



AN INSTITUTION OF



WHAT IS AN IRRP?

IRR is a shortened form of **Integrated Resource and Resilience Plan** and is an enhanced version of the traditional Integrated Resource Plan, or **IRP**. The **IRP** has been used in electricity sector planning for several decades and at its inception, represented a major planning and policy innovation.

The goal of an **IRP** is to identify a least-cost mix of resources to reliably supply a region's electricity needs over the long term.

IRPs are called integrated plans because they consider many different resources to satisfy the need for electric power. These resources can include:



fossil-fueled power plants using diesel engines, gas turbines and steam turbines,



or renewable power plants using solar PV, wind, geothermal, and hydropower.

They also include more distributed resources, like rooftop solar PV systems and energy efficiency programmes. While many find it strange to think of efficiency as a resource, the more energy we save, the less we need to produce to meet our needs.

Beyond meeting the need for electricity at an optimal cost, the mix of resources identified by an **IRP** must meet other established criteria, such as high availability, stability, reliability, among others. A core element of the **IRP** is this process through which we can select an optimum or ideal plan based on all our resource options and all our constraints. All of the above describes the goals and methodologies of the **IRP**.

The **IRR** increases the ambition of the **IRP** beyond the least-cost, in order to develop a least-regret plan. It does so by recognizing the importance of incorporating resilience into the plan. This means that the entire power system, including power plants, power lines and substations must be able to resist or rapidly recover from hazards such as hurricanes, floods, heatwaves and handle big changes in demand such as those seen during the COVID-19 pandemic.

Lastly, remember that **IRRPs** are guided by countries' goals, commitments and policies. Input from stakeholders is critical to a successful **IRR** that reflects the needs and priorities of the society it plans for.

PRIMARY GOALS OF IRRPs:



Ensure a reliable source of power for all



Minimize our negative impacts on the environment



Enhance the resilience of the power system to local hazards and risks



Minimize cost while still meeting our needs



Enable a sustainable future

WHY SHOULD WE DEVELOP AN IRRP?

We plan in order to determine the actions necessary to meet a desired goal; in this context, our goal is a resilient Caribbean. While planning is important to almost every activity, it is critical for electric power systems for a few reasons:



EXPENSE:

Power plants and other parts of the electric grid are expensive, and it is consumers who must ultimately pay for all these investments. Decisions on how, when and where we invest in the sector must be examined carefully;



COMPLEXITY:

The electric grid is a complex system of infrastructure, devices and power lines which are all linked together. Ensuring that these all work together and operate smoothly is a complex task;



IMPORTANCE:

Many critical aspects of modern society require electricity including water distribution, health care and communications;



ECONOMICS:

Much of our countries' economic activity is driven by electric power; residents, businesses and entire industries depend on and participate in grid activities. There is a strong link between energy and the economy;



MASSIVE CHANGE:

Much of our current power infrastructure is old and grids around the world are now being modernized. At the same time, technological changes, such as the advancement of renewable energy, energy storage and electric vehicles, create new possibilities for energy companies, businesses, and households. Both the risks and opportunities of this transition must be considered and planned for;



VULNERABILITY

The power sector and its assets spread across our countries are exposed to a variety of hazards. The risks presented now and in future must be examined and guarded against;



UNCERTAINTY:

We are much more uncertain about what life will be like in 10 years than what it will be like next week. Despite this, we must build infrastructure that can last 20 years or more. Any plans we make must account for this.

With all these things to consider, a proper planning process specifically designed for modern electric power systems is recommended. CCREEE believes that the IRRP is just that process, and that it will lead to better outcomes for our region's electric sectors and in turn, our livelihoods.



HOW WILL AN IRRP IMPACT ME?

The goals of the IRRP filter right down to you, the citizen. By determining the investments to be made in your country's power system, the IRRP will help determine the cost, reliability, efficiency and resilience of your electricity services and the environmental benefits you will enjoy.

On September 18th, 2017, The Commonwealth of Dominica was one of the first islands in the path of category 5, Hurricane Maria. Post-disaster assessments by power company DOMLEC revealed significant damage to its power plants, severe damage to 85% of its utility poles and power lines and, all 36,499 customers were left without power. The road to recovery included the straightening or replacement of 11,374 poles and repair or replacement of just under 550km of high and low-voltage conductors. Three months later, only 25% of the utility's customers were connected and receiving power.

Dominica's experience raises an important point for us all. While we build greater resilience into our power plants and our grid through the IRRP, the CCREEE recognizes the importance of building resilience at all levels in our communities. The buildings and facilities in which we live, work and use electricity must themselves be resilient. They should adhere to building codes, particularly those relevant to the Caribbean; the Caribbean Regional Energy Efficiency Building Code (CREEBC) and subsidiary codes that support resilience and energy efficiency.

While category 5 hurricanes are always high impact, catastrophic events, consider that the actions we take can increase or decrease our vulnerability and so, our ultimate risk. The case of Puerto Rico is a telling one. While the island also suffered greatly the effects of Hurricane Maria, industry analysts noted that a long history of underinvestment may have increased vulnerabilities in the sector. As if to emphasize the point, the island's road to recovery has been extremely difficult.¹

Hazards like hurricanes are only one part of the story. Outside of increasing the risk of damage from periodic hazards like hurricanes, poor planning often translates to unconstrained costs of service and low reliability. Historical regional reliability statistics indicate that many of us understand these impacts; and it is in the absence of reliable and resilient power that one most clearly

understands its value. Unreliable power means unreliable health services, unreliable water supplies, unreliable means of communication and a challenging business environment, particularly for small businesses.

IRRP's are how our societies can responsibly plan to ensure consumers do not suffer the hardships associated with reduced or unreliable access to power – and that will undeniably benefit you.

¹ Rebuilding Puerto Rico's Power Grid: The Inside Story via IEEE Spectrum <https://spectrum.ieee.org/energy/policy/rebuilding-puerto-ricos-power-grid-the-inside-story>





Country Name	Belize
Country population	398,050 ^[1]
Existing Energy Profile ^[2] (2017)	
Diesel	2%
Fuel Oil	3%
Bagasse	13%
Hydro	45%
Solar PV	<1%
Imports ^[4]	37%
Country-specific criteria	Increase resilience, increase energy access, mitigate the effect of natural hazards, sustainable economic development at least sustainable cost. Least-regret approach to underpin analysis
Country-specific challenges ^[3]	Resilience, loss reduction, electrification of rural communities and options to serve the hinterland, e.g. through grid-tie or micro-grids, must be tackled in Belize
Existing plans	IRP-does not look at natural disasters.
Uniqueness of IRRP approach	The CFE interconnection between Belize and Mexico is a unique feature of Belize's electricity sector. A large penetration of hydropower and increasing hazard impacts make resilience of immediate concern in Belize.

[1] CCREEE Energy Report Card for Belize (2018)

[2] BEL2017 Annual Report

[3] Olade Report, Assessment of the EGS & its alternatives of Belize

[4] Grid connection through the CFE tie-line to Mexico



CCREEE About Us

CARIBBEAN CENTRE FOR RENEWABLE ENERGY & ENERGY EFFICIENCY

The **Caribbean Centre for Renewable Energy and Energy Efficiency** (CCREEE) is a specialized institution of the Caribbean Community (CARICOM).

Established in the framework of the Global Network of Regional Sustainable Energy Centres (GN-SEC), The CCREEE is the implementation hub for sustainable energy activities and projects within the CARICOM region. Within the CCREEE's climate resilience strategic programme, the Centre is undertaking the development of IRRPs for several CARICOM Member States. These IRRPs are facilitated by kind financial support from the German Federal Ministry of Economic Cooperation and Development (BMZ) and technical support from the German Corporation for International Cooperation (GIZ).

Visit: ccreee.org/irrp to learn more

