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 Text only

# Space Industry Bill [HL]


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**12 July 2017**

Volume 783

 **Column 1242**

Second Reading

 3.40 pm

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**Lord Callanan**

That the Bill be now read a second time.

Previous

 Top

Next

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## **The Parliamentary Under-Secretary of State, Department for Transport (Lord Callanan) (Con)**

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My Lords, the UK space industry is a British success story—a story of invention and innovation, of enterprising spirit and global ambition: from our close collaboration with the European Space Agency, which continues to yield ground-breaking science and discovery, to our globally respected satellite companies leading the small satellite revolution. I know that many noble Lords share my admiration for the UK's achievements in space and will be keen to contribute to its continued success, which is why I welcome their input into and scrutiny of the Space Industry Bill, a Bill that will boldly go where no Bill has gone before.

Very few people realise how important space is to our everyday lives. Satellites in particular provide many critical services that we all take for granted. Navigation satellites, for example, provide the precision timing needed to enable global financial transactions. They support the safe and efficient use of our seas and skies, and help us all to find our way in unfamiliar surroundings. Weather satellites equip farmers, health workers and the emergency services with the foresight to protect people, property and produce from extreme weather, and provide unique insights into our changing climate. Communication and imaging satellites let us monitor disasters and threats to our national interests, and allow us to watch live news events unfolding anywhere on earth. Indeed, satellites, a specialty of the British space industry, play a crucial role

in our economy, supporting more than £250 billion of our GDP, and provide the data to power the future of our digital economy. Noble Lords can see why space has been made part of our critical national infrastructure.

This is how we use space today. Looking to the future, ambitious new plans could require tens of thousands of new small satellites to be launched and serviced. This surge in demand is the result of the declining costs of satellite manufacturing and launch services. What was once possible only at huge public expense is now being pursued commercially by companies such as SpaceX and Rocket Lab, spurred on by the global market for small satellite launch that could be worth £25 billion over the next 20 years. This is not the only opportunity. Sub-orbital flights to the edge of space offer another emerging commercial prospect. Such flights would not only be thrilling for paying customers but could expand the boundaries of human knowledge by giving our world-leading science sector access to the unique environment of microgravity, enabling exciting opportunities for discovery in many branches of science. Empowering our aerospace sector to pursue this opportunity will ensure that future aircraft technology comes by way of British innovation, keeping us at the forefront of aviation as we move into an exciting future of long-distance, high-speed air travel.

 **Column 1243**  
Click to show

We have in front of us opportunities of significant strategic and economic consequence. The UK is well equipped to pursue commercial markets in both small satellite launch and sub-orbital flight. Our northern latitude, abundant coastline, aviation heritage, great engineering capability, thriving space sector and business-friendly environment are all factors which make the UK an attractive destination for these services. In line with our modern industrial strategy, we will strengthen our economy by allowing UK companies to benefit from access to new opportunities and supply chains. The sky will no longer be the limit for our talented scientists, engineers and entrepreneurs, and we will attract the capability, infrastructure and investment needed to prepare for the next 50 years of spaceflight.

For example, British companies like Reaction Engines are developing engine technology which could revolutionise the way we get to and from space, making it easier and cheaper to escape the earth's atmosphere. If we fail to prepare for these opportunities, the UK risks losing out to early adopters overseas and would not receive the benefits of this British innovation. However, we must move quickly. Experts are forecasting a sharp rise in demand for launch services from 2020 and we are not alone in pursuing this market. The first movers in Europe are likely to gain a significant commercial advantage over those who arrive later.

A number of operators from the UK and further afield have expressed an interest in launching from UK spaceports. They recognise the benefits of setting up shop here, but until now have not had a sufficient legal framework to enable safe and secure operations. This is why we are here today. For several years we have been laying the groundwork for commercial small satellite launches and sub-orbital flight in the UK by understanding what regulation needs to be put in place to enable safe commercial spaceflight in this country; identifying the key characteristics of

any potential locations from which commercial spaceflight operations could be safely launched, and the infrastructure and facilities that would be required; and developing an understanding of the complex array of technologies in this emerging market and exploring options and approaches to attract commercial spaceflight operators and investment to deliver Launch UK.

Our thanks must go to all those who have helped to inform, challenge and shape this policy, which has resulted in the Bill before us, which aims to boost the economy, British business, engineering and science by making the UK the most attractive place in Europe for commercial spaceflight. It provides for the creation of a regulatory framework to enable commercial spaceflight activities—both launch to orbit and sub-orbital spaceflight—to be carried out from spaceports in the United Kingdom. It will work alongside the existing Outer Space Act, which was enacted primarily to implement UK obligations under UN space treaties. To date, this has involved licensing of satellites launched from overseas.

The Bill has to be sensitive to the context of the emerging market, which is full of innovation, disruptive technology and rapidly evolving business models. In this context it would be inappropriate and self-defeating to set down in the Bill language that would inflexibly bind the UK's ability to respond to this market as it emerges. Instead, we seek to be a global exemplar of good regulation by balancing flexibility and foresight with an absolute commitment to safety and best practice. As such, the Bill provides a framework for the development of more detailed rules in secondary legislation, supplemented by guidance and supported by a licensing regime.

I place on record my express and immense appreciation for the pre-legislative scrutiny already carried out on the draft Bill by the Delegated Powers and Regulatory Reform Committee and by the Science and Technology Committee in the other place to strengthen this framework. I know noble Lords will further build on this process with the benefit of their work, for which I am also grateful. Our collegiate approach will continue as we develop secondary legislation, consulting on key issues and providing confidence to investors and insurers that the UK will develop safe, business-friendly regulation in the public interest.

Our space industry extends to and benefits all territories in the United Kingdom, and potential spaceport sites have come forward from all across our union. The Bill extends to all those territories, except for certain provisions not extending to Northern Ireland and Scotland as described in individual clauses.

As I am sure noble Lords will see, the Bill is comprehensive in the measures it puts forward. These include the duties of the regulator, the intention being that space activities will be regulated by the Secretary of State acting through the UK Space Agency, and sub-orbital activities by the Civil Aviation Authority. It also provides for range and range control and the licensing of the range control service provider, operator and spaceport operator, setting out the circumstances in which regulators may grant such licences and where such licences are needed. It refers to informed consent, training, qualifications and medical fitness to ensure safe and effective regulation of persons taking part in spaceflight and associated activities.

 **Column 1244**  
Click to show

The Bill also provides for safety regulations, investigation of accidents and security. In addition, we have offences against the safety of spacecraft, which draw on offences against aircraft and aerodromes in the Aviation Security Act 1982 and the Aviation and Maritime Security Act 1990 respectively. The Bill covers monitoring and enforcement, allowing the regulator to investigate and prosecute offences contained in or made under the Bill.

The Bill regulates liabilities, indemnities and insurance. We have chosen not to bind any operational policy decisions by specifying any cap on liability. The existing Outer Space Act permits only the capping of the operator's indemnity to the Government and contains no provision concerning the operator's liability to third parties. We consider that the liability provisions in the Bill are therefore more comprehensive. However, liability capping will be subject to further consultation to ensure that our policy and regulation on capping, and many more measures besides, are in the public interest.

The Space Industry Bill is necessarily broad in scope, but it benefits from the experience and best practice of international launch and our own world-class aviation regulators, resulting in a safe, proportionate and comprehensive enabling framework in one piece of legislation.

In turn, the activities defined in the Bill and its subsequent regulatory framework will benefit many in the UK. Entrepreneurs will benefit from new opportunities to build innovative commercial enterprises off the back of launch services and small satellite data. Local economies will benefit from the creation of spaceport sites, with related jobs and opportunities in construction and hospitality. Our small satellite industry will have direct access to domestic launch capacity, reducing dependence on foreign launch services and enabling growth across the industry. British-based scientists will benefit from increased access to microgravity and investment in institutional capability in launch, spaceflight and related sciences, attracting world-class scientists to the UK. Young people seeking careers in science, technology, engineering and maths will gain new opportunities and greater inspiration from an expanding UK spaceflight industry. The UK as a whole will benefit from access to a strategic small satellite launch capability, contributing to our understanding of the world, the provision of public and commercial services, the delivery of national security and new opportunities for investment and export.

Half a century ago, the British rocket programme was considered unviable, but as the last rocket had already been built it was given permission to launch. Prospero, the small satellite that it successfully transported into space, was the first and, currently, only satellite to reach orbit on a British launch. Today, we stand at the dawn of a new commercial space age—an age in which we can once more reach for the stars, not at vast public expense or with our being dependent on the hospitality of others, but in the best spirit of British innovation by enabling, attracting and empowering commercial markets for small satellite launch and sub-orbital flight from UK spaceports.

 **Column 1245**  
Click to show

So let us end Prospero's lonely record. Let us empower our best and brightest to reach higher than they ever have before, inspire the next generation to reach higher still and, in so doing, deliver the benefits that low-cost access to space will bring us all. In this spirit, I welcome scrutiny of and debate on the Bill. I beg to move.

🕒 3.53 pm

### **Baroness Bloomfield of Hinton Waldrist (Con)**

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My Lords, the UK's space industry is important not only nationally but internationally. It already contributes substantially—approximately £13.7 billion to the UK economy and some 38,000 jobs. Workers in the sector are nearly three times more productive than the UK average. The UK's space sector is at the forefront of developments and therefore poised to make an even greater contribution in the form of space transportation, generating thousands more jobs throughout the sector and inspiring many young people to pursue studies and careers in the sciences. The aim of the UK Space Agency is to ensure that the UK develops into a major global player in this fledgling sector. It is important that the Government, through the passing of legislation as well as the publication of policy, give strong support to this aim.

 **Column 1246**  
Click to show


However, it is also important to emphasise that a Bill that introduces regulation can, unless carefully administered, also bring with it the undesirable potential for overregulation, wiping out the benefits that regulation can provide. It is vital that the space industry regulator, whether the Civil Aviation Authority or another body, should act in a positive and not a negative way when exercising its discretionary powers. As Sir Stephen Dalton, former Chief of the Air Staff and president of the Royal Aeronautical Society, writes in its magazine:


“The use of and access to space is growing exponentially and the increasing international commercial sources of such access are only likely to become more varied over the coming decade. Our community needs to encourage all the relevant agencies and organisations to move as speedily as possible to ensure that the facilities, spaceports, launch co-ordination and recovery options, as well as the regulatory structures, are framed and agreed in line with the greater access and use of space. International and inter-governmental agreements will be needed and new ways of working together on the continuum which is space, need to be brokered and agreed as soon as practicable”.

It is to be noted that much of the contents and format of the Bill mirror many of the provisions of the current civil aviation Acts, with the advantage that the interpretation of comparable provisions has been tried and tested previously over a number of years. This provides legislative confidence. It is unarguable that ensuring public safety must be the regulator's overriding consideration when exercising its statutory duties. Regulation is required and will provide public and investor confidence in space transportation as well as in the other areas the Bill covers. All these factors are welcome.

What is missing from the Bill, however, is any balancing provision comparable to that found in Section 1 of the Civil Aviation Act 1982 placing the Secretary of State under a general duty of encouraging measures for the development of space transportation within the UK. This is a highly valuable and effective provision and can no doubt be the subject of further consideration during scrutiny of the Bill in Committee. It is to be noted that the US Government expressly recognise the need to facilitate a pro-growth environment for the developing commercial space industry by encouraging private sector investment and creating more stable and predictable regulatory conditions. It is now for the UK Government to do so too.

It is not as if the UK is a follower and not a leader in the aviation and aerospace sector. The UK has been at the forefront of the development of aviation since the first powered flights by Cody at Farnborough in 1908 and arguably half a century before that, when, in 1849, Sir George Cayley strapped a hapless young local boy into his prototype glider for its first test flight: there was no such thing as the CAA or any regulatory control in those days. Since the 1950s, space flight has been developed with the UK occupying a leading role and today the UK is a major user of space and a provider of space technology to the world. Space is strategically important to the UK. The Government's goal of making this a £40 billion sector by 2030 is ambitious but attainable, with the right economic and legislative climate in place. In the absence of overregulation, especially when compared with other nations, including many in Europe, we have the drive, the knowledge, the universities and a world-class aerospace industry to ensure that the UK becomes a world leader in the promotion and provision of space transportation and space technology. It could be said that we are at the second dawn of UK aerospace, following which space travel becomes commonplace. Let the UK Parliament, Government and the devolved Administrations play their respective parts in its achievement.

 **Column 1247**  
Click to show

 3.58 pm

### **Lord Hunt of Chesterton (Lab)**

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My Lords, I welcome the Bill. There is no doubt that the UK's growing involvement in space science and technology over the past 30 years, from a rather low point, has now definitely encouraged greater general interest in science and technology in schools and universities. The Russians and then the United States knew that animal and human participation was a great stimulus to popular interest—it was a dog first, as noble Lords will remember, and then some humans.

The UK has seen the same stimulus, with Helen Sharman becoming the first woman from the UK in space and then Tim Peake's space voyage last year. At the Royal Institution Christmas lectures two years ago, full of young, enthusiastic scientists, and at a Science Museum event recently, Tim Peake communicated with thousands of schoolchildren as he demonstrated his scientific experiments in the space environment. The excitement and risk of the voyages were definitely part of the attraction.

Along with fundamental scientific experiments, satellites have provided many practical and commercial benefits in navigation, communication and monitoring the environment near and above the earth's surface, such as for weather and climate, ocean waves, volcanoes and the huge and dangerous effect of solar storms. As director of the Met Office, I represented the United Kingdom at the European meteorological satellite organisation, which worked closely with the UK space industry.

The UK has developed its space involvement through its membership of the European Space Agency and through UK and European-wide companies such as Airbus. Some of the UK's satellite business was developed with Russian launchers; particularly, for example, the Surrey satellites. This continued involvement with European space research and commerce has competed and collaborated with the activities of the major space nations. An important aspect of the ESA business has been launching satellites from its base in French Guiana through the company Arianespace. The Bill proposes that satellites will be launched from one or more bases or spaceports in the UK. These will have to be carefully regulated, as set out in the Bill.

The Bill has to be broadly framed so that, first, spaceflight provides new business: for example, tourism and testing new systems and materials. The UK's small satellite companies, such as Surrey, have been very successful—but they are now part of an international company. This approach should enable small countries to have their own satellites; for example, that company has worked closely with developing countries around the world. I believe that the use of space for development in these countries is a very important part of our space programme, and with the UK making a substantial financial contribution to developing countries, I trust that that will be part of the expenditure on space. Secondly, there will be connections between the international space station and low-orbit satellites. Through Tim Peake and others, the UK has been involved in the international space station.

Another interesting aspect to the science and technology is associated with microgravity, as the Minister described, with many applications of the extraordinary physical and biological experiments; for example, relating to drugs, aerosols and odours. There is a nice example on Google of what happens to a candle lit at ground level: when it goes up into space and gravity drops, the flame turns blue. I thought your Lordships would like a little bit of science.

The ranges for civilian operations extend over land and sea. Presumably these will be privately owned. Will foreign ownership be permitted? Surely security is important. What is not clear is how the Bill relates to the current regulations of United Nations agencies, which do not get a very full audience in this House, I am afraid. For example, the International Civil Aviation Organization—ICAO—will play a significant role in the growing business of space. ICAO will also have an important role with regard to UK satellites being launched from airspace or from foreign aircraft. Another aspect is the International Atomic Energy Agency, which regulates radioactivity and nuclear materials. Will any nuclear materials be involved in these near-orbit launches? I believe they should be.



**Column 1248**  
Click to show

There is also the question of whether there will be launches from shipping or oil platforms. I was at the annual meeting of the International Maritime Organization last week. The UK plays a prominent role in that UN agency. For example, one might have the situation that we have at the moment with ships with flags of convenience; some small countries have a large number of ships with their flag. One wonders whether the same thing may happen here. That needs to be considered very carefully.

I support the enthusiastic approach of the Minister to the Bill, which has my support.

🕒 4.05 pm

## Lord Moynihan (Con)

Share

My Lords, I declare two interests. First, I am a member of the Delegated Powers and Regulatory Reform Committee. As the Minister said, its involvement with this legislation began early. It was invited to comment on the draft spaceflight Bill at the request of the House of Commons Science and Technology Committee towards the end of the previous Parliament, a contribution which was welcome as a precedent and which, in turn, led to substantial changes from what was, in effect, a skeletal Bill to one where the number of regulations subject to the affirmative procedure has increased from four to 13.

 **Column 1249**  
Click to show

My second declaration is that I live in Prestwick, having moved to Scotland in December last year. I take an active interest in the area, not least because the office I occupy overlooks Prestwick Airport. I am a strong believer that Scotland and south Ayrshire, in particular, can significantly benefit from being designated and licensed as one of the first airports to enable commercial spaceflight activities—not vertical-launch rockets, but the horizontal launch of modified 747s to include satellites, scientific experimentation and suborbital spaceplanes. This part of Scotland is already a hub for high-tech engineering and experts in the aviation industry. It is also home to a wide range of entrepreneurially minded individuals from Buzzworks, with its nationally achieved award-winning restaurants across Ayrshire, to the remarkable business acumen and philanthropism of Tom and Marion Hunter. This is an area ready to take on the challenge as a home for high-tech companies as well as being one of the most beautiful areas of the United Kingdom. However, despite that paean of praise, I have no commercial interest in the subject of the Bill. My views are personal and underline my belief that south Ayrshire can become a thriving business centre for the supply and service sector to support spaceport activities.

In his excellent speech, the Minister referred to the way in which links with schools can provide the vital local benefit of preparing young people for careers in aviation technology and the spaceflight industry. The area can become a thriving economic zone lifting it to the forefront of technical expertise with training programmes, a visitor centre and some 880 acres of land for aerospace-related development adjoining Prestwick Airport. Prestwick Aerospace already employs more than 3,000 highly skilled employees. It is the largest aerospace cluster in Scotland.



If other sites are licensed in Scotland, the aerospace cluster at Prestwick will be able to service their development and act as the hub for technical and supply activities, bringing significant jobs to the local communities.

The educational links are perhaps the most exciting for the area. Ayr College, Strathclyde University, Glasgow University, UWS and the Astronomy Technology Centre at Edinburgh University can all be significant beneficiaries. Prestwick Airport is well located and has the best surface links of any Scottish airport. Its local weather microclimate is recognised as the best in the UK. It is not looking to become a Cape Canaveral with vertical launches—more remote locations would fit that bill—but it would focus on horizontal flights.

Of course, this Bill is not just about Prestwick. As the Minister stated, there are many opportunities throughout the United Kingdom, and it is my firm opinion that it will be necessary to license at least two spaceports in the UK to develop and deliver a sustainable and effective solution for launch operations, including, most importantly, diversionary runway capabilities.

Addressing the whole of the UK, the regulatory environment has the potential to support companies in their bid to help government,

“capture 10% of the global space market”,

by 2030. The most immediate beneficiary of this Bill will be the opportunity to deliver a significant proportion of the estimated 3,500 to 10,000 satellites that are due to be launched by 2025. It will also facilitate the building of bigger and more technologically advanced satellites and remove the need for UK companies to use test facilities located abroad.

Today is the first step in the parliamentary process to create the legal framework to enable exciting new technologies to operate safely from the UK. It is a welcome clear signal of the UK's commitment to enable commercial spaceflight to be carried out from UK spaceports, including the launching of small satellites into orbit, and permitting manned suborbital operations for scientific experiments and space tourism. It is essential that through the legislation before us we create a regulatory process which is internationally competitive for the billions of dollars of investment income which can boost the economy, British business, engineering and science by making the UK the most attractive place in Europe for commercial spaceflight and competitive with any regulatory system in the world. That is a significant challenge, but the most important objective is to provide a comprehensive and proportionate regulatory framework to manage risk, ensuring that commercial spaceflight and everyone working in the sector remain safe. The measures in the Bill to promote public safety by providing a regulatory framework to cover operational insurance, indemnity and liability are important in this respect.


Committee stage will provide us with the opportunity to scrutinise the Bill in detail. When we do, there are a number of key issues which we need to consider, some requiring an important balance between regulation and the vital importance the private sector attributes to the Bill providing a competitive framework, with enthusiasm and backing from the Government and a level of funding



Click to show

support commensurate with commercial success. As my noble friend the Minister said, we are talking about intense international competition to attract inward investment. The Government will need to step up to the plate as much as the private sector and will need to do so quickly if we are to gain competitive advantage.

I urge my noble friend the Minister to ensure that we do not stifle this opportunity by overregulating, as other nations such as Spain, Portugal and Norway are preparing competing legislation and launch sites. I ask my noble friend to give the House his commitment that the final legislative framework will ensure that the Government recognise the reduced risks posed by small-scale microlaunchers and nanosat payloads, each exceptionally valuable new areas where Britain could lead the world with “soft touch” regulatory oversight, while always recognising that there is no room for manoeuvre when it comes to the paramount question of safety. To allow this industry to succeed in the long term, it is essential that licensing, insurance and range-tracking costs are appropriate to the level of risk, so that the UK can build a globally competitive national space launch capability for the UK. A burdensome regulatory requirement would negatively impact this opportunity, which will see a massive growth in satellites and an ultimate colonisation of space.

 **Column 1251**  
Click to show

From the perspective of my work on the Delegated Powers and Regulatory Reform Committee, I believe the Government have already moved significantly to improve the Bill, which is very welcome. I was concerned that in the original draft Bill, the Government appeared to dispense spaceport operators from any statutory requirement in any Act of Parliament, without any parliamentary procedure whatever. Now, the Government have acknowledged, perhaps implicitly, the committee’s argument that a regulator’s job is to regulate compliance with the law not to dispense people from complying with the law.

It is also welcome to see that the Government have taken on board many of the committee’s recommendations. The number of regulations subject to the affirmative procedure has increased from four to 13, and two objectionable Henry VIII powers have been removed altogether. However, my one remaining concern in this area is the question of safety in a new, fast-moving and changing technology-driven sector. In the case of safety regulations under Clause 18, my noble friend justified making the first set of regulations affirmative, and subsequent regulations only negative, on the ground that the continuous updating of safety regulations should occur in a “nimble and proportionate” way—an unfortunate turn of phrase. No one would want safety regulations not to be updated because of the alleged difficulty of scheduling affirmative debates. I had ministerial responsibility for responding to both the Hillsborough tragedy and the Piper Alpha disaster, and the safety of the public must always be paramount. It sits as a priority alongside the safety of the nation. I very much hope that the Government will further reflect on the compromise solution on offer in Clause 18. I believe the issue of safety is sufficiently important

to require the affirmative procedure whenever and wherever safety regulations are revised and updated, particularly in this new industry. It should be for the House to be proportionate and not the Government.

I also hope the Minister can respond to the excellent comments made by the noble Lord, Lord Hunt, about the international relationships we have in this sector. I hope he will give a commitment today that we should be working very closely with the FAA in the United States, looking to learn from its regulatory framework and seeking to agree a bilateral arrangement to submit export licences for approval. I hope urgent progress is being made on this front and that the question of what is US technology and how it will be controlled if not on US soil is resolved before we leave Committee. The FAA in the States had never seen spaceflight before. It had to work through the role with all interested parties, as we should. There was a need to determine the right balance between the roles and the responsibilities of each and every party. We need similar progress in the UK, and I hope that my noble friend can set out a timeline for the measures set out in the Bill until the first licences and approvals are granted.

My second request to the Government is that, notwithstanding which operator is appointed, the sector needs to be joined up. There is talk of the Space Agency investing a sum of £10 million. We need to recognise that this will not go far in a multibillion pound industry if we are to meet the Government's objectives. The cost of a suborbital flight system is of the order of £120 million, and modifying a 747 as a carrier aircraft stationed in a UK airport—the type envisaged for airports such as Prestwick—is unlikely to cost much less than £700 million. Yet we have no real idea how the Space Agency is approaching the grant process and how it will reach decisions about which sites it backs and which operators at those sites. It has talked of £10 million being available, but it is not clear whether that will be per site or per operator. Not to put too fine a point on it, as I mentioned, £10 million is de minimis funding in the context of the space industry, especially if the UK wants to get behind it and establish a new, exciting growth industry as we approach Brexit.

My third and final observation is that we want to avoid regulatory mission creep. We must at all times maximise the participation of the private sector while providing a safe, secure, transparent and accountable regulatory framework, and there is no time to lose.

The Bill is a welcome and important step in the right direction, and I very much hope that when the House moves into Committee, we will have the momentum towards further and accelerated progress and clarity for the future of an important sector in a safe working environment.

🕒 4.16 pm

## Lord McNally (LD)

Share

My Lords, it is a great pleasure to follow the noble Lord, Lord Moynihan, in what I thought was a thoughtful and constructive speech. There are a number of reasons why I wanted to speak in this debate. I am a member of the All-Party Space Group. I am the treasurer of the Parliamentary Internet, Communications and Technology Forum—Pictfor. I have a son who works as a space

 **Column 1252**  
Click to show

engineer in Germany, and I was inspired by the adventures of Dan Dare in the *Eagle* in the 1950s. It is interesting to remember that Dan Dare was set in the 1980s, and the assumption was that Britain would be leading an international space effort to Venus by then. Of course, Dan Dare also inspired a generation of children with the idea of space travel and condemned schoolmasters across the land to the nickname “the Mekon” after Dan Dare’s small, green nemesis.

The moon landing in 1969 sustained the idea that space travel was just around the corner. The reality has been much slower and more circumspect, which prompted Sir Richard Branson to invest in space travel via Virgin Galactic, explaining as he did so that,

“government is not in the business of taking you and me to space; they have other priorities. It is up to private enterprise to learn from what government had started and pave a way for other applications for their technology”.

It is that thinking which is at the heart of the Bill. This is not the start of a mega state-funded journey into space. As the Explanatory Notes make clear:


“The Bill provides for the regulation and licensing of space activities”.

It is an enabling Bill which is in some ways very modest in its ambitions. It employs what I would describe as the “Field of Dreams” approach. Noble Lords will remember that in that film, Kevin Costner was encouraged to build a baseball stadium in the middle of nowhere with the heavenly advice, “Build it and they will come”. That is very much the advice that the Minister is giving us today.

The task of Parliament is to stress-test the idea in terms of whether there is a market and if there are any legal, safety or environmental issues which have to be taken into account. In terms of public support for the space industry, my noble friend Lady Randerson, who unfortunately cannot be with us today, has warned against pouring resources into projects of unproven merit while areas of transport are crying out for investment funds. That is a wise warning. On the other hand, we do not want to be like stagecoach manufacturers at the end of the 19th century: leaders in our field but oblivious to the fact that Henry Ford was about to roll out his Model T.

I mentioned that I was treasurer of Pictfor, one of the largest of the all-party groups looking at the implications for our economy and society of the new data technologies. From our agenda I see that we are on the brink of an explosion of demand for launch facilities to meet the rapid expansion of tele-communications and related technologies which already depend on satellites—from car navigation systems to mobile phones, from television services to cash transfer and withdrawals. In terms of demand for satellite launch capacity, we already have a chronic shortage.

I recently went to a presentation demonstrating the wide range of new technologies and services now being developed which will rely on satellite communications for their efficiency and success. The idea of driverless cars has already caught the public imagination. They will need a satellite-based support system far stronger and more accurate than the GPS systems with which we are all

 **Column 1253**  
Click to show

familiar. In addition to driverless cars, there is artificial intelligence, the internet of things and the development of 5G. This technological tsunami is already under way and almost all of it will involve satellite and space technologies in one way or another.


The US inventor/engineer/entrepreneur Elon Musk is talking of constellations of thousands of satellites, and it is clear that the next stage in the development of the space industry will involve building the capacity for thousands of launches for many years to come. So, in terms of spaceports, if we build them the customers are likely to come. It is also true that space travel, as mentioned by the noble Lord, Lord Hunt of Chesterton, retains the capacity to excite and inspire, particularly among the young. One only has to witness how the exploits of Helen Sharman and Major Tim Peake inspired great national pride and interest. I understand that Tim Peake is already scheduled to return to the International Space Station, so we will soon have a Brit in orbit once again, with the accompanying rise in public interest in space travel, and we wish him well.

I appreciate that this Bill is about not the International Space Station but what I might call the bread-and-butter side of the space industry, for which this Bill offers the framework legislation. Here we have to ask ourselves if this is a sector where we have the know-how and the capacity to succeed. It seems that here again the auguries are good. The UK is well placed to capitalise on the expansion of the space industry, with UK companies, such as Clyde Space and Surrey Satellite Technology, which has been referred to, already at the forefront of small-scale satellite manufacturing.

In preparation for this debate I received a briefing from another British company, Orbex, which is hoping to develop full orbital launch capabilities in Scotland with backing from the UK Space Agency and the European Commission's H2020 programme, as well as private venture funds. Some of our leading universities are also pathfinders in the field. Surrey Satellite Technology is a spin-off from the University of Surrey. The University of Leicester is working on plans to introduce an automated approach to satellite building that is similar to that used in the car and aircraft industry. This will be collocated with the National Space Centre.

Last month it was announced that the first commercial astronaut training centre will be built in the UK. The £120 million Blue Abyss facility will be constructed at RAF Henlow in Bedfordshire. In addition to these purely British ventures, a number of international companies, such as Airbus and Thales, are working here on space ventures. Private firms, such as Sir Richard Branson's Virgin Galactic and Elon Musk's SpaceX, are also in the field.

At the moment we are also well represented in European Space Agency projects and the number one investor in the main commercial programmes: telecommunications, earth observation and navigation. Can the Minister give an assurance that our involvement in the European Space Agency and its projects will be fully protected and sustained post Brexit? The space industry is a highly collaborative industry. For it to succeed, it must have access to public, private and international funding, co-operate extensively with other states, have access to the free flow of people and ideas and be governed by a robust regulatory structure.

 **Column 1254**  
Click to show

Are the Government undertaking any risk assessment as to impact of Brexit on our space industry? There are already worries in the sector, which thrives on the freedom to recruit the best and brightest. A hard Brexit that included the UK's exit from the Galileo satellite navigation programme and brought in cumbersome border checks would completely undermine the UK's desire to be the European hub for satellite launches. The truth is that Brexit is bound to cast a long shadow over our future prospects in the space industry. Since the Black Arrow and Blue Streak projects ended our ambitions as an independent player 50 years ago, as the Minister said, the emphasis of the past 30 years has been on the collaborative European efforts. Compared with other European space nations, the UK still has a very small national programme. Although the Government are putting great emphasis on encouraging the private sector, there is a case for a national programme to complement our ESA investment.

There are a range of other issues relating to insurance, liability and licensing, which will probably be best dealt with in Committee. In advance of that, have the Government considered plans for establishing a regulatory advisory group that would allow would-be participants to feed in ideas and concerns as the projects develop? It may be that lessons can be learned from other industries about safety and security concerns and engagement with the communities where they are located. The nuclear industry has a lot to teach us in that respect. Has any study been made of the likely environmental impact of spaceports and rocket launching? Has a full impact assessment been made of the cost of protecting spaceports from terrorists or other possible attacks?

The noble Lord, Lord Hunt, raised a number of other issues, which will need clarifying, on safety and international laws. We have an important job to do in getting the balance right between entrepreneurial freedom and public safety. I received two briefings which illustrate the dilemma that we face. From Orbex, the British company that I mentioned earlier, I received the plea:

“It must be paramount that the UK does not stifle this opportunity by over-regulating, as other nations such as Spain, Portugal and Norway are readying legislation and preparing launch sites. The UK should ensure that the framework legislation recognises the reduced risks posed by small-scale micro-launchers and nano-sat payloads, such exceptionally valuable new areas where Britain—and Scotland in particular—could lead the world with a soft-touch regulatory oversight. It is essential that licencing, insurance and range-tracking costs are appropriate to the level of risk”.

I think that the noble Lord, Lord Moynihan, got the same briefing, but it is worth repeating.

On the other hand, both the Science and Technology Select Committee in its report on the Bill and a detailed brief that I received yesterday from the Royal Aeronautical Society raised a range of issues about safety, liability, legal scope, planning, environmental impact and so on. Those are matters that we will be able to raise more effectively in Committee. Briefs arguing for a light touch and for specific regulation are helpful and will be used at the appropriate time. I welcome the offer that I received today from the Minister's office to engage with all sides of the House as

**Column 1255**

Click to show

this goes forward. As the noble Baroness, Lady Bloomfield, and others have said, we need to get the balance right with regulation that gives assurances about safety and freedom for entrepreneurs to take this forward.

As I said at the beginning, I am unashamedly of the Dan Dare generation. I have an *Eagle* annual that is 60 years old, which has a fully diagrammed article on how to build a spaceport, which I am very happy to provide to the Minister as part of the new spirit of collaboration. He has already laid claim to being part of the “Star Trek” generation by his opening quote—I had thought of him as more of a Buzz Lightyear than a Spock. I think that we will have an interesting time with this Bill and I am sure that, in the same spirit as that in which he introduced it, we can make it a good Bill for a very exciting industry.

🕒 4.30 pm

### Lord Dunlop (Con)

Share

My Lords, one hazard of speaking later in the debate is that many of the good points have already been made, so I apologise in advance if I indulge in a bit of reiteration. I warmly welcome this Bill; I do not approach it as a space expert but as an amateur enthused by what a recent Goldman Sachs report called “the second space age”, with the space economy forecast to become a multibillion-dollar market within the next two decades. It is a market in which the UK and UK businesses can play a leading role, if we are able to establish early-mover advantage. As has already been mentioned, countries such as Spain, Portugal and Norway are all preparing to bring forward competing legislation and launch sites.

 **Column 1256**  
Click to show

It seems to me that that is what the Bill is all about. A globally competitive and successful space industry cannot be built if we do not first put in place a regulatory framework to make it possible—one which recognises the space industry as it is today, not as it was 20 years ago. Traditionally, space has been dominated by Governments and government agencies with significant reliance on public funding, which is not surprising given the hitherto high costs of space entry. The UK space industry has therefore had to argue its corner for funds in the face of competing demands, and it has not always had a sympathetic hearing. Many felt that it was a “nice-to-have”, associated with exotic inter-planetary exploration, compared with the immediate and pressing needs of funding our schools and hospitals.

A few years ago I worked with the UK’s leading space company—then called Astrium, but now Airbus Defence and Space—on how best to argue for continuing investment in space. Our case had the not very original working title of “Bringing space down to earth”. Our argument was that the space industry is not some esoteric luxury; it is highly relevant, and increasingly essential, to improving everyday lives here on earth. GPS, memory foam, LEDs and artificial limbs all owe something to space innovations. If we are going to feed the world’s population—forecast to be 9 billion in 30 years’ time—food production needs to increase by 70%. More precise weather forecasting can help to improve crop yields and better tracking of food shipments can reduce the

number of perishable cargos delayed or damaged in transit. More-effective earth observation, brought about by advances in satellite technology, makes all this possible. As we wrestle here in the UK with how to deliver at an acceptable cost superfast broadband to the final 5% of the hardest-to-reach properties, or effectively to track and enforce fishing rights in our territorial waters post Brexit, better answers are likely to be found in developments in space.

The Government are to be commended for having the foresight to recognise the strategic importance of the UK's space industry. I pay tribute to my noble friend Lord Willetts, who is not in his place today but who, as Science Minister, was such a great champion of the space industry, overseeing the establishment of the UK Space Agency and an increase in our budgetary contribution to the European Space Agency.

As we look ahead, and as we have already heard today, the space industry is changing fast, driven by falling costs and lower barriers to entry. Satellites are becoming smaller and lighter, and reusable technology and other developments are cutting the cost of launches. A sector hitherto dominated by the public sector is now increasingly seeing an influx of private and commercial players. Private investment in space has been growing rapidly in recent years.

Three-quarters of private investment activity in the space sector since 2000 has taken place in the last five years, with eight space start-ups on average per year, and more than 50 venture capital firms had invested in space enterprises by 2015. As we have heard, private entrepreneurs such as Elon Musk, Jeff Bezos and Richard Branson are pioneering new space launch solutions.

While much attention is rightly paid to satellites and the value-adding applications derived from them, looking to the future, space tourism, mining asteroids for precious minerals and on-orbit manufacturing will no longer be in the realms of science fiction; they will become science fact.

The Bill is, of course, designed to facilitate the development of UK spaceports. As such, it begs one pretty big question: is the demand there to support one or possibly more spaceports in the UK? Structural changes in the industry suggest that demand is there, as we have already heard. Traditionally, large and heavy satellites have been launched into geostationary earth orbit from, for example, the Guiana Space Centre on the equator. A new disruptive technology—the so-called CubeSat—opens up new possibilities. It measures just 10 centimetres squared, weighs less than three pounds and typically is used in low-earth orbit, which does not require equatorial launches to be cost-competitive. Therefore, more miniature satellites will be needed to provide sufficient coverage of the earth, and they have a lifespan of just one to three years rather than the 15 for larger, more conventional satellites. All this means that between 2018 and 2020 alone there is a forecast requirement to launch 1,500 small satellites.

Ground infrastructure is therefore going to become a major constraint for CubeSat operators if they are not to rely on piggybacking on the less-suitable missions to launch larger satellites.

Therefore, there can be no question but that the Bill before the House is very timely. The Government abandoned the original competition to select the UK spaceport location in favour of



**Column 1257**  
Click to show



the licensing approach set out in the Bill. I think the Government are right not to restrict the possibility of multiple approaches that may allow different launch solutions to be tried in different places, and to bring fresh economic activity to local communities in need of it. As a former Scotland Office Minister, I am delighted to hear the support of the noble Lord, Lord McNally, and my noble friend Lord Moynihan for Scotland. If the House will indulge me, I would like to bang the drum for Scotland again. Three of the original five shortlisted spaceport sites are in Scotland at Prestwick, Stornoway in the Outer Hebrides and Campbeltown in the Mull of Kintyre, and only yesterday I learned of a fourth proposed site in Sutherland.

If the UK is fully to realise the economic potential of spaceports, linking them to a broader space industry ecosystem will be a real competitive advantage. In this regard Scotland is very well placed. It has a pre-existing and impressive space cluster of 100 private and public organisations and 18% of the jobs in the UK space industry are in Scotland. Scotland is home to the only UK-owned independent satellite manufacturer, Clyde Space. In the last two years, Glasgow has built more satellites than any other city in Europe. Scottish universities have built a strong reputation in space-related disciplines, including Strathclyde University's Space Institute and Edinburgh University, which, in collaboration with NASA, is developing Valkyrie, a human-sized robot booked on the next unmanned mission to Mars. One of the perks of being Minister is that you not only get to meet Tim Peake, you also get to meet Valkyrie, which I have to say was like something out of a "Star Wars" movie.

I recognise, of course, that Scotland is not the only place with a strong claim as the location for a spaceport. Some involved in the industry believe that the market could sustain more than one spaceport in the UK. Perhaps the Minister could comment on that when he winds up. I also wonder whether he could address two further points in his wind-up which have been touched on. The first is about the availability of insurance and the capping of liabilities, to which he himself referred. The new market potential comes in large part because costs and barriers to entry are falling. What further reassurance can my noble friend give that uncapped liabilities will not hinder commercial developments, particularly from smaller players and new entrants? The second concerns technology transfer. If spaceports are to succeed, the UK will need to attract those developing new launch technologies to come and operate from here. Many are currently based in the US, although, like the noble Lord, Lord McNally, I was pleased to hear about a British company, Orbex, which is developing an indigenous, full-orbital launch capability. Nevertheless, does my noble friend foresee any US regulatory hurdles to be overcome—for example, US ITAR restrictions—before these US launch companies are able to operate from here?

In conclusion, I warmly welcome the Bill. It is clear that we need to make quick progress if we are to secure early-mover advantage, and we need to put in place a regulatory regime that is sufficiently flexible to accommodate innovations in a very fast-moving industry.

🕒 4.40 pm

 **Column 1258**  
Click to show

## Lord Suri (Con)

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My Lords, it is a pleasure to speak on this subject. I have always favoured bold steps to unlock the potential that new markets hold and sensible frameworks set up by the Government to get the development of such markets right.

Spaceflight is a topic that has long interested me. The moon landing, which many of us in this place will remember, was the first time I turned my eyes heavenwards and considered what lay out there in the inky blackness, studded with lights. The pioneers of the space race are a fine example of how inventions spring forth from good regulation and government attention. Velcro, freeze-dried food and memory foam are a few of the more useful daily tools made available by the scientists at NASA.

It is my firm belief that creating a sensible and flexible regulatory regime will help scientific advance in this country, too. I should say, too, that I am delighted that the British Government were in a position recently to send an official British astronaut into space, in no small part due to the work of my noble friend the former Minister of State for Universities and Science. For us to be outstripped in the ease and regulation of spaceflight by a number of other European countries is certainly an anomaly that needs to be addressed.

I think that, in this Bill, the Government have struck the correct balance. In general, I am wary of excessive secondary legislation supported by guidance. It can give too much power to Ministers to escape the scrutiny and oversight provided here and in the other place. However, since this industry is moving at such a rapid pace, it is entirely reasonable to give more power to Ministers to tweak the rules so as to provide the best business environment. I will still be reading the *Policy Scoping Notes*, of course. I will be glad if the Minister can confirm that he will further engage with stakeholder industries over the summer to make sure that the Bill is in correct shape ahead of Committee.

Quite often, fledgling industries like this need some help to get off the ground, as it were. In the related industry of aerospace, there is the iconic example of wings. The UK is a world leader in wings due to a substantial investment made in that field by the British European Airways Corporation in the 1960s. Now, Airbus and Boeing still have most of their wing supply chain in this country. It is a great success story, hiring thousands of people across the Midlands, and is a plank of our industrial strategy. In that light, I would like to know whether there has been any consideration of what support could be provided to those who wish to set up spaceports and engage in sub-orbital activity. This need not necessarily take any form of grants, as tax incentives would have a similar stimulating effect.

Furthermore, I am glad that criminal law will be applied to spacecraft pursuant to the provisions of the Bill. I have no doubt that this will be a contentious industry with regular disputes. By applying criminal law to spacecraft, we establish in spaceflight one of the UK's great advantages — our widely trusted and internationally respected rule of law. This will, in my view, be a tempting

 **Column 1259**  
Click to show

prospect for future entrepreneurs and inventors looking for places to set up. Supporting new industry is precisely what the Government should be doing post Brexit, and I am glad that they are. I will be supporting the Bill.

🕒 4.45 pm

## Lord Balfe (Con)

Share

My Lords, I begin by drawing attention to my entries in the register of interests—in particular, my honorary position with the British Airline Pilots Association.

What I have to say may be seen as being tangential, but not irrelevant, to the Bill, but I pray in aid the fact that I have notified the Minister and he did not hit the ceiling when I told him what I would be dealing with—that is, safety, in particular. I commend the remarks of my noble friend Lord Moynihan and the noble Lord, Lord McNally. At the moment, we debate all Bills in the shadow of the Grenfell Tower tragedy and the fact that we know that, had steps been taken, we might well not be facing that problem today.

Safety issues are a major feature of the Bill. Clauses 9, 20, 40 and 18 all deal with various aspects of safety, and rightly so. Perhaps I may quote from the briefing notes a couple of points about Clause 18, which is the more general clause. They say:

“The regulations made under clause 18 will provide for overarching safety regulations and those not captured elsewhere”.

It also says that the Clause 18 powers,

“will supplement the matters prescribed under clause 9”,

and that,

“the broader powers in clause 18 will ensure continuing oversight”.

One of the difficulties that arose out of the last election—there were of course many—was that a number of issues that were near the top of the legislative agenda have slipped right down to the bottom. One of those issues, as the Minister will know because I have discussed it with him, is the safety aspect of drones at airports, and that could well apply at spaceports too. As the Minister will know, there has recently been a study of this matter. It has not been published yet, but I am sure that it will be. The point that comes through that study is that, unless some safety legislation is introduced at a fairly early stage, we could have another committee of inquiry looking at what I would regard as an avoidable accident.

I am informed by the parliamentary draftsmen that, as this is a DfT Bill, it would be perfectly possible to strengthen the safety provisions in it and to extend them into areas not presently covered, including drones at airports. In particular, I refer to the hazard they pose to helicopters. Scotland has been mentioned many times in this House and in this debate, and noble Lords will be well aware of the importance of helicopters, particularly in the Scottish North Sea. I realise

 **Column 1260**  
Click to show

that the Minister cannot agree anything this afternoon, because this matter is not within his brief today, but I ask him to take back to the department the problem posed by drones and the need, acknowledged by the Government before the election, for legislation to clarify the safety regulations around them. Perhaps he would look at whether it would be possible to add a suitable clause to this Bill or to strengthen one of its existing clauses.

It is a small area, but if it went wrong it would be another tragedy. I believe it to be an avoidable tragedy, and it has been accepted as such. It is sad that time was not found for specific legislation but I believe—and the parliamentary draftsmen seem to agree—that it would be possible to extend this Bill into that area. I invite the Minister to give no more than an undertaking that he will look at this matter when it goes back to the department and, if possible, come back to the House with a helpful amendment to the Bill.

🕒 4.50 pm

### Lord Fox (LD)

Share

My Lords, we have heard of “Star Trek”, Dan Dare, Buzz Lightyear and “Star Wars”. I am rather disappointed that no one managed to work HS2 into the narrative—but there may yet be an opportunity. I declare my interests in aerospace as listed in the Members’ register.

We have heard overwhelming support for the spirit of the Bill, with some serious reservations, particularly around safety. In the knowledge-based economy of the future, scientific research, innovation and skills will be important to the prosperity of this country. Any Bill that is aimed at strengthening that has the support of the Liberal Democrats. We have to be in a position to attract investment in the future, supporting the innovative technologies that have been outlined today.

 **Column 1261**  
Click to show

As we have heard from the Minister, the noble Baroness, Lady Bloomfield, and others, we already have a very valuable space industry in this country. The UK Space Agency estimates that it is worth about £13.7 billion —or a 6.5% share of the global space economy. The UK space sector, Space Agency and Innovate UK have the ambitious target of growing that share to 10% of the global market by 2030.

If you look at market trends in the space economy, you will see that there are two major developments. One is large satellites in geostationary orbit delivering massive broadband capability, and the other is the very large constellations of smaller and micro satellites in orbit, also delivering new services such as broadband, connectivity for driverless cars, 5G and other “internet of things” services. As we have heard from many speakers, already in this country we have companies that contribute well to the global economy in both those areas.

It is clear that one of the major bottlenecks in the growth of the small satellite sector will be launch capacity, and we heard from the noble Lord, Lord Dunlop, about the market need. Waiting lists could become prohibitive. If the noble Lord, Lord Moynihan, is correct and there are 10,000 satellites lined up to be launched over the next decades, there will need to be capacity, otherwise

the bottleneck will become even more apparent. A lot of the satellite applications which will drive future growth of the UK space industry require those satellites to be launched. In other words, the growth plans for the UK industry cannot be realised unless the satellites are there to create the data opportunities for the industries of the future.

So there is a gap in the market, and the UK could be a competitive alternative to some of the existing facilities and the potential facilities that are being considered. If a low-cost launcher programme could be put together, it could become a workhorse for European satellite programmes—as well as, as we have heard, a jumping-off point for what I call space tourism or lower-level flight.

As the Minister has already said, we are not the only country having these thoughts and considering such legislation. Other European countries have the same idea and are moving forward in this area. It is therefore right that we are trying to move swiftly and it is also right that we should move to the point where we have a flexible legislative environment in place.

The Government's ambition is not to have a sovereign launch capability; rather, it is, as we have heard, to rely on the private sector to come up with the capital to build several UK spaceports. As my noble friend Lord McNally suggested, the UK Government should not get sucked into draining more from the money tree that we hear about to support this process; there are many other pressing terrestrial travel needs that require investment. We have heard of one example from industry of putting together consortiums. Does the Minister have examples of other groupings coming forward? What kind of support is envisaged along the lines of the £10 million that has been referred to, which seems a large number but also a small one when compared with other transport needs.

 **Column 1262**  
Click to show

The noble Lord, Lord Moynihan, talked about the need for a timetable for approval, which is very important. What kind of time are we looking at? When we consider the example of Russia and building spaceports, we can see that it is a six to 10-year project. We need to know the lead time between when we cut the first grass and actually launch the first satellite or spaceplane. To meet the growth that we need will be the equivalent of creating by 2030 two new Inmarsats—the biggest company we have. Growing this industry to the size that people want will be a big ask and it is important that we get moving on it quickly. As the Minister, my noble friend Lord McNally and others have said, we want to get into a position of being able to drive those technologies with the data that we can produce from satellites. I understand that there is a proposal to use part of Innovate UK's industrial strategy challenge fund to stimulate the adoption of services, which again would help to develop more space companies. Can the Minister confirm this and explain how it might operate in the future?

There are one or two concerns. Heeding the advice of my noble friend Lord McNally about not going into too much detail on some of the regulatory and insurance issues, I would like to pick up on a couple of points around licensing and insurance for the mega-constellation style of launch. We heard from one noble Lord about the potential for 1,000 micro satellites to be released in a

single launch. This creates certain issues. British law currently treats nano satellite constellations no differently from a \$200 million satellite in geostationary orbit: in other words, each satellite in a constellation would be subject to a licensing fee of around £6,500 and would have to be covered by its own third party insurance. All of that adds up to a huge sum of money which starts to become a big barrier, particularly when we consider how the US Government deal with similar issues. So I will ask in Committee whether we will have an opportunity to rethink the process. As the noble Lord, Lord Suri, said, we need flexible and appropriate legislation, and this is an area that requires some thought.

The noble Lord, Lord Hunt, raised some thoughtful issues which I am sure that the Minister has taken on board. I would highlight the question of foreign ownership that he mentioned—because, of course, defining the ownership of a company can be extraordinarily difficult. It would be interesting to hear the Minister's thoughts on that, as well as on the issue of offshore launches.

No Liberal Democrat spokesperson can ever stand up at the moment without mentioning Brexit, so I am afraid that I am going to mention it briefly. First, will we retain full access to the vital EU space programmes? Where are we on that? Secondly, can the Minister confirm that the UK will continue to participate in Galileo and where will we be in Horizon 2020 on this issue? Thirdly, the chairman of UKspace has called for the UK to “enhance” its investment in the European Space Agency following Brexit—a point that was echoed by my noble friend Lord McNally. Our relationship with the ESA, which is not part of the EU, will be an important symbol of our continuing commitment to European co-operation. The Minister's thoughts on the future of that and how we will take it forward will be helpful.

Finally, other noble Lords mentioned the free flow of talent. The Minister quite rightly talked about wanting to attract world-class scientists to this programme and it being part of a magnet. We need some assurance, not just in this industry but in practically every other technology-based industry and all the university sectors, around free movement of talent and people. To make the UK the most attractive place to work, it has to be a place where people feel welcome, needed and valued.

Another issue that again was touched on by the noble Lord, Lord Moynihan, in his comprehensive speech, was the format of the Bill. He is right that it is substantially less skeletal than it was. My Benches have some concerns about skeletal Bills, not least because we feel that this may be the shape of things to come in other legislation. We recognise that this has been improved but it is not perfect. We would like to put that on record.

My noble friend Lord McNally and the noble Lords, Lord Moynihan and Lord Balfe, raised safety. They are correct. I am sure that we will have an opportunity, given that concern and the importance of the issue, to come back to it in discussions with the Minister and in Committee.

 **Column 1263**  
Click to show

In summary, the space industry is highly collaborative. For us to succeed in it, it has to have access to private and international funding; it has to be able to co-operate extensively with other states and allow the free flow of people and ideas around the world; and it has to be governed by a flexible and facilitating regulatory structure. This Bill provides for only the last of those three conditions. I hope that the industrial strategy will fill in some of those details. Notwithstanding that, it is a welcome Bill.

🕒 5.02 pm

## Lord Rosser (Lab)

Share

My Lords, this Bill is clearly regarded, I hope correctly, as not potentially controversial; hence it is starting its passage through Parliament in your Lordships' House. The Bill appears to have had a somewhat truncated period for consideration and scrutiny prior to its Second Reading. The *Draft Spaceflight Bill*, as it was then called, was published on 21 February, with an invitation sent to some three or four Select Committees to consider the measures proposed in the draft Bill. No deadline for reporting was apparently given. Nevertheless, the House of Commons Science and Technology Committee began its consideration of the draft Bill on 2 March, with the aim of reporting before the end of the Session. The advent of the general election rather curtailed its proceedings, including an evidence session with the Minister, but it published its report on 29 April. The committee received just 12 written submissions and took evidence from 12 witnesses.

As has been said, the Commons committee also wrote to the Delegated Powers and Regulatory Reform Committee of this House, inviting it to consider whether the delegated powers in the draft Bill offered sufficient opportunity for parliamentary scrutiny—an invitation to which the DPRRC responded. However, the House of Commons Science and Technology Committee commented in its report:

“Cabinet Office guidance recommends giving committees ‘at least three to four months (excluding parliamentary recess)’ to scrutinise draft Bills. We have had had just over five sitting weeks”—

hardly a satisfactory state of affairs.

On behalf of the Government, the noble Lord the Minister wrote, presumably to a number of us on, I think, 28 June—the letter was headed “Dear Colleagues” —setting out the measures contained in the Bill and the Government’s reasons for bringing it forward. I thank him for that letter. The penultimate paragraph stated:

“Given the number of delegated powers contained within the Bill, the Government has committed to publishing policy scoping notes covering all regulation-making powers prior to Second Reading”.

 **Column 1264**  
Click to show

Along with, I presume, other noble Lords, I received an email late yesterday afternoon with what I assume are the scoping notes—it looked like 94 pages. If that is the Government's version of honouring the spirit, as opposed to the letter, of a commitment given two weeks previously, it is not mine.

So we have a Select Committee not given anywhere near the Cabinet Office guideline on the amount of time to consider draft Bills and we have a Government who think that producing a lengthy document in the late afternoon of the day before a Second Reading constitutes honouring a commitment to publish such a document "prior to Second Reading". Bearing in mind that the Bill contains some 100 individual provisions containing delegated powers, one of which is a Henry VIII power, I am sure that many wonder whether this is but a dry run for the Government's approach to both the legislation and to Parliament in seeking to implement the decision to withdraw from the European Union.

The letter from the noble Lord the Minister of 28 June also stated that,

"further engagement with industry and others will take place over the summer and I intend to make more information available regarding the Government's approach to secondary legislation in advance of Committee Stage of the Bill".

In the light of what has happened with the previous commitment to which I have referred, can the Minister now give a firm and specific commitment on how far in advance of Committee that further information will definitely be made available, bearing in mind the Government could seek to start the Committee stage immediately after we return from the recess or shortly afterwards? Indeed, it might be helpful if the noble Lord the Minister could point out to his relevant government colleagues the extent to which the Bill provides for delegated powers and the commitments that have been given on providing further information on the Government's approach to secondary legislation, and suggest that it would be better if there was a breathing space between the return from recess and the start of the Committee stage.

The Outer Space Act 1986 provides the current legal framework for the UK to fulfil its obligations under the United Nations space treaties, which require any UK organisation or individual launching, procuring a launch or operating space objects to be licensed. These licensing powers rest with the Secretary of State and are administered by the UK Space Agency. To date, as has already been said, launches licensed by the UK Space Agency have taken place overseas. The Civil Aviation Authority recommended that the regulatory regime for spaceflight activities be updated, following its review of UK commercial space plane operations in 2014. At the end of 2015, the Government published a national space strategy. Following that, we now have this Bill, whose purpose is to make provision to enable commercial spaceflight activities to be carried out from the United Kingdom for the first time in the light of the expectation that the global market for small satellites will grow rapidly.

 **Column 1265**  
Click to show



The space sector has already delivered important benefits to the UK economy, generating a turnover of just under £12 billion in 2012-13 and employing at that time some 35,000 people. A 2016 assessment reported that the space industry was worth £13.7 billion in 2014-15, equivalent to 6.5% of the global space economy, and contributed £5.1 billion gross value added to the UK's economic output. The UK Space Agency has said that a majority of income generated by the space industry, nearly 75%, comes from space applications such as the services which use satellite data directly. Space operations, such as operating satellites and ground stations, constitute 15% of the income generated.

As the noble Lord the Minister has said, the Bill seeks to create a regulatory framework to enable commercial spaceflight activities, launch to orbit and sub-orbit spaceflight to be carried out from spaceports in the United Kingdom, and for the licensing of spaceflight activities. Clauses within the Bill make provision for the grant of licences, the establishment of ranges, safety and security as well as liabilities, indemnities and insurance. The Bill will apply only to activities conducted in the United Kingdom and will restrict the application of the current legislation in force, namely the Outer Space Act 1986, to activities conducted outside the UK. While the Government have said that the UK's obligations under international and EU space law, as it is currently practised, would continue to be enforced under this Bill in respect of the UK, where is that spelled out, for example, in relation to contamination of outer space in compliance with the 1967 UN Outer Space Treaty and covered in the Outer Space Act 1986, which would no longer apply to activities conducted in the United Kingdom?

The 1968 Act refers to a set of comprehensive standards applicable to the design and functioning of space vehicles, but these do not appear to be carried over into this Bill, which will, in future, regulate activities conducted in the UK. What are the Government's intentions in this regard? On licensing, why does the Bill not clarify the differing nature and duration of licences for the different parties involved, and the need for certification? Is it really the Government's intention that all this should be left to secondary legislation? Nor does the Bill appear to include provisions related to health and safety, environmental protection, local planning and other issues associated with on-site activities. Why does the Bill not do this?

We support the thrust of the Bill, which, as has already been said, has the support of the space industry, not least because of its focus on enabling commercial spaceflight from the United Kingdom. The major downside of the Bill, to which I have already referred, is the lack of detail, which makes detailed scrutiny somewhat difficult. It is in effect still a skeletal Bill which places a lot of powers in the hands of the regulators and the Secretary of State. Consequently, the Bill contains a very considerable number of delegated powers—as I have said, around 100 provisions—to bring forward secondary legislation in the future. While there is clearly an argument for having a flexible regulatory structure in a field of activity where there are many unknowns, there is also a need to provide for meaningful parliamentary debate and scrutiny, which cannot be achieved through secondary legislation in the way that it can through primary legislation.

 **Column 1266**  
Click to show

The Government have, as has been said, made some changes from what was in the draft Bill in the light of the reports and consideration by the House of Commons Science and Technology Committee and the Delegated Powers and Regulatory Reform Committee of this House, and that is to be welcomed, but the issue of whether the changes go far enough in meeting the concerns raised by those committees, and by others, is one that will have to be considered in more detail at further stages of the Bill, and in the light of further documents received from the Government only late yesterday afternoon by email, and further information that is to be provided by the Government prior to Committee. However, in its delegated powers memorandum dated 28 June the Department for Transport, in noting the concern of the DPRR Committee that some powers dealing with matters of significant public interest, such as safety and security, were subject to the negative resolution procedure, went on to say:

“However, switching these to affirmative procedure in all cases could take up a disproportionate amount of parliamentary time and might discourage timely updating because of difficulties in securing parliamentary debates”.

So much for the importance of parliamentary scrutiny and accountability. The Government appear, at heart, to regard it all as a bit of an inconvenience.

I would add, of course, that the Government have proposed a compromise in respect of some delegated powers with a “first-use” affirmative procedure, with the negative procedure thereafter. The Government’s response as a whole will need to be considered carefully, but as the DPRR Committee said in its response, while flexibility and adaptability are key to the underlying technology,

“it does not follow that legal matters affecting the rights of the general public should be governed by considerations of ‘flexibility’; quite the contrary”.

My noble friend Lord Haskel is not able to be here today to take part in this debate, but I know he has issues in relation to the regulations for operations and safety and standards, and other matters, in what is a highly competitive market, with thousands of new satellites required over the next five to 10 years and companies planning commercial spaceflights. Without international collaboration on standards, there is likely to be little collaboration in business. Is it the Government’s objective that the standards of safety and security outlined in the Bill should satisfy all potential customers? What protections are envisaged against cyberattacks seeking to cause disruption and damage? Presumably, launches and landings become more vulnerable to attack, with potentially tragic consequences, with the move to digital systems. If the navigation system is open to attack, the results could be even more tragic. This does not appear to have been addressed in the relevant clauses in the Bill, so what reassurances or commitments can the Government provide?

 **Column 1267**  
Click to show


The Bill refers to horizontal launches and vertical launches and establishing a new centre for these. Are the Government looking at adapting existing aerodromes, which would presumably already have some infrastructure for access, service and accommodation? What intentions or restrictions do the Government have in mind in respect of the location, ownership and operation of a spaceport or space station? In respect of horizontal launches, sub-orbital space tourism is presumably the major market and there are spaceport promoters interested in bringing this to the UK. Once members of the public are flying in a spacecraft, other concerns emerge, with the spacecraft becoming more like a commercial aircraft. Presumably, the CAA will be largely responsible for the regulatory environment in this situation. Issues have already been raised in this House, including by the noble Lord, Lord Balfe, about the potential dangers posed to aircraft by drones—and, indeed, by the use of lasers—and they could equally apply with the public flying in spacecraft. Do the Government intend to address this in the Bill?

With a major increase in the number of satellites, how do the Bill's provisions relate to international efforts to reduce the amount of junk? In some instances, there will no doubt be reusable spacecraft. How does the Bill regulate returning craft? Will this be controlled by the UK Space Agency and the CAA, and will they have to co-operate in this with other agencies? If that is the case, how does the Bill envisage this being done?

Finally, is it the Government's intention to retain our membership of the European Space Agency, which is independent of the European Commission? If so, is that space agency satisfied with the Bill's provisions?

I conclude by reiterating our support for the general thrust and intent of the Bill, but not for some of the lack of detail in it. No doubt there can be further discussions about the Bill prior to Committee, which looks as though it may not be until October. I hope that those discussions, as well as our discussions in further stages of the Bill, will resolve some of the questions about the lack of detail in the Bill.

 **Column 1268**  
Click to show

 5.17 pm

## Lord Callanan

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My Lords, I thank all noble Lords who have taken part in today's Second Reading for their, as ever, very informed questions, which they were quite right to ask. The challenge and the debate are welcomed by the Government and will help us strengthen the Bill. I appreciate the broad support that has been shown for the Bill's ambition. I reiterate the point that I have made to a number of noble Lords, both publicly and privately, that we are looking to co-operate on all sides of the House on this matter with Members from all parties and none. I am always available to discuss aspects of it and I have written to a number of Members to make that point. I thank my right honourable friend the Minister of State at the Department for Transport, who was sitting on the steps of the Throne earlier. I was delighted to see him paying such close attention to our proceedings.

I will try to address many of the points that have been made. I thank the noble Baroness, Lady Bloomfield, for her astute analysis of the UK space industry and her support for the Bill. On the issue that she raised concerning the comparable provisions to those in Section 1 of the Civil Aviation Act 1982 to promote the development of the space industry in the UK, I agree that the Government should recognise the need to promote growth in this sector. The Deregulation Act 2015 provides for a growth study to apply to functions specified by order. Statutory Instrument 2017/267 already lists functions under the Outer Space Act 1986, and we propose to amend this SI to also list functions under the Bill. My noble friend also shares the concerns of a number of other noble Lords—my noble friend Lord Moynihan also mentioned this—about over-regulation of this emerging market. This is a concern we are very alive to, and the Bill establishes a proportionate framework to support growth in this emerging sector while adequately balancing government and operator rights, the safety provisions and other factors dedicated to it. In exercising the powers in the Bill, the Government will ensure proportionality, and we intend to consult fully on all the secondary legislation required to implement these measures.

Engaging with agencies such as ICAO was raised by the noble Lord, Lord Hunt. Through the DfT and the Civil Aviation Authority, the UK has been working as part of a joint ICAO/UNOOSA space learning group better to understand how commercial spaceflight fits in with the global air navigation structure and how regulation will need to adapt to the new industry. ICAO has not yet developed detailed rules on spaceflight.

The noble Lord, Lord Hunt, also raised the issue of the carriage of nuclear materials. We do not intend to permit the carriage of any nuclear materials. Paragraph 3 of Schedule 3 allows for prohibitions and restrictions on this. There may be exceptions regarding everyday appliances such as smoke detectors, which routinely use small quantities of technically radioactive material.

We do not believe that the Bill engages obligations to produce an environmental impact assessment. Environmental impacts are heavily correlated with the type, frequency and location of spaceflight activities. At this stage, it is very difficult to ascertain specific environmental issues. For example, the sensitivities of a site cannot be known until we know the location of the spaceport.

My noble friend Lord Moynihan and the noble Lord, Lord Hunt, raised international agreements, and they were right to do so. We have put in place a number of agreements to enable commercial spaceflight in the UK. The type and nature of these agreements depends largely on the technology used, how and where it is operated and what it is used for. The UK complies with all existing space treaty obligations, and we are working to secure the agreements necessary to enable commercial spaceflight to take place from the UK.

On a point made by the noble Lord, Lord Hunt, I should say that the UK Space Agency's international partnership programme uses UK R&D to support international development. This supports developing countries to use satellite solutions for problems such as deforestation and disaster relief. My noble friend Lord Moynihan asked about the Government's support for the

 **Column 1269**  
Click to show

development of this emerging market in the UK, and a number of other Members raised a similar point. The UK Space Agency published details of the grant process in February, including our processes for assessing proposals and the criteria we would apply. We have engaged extensively with the parties who submitted funding proposals, to ensure that our process is transparent. The proposals were naturally submitted to the Government in commercial confidence and noble Lords will understand that I cannot disclose details now. However, I can confirm that in line with the process set out in February, the UK Space Agency is currently considering these proposals with independent expert advice, and I expect it will announce the outcome of the process later in the year.

A number of noble Lords, including the noble Lord, Lord McNally, raised questions around the European Space Agency. The Government's policy to exit the EU does not affect the UK's membership of the European Space Agency. The UK has a strong and healthy space economy with an international outlook. We have a long history of collaboration and participation in European space programmes and missions through the European Space Agency. The Government will continue to take an active role in European space programmes, supporting UK industry in its bids to win contracts overseas and developing our national capability to keep the UK competitive in the global market.

The issue of affirmative regulations was also raised by my noble friend Lord Moynihan. We need a proportionate approach for aviation. Section 60 of the Civil Aviation Act enables all aviation safety rules to be made by negative procedure. These safety rules are likely to be amended frequently. We aim to lay statutory instruments in summer 2019, and licences can be issued once these are in force.

The noble Lord, Lord Hunt, raised the issue of range ownership. Our intention is for these to be privately owned. Foreign ownership is not prohibited. A licence cannot be granted of course unless the applicant is a fit and proper person.

My noble friend Lord Dunlop asked me about the number of spaceports. The Bill does not restrict the number of licences that could be issued for spaceports. However, the decisions on licensing would be based on eligibility, alternative criteria requirements and safety standards. I noted his strong advocacy of Scotland, along with that of my noble friend Lord Moynihan—we have a lot of interest from Scotland, particularly given the rural nature of many of its locations. We are working closely with the devolved Administrations, but I hope that my noble friends would not expect an Englishman with Irish roots to adjudicate on this process. My noble friend Lord Dunlop also asked me about ITAR and knowledge transfer. The Bill includes provisions for entering into agreements with other countries, including the provision for knowledge transfer and to ensure that we can meet the ITAR constraints that may be imposed on us by the United States.

The issue of liabilities was raised by a number of noble Lords. We have taken the power in the Bill to cap liabilities. However, we can assure industry of our intention to cap liabilities only in circumstances for which analysis has already been carried out to determine the current liability

 **Column 1270**  
Click to show


cap policy under the Outer Space Act 1986, as amended by the Deregulation Act 2015. For other circumstances, we hope to carry out the analysis as quickly as possible to further promulgate our policy decision.

My noble friend Lord Balfe and the noble Lord, Lord Rosser, raised the issue of drones. Your Lordships will be aware that the department completed a consultation on the safe use of drones in the UK in March. We are considering the responses received and developing outcomes on this, and I hope the Government's position will be released very soon.

My noble friend Lord Suri asked me about consultation. We will discuss the proposed structure of the statutory instruments and how this fits with industry views. We intend to publish a database containing more detail on regulatory functions including spaceflights, on existing international best practice under each of those functions, and on initial assessments of risks associated with each of these functions before and after regulatory activity has taken place. We expect that this will start the conversation on the licensing framework and can inform discussions with insurers about the level of residual risk, and therefore start to gauge the potential appetite for insurers to enter the market.

The noble Lord, Lord Fox, asked me about timetables for launch. I am slightly hesitant on this, but we intend to lay statutory instruments in summer 2019. Once these have entered into force, regulators will be in a position to accept licence applications, which we expect will be processed in roughly 12 to 18 months. Please take that with a slight pinch of salt—these things can change and there are lots of considerations still to go through—but it might help as a rough timetable.

I take the point made by the noble Lord, Lord Rosser, about the policy scoping notes. Please accept my apologies that they came out late, but I wanted to get them issued before we sat down today. I appreciate it is very difficult to read a 94-page document in advance of this debate, but the policy scoping notes are not provided for discussion: they are our initial statement of intention with regard to the use of delegated powers and the need to consult on the use of powers given their importance and impact and the need to carry out analysis and assessment of criteria for determining safe levels of risk, for example. I confirm that it is not currently our intention to take Committee immediately after the holiday break in September. It will be a few weeks after that, subject to the vagaries of the Whips, and not immediately we return after recess.

 **Column 1271**  
Click to show

## Lord Rosser

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I thank the Minister for that comment. It had certainly been my understanding that it was not going to be in September anyway. What is of concern—given the extent of devolved powers, with further information still to come—is if on the first or second day back in October, the Committee stage of the Bill is scheduled. What I meant by breathing space was a breathing space in October before we start Committee.

## Lord Callanan

Share

I am not in a position to confirm that yet. As soon as I get further information from those who deal with these matters, I will let the noble Lord know. I intend to work as closely as possible with all noble Lords on this; when I have further information, I will share it with him.

On the question of licensing and insurance for mega constellations, space activities are risky in nature and the Government may be required to pay compensation for damage caused as a result of spaceflight and related activities carried out by UK entities or launched from the UK. The insurance requirement is one of the provisions in the Bill to protect the Government and the public by ensuring that there is a resource to meet such claims. We do not believe that small satellites pose the same risks to the space environment. Further work will be undertaken on the insurance requirement for the different activities licensed.

The UK has played a major part in developing the main EU space programmes—Galileo and Copernicus—and space surveillance and tracking, which have supported the rapid growth of the UK space sector and contributed directly to our prosperity and security. It is a global success story, leveraging our best talent to deliver highly innovative products and services every year, and we want that to continue if at all possible.


The noble Lords, Lord Fox and Lord Rosser, asked me about delegated powers. The Bill contains 71 clauses, 12 schedules and 100 delegated powers. This large number of delegated powers—I accept that it is a lot—is required because the commercial spaceflight environment is innovative, highly technical and fast changing. It is important that we have the flexibility given by secondary legislation to adapt to keep pace with this emerging market, as both UK regulators and the space industry develop expertise in this area. The Bill sets out the regulatory framework for a novel, dynamic and diverse industry, accommodating a wide range of different technologies. It aims to provide sufficient certainty and assurance to Parliament, regulators, industry and the general public while simultaneously having the flexibility to allow industry to grow. Early feedback so far from industry is that this flexibility is seen as vital. A rigid approach that offered limited opportunity to keep pace with either the development of spaceflight or the enhanced experience of the regulators would be restrictive for the sector.

The noble Lord, Lord Rosser, asked me about horizontal and vertical launch. He is correct: currently, we expect existing aerodromes to be most interested in conducting horizontal launch activities. I would expect vertical launch activities to be from a mixture of existing aerodromes and new facilities, subject to the strict licensing conditions that we have put in place. The noble Lord, Lord Hunt, asked me about flags of convenience. Responsible operators may be attracted to launch from the UK, but our vigorous approach to safety should deter less responsible persons.

## Lord McNally

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Before the Minister leaves the point about consultation, there is concern in the industry about the machinery by which the players influence regulations as they become firmer and clearer. They want to be sure that they can continue to influence the development of policy, rather than be

 **Column 1272**  
Click to show

faced with a fait accompli.

## Lord Callanan

Share

I can confirm that we are in extensive consultation with industry players. My honourable friend was visiting Surrey Satellites this morning for discussion on various aspects of the Bill and its commercial operations.

I think it was the noble Lord, Lord Rosser, who asked me about international environmental obligations under the Bill. They are covered by duties of the regulator in Clause 2 and under numerous other clauses, including Clause 8. We would not grant a licence if it were inconsistent with our international obligations. We have reviewed the relevant international, environmental treaties and obligations and the national requirements that may apply to spaceflight activities, and have concluded that we do not need any specific new provisions in the Space Industry Bill, but spaceflight activities and spaceports will, of course, have to fully comply with all existing planning and environmental requirements.

In relation to cyber interference, for conventional aviation we keep transport security under constant review, and we will do the same for spaceflight activities. We already work closely with partners across government and industry on restrictions between horizontal and vertical spaceports. I hope that I have responded to most points put by noble Lords, but if not there will perhaps be an opportunity to explore these issues further.

We have covered lots of vital areas and extremely important issues in this debate. Noble Lords were right to focus on issues of safety, environment and growth of the industry. I am sure that we will return to many of these issues in Committee. Once again, I thank all noble Lords for their general warm welcome for the Bill, notwithstanding some of the concerns expressed. As I said earlier, I look forward to working with noble Lords both in and outside the Chamber to ensure that we strengthen the Bill's provisions as it makes its passage through the House

## Lord Rosser

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Before the noble Lord sits down—I thank him for the responses to the questions raised—if he finds that he has been unable for very good reasons to respond to all the questions raised, and I will not confine this to my questions, can we take it that he will write in response to those questions he has not dealt with?

## Lord Callanan

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Of course. We have a meeting planned for next week anyway, when we can perhaps discuss these issues further. I will be very happy to clarify and give more detail on any of the points we have spoken about. With that, I conclude by asking the House to give the Bill a Second Reading.

Bill read a second time and committed to a Committee of the Whole House.



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