



## Power Generation

Our extensive experience measuring loss and damage in this unique and challenging industry encompasses a wide range of operations, facilities and situations.

The construction of power generation plants is expected to increase around the world over the next twenty years due to rising demand, ageing facilities and tougher environmental emissions standards.

The challenges this industry faces in operating these facilities, developing new technology for cleaner and renewable power and updating existing generating facilities and transmission infrastructures will create risks faced by few other industries.

We have quantified damages across virtually all types of hydro-electric facilities, renewable power sources such as solar and wind and thermal plants including coal, natural gas, nuclear, bio-mass, geothermal, waste, diesel and co-generation.

When our clients ask us to quantify a power generation loss, we can perform the following types of services:

- Examine operational, financial and management reporting records
- Interview key management, sales and operations staff
- Assess criteria, assumptions and methodology used for forecasting capacity and generation
- Compare forecasted generation to actual during the period prior to, during and following the loss period
- Consider the impact of non-loss related factors such as weather, environment and market prices
- Determine the impact of changes to planned maintenance cycles and unrelated operating

conditions or events on revenues during the loss period

- Assist in the analysis of decision-making process in relation to loss mitigation opportunities
- Conduct market studies in relation to demand, market pricing, dispatch hierarchy, etc., if/when needed
- Communicate the progress and results of the analysis in a clear and timely manner
- Expert and consulting witness testimony

## **Hydroelectric Power**

We have been engaged in a multitude of hydroelectric power plant losses resulting from such varied events as machinery breakdown, windstorm damage, floods, other meteorological events, etc. Our experience spans across the globe, and while many of the losses relate to Business Interruption coverage, we have also been engaged in a number of Delay in Start-Up losses.

When dealing with hydro plant losses, it is important to understand the nuances involved in estimating generation and revenue when dealing with run-of-the-river plants in contrast to plants with water reservoirs. Rainfall statistics, seasonality and environmental flows should be considered in the business income loss analysis. Perhaps one of the most important concepts relates to the “merit order” followed by grid operators in many countries to allocate demand across plants. There are of course many other factors that must be considered in terms of capacity and generation (for example, planned maintenance and typical unexpected outages, etc.) and pricing (for example, spot prices, contractual prices, government-mandated pricing structures, etc.).

## **Geothermal Power**

Geothermal energy is produced by using heat generated from within the Earth’s core that is harvested as a renewable resource to generate electricity. Various processes and technologies exist to harvest and use geothermal energy, including dry-steam plants, flash-steam power plants, binary geothermal plants and enhanced geothermal systems.

Each of these technologies has its own characteristics which are very important to consider when assessing BI losses. Sometimes the steam field operation is independent of the power generation plant. Depending on where in the world the power plant is located, it is important to understand the calculation of royalties and the various fees that the geothermal plants have to pay to the government or land owners for using the steam.

In addition, there are several other aspects such as capacity, generation, plant availability, planned and unplanned outages, pricing (based on PPA or open market), government incentives offered to renewables etc. that should be taken into account when assessing such losses.

## **Biomass / Waste to Energy**

Biomass or waste to energy plants utilise a range of fuel sources, including municipal waste, biomass, commercial and industrial waste, and waste wood. Fuel is burned in a large incinerator with the heat going to a boiler to generate steam to drive a turbine. In some plants/countries, steam is also used for heating within local municipalities.

MDD has been hired to quantify waste to energy plant losses around the world, from the UK, Scandinavia to the United States of America. Common loss incidents for assignments that we have worked on include turbine failure (trip), fire in incinerators, and boiler outages.

When measuring generation and revenue for biomass plant losses there are many factors to consider. These include seasonality in projected electricity generation, electricity generation adjustments for transmission and distribution factors, electricity generation valued at contract price or a combination of contract and spot prices, planned maintenance brought forward and carried out during the loss period, business rates savings and waste revenue savings and overtime costs for staff.

**Wind Power**

Wind power is the use of wind turbines to generate electricity. Next to hydroelectric power, wind energy is the second largest renewable energy source on the planet. Generally speaking, wind turbines are installed in groups known collectively as wind farms. Such farms can be located on land or offshore. Unlike, hydroelectric power, as an example, wind power is a variable renewable energy that, in conjunction with weather forecasting, can allow the network to adjust for changes in overall energy demand. The largest wind farm is located in China and has a capacity of nearly 8,000 MW (or about 8 average nuclear reactors).

As with other renewable energy sources, it is vital to understand both the interaction between the output of a wind farm and weather conditions as well as the relationship between the wind farm and how they are utilized by those managing the energy grid. Losses in this field can result from damage to the actual structure (with the most likely being damage to the blades or gearboxes) as a result of maintenance issues, design/mechanical defects, lightning strikes and other weather-related issues.

**Solar Power**

Solar power is simply the power obtained by harnessing the energy of the sun's rays. More specifically, the use of the sun's energy through the use of photovoltaic cells in solar panels and transparent photovoltaic glass to generate electricity or through the use of solar thermal energy to make steam which is converted to energy through the use of a turbine. Solar power stations are often referred to as solar power plants, solar parks, solar farms and solar thermal stations. The largest operational solar power station currently has a capacity of 392MW.

Solar power generation is the fastest growing renewable energy growth segment. It is expected that in just the next three years, worldwide solar capacity will more than double. MDD has been engaged in a variety of solar losses ranging from small co-generation installations to large solar farms around the world.

The most significant challenge when dealing with solar power losses is that the output from a solar facility can vary significantly based on the weather/climate in a region. Accordingly, specific attention must be paid to weather patterns both in terms of expected output during the loss period but also in terms of analyzing historical records to generate an appropriate generation model.

For an accurate, credible assessment of a power generation related loss, hire MDD.