

Courtesy of Clean Energy Council



The sources of clean energy

The technology needed to produce clean, renewable energy is out there. Progress has been made. But further investment and government action are needed to develop this technology further and ensure sustainable, clean energy sources for the future

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In the history of humanity, energy has been the code for growth. Energy has been used to power machines to make human efforts more productive. Finding and exploiting abundant and affordable energy have been the essential ingredients in the miracle of industrial development that has made lives safer, cleaner and better.

The world's fastest growing economy, China, knows this fundamental relationship only too well. New energy is the life blood transforming China's economy. The lives of millions of Chinese people are being changed every day. The scale of this extraordinary act of humanity is still being contemplated. It took the industrial revolution 100 years to lift 25 million Europeans out of poverty. China has done the same to 250 million people in a decade.

With this in mind, climate change and the need to decarbonise global energy poses a significant challenge. It threatens to impede not only the continued wealth and welfare of the world's most developed economies, but also to derail the remarkable progress made in recent times to address one of the world's most difficult problems – the problem of redressing the balance between rich and poor.

The answer to this problem is obvious: find reliable and affordable energy sources at scale that do not contribute to the Earth's oversupply of greenhouse gases. These energy supplies must also be used more efficiently and conventional energy markets must be released from the commercial straitjackets that have been placed on them for the past century. But fundamentally smart ways need to be found to harness the abundance of clean energy that exists today. And soon.

The question of the transformation is only one of convenience. Fossil fuels are serendipity incarnate. Every tank of gas we buy, every street light we see, is the result of millions of years of solar energy packed into the coal, oil and gas that power it. That energy density has made these fuels transportable and affordable. Cheap energy powered the stream trains that linked London to Liverpool and Chicago to Charlotte. It powered the steel mills of Europe, Japan and Korea. It powers the 600 million cars operating in the world today.

So now these carbon fuels need to be used to decarbonise energy, and to exploit the ingenuity and technology developed over the last fossil fuel century to find ways of extracting the plentiful but diffuse sources of clean energy on Earth.

It is entirely achievable, but unlikely to happen simply as a result of either sheer willpower or desperation. This suite of new clean energy technologies will be created

from two fundamental policy principles. First, sufficient abundance needs to be created to drive ingenuity. Second, enough competition needs to be imposed on this abundance to drive efficiency. Renewable energy accounts for around 7 per cent of global energy supply not because it cannot deliver more, but rather because that request has not yet been made of it.

What is known already is that energy can be drawn from the rain and the wind with remarkable efficiency and at industrial scale. By the end of 2009 the total installed capacity for wind energy was 158.5 gigawatts (GW), with an annual growth rate of more than 30 per cent a year. Global hydro energy supply exceeds 800 GW. Photovoltaic solar energy has passed 5 GW of installed capacity globally with a 50 per cent per annum growth rate as costs continue to fall behind a massive scale-up of production.

“ In the all-important clean technology space, a generation of innovation is being crammed into a decade ”

Sunshine is a rich but diffused source of energy. Large-scale solar technologies are looking at low-cost ways of concentrating this energy source to improve its efficiency at scale. There are 11 GW of large-scale solar projects under development globally in the United States, Spain and North Africa. Sunshine is also trapped in plant matter, which, when extracted as energy, delivers another 260 GW used as energy and heat.

Geothermal heat stores beneath the Earth's surface deliver around 38 GW of energy as electricity and heat, with enormous untapped potential. There are also hundreds of companies around the world working to safely and reliably harness the enormous energy potential in the Earth's ocean currents and tides.

So progress has begun. Investment in new clean energy generation in 2008 outstripped that in conventional



energy for the first time in history. The US-based Pew Charitable Trusts predicts a jump in total clean energy investment to around \$200 billion in 2010, led by China, Britain, Germany and Spain.

There is a clear first-mover advantage for governments. Those economies that act early will enjoy the largest benefits. China has invested more than \$30 billion in new clean energy generation during 2009 – almost twice as much as the US did.

In turn, those governments need to create the right conditions for investment in clean energy development and deployment to increase exponentially. In the long run, that will be delivered by an agreement on global greenhouse gas emissions. In the short run, that means sufficient regulatory certainty for investors to finance new clean energy projects.

In the all-important clean technology space, a generation of innovation is being crammed into a decade. That means faster cycles of success and failure, trials and

errors. Investors ought to back these risky ventures with confidence – and recover their losses in the failures and recycle their capital in other ventures. Governments play a crucial role in installing that confidence and creating that abundance.

Clean energy is just like conventional resource extraction – only in reverse. The technologies to extract conventional resources already exist. The resources just need to be located. With renewables, the location of those resources is already known. It is now just a matter of optimising the technologies. But these new clean energy generation sources are not always conveniently located. Investment rules in grids and networks need to change too.

At the spring summit of the European Union in 2010, leaders officially endorsed the G20 as an alternative forum for reaching an agreement on emissions reduction. Inevitably, the leadership in clean energy innovation and investment will come from these 20 leading economies. ♦