

# Preface

A storm is mounting. You were alerted about the approaching severe weather conditions by the weather forecaster. You're now sitting in front of your monitors trying to decide how many power units to commit. The precise power mix, whether it is more economical to run more hydro instead of wind for instance, is also key but you don't have much time to take a decision. With a combination of modeling tools and expert knowledge, you're trying to figure out whether the thick deck of clouds will make the 100 MW solar power plant ramp down within minutes or hours. And can some of this shortfall be partly compensated by the newly installed 150 MW wind farm? Meanwhile, gas generators will most likely be safe, but will there be enough time to start them up and avoid that horrific black out?

It has been a long day, but luckily the effects of this weather event have been well handled, as many tools were available to assess this situation and act on it efficiently. The seasonal forecast had predicted that such storms would be likely this month; thus the maintenance department had performed preventive maintenance in advance. However, it makes you wonder whether storms like this will become more frequent and impactful in the future. Already we are seeing an increasing number of meteorologically derived disasters. Warmer temperatures, as projected decades from now by climate models, will very likely bring even more severe events. It is almost a no-brainer to factor these climate effects into energy sector risk management decision-making. But exactly how to do this may not be straightforward.

It is the purpose of this book to provide the meteorological knowledge and tools to improve the risk management of energy industry decisions, ranging from the long-term finance and engineering planning assessments to the short-term operational measures for scheduling and maintenance. Most of the chapters in this book are based on presentations given at the inaugural International Conference Energy and Meteorology (ICEM), held in the Gold Coast, Australia, 8–11 November 2011 (see <http://www.icem2011.org>). The main aim of the conference was to strengthen the link between Energy and Meteorology, so as to make meteorological information more relevant to the planning and operations of the energy sector. The ultimate goal would be to make the best use of weather and climate data in order to achieve a more efficient use of energy sources. This book seeks to realize the same objective.

It is worth highlighting the close connection, in terms of temporal and spatial scales, between decisions in the energy industry on the one hand and natural

meteorological events on the other. Indeed, decisions in the energy industry extend from the tiny temporal scales related to electrical instabilities, to the short-term typical of supply and demand balancing, to the longer terms typical of maintenance through to planning. Similarly, meteorological phenomena occur over essentially all time and space scales from the tiny scales of turbulence, to the short-term and small-scale events such as tornadoes, to the longer/larger hurricanes, through to climate change via El Niño. Often there is a strong link between a particular meteorological phenomenon and its implications for the energy sector. Thus, for instance, a hurricane, which typically lasts several days and affects an area of a few thousand kilometres, will be factored in energy operational and maintenance decisions over the span of a number of days, and with an advance notice of several days (hurricanes can be predicted several days in advance).

The book is structured to emphasize the role of the energy industry in terms of meteorological requirements. Indeed, unlike the more standard approach, which begins by presenting meteorological information, as if the latter was in search of a purpose, here we have genuinely attempted to put energy in the driver's seat. Such order is also reflected in the titles of the book parts, as with *Why Should the Energy Industry be Concerned About Weather Patterns?* of Part One.

There is no doubt that Energy and Meteorology is a burgeoning inter-sectoral discipline. It is also clear that the catalyst for the stronger interaction between these two sectors is the renewed and fervent interest in renewable energies, especially wind and solar power. This connection is also apparent from the content of the book. However, it must be realised that weather and climate information is also critical to managing the energy supply from other energy sectors (e.g., off-shore oil operations) as well as understanding and estimating energy demand. We have tried to stress this broader dependency in various parts of the book.

The book could not have come together without the ICEM 2011 meeting. Hence, we are indebted to the superb support of Elena Bertocco, the extraordinary organizational role of Aurélie Favennec, the efficient work of the steering and scientific organising committee, and the keen contributions of the conference delegates during an intense and fascinating week along the beautiful ocean shore of the Gold Coast of Australia.

It is a great pleasure to acknowledge the tremendous assistance of Danielle Stevens who has indefatigably and very diligently been assembling the book, even when prodding was needed to obtain responses from chapter authors. We are also indebted to Pierre Audinet for his strong support in shaping this book and for suggesting what we believe is an appropriate and attractive book title. We also wish to thank all the authors of the book for chipping in and helping to carry out thorough reviews of all chapters of this book.

We do hope you will enjoy this book. Happy reading!

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