Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

Flexibility is Key to the successful Integration of variable Renewable Energy Sources in Chile

The energy sector is accountable for approximately 70% of Chile's greenhouse gas (GHG) emissions and plays a key role in the country's mitigation efforts. Currently, the share of renewable energies (RE) in the Chilean electricity market is increasing rapidly. RE sources already represent 40% of the country's electricity generation and are expected to grow by around 60% by 2035.

Chile's spatial distribution, spanning nearly 4,300 km from north to south, puts it in a privileged position in terms of RE resources. While the Atacama Desert in the north stands out because of its dry climate and some of the world's highest solar irradiance, the south has exceptional water and biomass resources and the long coastline makes for great wind potential in many parts of the country. However, the spatial and temporal distribution of these resources does not necessarily coincide with the electricity demand of industries and the population – a challenge faced around the world as shares of variable renewable energies increase.

Chile has a liberalised electricity market, with private market actors making investment decisions and the state playing a regulatory and administrative role. Increasing system flexibility in order to allow for the efficient integration of these new variable resources is becoming an important task for the authorities and is key to ensuring the sustained expansion of RE and harnessing the significant GHG mitigation potential of Chile's energy sector.

Through the International Climate Initiative (IKI), and operating on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has supported the Chilean Ministry of Energy since the initial stages of renewables expansion through a series of projects. Currently, the project Promoting Solar Energy in Chile, which is being carried out as part of the German Climate Technology Initiative (DKTI), is supporting the application of flexibility solutions in Chile. Key activities include:

Stakeholder Dialogue

Through dialogue formats with key public, private and academic actors in the electricity sector, based on objective information gathered collaboratively, it has been possible to de-mystify RE and establish common knowledge on the opportunities and challenges imposed by variable generation (wind and solar). This forms the basis for constructive discussion on technical and regulatory improvements and feeds into long-term policy strategies such as the Energy Policy 2050, which has set the target of 70% renewable electricity generation by 2050, and the Chilean NDC, which is aiming for a 30% reduction in GHG emission intensity by 2030.

Quality forecasting of renewable power generation

A centrally managed forecasting system for variable RE production supports the grid operator in planning system operations and reserve provision. It allows better foresight with regard to renewable generation and enables improved decision-making with reduced costs for system operation. Without appropriate forecasting, system operators tend to limit the amount of variable energy resources on the grid in preference of stable energy generation, generally provided by emission-intensive coal and gas power plants.

Modern Grid Code Requirements

The grid code is a technical regulation that defines the basic requirements and tasks that must be fulfilled by all actors in the electricity system for them to be permitted access. The reform of the grid code, implemented in cooperation with the National Energy Commission CNE, allowed for higher flexibility in the system by elevating requirements on frequency and voltage control to the latest international standards for both conventional and renewable generation. Thus, the system operator now relies on more flexible and more automated assets in order to maintain grid stability, allowing higher shares of variable renewables to be dispatched that otherwise would have to be curtailed.

Flexible fossil power generation

Existing fossil fuel-based power plants can ensure a large degree of flexibility in the grid. However, if they do not operate in a flexible way they can also form a major barrier to market entry for RE, resulting in a more expensive electricity system and higher GHG emissions. For this

reason, Chilean fossil power plants are benchmarked against similar units in Europe to detect flexibility gaps and comparisons of international market mechanisms are used to facilitate the design of appropriate ancillary services in the Chilean context. Furthermore, lifecycle analyses of privately operated Chilean fossil power plants represent an important source of input for the long-term energy planning executed by the Ministry of Energy, since they allow the Chilean Government to foresee the transition of Chile's energy matrix from fossil fuels to renewable energies and to prepare accordingly.

Lastly, the project completed a study evaluating the impacts of bioenergy deployment policies. This will contribute to the on-going debate on how the Indonesian Government can best develop supporting policies to attract private sector investment in RE. Policies can highlight the positive contribution of bioenergy utilisation towards achieving RE and climate targets, while creating job opportunities, increasing productivity, stimulating the biomass industry and promoting rural development.

The above-mentioned activities, funded by the BMUB, support the Chilean Government in its transition towards a sustainable energy sector. They strengthen Chile's capacity to achieve its NDC targets in a timely manner and even to set more ambitious targets in the future.

Imprint
Published by: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)
Division KI II7 · 11055 Berlin
E-Mail: KIII7@bmub.bund.de · Internet: www.bmub.bund.de/en/
Design: MediaCompany – Agentur für Kommunikation GmbH
Photo credits: GIZ, Chile
Date: August 2017

Contact: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Rainer Schröer
Marchant Pereira 150
Santiago, Chile
Email: rainer.schroeer@giz.de
www.4echile.cl