

After reading the article below, choose the best answer to each of the **ten questions**. Answer all questions **based ONLY on what is stated or implied in the article**

**Global clean energy in 2017**  
Sir David King  
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During the November 2016 Climate Change Conference in Marrakesh, much talk centered on implementation of the political commitments made in Paris in 2015. Governments are now focused on putting their words into action as they prepare for the first official stocktake in 2018. Innovation will have an essential role to play.

In November 2015, 20 nations, including the United Kingdom, launched a new international initiative called Mission Innovation on the sidelines of the Conference of the Parties (COP 21) in Paris. The idea was to accelerate cost-effective solutions to eliminate greenhouse gas emission in energy production. A year later, the effort has grown to 22 countries, plus the European Union, that have pledged to double their public research, development, and deployment funding to a cumulative total of around \$30 billion per annum in 2021. The initiative will support new developments in the science, engineering, and technology of low-emission energy solutions. In Marrakesh, an initial seven new Innovation Challenges were announced, with each led by a number of Mission Innovation members. Although each member will decide on priorities for its own expenditure, each challenge will be promoted through international conferences and workshops, and it is anticipated that many cross-country projects will be funded. The creativity and ingenuity that will flow from these projects will produce market-facing solutions through private finance and the engagement of private companies. It is critically important that the appropriate members of the research community are fully involved in these developments over the coming years.

Encouraging innovation in smart grids and energy storage technologies to match demand with supply is one challenge, and large-scale solutions will be location dependent. Brazil and Norway, for example, are well endowed with hydropower facilities that are adapted for pumped

hydroelectric energy storage—a solution not available to flat terrains. Every solution represents another set of market-facing opportunities. Another challenge is to develop inexpensive but reliable systems that enable off-grid households and communities to access renewable electricity. At their last meeting in May 2016 in Japan, the G7 heads of government agreed to assist in the roll-out of these solutions to developing countries. The International Energy Agency estimates that in 2013, 17% of the world's population—1.2 billion people—had no access to electricity.

Other challenges include carbon capture to enable near-zero CO<sub>2</sub> emissions from power plants and carbon-intensive industries; the production, at scale, of affordable, advanced biofuels for transportation and industrial applications; and the discovery of affordable ways to convert sunlight into storable biofuels. Perhaps of greatest interest to the theoretical physics, physical chemistry, and materials science communities that are working alongside the machine learning, robotics, and next-generation computing communities is the challenge of developing clean energy materials. The goal is to provide an integrated, end-to-end materials innovation approach, or platform, to deliver the mix of solutions.

The United Kingdom is focusing on the challenge of developing core heating and building systems that deliver competitively priced heating and cooling without carbon emissions. Globally, buildings account for almost a third of final energy consumption. Energy-efficiency technologies, design and materials to reduce demand for heating and cooling, integrated equipment and systems, storage solutions to match supply and demand, and efficient transfer of heat from production and storage to point of use will all be factors to deliver on this challenge. For the United Kingdom, this focus on innovation is an essential component of its continued commitment to tackle climate change. Mission Innovation is intended to spur the interest of the creative community in what is now the most urgent series of demands facing humanity. The opportunities are, simply, immense.

**Question 1:**

The author focuses **primarily** on...

- (A) Technological innovation necessary to provide electricity worldwide
- (B) Available technology to solve global climate change
- (C) International agreements to reduce CO2 emissions
- (D) Challenges and initiatives to promote technological innovation of cost-effective clean energy
- (E) Most relevant causes and consequences of global climate change

**Question 2:**

It can be inferred from the article that...

- (A) ... governments have agreed that private companies are the sole responsible to CO2 emissions, and these companies should lead the development of clean energy
- (B) ... governments have recognized their role on investing in technological innovation as part of the solution to the most urgent demands of humanity
- (C) ... governments have postponed to 2021 the decision on budget that will be invested in technological innovation
- (D) ... governments have already decided on the budget that will be invested in technological innovation during the year 2021
- (E) ... governments disagree on the exact budget that is required to develop clean energy technology

**Question 3:**

It can be inferred from the article that...

- (A) ... technological innovation is the only solution to the global climate change crisis
- (B) ... the private sector has no interest in developing clean energy technology
- (C) ... international governments are not interested in investing in research and technology, because only the private companies and engineers have the skills to develop technology
- (D) ... inefficient and polluting methods currently used to transform/produce/store energy are one of the causes of global climate change
- (E) ... each government should decide the priorities that best fit the needs of its own people, as the technological solutions to clean energy are likely to be location dependent

**Question 4:**

The author implies which of the following?

- (A) The private sector, including carbon-intensive industries, have not yet invested in technological innovation
- (B) The development of clean energy technology will be reached only by government institutions, which have the researchers, scientists and engineers with necessary skills and knowledge
- (C) Private companies do not have the resources to invest in technological innovation and develop clean energy solutions
- (D) The global budget for technological innovation until 2021 is lower the requested by private companies
- (E) The development of technological innovation required to fight global climate crisis is also a commercial opportunity to entrepreneurs

**Question 5:**

Which of the following **arguments** is used to **support** author's **position** on the role of governments to mitigate global climate crisis?

- (A) The development of currently existing clean energy technology was financed by governments
- (B) The necessary technological innovation requires internationally coordinated financial investments and cooperation on research, science and engineering
- (C) Countries that contribute most to CO<sub>2</sub> emissions have governments that do not invest in clean energy technology
- (D) Brazil and Norway are countries that have made substantial investment in the development of clean energy technology
- (E) Political commitments made in Paris in 2015 have already led to the development of important technological innovation

**Question 6:**

According to the text, which of the following statements about solutions to the clean-energy problem is accurate?

- (A) There is no single solution that could be applied at worldwide, because different locations provide different opportunities and challenges

- (B) Brazil and Norway have already developed several clean-energy solutions, which could be implemented in other countries
- (C) United Kingdom is the leading country in the development of clean heating and efficient building systems
- (D) Near-zero CO<sub>2</sub> emissions have been achieved by carbon-intensive industries through the use of advanced biofuels
- (E) Renewable electricity is available to many off-grid households and communities worldwide

**Question 7:**

It can be inferred from the article that “Mission Innovation” will have a substantial impact because...

- (A) ... it is an international, globally coordinated and well-funded initiative to promote technological development of clean-energy
- (B) ... governments have decided to financially support the private sector
- (C) ... governments are targeting inexpensive off-grid electric systems, designed for remote communities
- (D) ... financing technological innovation will enable capturing CO<sub>2</sub> emissions of power plants and carbon-intensive industries
- (E) ... the development of new energy-efficient technology will reduce the demand for heating and cooling

**Question 8:**

According to the author, which statement is **false** about the Paris-2015 and Marrakesh-2016 conferences?

- (A) In Paris-2015 governments have reached an agreement that includes general strategies to mitigate climate change
- (B) After Marrakesh-2016 the members of Mission Innovation have started to invest \$30 billion per year in clean-energy research
- (C) Until November 2016 much of the strategies designed and agreed in Paris-2015 had not yet been implemented
- (D) Mission Innovation is an international initiative created in Paris-2015
- (E) Governments continued to discuss Mission Innovation in Marrakesh-2016, launching seven priorities for technological innovation

**Question 9:**

According to the author “*Another challenge is to develop inexpensive but reliable systems that enable off-grid households and communities to access renewable electricity*” (3<sup>rd</sup> paragraph). The author means that:

- (A) Clean energy technology to provide renewable electricity to off-grid households is inexpensive
- (B) Electric systems that are off-grid are not reliable
- (C) Off-grid households and communities do not have interest renewable electricity
- (D) Technological innovation must also focus the development of clean energy solutions to small-scale consumers in remote areas
- (E) Off-grid households and communities do not need special technology to have access to renewable electricity

**Question 10:**

According to the author “*Other challenges include carbon capture to enable near-zero CO<sub>2</sub> emissions from power plants and carbon-intensive industries*” (4<sup>th</sup> paragraph). The author implies that:

- (A) Technology to reduce carbon emission from power plants already exists
- (B) Carbon emission from carbon-intensive industries and power plants is very low (near-zero)
- (C) Power plants capture atmospheric carbon through photosynthesis, therefore zeroing emissions from carbon-intensive industries
- (D) Carbon emissions from industries must be captured by power plants
- (E) Future technological innovation may be able to mitigate the carbon emission levels of existing power plants and carbon-intensive industries