,

1. The following comments are being submitted by the Alternative Law Collective (ALC) with reference to the Notice for submitting Comments in the matter of Indicative Generation Capacity Expansion Plan, 2021-2030 ('IGCEP') invited by your respected Office through advertisement on your website.

2. Alternative Law Collective is a group of lawyers and academics who specialize in different areas of the law but work collectively for causes having social impact. The undersigned counsels engaged with ALC are submitting these comments as concerned citizens of Pakistan who are likely to be seriously affected if the IGCEP is approved in its current form by the authority. We offer these comments both as citizens who stand for a socially inclusive, environmentally green energy policy, and also as responsible members of the academic and legal fraternity, who hope to see Pakistan's energy sector grow and prosper in line with the principles of sustainable development that are the cornerstone of the regulatory process. Although, the present IGCEP 2030 reveals improvements over its predecessor IGCEP 2047, particularly in its more realistic forecasting of demand, there are nevertheless serious deficiencies that warrant a more thorough correction and revision of the document. In its current form, the IGCEP report is riddled with technical shortcomings, legal infirmities, and inconsistencies with the principles of sustainability and settled environmental policies. It is also subject to internal contradictions and is dangerously misguided on a number of fronts as detailed below.

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A. THE PROPOSED IGCEP PLAN IS INCONSISTENT WITH ENVIRONMENTAL GOALS AND THE PRINCIPLE OF SUSTAINABLE DEVELOPMENT AS ENSHRINED IN THE NEPRA ACT AND ALTERNATIVE & RENEWABLE ENERGY POLICY, 2019 ('ARE').

3. The IGCEP 2021 envisions a combined 12% share for renewables (solar, wind and bagasse) for the target years 2025 and 2030. Not only is this abysmally low share well below what was proposed in previous version of the IGCEP, it also falls well short of the government RE targets as enshrined in the Alternative & Renewable energy policy 2019. The ARE prescribes that “the on-grid generation capacity will be at least 20% by 2025 and at least 30% by 2030.” This deficit of 60% from the target share is in spite of the fact that the IGCEP itself acknowledges these sources as the cheapest, and the most abundant and environmentally sustainable options. The recent World Bank report on the integration of Renewables in Pakistan corroborates this assessment and in fact finds that “the optimum electricity mix would require even greater additions... VRE share would represent 30–33% of a total installed capacity... by 2030.” It bears mentioning that the ARE 2019 represents an overarching GOP and inter-provincial consensus enjoying the approval of the Council of Common Interests and comprising a key part of the portfolio of policies that make up the National Electricity Policy (NEP). The mandate of the ARE is tied to section 14A of the NEPRA Act, which tasks the regulator with “ensuring the development of a sustainable renewable energy market with a dedicated and gradually increasing share in the electricity power sector.” The NEPRA Act binds NEPRA and NTDC as the licenced distributor with performing their functions in accordance with the National Electricity Plan. NTDC is therefore, obliged to prioritize the ARE targets of minimum 20% renewables share in 2025 and 30% in 2030, failing which NEPRA is bound to direct NTDC to revise of the IGCEP to bring it in line with these statutory minimums.
4. The IGCEP is prepared by NTDC under the obligations arising from the Planning Code of the Grid code, the purpose of which is to provide an unambiguous plan for meeting planning goals that are to be “coordinated with policy objectives for the electricity power sector, as

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well as with short term and long-term system planning objectives.” This includes the GOP’s strategic objectives of energy security, affordability of electricity, availability for all, environmental protection, sustainable development, social equity and mitigation of climate change as provided for in the ARE. The Grid Code also requires that the planning principles and process be “based on a philosophy that conforms to the regulatory process and allows for competition.” As such the IGCEP plan must display consistency with the National Electric Policy objectives and associated system planning objectives in both its short and long-term vision. The plan should therefore minimally prescribe a trajectory for a generation mix that displays three features subject to the least cost criteria: i) an increasing displacement of existing carbon-based fuel sources which are expensive and eco-unfriendly, ii) restriction of any future penetration of environmentally and socially harmful technologies, and iii) inclusion and integration of RE technologies on a progressively increasing fashion in line with long-term policy objectives. This entails not simply adding RE technology based on additional capacity expansions, but also displacing existing and/or committed carbon-based projects from the energy mix. As stated by the ARE “In addition to generation capacity expansion, AREPs shall also be solicited for displacement of expensive electricity generated using fossil fuels (thermal plants). This is a major directional change from the past...” Despite this clear directive, the IGCEP has not only made no attempt to scale down and displace existing fossil-fuel and coal-based projects but also proposes adding almost up to 20,000 MW of imported and local coal into the mix.

5. Recognizing the disastrous effects of carbon-based fuel sources on the energy economy and ecology of the country, the 2021-30 iteration of IGCEP revises the share of the local coal in the production of energy as compared to the previous plan lowering it to 15% by 2025 and then to 11% of the energy mix by 2030. In this respect, the IGCEP also asserts that the volume of the carbon emissions will be less than the average emissions of the Organization for Economic Co-operation & Development (OECD) countries: “Carbon emissions in the country by power generation accounts for 0.353 kg-CO₂/kWh in the year 2021 and this

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indicator reduces to 0.202 kg-CO2/kWh by 2030 which is even less than average of Organization for Economic Co-operation & Development (OECD) countries.” Contrary to the optimistic self-appraisal of a “green and clean energy” plan, the IGCEP’s current projected share of the dirty local coal in the energy mix is in fact set to wreak havoc on multiple fronts. The IGCEP report only studies carbon emissions (that too only in part neglecting to account for instance for the carbon load of the mining process itself) – studies on other emissions and externalities specific to coal-based power plants are conspicuously absent. These additional emissions include toxic heavy metals such as mercury, and other pollutants such as SO2 and coal ash. Independent studies have found, that the proposed cluster of coal projects in Thar alone would constitute one of the largest air pollutant, mercury, and CO2 emissions hotspots in South Asia. These projects are slated to expose an estimated 100,000 people to exceedances of the World Health Organization guideline for 24-hour average SO2 concentrations, and 3,000 people to exceedances of the guidelines for PM2.5 concentrations. This along with an estimated emission of 1400 kg of mercury per year, most of which will be deposited onto surrounding cropland endangering local food supply. The IGCEP report includes no data or discussion of such environmental impacts in its report, and also provides no explanation for why such relevant data and analysis has been left out.

6. Aside from the fact that full environmental impact of such a hefty share for coal-based power in the energy mix has not been studied, the report also fails to specify either the data inputs or the methodology for calculating the cost of these externalities which are likely to result from the construction and operation of such plants. Similarly, there is no data or analysis of the ecological and human and social costs associated with coal power production, and its effect on coal’s ability to satisfy the least cost criteria over the aggregated life cycle of a project. In particular, there is no mention of the estimates on community displacements and disruptions of local hydrology, land use, etc., in regions earmarked (or likely to be chosen) for coal power plants. The rehabilitation plans and programs for displaced communities, and the

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operational records on environmental monitoring data for existing coal projects have also not been studied. Nor is there any attempt to factor in the forecasted health costs and long-term ecological impact of the heavy reliance on coal (or Hydel) called for by the IGCEP. Current studies project that the power plants and mines in the Thar region alone would be responsible for an estimated 29,000 air pollution-related deaths over an operating life of 30 years. Other health impacts include 40,000 asthma emergency room visits, 19,906 new cases of asthma in children, 32,000 preterm births, 20 million days of work absence (sick leave) and 57,000 years lived with disability related to chronic obstructive pulmonary disease, diabetes and stroke. An excerpt from a World Bank study on RE integration in Pakistan's power sector sheds some light on the flawed nature of last year's IGCEP's data inputs for costing analysis when it comes to evaluating the feasibility of coal based power:

"No restrictions on water availability were considered and modeled, as complete information was not available and alternatives through air cooling exist (but with an impact on economic performance). This combined techno-economic-environmental risk is strongly recommended to be analyzed in a separate study. This should also include other external costs and benefits such as employment opportunities and economic development for the local community in remote areas, but also adverse health impact areas. In this study external costs from any power generation technology are not considered but for one scenario, which prices carbon emissions. Due to the carbon emission factor of coal this will affect coal-fired generation more than fossil-fueled generation."

It bears noting that the inputs and data analytic methods for this year's IGCEP suffer from similar defects. The same study notes elsewhere that "Domestic coal is not economic when the external costs of GHG emissions are considered. Other risks, such as water scarcity and security of supply due to the concentration in one area, may further reduce the feasibility of domestic coal."¹ It amounts to regulatory negligence that a planning process tasked primarily with determining the least-cost and most sustainable long term energy mix should rest on data inputs and a costing methodology that simply ignores these basic assessments about long-term costs. Factoring in this information is crucial for an accurate and realistic

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assessment of the true costs and potentials of the different generation technologies on offer. An informed comparative cost-benefit analysis is essential if the IGCEP's stated objectives of a least cost environmentally sustainable mix and NTDC's own reliability goals are to be met.

7. The IGCEP's claims of successfully addressing Pakistan's goals for "clean and green power" rests not on the robust integration of renewables, such as solar and wind but rather through a disproportionately high inclusion of ecologically damaging hydro power – an addition of more than 50,000MW. This claim of clean and green power and the mechanism for achieving it are both based on a limited and misguided understanding of Pakistan's international obligations, the principles of environmental sustainability, and the statutory imperative to mitigate climate change. While the projected decrease in carbon emissions from 0.353 kg-CO₂/kWh in 2021 to 0.202 kg-CO₂/kWh by 2030 is a step in the right direction, it is neither sufficient nor does it mitigate the plethora of other environmental impacts associated with coal and hydro power – especially large hydro projects. According to the NEPRA Act the development of renewable electricity markets must uphold "the international commitments of Pakistan as well as the responsibility of Pakistan to support and encourage measures to effectively mitigate adverse climate change..." The latter responsibility includes not simply the reduction of GHG emissions but also the preservation of natural resources such as population, biodiversity, global and regional climate, ozone, prevention against toxic and hazardous substances, desertification, and nuclear damage, and the protection of air, land, sea and local or transboundary water resources, indigenous cultures and natural geology. The IGCEP in its oversized claim to have pursued a clean and green energy, fails to consider the impact of its proposed generation mix – particularly the expansion of large hydro and local coal – on any of these factors and includes no analysis of the mitigation measures and costs associated with the same in its proposed capacity expansion plan.

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8. The emphasis on hydropower in the IGCEP also signals a misconception on the part of NTDC on the status of hydel as “renewable energy.” The present version of the IGCEP plans for 61% of the energy to come from a combination of wind, solar, bagasse, and hydro which is in line with the Prime Minister’s statement at the December 2020 Climate Ambition Summit in which he announced Pakistan’s aim for a 60% renewables-based generation. This suggests that the IGCEP has assumed hydropower (including large hydro) as an RE source. However, the National Electricity Policies and the legal and regulatory framework make it plainly evident that this is a misguided assumption. Neither the Renewable Energy Development Policy of 2006 nor the ARE policy 2019 envision large hydropower as a “renewable” source, and while the former does include small hydro (>50MW) in its purview, the latter declares that “small hydro projects (less than 50 MW) are not covered under this Policy. A separate policy is under consideration for small hydro.” Large hydro on the other hand is explicitly governed by Pakistan’s Power Policy 2015 along with other carbon-based and non-renewable energy sources. The IGCEP is therefore misguided in its perception that hydropower projects comprise an RE source suitably “green” and comparable to wind and solar in its environmental sustainability and its contribution towards meeting RE targets.
9. The heavy emphasis on coal and hydro projects also violates the letter and spirit of the Paris agreement which Pakistan has signed and ratified. The Agreement requires that parties adopt action against climate change following a “country-driven, gender responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions.” The proposed expansion plan and planning methods involved in the preparation of the IGCEP on the other hand, marginalize, neglect, undermine and oppress the very vulnerable communities and local knowledge and culture these principles of climate action are meant to protect. None of the affected communities of the

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proposed coal (especially in the heavy clusters of projects in Thar) and hydel projects have been consulted in the formulation of this plan, nor have their local knowledge forms been utilized in generating and analyzing appropriate data in the planning and preparation of the document.

10. The IGCEP states on pg 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 however, does not even appear to pursue this goal. Unlike its predecessor, IGCEP 2047, its scope is restricted to 2030 and is therefore only medium term at best. In addition, it fails to address the core question of *how* to improve the decision-making process and under *which long-term uncertainties* to minimize *which risks*, and for *whom*. In particular, the IGCEP includes no analysis of the potential uncertainties, risks, and impacts the choice of energy sources today will have on future generations two or three decades down the line. For instance, the long-term risks of a continued pursuit of local and imported coal, the abandonment of a 30% wind and solar target, and the massive on-boarding of large hydro power and their potential impact on the ability of future generations of Pakistani citizens to enjoy basic rights, freedoms e.g. access to life, livelihood, health, and use natural resources simply haven’t been addressed in the document. This is a glaring omission given the significance of the principle of intergenerational rights in relation to energy development policies and environmental protection under international and national law. The principle stands enshrined in Pakistan’s provincial Environmental Protection Acts according to which “sustainable development” means “development that meets the needs of the present generation without compromising the ability of future generations to meet their needs.” According to Pakistan’s Power Policy 2015 which governs coal and large hydro projects, the provincial environmental acts regulate both large hydro and carbon-based power projects – the same therefore require close evaluation for their inter-generational environmental, ecological, and social impacts. The IGCEP in this respect has therefore overlooked an important aspect of its own stated goal. It merits mention that protecting the

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rights of future generations as against energy policy decisions taken today have risen to sharp prominence in recent years. Just last month, a verdict by the German constitutional court has declared the German Climate Action Law as unconstitutional because it lacked sufficient analysis of long term climate protection mechanisms beyond 2030 which constitute a curtailment of the rights of future generations. This judgment can and must serve as a guiding precedent and example for planning and regulatory bodies

11. An overwhelming majority of the Hydel projects selected in the IGCEP are large hydro power. The IGCEP report is completely silent about the environmental, ecological, and intergenerational damage that is caused by such large hydel projects. The following are only a few of the many inherent problems associated with such projects:

- (i) Large and mega hydel projects – especially those involving the use of reservoirs block the flow of rivers and also trap the flux of sediment rather than letting it nourish the floodplains, delta and estuaries. This has grave long-term impact not only on the ecology of the river but also on the functioning of the plant itself. Rivers drying up and no longer reaching their destination is another impact which results in the fast-paced erosion of the coastal areas. Dams also restrain the flow of river which results in high water temperature and low oxygen for the water species causing depletion of aquatic life, and with it the livelihoods of the local population dependent on it. Furthermore, dams also block the access of the fish to the floodplains where they usually spawn and feed themselves. Ultimately, it also limits the food resources for local residents. Environmentalists have also noted that low flows affect groundwater tables and cause the floodplain vegetation to dry out. In general, large hydel projects are closely associated with “losses of homes, farms, and livelihoods; disruption of community networks and cultural identity; changes in biodiversity; and health dangers, particularly from waterborne diseases.”

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- (ii) Dam silting is another problem that should blunt our zeal for the construction of large hydel plats. In this regard one study notes that “most of the world’s dams and reservoirs are losing their water-holding capacity because they are filling up with silt (very fine particles of sedimentary material). This silting is due, in large part, to excessive logging and deforestation, which lead to widespread soil erosion in upstream river catchments. When vegetation and trees are cut, heavy rains wash the topsoil into the rivers. As long as the river is flowing swiftly, the silt particles are held in suspension and carried along, but when the flow encounters a dam, the silt sinks to the bottom of the reservoir. The accumulation of silt deposits over time eventually reduces the reservoirs’ holding capacity, thereby reducing their life span. Studies indicate that, on average, 1% of the water storage capacity of the globe’s reservoirs is currently being lost annually through silting.”
- (iii) Hydro projects have also been found to involve high volume of greenhouse gas emissions – a lesser appreciated aspect of the negative environmental impact of these projects. Studies have found that “emissions from dams can be much higher than those from fossil-fuel-based plants because major reservoirs emit methane derived from the anaerobic (oxygen deficit) decomposition of organic matter. Organic matter in reservoirs is produced by aquatic plants that grow under water or by land plants submerged by rising water levels and transported into the reservoir by rivers.”
- (iv) IGCEP also quite negligently ignores the causal connection between floods and large hydel project constructions which have been discussed in detail in the “A rude awakening,” the judicial tribunal report on the 2010 floods in Pakistan. Apart from other recommendations regarding water and power projects, the report also clarifies with reference to the experience of India, that the goal of generating electricity typically requires increases in the elevation of the hydraulic head of

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hydel plants exacerbating the risk of flooding. The findings of this report and numerous other studies belie the common misconception that hydel plants and large reservoirs prevent against flooding. As noted by this report, the irony of the matter lies in the fact that what is proposed as “a solution to the flood woes itself becomes a cause of it.” NEPRA must demand explanation from the NTDC for neglecting this important aspect of dam hydrology in its proposed plan to expand hydropower.

B. THE PROPOSED IGCEP PLAN ALTERS THE CRITERIA FOR THE CLASSIFICATION OF PROJECTS AS CANDIDATE OR COMMITTED RESULTING IN A SUB-OPTIMAL OUTCOME FOR CAPACITY ADDITIONS.

12. A curious and highly objectionable aspect of the IGCEP 2030 is the arbitrary, unprecedented, and unreasonable change in the criteria for classifying a project as “committed.” In previous versions of the IGCEP a project is classified as “committed” only if it fulfills one of the following pre-requisites:

- “It is already under construction;
- Has achieved financial close;
- Has strategic importance i.e. China-Pakistan Economic Corridor (CPEC) project;
- or is a G2G project.”

In the present IGCEP, however, a project is considered “committed” if it fulfills any of the following criteria:

- 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.

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- 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.

The effect of this arbitrary and unprecedent change in classification criteria is a substantial addition of a number of large and small hydro projects that have been exempted from being tested against other RE technologies for their fulfillment of least-cost criteria. As blocks of technology options, Hydro and RE projects have therefore been placed on an unequal footing without a fair competition. The result is an energy mix that is sub-optimal in terms of cost and sustainability and a market outcome that frustrates NEPRA's goal of developing competitive markets.

13. This change in classificatory criteria also amounts to a circumvention of the market and regulatory process through a pre-selection of preferred projects which amounts to a form of market nepotism. This will considerably hurt investor and consumer confidence in the possibility for a free market for electricity which is a present priority of NEPRA with the CTBCM reforms in the pipeline.
14. The problem of classification notwithstanding, committed and even existing on-line projects should not in principle be excluded or exempted in any way from being made to compete

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against all candidate options. For the least cost modeling exercise to be at all purposeful, all projects and technology blocks should be subject to a principle of continued competition. Any meaningful assessment of fuel source and technology share in the generation mix should and must consider the optimality of technology option irrespective of the stage in the life cycle of project. It should be noted that IGCEP is tasked with identifying the optimal balance of least cost and environmental suitability of the fuel mix in the decade ahead. This statutory duty requires application of mind and meaningful evaluation of the actual set of options not only for capacity addition but also for replacement of existing and retiring projects or shelving of committed projects that have run up against debilitating delays or inefficiencies etc. In principle, therefore, the IGCEP should have specified and worked with data input parameters, costing methodologies and an assumption set designed to maximize the most meaningful array of options and subject them to a multi-factorial analysis to determine the true least-cost solution for future additions.

15. In light of the above submission, the IGCEP's classification especially of imported and local coal projects as "committed" invites scrutiny for its inconsistency with the intent, letter, and spirit of the ARE policy. By protecting these projects from a fair competition against RE technologies, the IGCEP contravenes the ARE as well as the economic and market logic of the modelling exercise. As earlier stated, the inclusion of ARE technology is not simply meant to be a mere additive to meet the future generation capacity, but also to displace the existing carbon-based projects. This should apply more emphatically to carbon-based projects that are not even on-line yet, and some of which may have not even achieved full financial closure, and are subject to delays, cancellations, and other future risks. The NTDC is therefore, obligated to model and propose options that include not simply evaluation of renewable candidates as opposed to other candidates but also the evaluation of renewable candidates vis a vis existing and committed carbon-based projects. The same has been forcefully noted in the World Bank report on RE integration in Pakistan which observes that "some committed plants are only drawn because of their status but not because they make

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economic sense or are needed for supply. These include the Jamshoro imported coal plant..." It bears mentioning that the report finds several cases where it proves more economical to shelve committed and even existing projects with guaranteed fuel offtake agreements and accept penalty payments instead of curtailing further amounts of RE generation. Even otherwise, alternative scenarios such as renegotiation of onerous non-renewable project contracts should be included in the modeling exercise to generate meaningful options for least-cost pathways.

16. In similar vein, for truly meaningful comparisons between different scenarios considered in the modelling analysis, the generation cost per unit (with its constituent capacity component and energy component) and the projected environmental and social impact costs per unit should have been estimated for each financial year. Since the ARE Policy provides for addition of ARE projects based on both capacity needs and displacement of more expensive fossil energy, this data should be an essential feature of the modelling inputs. The sensitivity analyses should also include a scenario where every available generation project and technology block type is available for unconstrained picking by PLEXOS purely on the basis of economic dispatch and least cost generation.

C. THE PROPOSED IGCEP PLAN WILL EXACERBATE REGIONAL DISPARITIES IN ENVIRONMENTAL IMPACT AND PRECIPITATE INTER-PROVINCIAL CONFLICT.

17. The combined coal and hydel focus in the generation mix is an especially toxic combination given the interaction between the environmental impact profiles of these technologies and the regional dynamics involved in their deployment. Hydel potential is concentrated in the north – mostly in KPK, but the negative impact of low water flow shall be experienced in lower riparian areas – especially in Sindh and Southern Punjab. In addition, coal mining and burning which aside from the aforementioned emissions risks is also notoriously water intensive and poisonous to the local hydrological resources is also heavily concentrated in the

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South, particularly in Sindh, South Punjab, and Baluchistan – regions which are already threatened by desertification, water scarcity, drought and sever water pollution. Given Pakistan's present provincial disputes especially around water, the focus of the policy as it stands amounts to a reckless inflaming of existing conflicts in the state as well as the propagation of a disproportionate ecological and climatic impact in Sindh, Southern Punjab and Baluchistan. It is thus inconsistent with the objectives and guidelines of the NEPRA Act and ARE policy both of which call for energy plans that enhance social equity and envision the adoption of measures meant to "mitigate adverse climate change and to effectively manage conflict of interest of the State in relation to development of the electric power markets of the Islamic Republic of Pakistan."

18. The IGCEP does not take into consideration the injury of the upstream new hydro-power projects on the down-stream provinces. No attempt has been made by the IGCEP to evaluate the effect of these projects on the minimum flow of water in the riverbed downstream. Without prejudice to other environmental injuries, the right of the upstream provinces to build dams, hydel power reservoirs, on or divert water from a shared resource cannot be had at the cost of the right of downstream provinces to have access to the minimum flow of water in the riverbed. The state of Pakistan in "THE MATTER OF THE INDUS WATERS KISHENGANGA ARBITRATION" denied India her right to build KHEP altogether. However, the court of arbitration observed that she has a right subject to the following equation:

"Both Parties' entitlements under the Treaty must be made effective so far as possible: India's right to divert water for the operation of the KHEP is tempered by Pakistan's right to hydro-electric and agricultural uses of the waters of the Western Rivers, just as Pakistan's right to these uses is tempered by India's right to divert the waters for the KHEP's operation. Any interpretation that disregards either of these rights would read the principles of Paragraph 15(iii) out of the Treaty, to one or the other Party's injury."

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One could argue that this judgement does not apply to the situation at hand, however, it must be noted that there is no anomaly in treating two equal provinces as two different states because the nature of injury is the same and purely a result of violence by upstream regions on those who are downstream. The transboundary harm has been observed as the violation of customary international law in several judgments. In order to illustrate it we cite some cases from the Indus treaty case.

“Well before the Treaty was negotiated, a foundational principle of customary international environmental law had already been enunciated in the Trail Smelter arbitration. There, the Tribunal held that no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.”

In that very case, the court also addresses the contention by the India that Pakistan is practicing double standard as the NJHEP breaches the commitment of minimum environmental flow downstream. The court observes:

“Similarly, the Court takes note of the statement in Pakistan’s Reply that:

India’s contention [that Pakistan is applying a double standard as between its criticism of the KHEP’s environmental flow and Pakistan’s plans for an environmental flow below the NJHEP] is incorrect because the releases downstream of NJHEP have yet to be fixed, and a further consideration of environmental impacts is now being carried through by the same international team, applying the same methodology, as with respect to Pakistan’s Environmental Assessment of the downstream impacts of the KHEP.”

This is an acknowledgment that hydro-electric projects (including Pakistan’s projects) must be planned, built and operated with environmental sustainability in mind.

ALTERNATIVE LAW COLLECTIVE

Main Office: Suit No. 1, 3rd Floor, Ghazi Plaza, 2 Mozang Road, Lahore.

Regional Office: [Islamabad] 19-B, Saeed Plaza, Blue Area, Islamabad.

E-Mail: syed.ghazenfur@gmail.com

Contact Number: 092 - 308-6124105

D. THE IGCEP EVALUATION OF MAXIMUM RENEWABLES INTEGRATION IS BASED ON FLAWED DATA AND MISCONCEPTIONS ABOUT THE TECHNOLOGIES.

19. The IGCEP's chief reservation regarding wind and solar power are the problem of "intermittency." On pg 20 the IGCEP cites "intermittency" as the reason the document does not pursue the RE minimums set out in the ARE:

"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."

This argument however fails to offer a fair assessment of new technologies such as battery storage, demand response systems, hybrids, and other "smart grid" options, the use of which according to the World Bank study could in fact justify a rate of least cost RE deployment even higher than the ARE minimum targets. On page 88, The IGCEP admits that it "was set to model hybrid RE technologies pursuant to Assumption Set approved by CCoE and for this purpose relevant project execution agencies were approached to provide input data. However, AEDB informed that they do not have the requisite data and intimated that a detailed technical & financial feasibility study would require to be undertaken for this purpose. Hence, due to non data provision (cost, hourly profile etc.) hybrid technologies are not modelled in the current iteration of the IGCEP." The IGCEP therefore simply hasn't evaluated RE technology for its full and fair potential according to present market options. It therefore lacks any acceptable rationale for ignoring the ARE minimum targets.

E. FINANCIAL PARAMETERS ARE UNRELIABLE OWING TO BIASED SELF-REPORTING ON POWER PLANT COST DATA BY PROJECT EXECUTING ENTITIES.

ALTERNATIVE LAW COLLECTIVE

Main Office: Suit No. 1, 3rd Floor, Ghazi Plaza, 2 Mozang Road, Lahore.

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E-Mail: syed.ghazefur@gmail.com

Contact Number: 092 - 308-6124105

- a) The Financial Parameters used in the study (as explained in Section 4.4), have been obtained from ‘concerned project executing entities’ and ‘the latest tariff determination available on the NEPRA website.’² These Financial Parameters are unreliable and biased, being fully dependent on the self-reporting of Power Plant Costs by the project executing entities. This financial self-reporting has historically been accepted by NEPRA without objections and sans any independent verification, with reported data relied upon for important policy decisions often to disastrous effects. In its recent ‘Report on the Power Sector’ (**RPS**), the Committee for Power Sector Audit, Circular Debt Resolution and Future Roadmap calculated excess payments of Rs. 291.04 billion over the tariff control period of 30 years made out to just one coal fired power plant i.e. Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited located at Qadirabad, District Sahiwal. The entire costing model that is currently adopted is hit by structural defects and bias. Its integrity is compromised by the self-interested nature of the reporting, ineffective or incomplete disclosures, misleading data, and questionable financial practices of the project executing entities. These costs claimed by the project executing entities and approved by NEPRA have been subsequently worked into the various tariffs in the previous years. The source data is therefore unreliable and potentially dangerous for IGCEP’s costing and planning purposes.

E. THE PLAN SEEKS TO INSTALL MORE CAPACITY WITHOUT PROPOSING ANY TRANSMISSION EXPANSION PLAN AND COST EFFECTIVE SOLUTIONS REGARDING TRANSMISSION AND DISTRIBUTION INEFFICIENCIES AND LOSSES.

20. Despite being asked to coordinate the TSEP and IGCEP by NEPRA, NTDC has prepared the IGCEP without reference to and coordination with a Transmission Expansion Plan. The success of any long term strategically important plan is dependent on the methodology and on the envisaged sequence of events under the plan. Logic dictates that NTDC should have first prepared a ‘Transmission System Expansion Plan’ to meet the ARE minimums and on

² P. 25 of IGCEP.

ALTERNATIVE LAW COLLECTIVE

Main Office: Suit No. 1, 3rd Floor, Ghazi Plaza, 2 Mozang Road, Lahore.
Regional Office: [Islamabad] 19-B, Saeed Plaza, Blue Area, Islamabad.
E-Mail: syed.ghazenfur@gmail.com
Contact Number: 092 - 308-6124105

the basis of information provided to it by the Ministry of Power of GoP, PPIB, AEDB, and all provincial agencies. The ARE policy expressly envisions this sequence of events:

“It has been decided that rather than inducting RE projects on a reactive basis, a new policy direction is being set whereby Pakistan intends to have at least 20% of its generation capacity as ARE technologies by 2025 and 30% by 2030 (20X25 and 30X30 target). It is estimated that such targets can be achieved but will require upgradation of the transmission infrastructure; this exercise will be undertaken in parallel and, where necessary, as a pre-requisite”

It is more appropriate to the remit of NTDC for it to devote its efforts first to the development of a technical and financial plan on how to expand and improve transmission and distribution in order to evacuate power from a power project and to determine the cost of transmission lines thus allowing more meaningful determination of demand and supply forecasting and a more accurate modeling of the true least cost and long-term sustainable generation mix. At the very least, a well coordinated and simultaneous process of developing the TSEP and the IGCEP should have been followed. This would have better enabled NTDC and NEPRA, Ministry of Power of GoP, PPIB, AEDB, and all provincial agencies to take an informed and comprehensive decision regarding the procurement of power from any particular technology and project. However, here, the IGCEP has that sequence backward as documented on page 91 of the IGCEP:

“Pursuant to the directions by NEPRA dated 15th October 2020, NTDC is obligated to prepare TSEP along with IGCEP for submission to NEPRA, to maintain the true least cost principle at least for candidate projects optimized by the PLEXOS model. However, subsequent to approval of Assumption Set by CCoE and its notification on 28th April 2021, stringent timeline was set by Power Division for finalizing the report and, hence, NTDC could not prepare the TSEP at the time of submission of IGCEP to NEPRA”

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Contact Number: 092 - 308-6124105

How then is it possible for NTDC to compute accurately and predict reasonably the true least cost long-term option when the details of the underlying transmission infrastructure, its upgrading costs and improvements in ability to support different technologies long term have not yet been evaluated?

21. In fact, the IGCEP ought to be complemented by Transmission System Expansion Plan since the latter could even be an alternative to generation in given cases. Planning for generation in the absence of the same would be counter-productive. In addition, the Grid Code requires NTDC to identify new generation requirements by capacity, commissioning date, and location, the latter has not always been identified and may change the outcomes envisaged in the IGCEP. When the analysis is performed in tandem with a TSEP, the true cost of end-to-end electric supply can better be evaluated for all generation options. When conducted in tandem with the TSEP, it is likely to produce a different outcome than envisaged in IGCEP 2047. Thus, an end-to-end cost analysis of electricity supply should be considered for all generation plants. At present, the evidence suggests that while large-scale RE deployment is possible without a major expansion of the transmission interconnections between the three zonal regions (north, south, and midland), but there is a need for greater distributed deployment for both RE and non-RE sources with the former allowing for much lower costs in the event of inter-zonal expansion of transmission infrastructure as well as higher optimality outcomes in case of distributed generation.

22. IGCEP has determined the need to install more capacity without catering for transmission and distribution inefficiencies and losses, which by some studies of NEPRA amount to 23% to 25%. IGCEP has considered least cost solution using a combination of CAPEX, OPEX and Capacity factors. The IGCEP has not added in the separate cost of transmission line and related losses, dispatch requirements, and consumption patterns. A resolution of the T&D

ALTERNATIVE LAW COLLECTIVE

Main Office: Suit No. 1, 3rd Floor, Ghazi Plaza, 2 Mozang Road, Lahore.

Regional Office: [Islamabad] 19-B, Saeed Plaza, Blue Area, Islamabad.

E-Mail: syed.ghazefur@gmail.com

Contact Number: 092 - 308-6124105

losses is likely to reduce the need to install more fossil powered, especially Coal Fired Power Projects.

E. FAILURE TO ACCURATELY FACTOR IN FINANCIAL, TIMELINE, AND OPERATIONAL REALITIES OF CONSTRUCTING HYDEL AND COAL FIRED POWERED PLANTS IN SUCH HIGH NUMBERS.

23. Construction costs and probable delays associated with domestic coal and hydro plants are much higher than wind and solar alternatives. This is also recognized in the World Bank study which notes that for hydropower, the “risks for delay consist in potential environmental and social impacts (necessity to arrange resettling in affected areas), financing problems, and technical challenges (difficulties with the water resource or access roads for often difficult terrain). With construction periods of five to nine years for large hydro capacities and four to five years for medium (up to 100 MW) to small capacities (1–50 MW), each with a potential for delay, it seems likely for the committed hydropower plants to be operational later than foreseen (compared to any other technology).” Similarly, coal plants are also notoriously prone to inordinate delays and even cancellation. With imported coal, the additional risk of international moratoriums and price hikes adds another layer of high probability risk that is widely anticipated by analysts and commentators. Once adjusted for these delays and obstacles, coal and hydropower quickly become a far costlier option than currently assumed in the IGCEP.
24. The limitations of considering Hydropower plants as “clean” and “renewable” energy become readily apparent when we consider how they can operate in a similar fashion to thermal power plants in some respects. Both are required to declare available capacities at defined periods and intervals; however, a hydropower plant’s available capacity may be more sensitive owing to the intermittent nature of flow/river discharge. This “hydrological risk” can cause unforeseen water availability issues. As per GoP power policy, this risk is to be borne by the power purchaser for all hydropower plants having a capacity over 50 MW. This

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E-Mail: syed.ghazefur@gmail.com

Contact Number: 092 - 308-6124105

is effectively a fixed capacity payment which renders nugatory the benefits accruing from renewables which the ARE declares lie precisely in their lack of such capacity charges.

25. In addition, according to recent studies climate change is expected to drastically affect the availability of water as a resource for power generation. At least a third of glacial volumes is expected to be lost in the coming decades. Thus while we might expect a brief increase in supply during the next decade or so, this will quickly changing to a reduced and more unstable supply soon thereafter with a wholly unpredictable water level and flow profile in the second half of the century.
26. The undersigned request your respected Office to be allowed and invited to participate in any public hearings to further evince the above provided comments.

Regards,

Asad Farood
Professor of Law at LUMS

Syed Zain ud Din Moulvi
Policy Consultant
(Lahore)

Abdul Rafe
Advocate High Court
(Lahore)

Syed M. Ghazefur
Advocate High Court
(Lahore)