

# POSSIBLE FUTURES:

## FINDINGS FROM THE DELPHI ENERGY FUTURE 2040

### CLIMATE ACTION GAINS MOMENTUM

The year 2040 sees the largest CO<sub>2</sub>-emitting countries in the world united: a series of ecological disasters, followed by humanitarian crises and political radicalisation in the regions most affected have led industrialised countries to take decisive action and change course. Governments all over the world are promoting the development of sustainable and climate-friendly energy systems powered by wind, sun and water. During times of economic downturns and even full-blown economic crises they keep to their ecological targets – among other reasons because they are increasingly recognising the economic potential of sustainable energy policies, namely low electricity production and infrastructure costs as well as independence from imports.

What is more, governments can act safe in the knowledge that they have their populations' support. Consumers in industrialised countries and emerging economies are exerting pressure. Sustainability is becoming the decisive competitive factor in the markets. Non-sustainable forms of production are considered unethical and are rejected. The carbon emissions that have been generated in manufacturing and transporting products and services are now a standard information indicated on all product labels. For more information, please read theses 6, 7, 24 and 32.

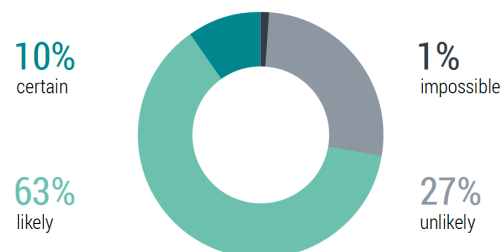
**"Delphi Energy Future 2040"** is a strategic foresight project in the energy sector, based upon the expertise of more than 350 experts from over 40 countries and all relevant sectors. This extraordinary study offers exciting insights into a worldwide discussion that evolve around the core question "What future awaits the energy systems in Germany, Europe and the world in the year 2040 and beyond?" To access all results, please download the full report free of charge here:

<http://www.delphi-energy-future.com/results/>

### THESIS 7

By 2040 the largest CO<sub>2</sub>-emitting countries will have taken decisive action to change course as a result of a series of ecological disasters; sustainable energy systems will have been promoted, economic and energy policies will primarily be aimed at fighting climate change.

### WILL THIS THESIS ACTUALLY TAKE PLACE?



## CHINA AND INDIA ARE CHANGING COURSE

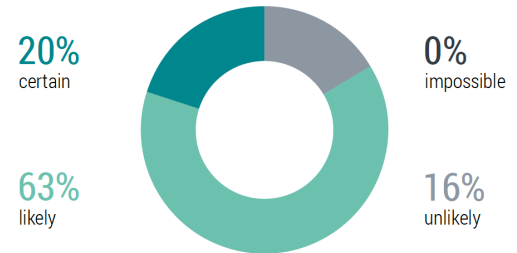
India and China, the two most populated countries in the world, have undergone a fundamental transformation in response to these developments. These Asian heavyweights are not only catching up fast with industrialised countries in economic terms but are in the process of surpassing them or even already have surpassed some of them. Their growing and ever more confident urban middle classes are demanding that their governments adopt an environmentally friendly course of development. City air pollution, a tangible symptom of an outdated model of development, is not only prompting the middle classes to protest. Political calls for decisive action to reduce environmental pollution are also raised in response to the high costs generated for the Indian and Chinese economies and their healthcare systems. High particulate air pollution, primarily stemming from the combustion of fossil energy sources for the generation of electricity and heat as well as for transport purposes, has become an economic problem.

Given the size and dynamics of the Chinese and Indian markets, their switch is having resounding effects far beyond Asia. Chinese and Indian demand for natural gas as a substitute for coal is driving a global shale gas boom; China itself, but also countries such as Argentina, Algeria or South Africa, have become major producers alongside the USA. China is also becoming the world's largest developer and exporter of sustainable energy solutions: electric mobility has received a massive boost driven by the ambition to make city transport sustainable. Thanks to technological innovation, mostly in the field of battery technology, the distance electric cars can travel on a single charge has been considerably improved. Digital traffic control and the fusing of traffic with urban power supply systems are enabling high efficiency gains.

### THESIS 32

By 2040 the carbon emissions that have been generated in manufacturing and transporting products and services – including mobility – will be a standard information indicated on product labels

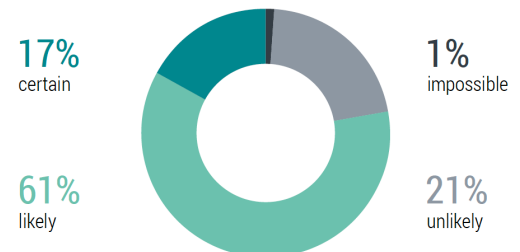
#### WILL THIS THESIS ACTUALLY TAKE PLACE?



### THESIS 24

By 2040 consumers will expect businesses, products and services to be sustainable on a comprehensive scale. Non-sustainable forms of production will be considered unethical.

#### WILL THIS THESIS ACTUALLY TAKE PLACE?

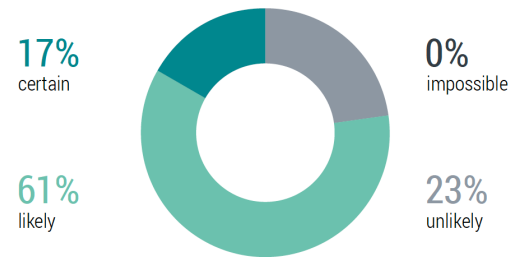


Energy transitions all over the world have delivered on their promises: countries that have strongly promoted renewable energy sources top the list of the most competitive economies in the year 2040. The renewable energy boom has allowed them to abandon subsidies for fossil energy sources and nuclear power. India and China, which are among those nations that have implemented their own energy transitions, are pursuing active, constructive climate policies – and are the driving forces behind the implementation of a global climate regime imposing binding and ambitious carbon emissions reduction targets. For more information, please read theses 4, 8, 36 and 46.

### THESES 8

By 2040 the growing middle classes in emerging economies such as China and India will have forced their countries' governments to adopt sustainable energy policies. Policymakers' top priority will be to fight environmental pollution, a rising share of growing energy demand will be met from renewable energy sources.

#### WILL THIS THESIS ACTUALLY TAKE PLACE?



### THESES 4

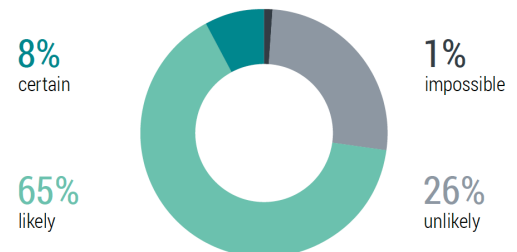
**A:** By 2040 the "shale gas revolution" will have become a global phenomenon; countries like China, Argentina, Algeria or South Africa will have become major producers alongside the USA. Versus

**B:** By 2040 the fracking boom, which started in the USA, will already be over and will have had only a minor impact on the development of worldwide energy systems.

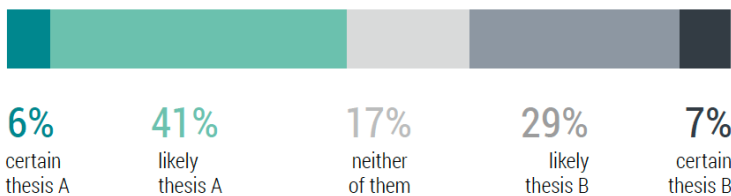
### THESES 46

By 2040 China will have become the world's largest developer of sustainable energy technologies and the leading innovator in this field.

#### WILL THIS THESIS ACTUALLY TAKE PLACE?



#### WHICH OF THE TWO THESES (A, B) WILL TAKE PLACE?



## GLOBAL CLIMATE TREATY IS DELIVERING EFFECTIVE RESULTS

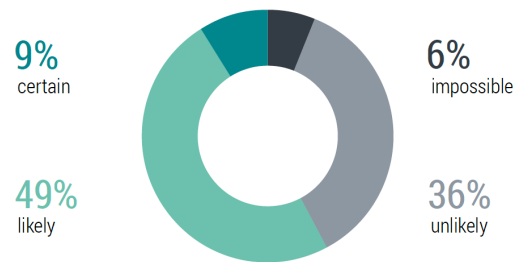
The period until 2040 has marked a turnaround in international climate protection efforts. A global regime aimed at averting another bout of unchecked global warming finally is a reality. Industrialised nations, developing countries and emerging economies, greenhouse gas emitters large and small have agreed binding rules for the protection of the earth's climate, setting national decarbonisation targets and creating mechanisms for the monitoring of governments' compliance with these targets. Major industrialised countries and emerging economies have committed themselves to significantly reduce their emissions of greenhouse gases.

The global nature of this climate deal is preventing environmentally harmful industries from relocating to countries with less strict policies and thereby to benefit from more relaxed rules elsewhere. Carbon leakage, a problem associated with climate policies of limited regional effect, has thus been avoided. Regional pricing schemes for carbon emissions from all sectors of the economy are effectively controlling and limiting climate gas emissions, with various models being applied – tax- and certificate-based as well as trade-based mechanisms. Besides Europe and North America, China is among those pioneering such systems. For more information, please read theses 11 and 12.

### THESES 11

By 2040 a global climate regime with binding and ambitious targets for the reduction of carbon emissions will be in place.

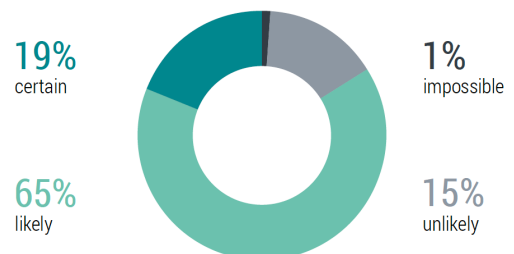
#### WILL THIS THESIS ACTUALLY TAKE PLACE?



### THESES 12

By 2040 a global climate regime with binding and ambitious targets for the reduction of carbon emissions will be in place.

#### WILL THIS THESIS ACTUALLY TAKE PLACE?



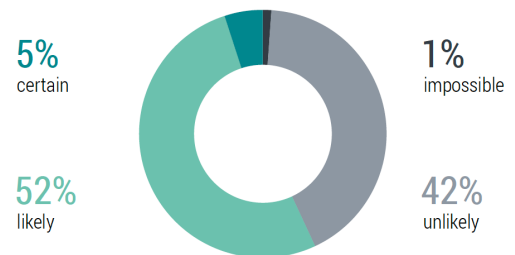
## A FUNCTIONING CLIMATE REGIME IS DRIVING INVESTMENT

Steadily falling costs and the superior competitiveness of renewable sources of energy have made it easier for states to agree to a global climate regime without any fear of suffering economic disadvantages. Determined implementation of the agreement and the existence of emission pricing schemes have given another boost to renewables. This further increases their economic momentum. Investment streams are redirected, with enormous sums going into research and development in order to be able to serve the new markets. Return targets of investors and the aim to produce affordable power are more and more the main factors that drive the promotion of renewables. Economic benefits have trumped over climate protection as the key motive – to the benefit of both. For more information, please read thesis 9.

### THESIS 9

By 2040 economic profitability, investors' interests and independence from imports will be the key considerations driving the trend to build sustainable energy supply systems. Climate protection will no longer be the primary driver and rationale behind this development and will only be of secondary importance.

### WILL THIS THESIS ACTUALLY TAKE PLACE?



### CONTACT

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"Delphi Energy Future 2040" is a joint project of:

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German Association of Energy  
and Water Industries

**giz** Deutsche Gesellschaft  
für Internationale  
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**pwc**