1. Making the most of limited meteorological predictability for energy
Lead: Jethro Browell
All forecasts are wrong, but many are useful. In this session, we will review the state-of-the-art energy forecasting tools and our understanding of what limits their predictive power. We will discuss how to make the most of limited predictability, e.g., through use of probabilistic forecasts, and try to plot a course towards forecast and decision improvement.

Focusing on timescales from hours to day-ahead, we'll look at examples of best practice and determine sources of uncertainty, and their interactions, which limit predictive power. We'll explore how users can/could/should make use of forecast information, and how both forecasters and forecast-users can drive improvements here. We'll consider how to reconcile different types of uncertainty information, such as ensemble numerical weather predictions and statistical models of consumers' response to temperature, and seek to design appropriate frameworks for disaggregating and understanding forecast uncertainty.

2. Climate uncertainty and power system planning
Leads: Jan Wohland and Alex Kies

A typical goal of power system planning involves identifying the infrastructure required to satisfy the demand of energy consumers at minimal overall cost. In the past, power systems were planned on the premise of controlling a small number of centralised generation units such that they delivered power to end users on demand via extensive transmission and distribution grids. Increasing shares of weather-dependent renewable generation fundamentally challenge this premise and make novel approaches to power system design and operation necessary. As power system infrastructure evolves slowly - on timescales of decades - climate uncertainty has therefore become a major aspect of future power system design.

The following questions revolving around climate uncertainty and power system planning will be discussed:

- What is meant by climate uncertainty in power system planning and how can it be quantified?
- Which power-system technologies (or combinations of technologies) can be utilized to reduce the impact of climate change and climate uncertainty?
- How can climate uncertainty be compared to other sources of power system planning uncertainty (such as those of economic, social or technical assumptions)?
- How do we best approach climate uncertainty: should the focus be on producing 'more accurate' longer-term climate predictions or on 'improving' power system design methodologies to ensure that their solutions are robust to a wider range of possible future climatic conditions?
- Which aspects of climate uncertainty matter most for different types of stakeholder (e.g., investors, regulators, grid operators, manufacturers)?

3. Definition and assessment of weather stress events for energy
Lead: Hannah Bloomfield
There is a large amount of literature emerging on extreme events relevant to the operation of energy systems around the world. The definition of these extreme events is varied, encompassing a spectrum of definitions from extreme weather events (such as heatwaves, large storms, wildfires, or droughts) or an extreme energy system response (such as forced curtailment of generators, infrastructure damage, or system adequacy issues). This breakout group will build on discussions from the

NextGen2020 meeting, focussed around how the definition of 'extreme events' differs between the climate and energy communities.

We will discuss how improved collaboration between the fields can benefit our understanding of extreme events, including:

- What is an extreme event from the perspective of energy and of climate science, and how do these perspectives differ?
- What tools and metrics exist for identifying extreme events? To what extent do they need to be adapted for energy-climate applications and what challenges are there in doing so?
- What is known about the weather/climate drivers of extreme energy events?
- Can we identify gaps in existing extreme events analysis for future work?

4. Added value of subseasonal-to-seasonal (S2S) forecasting for energy

Lead: Paula Gonzalez

The uptake of subseasonal forecasts by different sectors is motivated (and at the same time constrained) by their potential utility for, e.g., profit enhancement and/or risk reduction. Subseasonal to seasonal (S2S) prediction has been identified as having great potential for its use in applications, including the energy sector, but understanding of the performance of such forecasts and their potential economic benefits remains limited.

Within this context, we will discuss the following points:

- Which energy sector processes and decisions could benefit from reliable forecasts on S2S timescales (i.e., weeks to months in advance)? What type of information is required (e.g., variables, resolution, frequency)? What forecast products would be of most use to the sector?
- What are the main constraints limiting the uptake of sub-seasonal prediction by the energy sector?
- To what extent can so-called "window-of-opportunity" in S2S forecasting (i.e., knowledge of periods when forecasts may be more skillful than normal) be utilized in the energy sector?
- What evidence can be provided to encourage greater uptake of S2S forecasts in the energy sector (e.g., case studies, skill assessments)?

5. Renewable energy and research into developing markets

Lead: Matteo De Felice

Many countries in the world are seeking to increase their share of renewable energy, yet in some areas the penetration of RES is still low (for example in Western Africa, Southern Africa, Asian/Pacific area). This lack of penetration is likely to have several complex causes but, in general, improving access to climate information is a necessary step in supporting the development of renewables and increasing the resilience of energy systems in many areas.

Accessing high-quality climate information for decision making can be restricted in many ways - by the lack of skills or tools or, more generally, in the lack of established good practices in "manipulating" data from its raw form into actionable knowledge. This working group will therefore address the following concerns:

- how can we support the skill development in the use of climate data for energy in developing markets and the availability of user friendly & well documented tools?
- In which cases better/more climate information can help to support RES penetration?
- What are the gaps (if any) in terms of climate information in developing areas?
- Can more climate information help the uptake of RES?