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International Energy Agency

THE OUTLOOK FOR GLOBAL ENERGY INVESTMENT

Summer 2014

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THE OUTLOOK FOR GLOBAL ENERGY INVESTMENT

Report of the high-level Policy Insight
on the occasion of the official Brussels launch of the
International Energy Agency's (IEA)
"World Energy Investment Outlook"

co-organised by *Friends of Europe*

and the International Energy Agency (IEA)

in association with OMV

with media partner *Europe's World*

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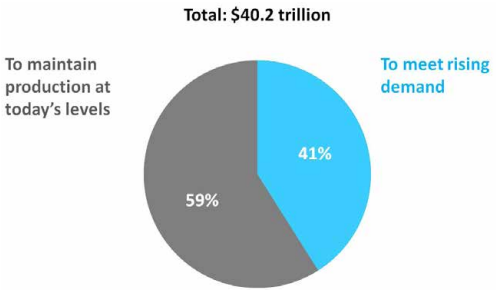
Investment trends that will shape the future

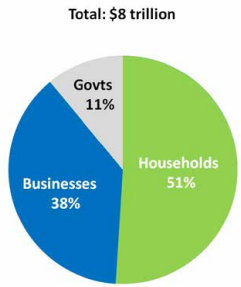
Limiting global warming to two degrees Celsius would need investment just a tenth higher than a baseline scenario, Fatih Birol, the International Energy Agency's (IEA) Chief Economist, told at *Friends of Europe* conference on 17 June. It started with his presentation of a new IEA report outlining the investments required for global energy supply up till 2035. Based on projected demand and public policy, the IEA's World Energy Investment Outlook estimates that $8 trillion (tn) of investment would be needed to achieve greater energy efficiency, on top of $40.2 tn of investment in energy supply.

Investment in energy supply, 2014-2035



Over 80% of upstream oil & gas investment offsets output declines at today's fields: one-third of power generation investment is to replace plants that retire

Investment in energy efficiency, 2014-2035



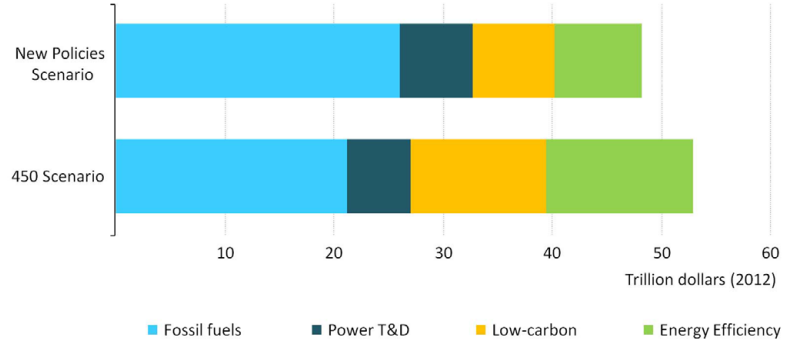
Increasing annual efficiency spending from $130 billion today to $550 billion by 2035 will require new models & sources of financing, from banks & capital markets

Source: OECD/IEA 2014

This investment path implies a 3.6 degree Celsius rise in global temperatures – well short of climate stabilisation goals, said Birol, as current regulation is not strong enough to push sufficient investment in low-carbon sources and energy efficiency.That might change if there is a breakthrough at the UN climate conference in Paris in 2015, he said. If the world aims for just a two-degree rise in temperatures, the necessary investment would rise by $5 tn, to $53 tn.

"The difference is very small," Birol told the conference. But "energy investments need to be reallocated for different technologies: more renewables, more efficiency, more nuclear power. The issue here is not the amount of money – it is the reallocation of the money."

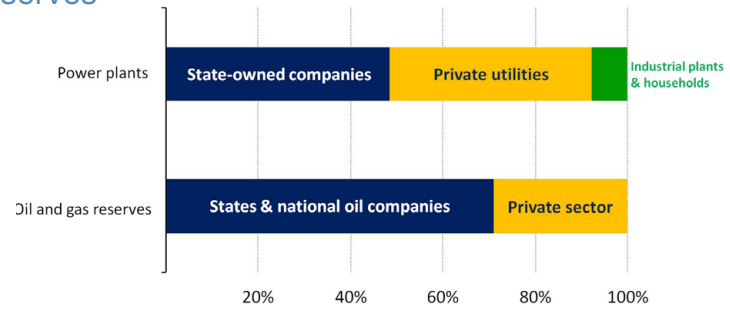
Investment in the New Policies and 450 Scenarios, 2014-2035



Source: OECD/IEA 2014

Decisions made in energy investment will shape the future energy supply and whether it is reliable, affordable and sustainable. Though vast amounts of capital and resources are available, it is crucial that the money is spent in ways

Ownership of worldwide power generation capacity & oil and gas reserves



Alongside investment by the private sector, the objectives, corporate culture & financing of state-owned companies are critical to future energy investment flows

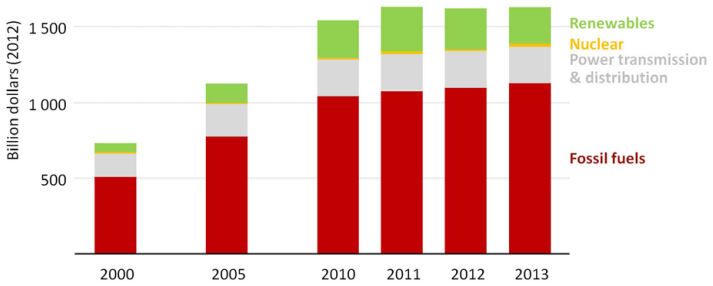
Source: OECD/IEA 2014

that produces the desired results. That depends partly on the private sector – both financial and energy firms – and also on the roles that governments assume as regulators and providers of incentives.

The IEA found that in real terms twice as much capital is required to produce one unit of energy now than 10 years ago, and total investment doubled between 2000 and 2011 to about $1.6 tn. However, the last three years have seen a slowdown in energy investment due to a declining investment in electricity markets in emerging economies and declining investment in renewables in Europe.

While the largest share (80%) of current investment, more than $1 tn per year, is still related to fossil fuels, renewable sources of energy play a growing role, with annual investment increasing from $60 bn in 2000 to a high point approaching $300 bn in 2011, before falling back to $250 bn.

Annual energy supply investment



Investment in renewables rose from $60 billion in 2000 to a high point approaching $300 billion in 2011, before falling back since

Source: OECD/IEA 2014

The $40 tn of investments needed by 2035 will require an increase in annual spending to about $2 tn, with the main investment coming from Asia, US (shale gas) and Europe (renewables). However, "in order to make investments profitable and attractive, we will have to see higher energy prices," Birol said. "The increasing capital costs mean the cheap energy era is fully over."

Just 40% of the investments will be needed to meet growth in demand, with the other 60% going to replace aging infrastructure, such as power plants being retired, drying up oil fields and obsolete pipelines. That means the coming years present a chance to rethink energy supply – from the types of fuels used to the degree to which distribution is centralised or dispersed. "If we want to change the system we have a golden opportunity," Birol said.

"The coming years present a chance to rethink energy supply. If we want to change the system we have a golden opportunity."
Fatih Birol, IEA Chief Economist

Investors' choices

Europe has invested three times as much in renewable energy sources over the past 10 years as the United States in shale gas, Birol said. But private finance will only invest under certain conditions. Institutional investors, such as pension funds for example, are focused on three objectives: to pay their beneficiaries, preserve value and grow. That means they will invest in green energy so long as it has proven quality, strong cash flow and limited technology or regulatory risk, said Ian Simm, Founder and Chief Executive of the London based Impax Asset Management Group. Much of the renewable energy industry is small in scale, uses unproven technology and operates in an environment that keeps changing.

"If clean energy projects continue over time to operate as successfully as they have been doing, they will tick box of reliability."

Ian Simm, Founder and Chief Executive of the London based Impax Asset Management Group

In recent years, investors led by Australians and Canadians have woken up to infrastructure as an asset class, Simm said. "If clean energy projects continue over time to operate as successfully as they have been doing, they will tick box of reliability," Simm said. "There is scale if assets can be bundled up from small scale to larger vehicles. We are well advanced in the early stages of that trend."

Large European pension funds including Pension Denmark and PGGM in the Netherlands and insurance companies such as Allianz and Munich Re have already invested a billion euros or so each, and have the appetite to do a lot more, he said. "These institutions are leading the way of private capital into clean energy markets, and showing that there are models that work and can be scaled," Simm said. "There has also been a rise in green bonds over the last couple of years, providing a gateway for fixed income investors."

Different questions hang over traditional, fossil fuel investment. Power companies have invested massively over the past five to 10 years, but there is now excess capacity, with utilisation of around only 30%, said Gerhard Roiss, Chief Executive of the Austrian energy giant OMW. “We see a huge amount of stranded investment in this sector,” he said. “Even newly built power plants are not running.” As a result, over the past few years, market capitalisation of around €500 bn has been destroyed, he said.

"I think Europe should not suspend talks on South Stream, but should speed them up, as well as talks on further pan-European pipeline projects.”

Gerhard Roiss, Chief Executive officer of OMW

Security of supply will be a big concern in the future, Roiss said. That makes it important to build the right infrastructure to ensure gas delivery to Western Europe from the east.

“Europe needs pan-European gas highways without borders,” he said. That means that talks on South Stream should be continued, despite recommendations not to. “I think Europe should not suspend talks on South Stream, but should speed them up, as well as talks on further pan-European pipeline projects.”

Europe faces possible blackouts in future due to underinvestment, Birol warned. Despite the current overcapacity, new thermal power plants producing 100 gigawatts of electricity are needed by 2025 to safeguard reliability. But such investment will not come under current European rules, as wholesale electricity prices are too low to recover the costs of new investment. “In Europe we have very high end-user electricity prices and very low wholesale prices,” he said. “To make the thermal sector investible we need a 20% increase in wholesale prices.”

But these increases will aggravate the situation of end-users, who already pay high prices, and further hurt the competitiveness of European business. “Europe has to redesign its electricity sector, giving priority to the stability of the system, while of course continuing to protect the major success story of renewables penetration,” he said.

William Garcia, European Chemical Industry Council and Andrzej Rudka, European Commission, Directorate General for Enterprise and Industry, members of *Friends of Europe*'s 'Climate-Energy-Industry' Working Group

Oil investments are also very risky, said Anthony Hobley, Chief Executive Officer of Carbon Tracker, the UK-based non-profit organisation working to align the capital markets with the climate change policy agenda.

"There is a lot of financial risk in business-as-usual investment in the oil sector."

Anthony Hobley, Chief Executive Officer of Carbon Tracker Initiative

Already, $1.1 tn of the capital expenditure that oil companies have earmarked for high-cost projects will only break even if the oil price stays at over $95 a barrel until 2025, he said.

Global warming – and a possible international climate change deal – could endanger even more oil investment. It is generally thought that human society will probably be able to cope with a 2 degree Celsius rise in global temperatures, Hobley said. But to have an 80% chance of holding the rise below 2 degree Celsius, we can only afford to burn 20% of the world's fossil fuel resources. In that case, the potential investment that would be wasted would total $21 tn, he said. "There is a lot of financial risk in business-as-usual investment in the oil sector," Hobley added. "Those companies believe we won't have an effective climate policy."

The role of governments

Governments are playing an increasing role in energy policy, but it is hard to prescribe exactly what they should and should not do. Several decades ago, investments became increasingly based on market signals rather than government instructions, Birol said. But the recent trend has been the opposite: whereas in 2000 one third of investments took place in sectors where market signals dominated, the figure today is just 10%. Transmission is mostly regulated, as are nuclear feed-in tariffs. And in emerging countries, fossil fuel power generation is regulated. "Worldwide, we need $16 tn of investment in the power sector, but of this only $1 tn will be in places governed by market signals," Birol said. "$15 tn will be in areas where investment decisions are regulated."

"We see a big concern that the EU has lost its climate change leadership that we established 20 years ago."

Giles Merritt, Secretary General at *Friends of Europe*

EU energy policy serves three masters, said Marie Donnelly, Director for new and renewable sources of energy, energy efficiency and innovation at the European Commission Directorate General for Energy. These are the need to decarbonise and promote sustainability; the demand for competitive, affordable power; and security of supply. "The policy cannot be simple," she said. "You have to address three quite different objectives and try and achieve all of them at the same time. It means the policy has to be complex."

Moderator Giles Merritt, Secretary General at *Friends of Europe*, wondered whether the EU, having established climate change leadership 20 years ago, had not slipped into policy drift. "What are we in Europe going to do in political terms?" he asked.

Roiss said that ideas such as a European energy policy, a single energy market and harmonisation of national energy policies might look very simple, but the development of energy-related industries had a long history and had been very regional. "It's easy to talk about climate, because climate is young," he said. "It is extremely difficult to find a European energy strategy or policy. But what can do is start where innovation is coming in."

The present era is characterised by unprecedentedly cheap money and unprecedented technology change, with lots of new technologies and business models jostling for position, said Simm. That makes it even more difficult than normal to allocate capital correctly – and it means governments should be very cautious about intervening in markets.

"Governments should focus on providing public goods – standards, interconnectors, getting markets to work," Simm said. Governments should also be careful not to make retrospective changes in areas such as subsidies for wind and solar power, he added. "When an investment is made by the private sector, we need to take at face value the pledges made by governments. What is unacceptable is if governments change the rules in existing projects. That damages the economics of a project and sends a very strong negative signal to future investors."

Efficiency above all else

Greater efficiency could help solve a lot of energy problems. Energy is basically needed for three things, said Donnelly: To heat and cool spaces; to power gadgets and hot water; and for mobility. A focus on what we use energy for could thus help drive down the amount used over time. In particular, 75% of buildings in Europe were built more than 30 years ago and will be with us up to 2050. New buildings will – gradually – result in less energy use.

> "Greater efficiency could help solve a lot of energy problems. The use of energy will go down over time but our comfort level will not change."

Marie Donnelly, Director for new and renewable sources of energy, energy efficiency and innovation at the European Commission Directorate General for Energy

"We need to ask: what are the services we get from energy and how can we ensure that those services are maintained with or without energy?" Donnelly said. "A lot of the new developments mean that the use of energy will go down over time but our comfort level will not change."

Of the $8 tn in efficiency investment projected by the IEA, the bulk will be made by households, in the form of better heating and lighting systems and more efficient cars, Birol said. That requires greater connection between households and capital markets for financing such spending.

"There is a magic medication called aspirin: we take aspirin for a headache but we find out it is also good for our blood pressure, for sight and many other things," Birol said. "Efficiency is the aspirin of the energy world. It is very cost effective and very cheap".

"Efficiency is the aspirin of the energy world. It is very cost effective and very cheap."

Fatih Birol, IEA Chief Economist

Energy storage is important, but the IEA doesn't see any breakthroughs in the next 10 years. However, "we see a 600% increase in efficiency investments in the years to come, mainly driven by increasing energy prices, regulations and on top of that climate change concerns. It could be a bonanza investment for companies in the years to come."

The trouble with action to change habits in energy use is that it tends to be too slow, Birol said. Delay makes eventual actions more expensive – and therefore harder to carry out, adding that next year's Paris conference will be "one of the last chances" to take appropriate action.

"Based on our analysis, we really need to act now," he said. "But that was the result of my analysis five years ago as well – and we didn't. The more we fail to act, the more expensive it becomes. And the more expensive it becomes, the more difficult it will be."

ANNEX I – Programme

POLICY INSIGHT
The outlook for global energy investment

There is no shortage of either the energy or financial resources needed to meet the world's future energy needs. But there is legitimate concern that these resources may be allocated in ways that fall short of offering a universal, reliable and affordable energy supply. Added to that, the energy sector looks set to continue emitting pollutants and greenhouse gases at a rate causing serious environmental damage. Whether these fears turn out to be justified depends on a range of policy, regulatory and market considerations, that vary widely region by region, while determining both the energy sector's ability to attract finance, as well as the business models, technologies and fuels that investors will choose.

What scale of energy investment is needed and where will it come from? What sectors and technologies should be prioritised to secure energy supply? What role should governments play in shaping investment decisions? Are current investment patterns sustainable? What is the likely impact of climate policies, and the target of limiting the rise in global average temperatures to 2°C, on profitability and future investment trends? What can be done to avoid the risk of a financial carbon bubble? What factors can explain the setback in clean energy investment worldwide from the record level of 2011; will the likely cuts in energy subsidies in Europe aggravate this downward trend? Could investments in energy efficiency yet be a game changer?

Fatih Birol	Chief Economist at the International Energy Agency (IEA)
Marie Donnelly	Director for New and Renewable Sources of Energy, Energy Efficiency and Innovation at the European Commission Directorate General for Energy
Anthony Hobley	Chief Executive Officer of Carbon Tracker Initiative
Gerhard Roiss	Chief Executive Officer of OMV
Ian Simm	Founder and Chief Executive of Impax Asset Management Group

Moderated by Giles Merritt, Secretary General at *Friends of Europe*

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