Public Disclosure Authorized

Program Information Document (PID)

Concept Stage | Date Prepared/Updated: 10-Aug-2021 | Report No: PIDC250493

BASIC INFORMATION

A. Basic Program Data

Country	Project ID	Parent Project ID (if any)	Program Name
India	P176032		Himachal Pradesh Power Sector Development Program
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Does this operation have an IPF component?**
SOUTH ASIA	09-May-2022	06-Oct-2022	No
Financing Instrument	**Borrower(s)**	**Implementing Agency**	**Practice Area (Lead)**
Program-for-Results Financing	Ministry of Finance, Government of India	Directorate of Energy, HPPTCL (Himachal Pradesh Power Transmission Corporation Limited), HPSEBL (Himachal Pradesh State Electricity Board Limited), HPPCL (Himachal Pradesh Power Corporation Limited), HIMURJA, HPSLDC (Himachal Pradesh State Load Despatch Centre)	Energy & Extractives

Proposed Program Development Objective(s)

The program development objective is to strengthen the capacities of the relevant institutions to develop and deploy Himachal Pradesh's renewable energy resources in a sustainable manner.

COST & FINANCING

SUMMARY (USD Millions)

Government program Cost	1,000.00
Total Operation Cost	250.00
Total Program Cost	250.00
Total Financing	250.00
Financing Gap	0.00

FINANCING (USD Millions)

Total World Bank Group Financing	200.00
World Bank Lending	200.00
Total Government Contribution	50.00

Concept Review Decision

The review did authorize the preparation to continue

B. Introduction and Context

Country Context

1. **India's Gross Domestic Product (GDP) growth was already slowing when the COVID-19 outbreak unfolded.** Real GDP growth had moderated from an average of 7.4 percent during fiscal year (FY) 2015-16-FY2018-19 to an estimated 4.0 percent in FY2019-20. The growth deceleration was due mostly to (i) impaired balance sheets in the banking and corporate sectors affecting credit and investment, and (ii) a marked decline in private consumption growth. Against this backdrop of pre-existing weakness, the outbreak of COVID-19 has had a significant impact, with real GDP contracting by 7.3 percent in FY20/21. On the fiscal side, the general government deficit widened significantly in FY2020-21, owing to higher spending and low revenues. Given the significant uncertainty pertaining to epidemiological developments, real GDP growth for FY2021-22 is likely to be in the range of 7.5 to 12.5 percent.

2. **Although India has made remarkable progress in reducing absolute poverty in recent years, the COVID-19 outbreak has reversed the course of poverty reduction.** Between 2011-12 and 2017, India's poverty rate is estimated to have declined from 22.5 percent to values ranging from 8.1 to 11.3 percent. However, recent projections of GDP per capita growth, taking into account the impact of the pandemic, suggest that poverty rates in 2020 have likely reverted to estimated levels in 2016. Labor market indicators from high frequency surveys -including from the Centre for Monitoring Indian Economy (CMIE)- suggest that vulnerability has increased, particularly for urban households. Overall, the pandemic and its economic impacts are estimated to have raised urban poverty, creating a set of "new poor" that are relatively more likely to be engaged in the non-farm sector and to have received at least secondary education.

3. **Energy security is the pre-requisite for socio-economic development.** Under Sustainable Development Goal (SDG) 7 on Affordable and Clean Energy, India aims to achieve universal access to affordable, reliable, and efficient energy services by 2030. As per NITI Ayog's SDG India: Index & Dashboard 2020-21 report[1], almost 100 percent of the households have access to electricity. Expanding and strengthening of the infrastructure along with its upgradation to the new-age technologies becomes critical to achieve rest of the targets set forth under SDG 7. India has already achieved One Nation-One Grid-One Frequency by connecting all the regions and the states through its National Grid that plays an important

[1] https://www.niti.gov.in/writereaddata/files/SDG_3.0_Final_04.03.2021_Web_Spreads.pdf

role in transmitting electricity from power surplus areas to the load centers (or the power deficit) areas. However, augmenting the transmission and distribution (T&D) network at the state level will be equally necessary to help India successfully deliver on the SDG 7 goals.

4. **Climate change may have significant impacts on global poverty incidence in this decade**, possibly pulling more than 100 million people into poverty by 2030. While India's per capita emissions of greenhouse gas (GHG) emissions are relatively low, India is the world's third largest emitter of GHGs. India is also very vulnerable to changes in monsoon patterns. Global Circulation Models project that precipitation events will increase in number and intensity. With a greater variability in rainfall, agro-climatic conditions are likely to deteriorate across the country. In addition, the melting Himalayan glaciers are likely to also impact agriculture, livelihoods, and industry in the Gangetic plains. India has therefore pledged to enhance investments in development programs in sectors vulnerable to climate change, including the Himalayan region.

5. **In 2015, India announced its Nationally Determined Contributions (NDC) targets, which focused on the energy sector as one of the important pillars in combating climate change** and included: (a) reducing the emissions intensity of its GDP by 33 percent to 35 percent by 2030 (compared to the 2005 level) and (b) achieving about 40 percent cumulative electric power installed capacity from non-fossil fuel energy resources by 2030. In 2019, the Prime Minister announced that India would increase the share of non-fossil fuels to 175 gigawatts (GW) by 2022, and further to 450 GW by 2030. The cumulative renewable power installed capacity (excluding hydro above 25 MW) has increased by more than 2.7 times from 35 GW in March 2014 to 96.96 GW in June 2021 and constitutes over 25 percent of the country's installed power capacity. Further, India's emission intensity of GDP reduced by 24 percent between 2005 and 2016 over 2005 levels[2].

6. **However, a substantial amount of power from other generation sources that have quick start and stop capability and offer other grid balancing services is required to allow successful integration of renewable energy given its variable nature.** Such resources come online within a short span of time to bridge the gap on supply side arising due to variable renewable energy (VRE) generation. Given this and to meet the targets under SDG 7, India's future power grid – at central as well as at state - will need to be significantly more dynamic, requiring an evolution in India's power system operations, and power markets. On generation front, there are multiple storage technologies that can help balance variability of RE and one such technology is hydropower[3]. Highly flexible hydropower, with an ability to effectively store energy in its reservoirs and respond quickly to system requirements but which to date has only been valued for energy served, will have even greater value within the future Indian power system. To promote hydropower in the country, the GoI gave a policy thrust by declaring large hydropower projects (above 25 megawatts [MW]) as renewable energy sources through its order in March 2019. The policy duly recognizes the role of hydropower in better integration of VRE. The benefits of hydropower were demonstrated during India's 'nine minutes light out' event in 2020, as the pan-India lighting load reduced to almost 31 GW and then recovered after nine minutes. This sharp dip and surge in the power demand over a very short span of time was successfully managed through flexible hydropower stations due to its features like inertia, reactive power, and voltage control.

Sectoral (or multi-sectoral) and Institutional Context of the Program

7. **The Ministry of Power (MoP), Government of India (GoI) aim to deliver 24x7 power for all by creating an efficient, resilient, and financially sustainable power sector.** This objective along with the aim to provide access to clean energy has taken centerstage amongst all the plans around economic development and environment. States are an equally important partner to help MoP achieve these objectives, given electricity is a concurrent subject in a federal

[2] https://unfccc.int/sites/default/files/resource/INDIA_%20BUR-3_20.02.2021_High.pdf
[3] https://posoco.in/download/fold-posoco-report-on-operational-analysis-for-optimization-of-hydro-resources/?wpdmdl=14168

structure. Keeping in line with the expectations set forth by MoP, Government of Himachal Pradesh (GoHP) also formulated its 24x7 power for all roadmap in 2016. In line with the progressive policies of the state government, HP has seen a rapid growth in its industrial consumer base. Given that HP is one of the pioneering states in achieving 100 percent electrification, the GoHP's roadmap aims to further improve reliability and quality of power supply, which is directly correlated with a better quality of life and will contribute towards the country's overall SDG 7 goals.

8. **Real Gross State Domestic Product (GSDP) of Himachal Pradesh (HP), at constant (2011-12) prices, is estimated to have grown at 4.9 percent in FY2019-20.** This growth is higher than the national GDP growth rate of 4.0 percent for FY2019-20. Owing to the impact of the COVID-19 pandemic, HP's real GSDP is estimated to have contracted by 6.2 percent in FY2020-21. As per the GoHP's Economic Survey 2020-21, the state seeks to achieve by 2022, among other things: (a) 24x7 power-for-all with the required quality voltage (the state has already achieved 100 percent electrification), (b) a reduction in transmission and distribution (T&D) losses to 11 percent (in FY2021 it was at 14 percent), and (c) a reduction in the percentage of the population living below the poverty line from 8.1 percent (in FY2011-12) to 2 percent. The Bank's Program will contribute towards some of these objectives.

9. **The power sector reform in 2010 helped the state further develop its power sector.** The reforms began with the unbundling of the erstwhile HP State Electricity Board (HPSEB) and creation of two utilities: (i) Himachal Pradesh State Electricity Board Ltd. (HPSEBL), an integrated utility with the generation, distribution and trading function in the state, and (ii) HP Power Transmission Corporation Limited (HPPTCL) with the mandate to manage and operate the transmission system as a State Transmission Utility. Alongside, the HP State Load Despatch Centre (HP SLDC) was established with responsibility, among other things, of optimum scheduling and dispatch of electricity within the state and exercising supervision and control over the inter-state transmission system. Before the 2010 reforms, the GoHP had already established the HPPCL in 2006 for planning, promoting, and organizing the development of various aspects of hydroelectric power. In addition, Himurja was constituted in 1989 for the promotion and sustainable development of renewable energy (non-hydro) and energy security in the state. Overall responsibility of the coordination across various power sector institutions - state, central and private - within the state rests with the HP Directorate of Energy (DoE). The proposed Program intends to work on all the aspects – generation, transmission, and distribution – of the power sector in the state and so, these institutions under the leadership of HP DoE will be the integral partners in the Program.

10. **Since 2014-15, the state distribution company (HPSEBL) is meeting 100 percent of its demand from hydropower resources** with a very small quantum coming from nuclear and solar generating stations. The state also has a share in coal and gas-based power stations and can tap into it on need basis. The State's 2016 Solar Power Policy aims to increasingly reduce reliance on fossil-fuel based resources as well as to diversify its portfolio beyond hydro resources. National Institute of Solar Energy (NISE) has estimated a potential upwards of 33 GW but given the hilly terrain, this all may not be realistic. However, GoHP is working with various central utilities to tap into the potential of about 850 MW solar park in its cold desert in Spiti. Upgrading the state's power infrastructure would be a key enabling factor to take full advantage of highly flexible hydropower resources of the state. This also requires augmenting the state's existing T&D network. Further, HP intends to introduce advanced technologies such as electric vehicles (EV) and smart grids, which necessitates having an integrated resource plan (IRP) for a holistic sectoral planning and optimal resource utilization.

11. **With an implicit friction between power export and meeting the state's domestic demand, the state's own transmission and distribution (T&D) assets also play an equally important role**. HPSEBL has undertaken various activities under R-APDRP Scheme of the GoI to improve sub-transmission and distribution systems. There is a need to further automate the systems to allow better understanding of the consumer's demand profiles especially as consumers are becoming prosumers (by producing their own power through solar rooftop installations). Smart Grid has been

identified as a key tool to achieve transformation towards a more digital and consumer centric grid, by policy makers and utilities. Ministry of Power (MoP) established National Smart Grid Mission (NSGM) to create a framework for initiating Smart Grid projects. HPSEBL is leveraging such initiatives to further improve its service delivery. Furthermore, HPPTCL continues to strengthen the state's transmission network – connecting the state's distribution network (to serve domestic demand) as well as with inter-state transmission system (for power export/import) – and forms a backbone to transmit power from power surplus areas to power deficit areas within the state. The transmission system needs augmentation as well as updation on a regular basis to transmit the power in a more efficient manner. The Program will support the state on its T&D investments leading to an improved and reliable access to power supply within the state.

12. **Hydropower is the primary source of power generation in HP.** The state government framed its own Hydro Power Policy in 2006 for harnessing the state's hydropower potential of more than 23 GW across 5 perennial river basins. Of this, about 10.8 GW has already been installed. Since the state has achieved 100 percent electrification, HP is a net exporter of power. Hydropower is not only a clean energy but is also capable of providing flexibility and storage capacity that will be needed by an increasingly dynamic Indian power grid with an increase in VRE. HP with around 15 percent of the hydropower potential at the national level and over 43 percent hydropower potential in the Northern Region has a critical role to play in India's energy transitions journey. Building on the lessons learned from the implementation of the state's 2006 Hydro Policy, GoHP has been adopting appropriate policy measures to meet environmental and social (E&S) objectives as well. While providing essential adaptation services to reduce the impacts exacerbated by climate change such as floods and drought, hydropower facilities can also be susceptible to climate risks due to their dependence on precipitation and their vulnerability to natural disasters. Hence, HP needs to further enhance its existing environmental and social management protocols sustainably while developing its power infrastructure.

13. **Thus, this state-led Program will contribute towards providing reliable power within the state; maintaining the stability of the world's largest synchronous national grid; supporting decarbonization not only at the state level but also at the national level and possibly at the regional level; and hence, will be an important and an integral part of the country's energy transitions story**. This will be achieved by undertaking reforms through promoting sustainability aspects with regard to the development of hydropower projects, better uptake of VRE across the country by valuing hydropower projects for its flexibility, making investments in the state's T&D assets, as well as strengthening institutional capacity of the various institutions in the state's power sector.

Relationship to CAS/CPF

14. **The Program is aligned with the Country Partnership Framework's (CPF) first focus area on promoting resource-efficient growth**, and more precisely with the specific objective (1.4) on increased access to sustainable energy. As mentioned in the CPF, the World Bank Group is committed to support the sectors and areas that are critical for facilitating growth and poverty reduction while promoting greater resource efficiency. The Program fits in with this focus area as it will contribute towards improving access to reliable and clean sources of power, in alignment with the GoI's and the state's SDG 7 targets. As mentioned in the previous section, the proposed operation supports the World Bank Group's corporate commitment to increase renewable energy uptake in the client countries and address climate change. The Program is also aligned with the WBG's goal of promoting shared prosperity.

Rationale for Bank Engagement and Choice of Financing Instrument

15. **World Bank has a long and successful history of engaging in HP through multiple projects that included direct lending to Nathpa Jhakri hydropower project in 1989 and Rampur hydropower project in 2008. Further, Bank also**

supported GoHP through two Development Policy Loans (DPL) to Promote Inclusive Green Growth and Sustainable Development in years 2012 and 2014, which supported, among other things, the promotion of environmentally sustainable and socially responsible hydropower development. Building on the work done previously and leveraging hydropower as a flexible resource in the state while investing in its T&D infrastructure will contribute towards achievement of the targets under the Paris Climate Agreement as well as the SDG 7 as it will help in decarbonizing the grid. Further, given that the VRE has already achieved grid-parity with fossil-fuel based power generation plants, the demand for clean energy in sectors beyond energy is already being noted. For instance, hydrogen which acts as a feedstock and a fuel for many heavy industries can be produced using VRE instead of fossil fuel-based electricity used currently. Flexible services from hydropower would pave a way forward to decarbonize many more sectors by contributing towards an increased uptake of VRE. Moreover, the Program would also like to demonstrate through HP that how other states and may be countries in the region could build further on this experience.

16. **As the Program will be anchored on the government's existing power sector program while enhancing its efficiency and effectiveness, the Program for Results (PforR) is considered the most suitable financing instrument**. While the Program will make investments in the state's T&D infrastructure and further the new-age technologies such as Smart Grid, it also aims to bring in further aspects of sustainability (such, as introducing Management Information System [MIS] for basin-level catchment area monitoring) and flexibility to the state's hydropower sector. No investments in hydropower projects is envisaged under the Program. Though Investment Project Financing (IPF) provides a demonstration effect through investments in a specific project, PforR has far more impact through its work at a structural level to introduce sustainability aspects in the government's planning process. Further, the PforR instrument allows a deeper focus on institutional strengthening, which is the cornerstone of this engagement. The Program will build capacities within the various HP power sector institutions in furthering their adaptation to the new-age technologies and handholding them through institutional strengthening.

17. **While the state has sufficient power availability, the existing T&D systems needs replacement with more efficient equipment having state-of-the-art technology, strengthening, and augmentation to meet its increasing power demand.** The systems are old, and augmentation has been slower than required. The Program intends to deploy state-of-the-art technologies (such as advanced power trade, and distribution efficiency through smart meters, sub-stations, feeder automation, and energy efficient distribution transformers) for development of a reliable electricity supply and auto-healing distribution system. This is especially important in hilly terrain where there are challenges in maintaining uninterrupted power supply and where restoration in case of a breakdown may take longer. The Program will seek to strengthen the power delivery extra high voltage (EHV) infrastructure and improve the efficiency of the distribution backbone to allow GoHP to achieve its goal of providing reliable and good quality power supply to its population. Such investments are also necessary to enable an increase in the state's trading of the surplus flexible hydropower and other renewable energy resources. The PforR instrument, provides the flexibility to support such investments along with the reforms as described above. Building on the Bank's previous engagements and from an IRP perspective, the Program will also strengthen the existing Basin Catchment MIS in a landscape approach, which allows planning and resource allocation jointly by stakeholder departments for hydro catchments. The other significant environmental and social aspects like, cumulative impacts known from existing Cumulative Impact Assessment (CIA) studies of various basins in the state, emergency preparedness plans, dam safety, downstream flows including e-flows, and enhancing implementation of benefit sharing mechanisms for local communities will also be strengthened and enhanced for sustainability as part of the proposed Program. The Program doesn't envisage any investments in hydropower projects.

18. **A results-based / disbursement linked approach using a PforR instrument will be used for up to 100 percent of the loan amount to finance investments and support reforms in the HP power sector.** This instrument will contribute

towards an improved use of overall public expenditure on the state's power sector while enhancing the performance of the state's own processes and institutions. Further, this Program can also serve as a demonstration case for other states as well as other countries that have a hydro-rich base and are planning to use it for improved integration with VRE resources to help them meet their respective climate change mitigation targets.

C. Program Development Objective(s) (PDO) and PDO Level Results Indicators

Program Development Objective(s)

19. The program development objective is to strengthen the capacities of the relevant institutions to develop and deploy Himachal Pradesh's renewable energy resources in a sustainable manner.

PDO Level Results Indicators

20. **Achievement of the PDO will be assessed on progress on a selected set of strategic indicators.** The preliminary list of PDO level result indicators is proposed as per result areas at the concept stage and will be further refined in discussions with GoHP during the preparation phase. Wherever the indicators are not measurable at this stage, the team will work on identifying and quantifying those, as applicable, during the preparation of the Program. The outputs under Result Area 3 could be verified on a sample basis by independent third-party verifiers after commissioning of the respective asset. The outputs under the other two result areas will be verified based on the reports provided by the respective power sector institution under the leadership of DoE, GoHP.

1. **Strengthening institutional capacities of the various state power sector utilities/agencies:** Since the various power sector utilities/institutions will play an important role in delivering the mandate set out by the Program, their capacity building and institutional strengthening is the foremost important pillar in this engagement. The Program will support the state's institutions in the development of the knowledge and skills required to undertake IRP, and to develop, manage, and operate the state's power system, to maximize the value of its hydropower and other renewable energy resources, and to efficiently plan, finance, and develop these resources over the longer term. The key output indicators will be:
    a. Development and adoption of capacity building and institutional strengthening plans for the respective power sector institutions
    b. Development and adoption of the digitization plans for the selected utilities (HPPTCL and HPSEBL)
    c. Increase in power traded by the state (percent)
    d. Introduction of SCADA and enhanced systems for SLDC's operations

2. **Integrated Resource Plan (IRP) and its Sustainability**: To realize the objectives of the Program, an IRP is essential. IRP involves considering various aspects of power sector in a holistic manner. For instance, this includes but is not limited to power generation sources – both hydro and other renewable energy, distributed energy sources, demand side management, energy storage systems, etc. allowing to efficiently meet the future electricity needs within the states. The key output indicators will be:
    a. Development and adoption of a State-level IRP for the period up to 2030
    b. Development and adoption of an action plan to allow flexible operations of the state's hydropower projects
    c. Implementation of web-based basin-wide MIS for project milestones (including for environmental and social aspects also)

d. Implementation of basin-wide monitoring of catchment area MIS for mitigating environmental and social risks
e. Meeting Renewable Purchase Obligations (RPO) targets of the state (percent)

3. **Promoting Resource Efficient Investments**: One of the important interventions of the Program will be to serve state's power consumption in an optimal manner through efficient investments. This would entail strengthening/augmenting the existing EHV power delivery infrastructure as well as modernization and automation of electricity network in major cities/towns across the State for improved reliability of supply and customer satisfaction. Further, the investments in the distribution sector to provide IT-enabled services to all the consumers through smart metering, online billing, payments, credit control, power quality measurement, grievance redressal platforms, etc. will also be done. The key output indicators will be:
    a. Reduced AT&C losses (percent)
    b. Increase in state's transmission (circuit kilometer [ckm]) and transformation capacity (mega volt-amperes [MVA])
    c. Increase in consumer indexing (percent)

D. Program Description

PforR Program Boundary

Government program

21. **The 'Drishti Himachal Pradesh-2030: Sustainable Development Goals'[4] highlights the state's vision of ensuring quality and affordable 24x7 power for all, with an emphasis on utilization of existing hydropower potential and additions to solar energy production.** While the state has already achieved 100 percent electrification, GoHP continues to strive to improve the quality of power supply to all consumer categories. For optimal utilization of its power sector infrastructure, coordination amongst various stakeholders becomes extremely important. The Drishti-2030 document notes that to meet SDG 7 targets, there is a need to reinforce electrical infrastructure every year through investments. GoHP has been working across various central and state level schemes across generation, transmission, and distribution to help it move towards the targets set forth as per the Drishti-2030 document. Some of the such important schemes/policies are described below.

22. **On generation, HP's 2016 Solar Power Policy notes that solar is the most viable option to supplement hydropower**, and its aims include contributing to the national objective of increasing the share of VRE in total energy consumption, empowering people in remote, and rural areas with 24x7 power through decentralized solar power supply and facilitating the achievement of RPO through capacity creation in the state. The Himachal Pradesh Electricity Regulatory Commission (HPERC) prescribed a long-term RPO, in line with the National Action Plan on Climate Change (NAPCC), under which, by 2022, HPSEBL would have to purchase at least 21 percent of electricity including 10.5 percent from solar sources of total energy consumption from renewable sources. It was estimated that while the energy available from non-solar sources was already more than the RPO, the state would require about 700 MW capacity against the solar RPO. Of this, the state has only about 40 MW[5] installed within the state and hence struggles to meet its solar RPO.

23. **On transmission, in 2015-16, under the Green Energy Corridor scheme, the MoP sanctioned investments in intra-state and inter-state transmission systems to remove system integration barriers for large-scale VRE project**

[4] http://planning.hp.gov.in/NewReleases/Drishti-HP-2030.pdf
[5] Of 40 MW, about 26 MW is ground-mounted solar and about 14 MW is rooftop solar (as of July 15, 2021).

across state transmission utilities in eight renewable energy-rich states, including HP. The scheme incentivizes wind and solar developers to connect directly to these Green Energy Corridors by promising zero transmission charges until 2022 for the projects connected to these lines. Phase I included investment in intra-state and inter-state transmission and Renewable Energy Management Centers (REMC) to integrate a total of 33 GW of VRE. Phase II aims to connect 100 GW of solar and 60 GW of wind generation capacity by 2022. As of December 31, 2019, only 147 circuit kilometers (ckm) of lines had been constructed in HP out of the target of 502 ckm for the intra-state transmission system.

24. **On distribution, the NSGM aims to "enable on-demand access and availability of affordable reliable quality power for all with optimal mix of conventional and renewable energy sources".** The Mission includes a focus on building capacity and developing preparedness for effective Smart Grid implementation at the state level. NSGM goals relating to Smart Grid rollout have been set for aspects including network mapping and consumer indexing, Advanced Metering Infrastructure (AMI); Distribution Automation / Supervisory control and data acquisition (SCADA); and, electric vehicles (EV). HPSEBL has been building on such initiatives of MoP and executed the Smart Grid pilot project at its industrial town of KalaAmb by implementing AMI for its 1335 Industrial consumers, distribution automation, and substation automation thereby addressing the functionalities e.g. peak load management, power quality monitoring, and outage management.

25. **Electricity being a concurrent subject, GoHP is undertaking interventions in the power sector through the mandates provided to the states by the central government under its various missions.** The power sector reforms began with unbundling of the HPSEB in 2010 that was mandated under the Electricity Act 2003. Over the time, various state governments including GoHP have been aligning their agendas with the central government's plans. Such plans span from achieving power for all to NSGM to promotion of VRE by adopting RPO targets and Green Energy Corridors to IPDS. Since the Program works towards holistic development of the power sector and engages across generation, transmission, and distribution segments, it will contribute towards the State's Vision as laid in Drishti-2030 that encompasses the state's various power sector policies and builds on the national level policies.

E. Initial Environmental and Social Screening

26. In accordance with the requirements of the Bank's Policy on PforR, the review of the current country systems for the management of E&S risks and impacts will be undertaken, gaps identified, and an appropriate mitigation plan will be developed. The Program's E&S Systems Assessment (ESSA) will review the extent to which the Program's E&S management systems are consistent with the six core E&S principles[6]. The specific objective of ESSA is to: (i) assess risks, benefits, impacts, and opportunities of the designed Program, (ii) review existing measures included in the laws, policy, and guidelines, (iii) assess institutional systems, practices, and capacities, and (iv) provide recommendations to strengthen institutional mechanisms for planning, implementing, and monitoring of E&S outputs and outcomes.

27. **Environmental Assessment**. Based on preliminary discussions with the various HP power sector institutions, the Program will contribute towards holistic development of the state's power sector. It would therefore be the key to establish environmental sustainability in the Program design and mechanisms, such as avoiding, minimizing, or mitigating impacts, and promoting data acquisition for informed decision making within existing legal and regulatory framework. The risks related to sector program, initiatives, and activities will be assessed and appropriate mechanisms will be developed during the assessment. In addition, specific negative list will be prepared to avoid high risk activities for the Program. Based on the assessment, the overall environmental risk rating will be determined and only those activities eligible for the PforR financing will be included in the final Program design.

[6] Bank Directive, Program-for-Results Financing; 2019

28. **Climate Change Vulnerability Context.** HP is expected to experience increasing threats from climate change as: (i) the mean annual temperature is projected to increase by 1.7-2.2°C in the 2030s with respect to the 1970s, (ii) the projected precipitation is likely to increase by 5-13 percent in the 2030s with respect to the 1970s, (iii) droughts are expected to become more severe in the state and the potential for replenishment of groundwater is expected to continue to decline, (iv) glacial lake outburst floods (GLOF) are of immediate concern. GLOFs originating in the upper Satluj River Basin (China) are a threat to downstream areas of eastern HP (SSAPCC, 2012). While the project aims to strengthen institutional capacities and build resilience of the power sector through IRP, advanced infrastructure, and IT systems, power sector infrastructure (across generation, transmission, and distribution) may become susceptible to various climate-induced impacts. Between 2007 and 2015, the estimated value of disaster damage and loss to power supply was Rs. 2157 lakh (HP State Disaster Risk Management Plan, 2017). Given the long life of T&D infrastructure (40-75 years), it is imperative to account for future impacts in policy and project design. Similarly, hydropower stations are vulnerable to changing water availability due to increased precipitation, changing river flows, and droughts. Hydropower plants with water storage facilities help reduce the impact of changes, but the estimated impacts are higher for the higher capacity plants (Mishra et al., 2020).

29. **Climate Co-Benefits.** The proposed Program will support interventions to both mitigate and adapt to climate change. As noted above, the Result Area 1 will strengthen the institutions for sustainable and holistic development of the state's power sector infrastructure. The Result Area 2 will contribute towards exploring hydro as a flexible resource to allow for a higher uptake of VRE within and outside the state as operators and planners would need to develop ways of understanding and anticipating increasing climatic and hydrological variability to ensure that existing and future facilities are designed or enhanced to be resilient to a much more variable climate. The strengthening of the existing systems based on the learnings on cumulative impacts as available from the existing basin CIA studies including safety will be a part of the proposed Program. The Result Area 3 will support adaptation with improved T&D systems and smart metering that aims to reduce losses resulting in higher availability of energy being served. Increase in any uptake of renewable energy, will contribute towards reducing GHG emissions. Other potential means to enhance the design of the Program and to better address vulnerabilities to the climate change will be explored during the preparation phase. The environmental, health safety, and social procedures will be mainstreamed in T&D areas to help address the climate vulnerabilities.

30. **Social Assessment.** The Program will build on the experience of the Bank's previous engagement in the state to strengthen and institutionalize social risks management and to enhance opportunities for stakeholders to achieve social development outcomes. The six core principles of PforR provides the framework for carrying out the social assessment of the risks and opportunities that may arise with investments to achieve the results of the Program. The social risks are likely to be associated with: (i) weak process of planning and implementation of construction-induced adverse impacts for augmenting T&D and catchment area treatment whereby private and common assets may be required temporarily and/or permanently, (ii) lack of systems for sustainable stakeholder engagement and citizen feedback, (iii) ineffective grievance redressal mechanisms, (iv) translating the opportunities embedded in the states' policy on Benefit Sharing into actionable plans for the sector as whole, (v) inequitable distribution of benefits that may marginalize women and other vulnerable groups, (vi) lack of systems for reporting on labor welfare laws that are required under contracts, (vii) adverse impact on host community with influx of labor during construction, (viii) weak processes to address SEA-SH (Sexual exploitation and Abuse – Sexual Harassment) and Gender Based Violence (GBV) at workplace and construction sites, and (ix) lack of systems for monitoring and evidence based reporting on overall management of social risks and opportunities. In addition, the need for labor management and protection at work sites and camps, as well as labor influx management (including protection against SEA and GBV) are to be foreseen. The Program will support strengthening of systems and institutional capacity to implement and monitor

national and state's legal and policy framework that recognizes these risks and includes safeguard measures to address them. To maximize benefit sharing and manage transition of relationships between producers and consumers and for the overall risk management of the Program a robust communication strategy and citizen interface will be required. More importantly, the Program aims to address gender gap on decision making on utilization of funds for benefit sharing. Similarly, the Program will include specific mechanism to ensure access to opportunities for differently abled people and old and infirm. A grievance redress system will also be designed/leveraged to address complaints during the planning and implementation stage of the Program.

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Implementing Agencies

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