ANNEX 6: FURTHER DETAILS ON OPTIONS TO IMPROVE THE CLIMATE RESILIENCE OF ALBANIA'S ENERGY SECTOR

Next steps

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Informational

* Compile digital databases on historic and observed climatological and hydrological conditions. Provide free access on the Web to these data.

* Improve coordination of Albania's forecasting agencies (the Military Weather Services, Institute of Energy, Water and Environment and the National Air Traffic Agency), by sharing data, expertise, and financial strength to support better quality forecasting. These organizations could collectively engage with energy-sector stakeholders to understand their data needs to support management of the energy / climate interface.

* Upgrade Albania's weather and hydrological monitoring network, focusing most urgently on the Drin basin:

- Monitoring sites could be equipped with automatic devices able to record and transmit in real-time the key weather variables (rainfall, runoff, temperature, sunshine hours, wind speed, reservoir head, evaporation, turbidity, water equivalent of snow).
- Measure sedimentation in reservoirs, which has not been measured for 40 years.
- The data above could be collected by KESH and used in managing reservoirs for safety and energy production.
- Wind data are also required, measured at the height of wind turbines (80 to 100 m) to ensure wind farms are designed appropriately and will operate efficiently. Once these data are available, explore whether high wind speeds coincide with periods of lower rainfall, in which case wind power could provide a useful resource when generation from hydropower facilities is lower.

* Develop in-country or obtain weather and climate forecasts appropriate for energy-sector planning needs:

Short-range forecasts (1 to 3 days ahead) could be provided by IEWE—including weather products for energy demand forecasting (temperature, cloudiness), reservoir management (rainfall), safety and disaster management (heavy rainfall, high winds, lightning strikes)

- * Medium-range forecasts (3 to 10 days ahead) could be obtained by subscribing, for example, to the European Centre for Medium-range Weather Forecasting regional forecasts—particularly for use by KESH—to facilitate effective management of water reserves for hydropower generation
- * Seasonal forecasts (several months ahead) could be developed by IEWE from statistical models of teleconnections, using observed and historical data for application to energy-sector planning
- Climate change scenarios (years and decades ahead):
    - These should be at a spatial resolution suitable for river basin planning (e.g., 50 km × 50 km)
    - They should be developed by downscaling ensembles of outputs from global climate models (GCMs), which are provided by Met Agencies around the world, coordinated through the World Meteorological Organization.
    - The GCMs to be included in the ensemble should be those that are best able to

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simulate the observed (historic) precipitation. * Consider providing free access to these data to energy-sector stakeholders. Short-range and medium-range forecasts should be available in real time via the Web.
Undertake further research on climate change impacts using downscaled climate change scenarios, researching the impacts of changes in seasonal conditions and extreme climatic events.
* Update watershed models and maps of Albania's climate to support planning for optimization of future hydropower assets.
* Join networks of experts working on climate and climate change issues; for instance, WMO, EUMetNet, and EUCOS.
* Create partnerships between weather, climate and hydrological experts, and energy-sector stakeholders to enhance dissemination of dissemination of information and to ensure that data providers understand user needs.
* Strengthen regional cooperation on sharing of weather/ climate information and forecasting and undertake research to develop shared understanding of regionwide climate change risks and their implications for energy security, energy prices and trade, including: • Data exchange on historical and recent observed data • Joint studies and monitoring activities with institutions in neighboring countries, especially in the two upper watersheds of the Drin and in the Vjosa watershed • Regional studies to establish whether all South East Europe's watersheds are positively correlated (i.e., whether they experience wet or dry years or seasons at the same time, and whether wet and dry years correspond with cold and hot years): o If so, the existing and proposed hydropower assets in the region may be exacerbating the region's vulnerability to climate risks. o If not, it may be possible to undertake an investment strategy to diversify risk across the region.
* Work with regional partners to develop better knowledge of the linkages between energy prices and hydrological conditions in the face of climate change: • Marginal costs of energy production are higher in dry years than wet years. • Some data linking these factors are available for 2010 and 2015. • Research should be undertaken to develop data out to 2020 and 2030, taking account of climate change projections.
* Improve understanding of current rates of coastal erosion and of the impacts of rising sea levels and storm surges on future erosion rates, for better management of coastal assets (e.g., TPP and port facilities).
* Learn from experience of energy-sector experts worldwide on managing current and future climate-related risks (e.g., hydropower experts in Brazil and EDF in France, both of whom have been researching these issues for some time).
* Monitor changing ground conditions and concentrations of pollutants at Patos Marinza.
Identify whether contaminated land remediation at Patos Marinza would be effective / quick enough in the light of climate change impacts and if not, develop additional management plans while rehabilitation is underway.

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* Monitor potential for pollution incidents at coal mines due to heavy downpours.
***Institutional:* Managing current climatic variability and changes in average climatic conditions**
* Improve and exploit data on reservoir use, margins, and changes in rainfall and runoff to improve management of existing reservoirs.
*† Consider providing incentives for energy-efficiency measures to reduce demand.
* Support enforcement of measures to reduce technical and commercial losses of water.
* Work with water users in the agricultural sector to devise agreed strategies for managing shared water resources with owners of hydropower plants. This could draw on the outcomes of World Bank research investigating climate change impacts on agriculture in Albania. The outcomes of the research presented in this report and the agricultural assessments could be integrated to consider the cross-sectoral issues around water management.
*† Support enforcement of measures to reduce commercial losses from the power distribution system.
Incorporate robustness to climatic variability and climate change in regulations, design codes, energy-sector proposals, site selection decisions, environmental impact assessments, contracts, public-private partnerships for new energy assets and other policy instruments for new facilities.
Ensure that proposed locations for new LHPP will be sustainable in the face of climate change risks.
Assess use of tariffs and incentives to promote climate resilience of energy assets.
Consider amendment to regulations to capture climate change costs in energy prices and the price of water.
* Strengthen measures to control illegal logging that contributes to soil erosion and siltation of reservoirs.
Set up a committee to provide oversight and monitoring of progress on climate change adaptation.
***Institutional:* Managing climatic extremes**
Review and upgrade Emergency Contingency Plans (ECPs) for LHPPs, to take account of expected increases in precipitation intensity due to climate change, ensuring that they include: monitoring of precipitation; modeling of river flows; communication instruments and protocols for downstream communities; and plans for evacuation.
* Consider use of Power Purchase Agreements with neighboring countries and large energy users to assist Albania in coping with the impacts of extreme droughts on energy security. This would need to be supported by real-time data on regional runoff and precipitation (as outlined above), and could include: • Off-take arrangements with countries generating energy through less climatically vulnerable assets such as thermal power plants • Power swap agreements, whereby Albania could buy thermal energy from neighbors at low cost during off-peak hours at night while allowing its reservoirs to fill, then recoup the energy during the next day's peak load hours via a higher fall • Instituting formal arrangements with large energy users such that they agree to their electricity supply being cut off in an extreme situation, in return for which they pay less for electricity
* Investigate applicability of weather coverage and insurance instruments for energy-sector risk management.

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* Support development of contingency plans in collaboration with stakeholders for better management of extreme climatic events and ensure that resources could be mobilized effectively to respond to them.

* Ensure that regulations on dam security are enforced.

Physical / technical

Optimize existing energy assets:

- * Improve maintenance of existing assets, many of which were designed and constructed several decades ago.
- Check that the sizing of existing assets is robust to climate variability and projected changes in average climatic conditions and explore whether water storage could be increased at reasonable cost to help manage seasonal variations.
- Review old and/or inefficient equipment and identify cost-effective measures to improve efficiencies, such as:
    - Clearing / redesigning trash racks
    - Upgrading turbines and generators
    - Replacing equipment to reduce water losses (e.g., shut-off valves)
    - Improving aprons below dams to reduce erosion
    - Raising dam crest on Fierze
    - Increasing capacity of spillways on Fierze and Komani dams
    - Developing pump storage scheme on Drin river cascade
    - Digging wider channels for SHPPs

* Reduce losses:

- Reduce electricity transmission losses.
- Reduce losses of water—hold dialogues with stakeholders sharing watersheds to discuss losses and establish how best to work together to reduce them.
- † Improve demand-side energy efficiency through incentives (e.g., for insulation and energy efficient appliances) and enforcement.

Ensure new assets are resilient:

- For new assets at the design stage, review the robustness of design and site locations to climatic variability and projected climate change—including design of energy generation assets as well as associated infrastructure, such as port facilities.

*† Diversify energy generation asset types into non-hydropower renewables and thermal power plants, ensuring that site selection and design are resilient to climate change.

† Increase hydropower installed capacity, ensuring that new facilities are designed to cope with changing climate risks.

*† Provide better interconnections to facilitate regional energy trade.

*† Reduce energy demand and improve energy efficiency through greater use of domestic solar water heating, improved building standards, use of lower energy appliances, and use of alternative heating

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sources other than electricity.
Optimize transmission and distribution by reducing technical losses (e.g., insulation of cables, under grounding of critical cables, consider DC rather than AC for long lines).
*† Install alternative fuel sources (other than electricity) for heating buildings, such as solar water heaters, geothermal.