



## THE CHANGE WE NEED – BASED ON CLEAR SIGHT, CREATIVITY AND COURAGE

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100 years ago, at the time of the foundation of the World Energy Council, post-WWI peace was the major concern to get the economy back on track and prevent the next war. Peace was followed by calls for a new international order in which global organisations would steer and regulate potentially sensitive areas of international life and trade.

Back then, *'new internationalists'* offered the diagnosis that economic globalisation in the nineteenth century had outpaced national politics. Political institutions needed to catch up and create new bodies that could see and act above those of nation states.

Energy was among the most explosive subjects in international relations, and the first World Power Conference in 1924, debating current and emerging energy issues, was a major experiment and manifestation of the search for a new international order after the upheaval of the First World War. The Prince of Wales expressed this in his opening speech and commended the Conference as a significant step towards removing *'one of the greatest obstacles to progress'* arising from the disparity in the utilisation of knowledge.

Another new technology, the development of short-wave radio, would bring about *'the unity of world thought and opinion'*. Lord Reith, managing director of the recently formed British Broadcasting Corporation expressed this at one of the WPC panels, pointing out that the wireless *'ignores the natural barriers which estrange mankind.'*

The World Power Conference was after the same goal as the radio: both were seeking to create a 'unity of world thought' through a meeting of minds on all matters relating to energy and its application. Many hoped WPC would be a technological *'League of Nations'*, a term used by many including, in 1930 at the opening of the WPC conference in Berlin, the German President, Paul von Hindenburg.

The main inspiration behind the World Power Conference was Daniel Nicol Dunlop whose principle objective was to create an international organisation that could stand above politics. Born in 1868 in Kilmarnock, Scotland, Dunlop was a visionary central in the formation of the British electrical industry.

Dunlop had originally wanted to found a World Economic Conference. However, he reasoned against it and confessed to a friend: *'I could see clearly that it was impossible to bring together politicians, and as all the important economic decisions are in the hands of politicians, it was hopeless to found an international economic body as a first step. But it was possible to*

*bring together human beings in the field of technical questions, and so I started there.'* This was the context 100 years ago.

### Energy: the 'was', 'is' and 'should be'

Let's consider what were the most defining events shaping energy since then until today. Over the period of the last 100 years, it was clearly the establishing of previously non-existent energy supply chains, infrastructure and systems to the benefit of 6 billion people, locking in about half of the world's invested capital and enabling economic development. We argue that over a period of the last 50 years the most significant event was the 1973/79 oil shock and formation of OPEC, ending non-cartelised low-cost oil and giving birth to the first international push for energy efficiency. If we consider the period of the last 20 years the most cited event has been the shale revolution, leading to US energy independence, undermining the cartel and ending fears of peak supply.

We note that so far this seems largely a history of oil. This is about to change. Over the last 10 years the most significant event was arguably post-Fukushima realities including the exponential solar PV explosion, demonstrating the real possibility of a greening of supply with new renewables. Over the last 5 years we could observe a mindset shift behind peak oil demand, making this issue an accepted topic in board rooms and ministries of most relevant resource players.

Today climate change is the number one challenge in energy and we see a global grand transition driven by d3 (decarbonisation, digitisation, decentralisation). Geopolitics define a tougher environment: international climate change mitigation efforts have slowed since Paris COP21 in 2015 while mounting trade barriers slow down green technology deployment.

Innovation is acceleration at multiple frontiers: solar cell front-running projects are now delivering electricity below 2 c/kWh. China and India are moving to aggressive e-mobility schemes (depending on a 90 per cent Chinese controlled battery supply chain). And, on the digital frontier start-ups develop business models based on uberisation, big data and internet of things in energy and we have just witnessed the first public blockchain in energy going live, supported by major energy players.

Furthermore, electrification is probably the widest referred-to trend. At a time when for the first time we have less than 1 billion people without access to energy, the electrification of final demand is accelerating through e-mobility, heat-pumps, and electrification of industrial processes. But

electrification has limitations in non-road (freight) traffic, high-density urban centres with cold winters, and in energy intensive materials. Today, electricity represents about 20 per cent – only – of final demand. Doubling electricity in 20 years is an ambitious venture and at a time of globally growing energy demand would bring the electricity share to about 30 per cent of final demand, which still leaves us with 70 per cent energy supply from molecules.

Hence, molecules need radical greening, as per Japan's call at this year's G20. Will hydrogen offer a way to mind the 70 per cent climate gap? Examples, such as retrofitting coal plants with first grey (fossil based), then blue (with carbon capture and sequestration) and increasingly green (e.g. from green power-to-X) ammonia imported from countries with existing ammonia production explore the stepwise greening of existing supply chains and infrastructure in natural gas and hydrogen chemicals. The key difference compared to the boom-and-bust hydrogen hype in the early 2000s is that this time it is all about unlocking pathways that re-use existing infrastructure.

What must we deliver as part of a vision to succeed in achieving carbon emission reduction objectives? In the next 5 years: 10-15 per cent e-vehicle sales in major markets. In the next 10 years: first, half CO<sub>2</sub> emissions, and then half it again every decade. Second, deliver greater system flexibility through digitisation in order to enable the integration of new renewables at a scale beyond hydro or nuclear. In the next 20 years: first, managing peak demand. Second, doubling of electricity supply. And, third, lending 5 per cent of synthetic green molecules into existing supply chains. In the next 50 years: delivering on ambitious yet essential visions such as Net Zero Carbon or Road to Zero (carbon emissions).

### The change we need

What did we say was the context 100 years ago? A major unifying challenge, a call for a new international order, energy as a hot topic, a technology and communications revolution to support this, and the creation of a technical league to advance practical solutions.

In many ways, this sounds very familiar, looking at today's context – yet there are very important differences. As we did 100 years ago, we speak again about the need of a new international order. The diagnosis is again that economic (capitalist) globalisation has outpaced national politics, looking at multinationals tax evasion, borderless platform monopolies or WTO compliant carbon leakage.

For many of these issues, eyes move to Asia and to the question whether China will step up as a good and caring global citizen. Meanwhile, some others build walls.

Today humanity's greatest challenge is climate change at a moment when existing multilateral organisations fall short of expectations. There is increasing acceptance and support for exclusive coalitions of the willing of state and non-state actors as critical part of the solution.

We have moved beyond short-wave radio, but new frontiers of communication are again seen as a game-changing opportunity. This time it is not to overcome natural barriers which estrange mankind but to overcome technical boundaries which separate things: the '*internet of things*' in energy will connect a rapidly growing number of devices – fridges, car batteries, heat pumps, cooling centres – and thereby enable system flexibility allowing for increasing shares of intermittent renewables.

100 years ago the response was to create an inclusive technical league of nations. Today, the key to unlock innovation acceleration is building and strengthening innovation ecosystems through nurturing talent, delivering capital vehicles and creation of regulatory sandboxes. Finally, looking at the 'was', 'is' and 'should be', which are the key ingredients that must be part of the solutions space?

Rather than believing in the all-electric solution, the solution must be to end the cold war between electrons and green molecules. Rather than building new infrastructure in many places the solution must be about greening and re-using existing supply chains and infrastructure and thereby unlocking low-cost transition pathways. Rather than trusting in markets alone the solution must be to advance these issues through well-defined objectives and supporting frameworks such as net zero carbon or road to zero – supported, obviously, by well-oiled markets.

And, while doing all this, we cannot lose sight of the fact that ultimately the most effective solutions to mitigate climate change and enable effective trade and deployment of clean technology solutions must come from global collaboration.

100 years ago, the time was marked by daunting challenges as well as promising new opportunities. The World Energy Council's founder Daniel Dunlop imagined, inspired and instituted the necessary change. 100 years later we face arguably humanity's greatest ever challenge and we are at the verge of breath-taking and potentially disruptive new opportunities. The task is daunting and complex. It is time now for us all to write history on the foundation of clear-sight, creativity and courage – and deliver the change we need. ■